



Land at Fathoms Reach, Hayling Island

Desk Study and Ground Investigation Report

Taylor Wimpey UK Ltd (Southern Counties)

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EXECUTIVE SUMMARY

SITE INFORMATION AND SETTING	
Objectives	The objective of the desk study is to formulate a Preliminary Conceptual Ground Model to identify key geo-environmental and geotechnical risks to the proposed development. The objectives of the ground investigation are to refine and update the preliminary Ground Model, determine geo-environmental and geotechnical site conditions and identify key contamination risks in accordance with the principles of LCRM; to identify geo-environmental mitigation requirements to enable development; and to provide preliminary geotechnical recommendations for design.
Client	Taylor Wimpey UK Ltd (Southern Counties)
Site name and location	Land at Fathoms Reach/ Southleigh Grove. Hayling Island, West Sussex. Postcode: PO11 0RR
Proposed development	The site development proposals are understood to comprise 51 residential units.
GROUND MODEL	
Desk study summary	The site currently comprises open land surrounded by mature trees along the Eastern, Western and Northern boundaries and with brambles across the East and South boundaries. There are five domestic dwellings (61 - 69 Fathoms Reach) located to the West of the site. A public footpath runs along the East and North boundaries of the site. The site is an irregular approximate rectangle in shape and has an area of approximately 1.75 ha. The site comprises relatively flat ground, with topography sloping from the south to approximately 1m lower to the north, at approximately 7m above Ordnance Datum (OD). Review of historical Ordnance Survey mapping indicates: • The site was an open field surrounded by pathways before 1932, when a Holiday Camp, initially located to the south-west of the site, was extended into the site area. • Some recreational facilities including a paddling pool, roller skating area and tennis court were present at the west and south of the site between 1937 and 1968. • The holiday camp located to the south-west of the site was replaced or utilised as a military camp, probably for training purposes, during WWII. • In 1989, the holiday camp was replaced by residential housing, including five houses within the western part of the site. • The density of residential housing and associated infrastructure, within the site's immediate environs has increased from 1932 until that which is present today. • A significant 'Historical Mineral Planning Area' named 'Higworth Farm' is recorded to the north of the site, related to 'surface mineral working' of sand and gravel, from the 1930s until 1967. These workings may have been backfilled with unknown materials. • Other possible sources of contamination and/or contaminative land uses have been identified within the site's immediate environs, such as historical smithies, gas works, farms, garages and electricity substations. A detailed UXO risk assessment determined the UXO risk within the site boundary to be low in post war worked ground, increasing within the un-worked post war ground. Appropriate mitigation measures are recommended in this report. The superficial geology at the site consists of River Terrace Deposits (sand, clay and silt) underlain by London Clay Formation (variable proportions of clay, silt and sand). The superficial deposits comprise a Secondary A aquifer. The site is not within a groundwater protection zone and there is one active licensed groundwater abstraction located at 1.5km West of the site. A drainage ditch was observed along the north and east boundary of the site. There is one active licensed surface water abstraction located at 1.2km East of the site.

	The Environmental report procured for the site indicates that the potential for naturally occurring elevated Contaminants of Potential Concern (CoPC) is low.
Ground and groundwater conditions encountered by investigation	The ground conditions as proven by the investigation undertaken at the site comprise: • Topsoil – to between 0.00m and 0.15m below ground level (bgl), comprising soft (wet), brown, slightly gravelly slightly sandy silty CLAY or slightly gravelly clayey SILT with abundant roots and rootlets. Locally topsoil contained occasional brick and concrete fragments at the Southern side of the site. • Made Ground – encountered within the southern side of the site, between 0.00m and 0.80, bgl, with an average thickness of 0.30m, generally comprising light brown, slightly gravelly slightly sandy clayey SILT with occasional roots and rootlets and occasional/rare brick, concrete and asphalt fragments. • River Terrace Deposits - between 1.45m and 2.85m thick, however, the base of the unit was not proven. This generally consisted of firm to stiff, orangish light brown light grey mottled slightly sandy CLAY with rare inclusions of black fibrous material, and medium dense to dense, orange, slightly gravelly slightly clayey fine SAND. Occasional dense, light grey mottled orange, sandy slightly clayey GRAVEL was encountered at Northern side of the site. • The underlying geology is anticipated to be London Clay Formation. Groundwater was encountered at depths between 2.00m bgl and 2.75m bgl during the investigation. Water levels recorded post-fieldwork ranged from 0.27m bgl to 2.73m bgl (6.30m OD to 4.41m OD).
GEOTECHNICAL CONCLUSIONS	
Conclusions of geotechnical assessment	Obstructions associated with former structures, including foundations, floor slabs and services, should be anticipated. Excavation to proposed founding depth generally should be feasible using standard excavation plant. Heavy duty excavation plant/breaking equipment may be required to excavate obstructions such as from existing construction. Excavations during the investigation were generally stable, although slight spalling should be expected from the Made Ground and within the sands and gravels below the water table. Water seepages into excavations are likely to be adequately controlled by sump pumping. Foundations are recommended to comprise: • Strip/trench fill foundations to between 1.5m bgl to 2.5m bgl as appropriate for clay of medium volume change potential; • Deepened where in influence distance of trees; • Piled foundations or engineer designed foundations where depths due to trees exceed 2.5m depth; • Further investigation would be required for design of piles. Allowable net bearing pressure of 110kN/m² should be available for strip/trench fill foundations to keep settlement within acceptable limits. Suspended floor slabs with a sub-floor void are recommended due to presence of trees and medium volume change potential soils. A design CBR of <5% is recommended for pavement design. Soakaway drainage is considered unsuitable for this site, based on the results of infiltration testing. Buried concrete: Design Sulfate Class - DS-1 and ACEC Class AC-1, Chemical Class DC-1.

GEO-ENVIRONMENTAL CONCLUSIONS

Conclusions of generic contamination risk assessment	Human health: - Asbestos fibres (<0.001% v/v amosite) noted to be present within Made Ground. - No other unacceptable contamination risks to human health identified. Plant growth: - No exceedance of plant acceptance criteria identified. Controlled Waters: - Not considered to be at risk. Ground gases or vapours: - Made Ground is less than 1.0m in thickness, and composed of generally non-putrescible materials. Natural soils contain no credible methane source. CS1 conditions apply. - The site is in a Radon Affected Area (1 to 3% of existing homes affected). - No gas protection required. Construction materials: - Determinand concentrations indicate plastic or bitumastic products are not at risk. Water supply pipes: - Barrier pipe is assumed to be required for potable water supply at brownfield sites such as this. However, the assessment has indicated no significant Contaminants of Concern and as such standard pipework may be suitable for the site subject to approval from the supply company.
Proposed mitigation measures	In the light of the presence of asbestos in the Made Ground, mitigation measures are proposed to remove unacceptable risks which include: - The installation of a 600mm engineered cover system in gardens and 450mm in public open space, comprising a geotextile marker layer, subsoil beneath a topsoil thickness of between 150mm and 300mm; or - Removal of Made Ground from site and replacement with suitable soils. The methodology for the remediation should be presented in a Remediation Strategy, which will need to be submitted to the warranty provider and the regulatory authorities for approval. In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow reuse of suitable material at the site. Verification reports by a competent independent geo-environmental specialist will be required following completion of any remedial works.
Waste management	Excavated soils to be disposed of as waste, are likely to be classed as follows: - The topsoil generally has a high organic content (as indicated by Fraction of Organic Carbon testing) and is likely to be classified as hazardous waste. - The natural uncontaminated subsoils are likely to be classified as 'inert' waste and subject to WAC testing should be able to be disposed of at an inert landfill. - The 'General' Made Ground is likely to be classified as non-hazardous waste. - Any soils containing > 0.1% asbestos or visible asbestos containing materials would be considered as hazardous.

FUTURE CONSIDERATIONS

Further work	Following the ground investigation works undertaken to date, the following further works will be required: - demolition asbestos survey of the five properties in the west of the site, constructed in the 1980s; - care taken to avoid asbestos from demolished buildings entering the soils; - discussion and agreement with utility providers regarding the materials suitable for pipework; - discussions with regulatory bodies and the warranty provider regarding the conclusions of this report;
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- arboricultural tree survey;
- assessment of tree influence on foundations and design of foundations;
- discussions with piling contractors regarding conclusions of this report and design of the piles;
- production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies and the warranty provider);
- production of a Materials Management Plan relating to reuse of soils at the site and import of soils to the site (if appropriate);
- remediation and mitigation works; and
- verification of the remediation and mitigation works.

Other constraints such as ecological precautions may also be required, as recommended in specialist reports by others.

This Executive Summary forms part of Hydrock Consultants Limited report number 16117-HYD-XX-XX-RP-GE-1000 and should not be used as a separate document.

1. INTRODUCTION

1.1 Terms of reference

In August 2020, Hydrock Consultants Limited (Hydrock) was commissioned by Taylor Wimpey Southern Counties (the Client) to undertake a desk study and ground investigation at Fathoms Reach/ Southleigh Grove in Hayling Island, PO11 ORR.

The site currently comprises an area of open land and includes five existing domestic dwellings (61-69 Fathoms Reach) which it is understood are scheduled for demolition and replacement.

Hydrock understands that the proposed development is to comprise the construction of approximately 51 residential units. A proposed development layout (SDA Design Group Drawing 19-1105-SK 01-1st), is presented in Appendix A.

The works for this ground investigation have been undertaken in accordance with Hydrock's proposal referenced (C-16117-E.001 dated 16/06/2020) and the Client's instructions to proceed (email dated 10/08/2020 and PO number HM-10010/00921 dated 10/08/2020).

1.2 Objectives

The works have been commissioned to provide ground related design and construction recommendations for the proposed development. The investigation includes Phase 1 (Desk Study and Site Reconnaissance) and Phase 2 (intrusive investigation).

The objective of the Phase 1 Desk Study is to formulate a Preliminary Conceptual Ground Model of the site to identify key geo-environmental and geotechnical risks to the proposed development.

The objectives of the Phase 2 Ground Investigation are:

- to resolve uncertainties identified in the Phase 1 Desk Study by refining and updating the preliminary Ground Model, determining geo-environmental and geotechnical site conditions and identifying key contamination risks by updating and finalising the Conceptual Model in accordance with the principles of LCRM;
- to identify geo-environmental mitigation requirements to enable development; and
- to provide preliminary geotechnical recommendations for design.

1.3 Scope

The scope of the Phase 1 Desk Study comprises:

- a field reconnaissance (walkover) to determine the nature of the site and its surroundings including current and former land uses, topography and hydrology;
- acquisition and review of:
 - historical Ordnance Survey maps, to identify former potentially contaminative uses shown at the site and immediately surrounding it, and an assessment of the associated contamination risks;
 - a third-party environmental report to identify flooding warning areas, local landfills, pollution incidents, abstractions, environmental permits etc. which may have had the potential to have environmental impact on the site;

- topographical, geological and hydrogeological maps;
- British Geological Survey (BGS) archive records;
- regional UXB risk maps;
- a site-specific specialist UXO Desk Top Study
- development of a preliminary Ground Model representing ground conditions at the site;
- development of an outline Conceptual Model (oCM), including identification of potential pollution linkages;
- a qualitative assessment of any geo-environmental risks identified; and
- identification of plausible geotechnical hazards.

The scope of the Phase 2 Ground Investigation comprises:

- a preliminary ground investigation including trial pitting, windowless sampling and soakaways testing to:
 - obtain data on the ground and groundwater conditions of the site;
 - allow collection of samples for geotechnical and chemical laboratory analysis;
 - allow geotechnical field tests to be undertaken;
 - install groundwater wells;
- groundwater level monitoring;
- groundwater sampling;
- geotechnical and chemical laboratory analysis;
- updating of the preliminary Ground Model;
- preparation of a geotechnical risk register;
- presentation of an initial geotechnical design recommendations;
- formulation of an updated Conceptual Site Model (CM), including identification of plausible pollution linkages;
- completion of a generic quantitative risk assessment of potential chemical contaminants to establish 'suitability for use' under the current planning regime;
- discussion of potential environmental liabilities associated with land contamination (soil, water and gas); and
- identification of outline mitigation requirements to ensure the site is 'suitable for use'.

1.4 Available information

The following have been provided to Hydrock by Taylor Wimpey for use in the preparation of this report:

- Digital Terrain Survey. May 2017. 'Site Survey'. Reference Number DTS270720-5W2A. Drawings 1-3;
- SDA Design Group. 5th October 2021. 'Site Plan, Planning Layout'. Reference 19-1105-005-1ST, and
- Promap. 'Location Plan - Land at Fathoms Reach Hayling Island' (unreferenced).

It is assumed that Taylor Wimpey has commissioned or obtained assignment of the above documents and Hydrock has full reliance on them.

1.5 Regulatory context and guidance

The investigation work has been carried out in general compliance with recognised best practice, including (but not limited to) BS 5930:2015+A1:2020, BS 10175:2011+A2:2017 and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The geo-environmental section of this report is written in broad accordance with BS 10175:2011+A2:2017, 'Land Contamination: Risk Management' (LCRM, 2019) and the AGS (2006) 'Good Practice Guidelines for Site Investigations'.

The methods used follow a risk-based approach, the first stage of which is a Phase 1 desk study and field reconnaissance, with the potential geo-environmental risk assessed qualitatively using the 'source-pathway-receptor contaminant linkage' concept to assess risk as introduced in the Environmental Protection Act 1990 (EPA, 1990). Potential geotechnical risks are also assessed.

Phase 2 comprises intrusive ground investigation work and testing. The factual information from Phase 1 and Phase 2 are used to develop the Conceptual Model (CM). This CM is based on a ground model of the site physical conditions and an exposure model of the possible contaminant linkages. The CM forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines. This GQRA might lead to more Detailed Quantitative Risk Assessment (DQRA).

Professional judgement is then used to evaluate the findings of the risk assessments and to provide recommendations for the development.

The geotechnical section of this report is prepared in general accordance with BS EN 1997-1+A1: 2013, BS EN 1997-2:2007 and BS 8004:2015. This report constitutes a Ground Investigation Report (GIR) as described in Part 2 of Eurocode 7 (BS EN 1997-2) (EC7). However, it is not intended to fulfil the requirements of a Geotechnical Design Report (GDR) as specified in EC7.

Where relevant the NHBC Standards (2021), have also been applied.

The geo-environmental and geotechnical aspects are discussed in separate sections. Throughout the report the term 'geotechnical' is used to describe aspects relating to the physical nature of the site (such as foundation requirements) and the term 'geo-environmental' is used to describe aspects relating to ground-related environmental issues (such as potential contamination). However, it should be appreciated that this is an integrated investigation and these two main aspects are inter-related. Designers should take all aspects of the investigation into account.

Remaining uncertainties and recommendations for further work are listed in Section 9 and Section 10.

Reference to the details of the approach and the methodologies adopted are provided in Appendix J.

2. PHASE 1 STUDY (DESK STUDY AND FIELD RECONNAISSANCE)

2.1 Data

A number of desk study sources have been used to assemble the following information. These are presented in Appendix D and include:

- Third party environmental database search (Groundsure Enviro+Geo Insight report, reference GS-7030272);
- Historical Ordnance Survey mapping;
- BGS Archive Records;
- Zetica UXB Risk Maps;
- Preliminary Unexploded Ordnance Risk Assessment (MACC International Limited Project No. 6690 version 1.0 dated 10/09/2020)
- Detailed Unexploded Ordnance Risk Assessment (MACC International Limited Project No. 6690 version 1.0 dated 26/10/2020)

2.2 Site referencing

The site is referenced in Table 2.1 and the location is indicated in Figure 2.1 and Figure 2.2.

Table 2.1: Site referencing information

Item	Brief Description
Site name	Land at Fathoms Reach Hayling Island.
Site address	Fathoms Reach/ Southleigh Grove, Hayling Island, West Sussex, postcode PO11 0RR.
Site location and grid reference	The site is located to the east of Fathoms Reach Road. The National Grid Reference of the approximate centre of the site is 471665E 099672N.



Figure 2.1: Site location
(Reproduced with permission from Groundsure)



Figure 2.2: Extract from the Ordnance Survey Map.
(OS licence 100023353).

A site location plan (Hydrock Drawing 16117-HYD-XX-XX-DR-GE-1000) is presented in Appendix A.

2.3 Site description and field reconnaissance survey

A field reconnaissance survey was undertaken on 26th August, 2020 to visually assess potential geotechnical hazards, contaminant sources and receptors. The weather during the field reconnaissance survey was sunny and warm.

A description of the site is presented in Table 2.2 and selected photographs are presented in Figure 2.3 to Figure 2.6. Additional photographs are presented in Appendix B.

Table 2.2: Site description

Item	Brief Description
Site access	The site is 175m to the east of A3023 (Manor Road). The site currently has three points of access. Vehicular access is via Southleigh Grove to the south (between concrete bollards-Fig. 2.3), with pedestrian access via Fathoms Reach to the west (Fig. 2.4), and via Manor Road next to Newtown House, also to the west (Fig. 2.5).
Site area	The site is an irregular approximate rectangle in shape and has an area of approximately 1.75 ha.
Elevation, topography and any geomorphic features	The site comprises an area of relatively flat ground, with topography sloping from the south to a slightly lower elevation to the north, typically between 6.37m and 7.73m above Ordnance Datum (m OD).
Present land use	The site currently comprises open land and five domestic dwellings (61-69 Fathoms Reach) located at the West. The site is private land but has been used informally for walking dogs and exercising. There is evidence of drainage ditch along the pathway to the north and along the eastern boundary of the site. There are no overhead services at the site. Nos 61-69 Fathoms Reach are currently occupied and comprise 2 storey residential dwellings with traditional brick construction, generally in good condition. No evidence of cracking, subsidence or deterioration. With the exception of the existing houses, there is no evidence of previous buildings or other development on the other areas of the site.
Vegetation	The site is overgrown with long grass surrounded by mature coniferous trees estimated to be approximately 15m tall along the Eastern, Western and Northern boundaries with occasional dense brambles across the east and southern parts of the site. Sporadic deciduous trees across the site were also encountered.
General site sensitivity	Hayling Island is surrounded by tidal water with Langstone Harbour 900m to the west, Chichester Harbour to the east and the Eastern Solent / English Channel 900m to the south. The site is set within a predominantly residential area with arable farming on intermediate land.
Site boundaries and surrounding land	The site is bound to the east by mature trees in line with a footpath and a drainage channel approximately 1.0m wide, with a field with crops further east. To the north the site is bound by a footpath surrounded by mature trees and a drainage ditch approximately 1.0m wide with an open grassed field beyond. To the west, there is a pathway leading to Manor Road, dense vegetation and mature coniferous trees, and rear gardens of houses to the south west. Evidence of fly-tipping was noted across the west of the site (litter, timber pallets, old tyres). To the south, the site bounds with rear gardens and a tarmac pathway leading to Southleigh Grove roundabout.

A site survey plan (Digital Terrain Survey Reference Number DTS270720-5W2A Drawings 1 to 3) and a site features plan (Hydrock Drawing 16117-HYD-XX-ZZ-DR-GE-1001) are presented in Appendix A.



Figure 2.3: Entrance to the site via Southleigh Grove



Figure 2.4: Small pedestrian entrance via Fathoms Reach.



Figure 2.5: Pedestrian entrance to the site via Manor Road



Figure 2.6: Looking to North boundary of site

2.4 Site history

A study of historical Ordnance Survey maps (Appendix C) has been undertaken to identify former land uses at the site and the surrounding areas which may have geotechnical or geo-environmental implications for the proposed development. The site history is summarised in Table 2.3.

Table 2.3: Site history review

Reference	Key Features on Site	Key Features off Site
OS Map ¹ 1866: 1:10,560 OS Map 1867 - 1908: 1:2,500	The site comprises an open land with sporadic non-coniferous trees on the south-east. Minor roads (possible pathways) surrounding boundaries.	Few developments to the NW (Newtown) and SW (West Town). Smithy at 488m E. Several farms located West/ Southwest of the site named: West Town, Ham, Myrtle, Newtown. Rook Farm located East. Grave Yard at 472m NE at the backyard of St. Mary's Church.
OS Map 1896: 1:10,560	No significant changes within the site boundary.	Smithy works at 200m S and 450m E.
OS Map 1907: 1:10,560		Gasworks at 400m W (Town gas production).
OS Map 1931: 1:10,560		Engine House at 472m W.
OS Map 1931- 1932: 1:10,560		Two records of tanks circa 425m W dating 1931 and 1932. Two records of tanks circa 470m W dating 1931 and 1932.
OS Map 1932: 1:2,500	A structure of undefined type or use in the west side of the site. Main road to the west is called Manor Road.	Residential development increased considerably on the land to the south and west of the site. Holiday camp 100m to the south. Unspecified Tank at 283m SW.
OS Map 1937: 1:2,500	Putting Green Golf Club.	Tennis court to the South. Unspecified Commercial/Industrial property at 400m west.
OS Map 1957: 1:10,560	No significant changes within the site boundary.	Military camp 20m from the south-west boundary.
OS Map 1966- 1968: 1:2,500	A tennis court in the west of the site. Recreation facilities in the south (playground, paddling pool, roller skating rink).	Southleigh Holiday Camp expanded to the north-west of the site. Housing developments increased to the south. Newtown Hotel was built to the north-west. Pond at 169m NE. Unspecified tank at 453m SE. Electricity Substation at 230m W and 398m W. Electricity Substation at 432m E. Electricity Substation at 449m E and 497m SW. Two records of Old garages circa 250m SW. Old garage at 497m E.
OS Map 1987: 1:2,500	No significant changes within site boundary.	Further housing developments to the west of the site. Fathoms Reach Road to the west of the site. Southleigh Grove to the South. Old garage (1966-1968) no longer shown.

¹ Ordnance Survey Historical Map Information provided by Groundsure.

Reference	Key Features on Site	Key Features off Site
		Electricity Substation at 233m W, 383m S and at 463m E. Unspecified Tank at 104m SW.
OS Map 1989-1991: 1:2,500	Southleigh Holiday Camp was replaced by housing developments. Tennis Court and recreation facilities no longer shown – apparently demolished. Fathoms Reach Road was extended to the western boundary of the site. Five dwellings (61-69 Fathoms Reach Road) built in the west of the site.	Electricity Substation at 137m S, 319m SW and 353m SE until 1997. Old garage at 419m W until 1997. Gas Governor at 259m NW until 1997.
OS Map 1990: 1:10,560	No significant changes within site boundary.	Police Station at 214m S. Fire Station at 414m E. Unspecified Works at 419m E. Electricity Substation (1966-1968) no longer shown.
OS Map 1993: 1:2,500		Southleigh Grove Roundabout was built with further residential development adjacent to it.
OS Map 2003: 1:1,250	The asphalt path to the site from Southleigh Grove Roundabout is shown.	No significant changes.
OS Map 2020: 1:10,000	The site comprises open land surrounded by mature trees to the E, N and partially W with 5 dwellings to the W.	

In summary, the site was an open field surrounded by pathways until 1932, when a Holiday Camp, initially located to the south-west, was expanded into the site. Some recreational facilities including paddling pool, roller skate area and tennis court were located in the west and south of the site between 1937 and 1968. However, these structures appear to have been removed by 1989, when the holiday camp was replaced by residential housing, five of which were in the west of the site. At this time, it is possible that asbestos containing materials could have been used in their construction.

Tanks, electricity substations and old garages showed in the OS map 1966-1968 were no longer shown between 1996-1997.

During WWII the holiday camp to the south west of the site was possibly utilised as a military training camp.

The density and extent of residential housing and associated infrastructure in the site's immediate environs has increased from 1932 until today.

Possible sources of contamination and/or contaminative land uses have been identified within the wider area, such as the historical military camp, smithy works, gasworks, old garages, tanks and electricity substations, together with present day farm activities, and considered in subsequent sections of this report.

2.5 Unexploded ordnance (UXO)

A preliminary UXO risk assessment for the site was commissioned by Hydrock from UXO specialists MACC International Ltd. (MACC) in September 2020, reference No. 6690.

The MACC assessment, which is included in Appendix D, indicates that Hayling Island suffered a significant level of enemy bombing during WWII. Multiple bombing decoys were established at Hayling Island, notably to the south-west of the site. Records indicate that the West Town area, approximately 300m to the south west of the site, suffered serious damage as a result of enemy bombing including extensive damage caused by land mines dropped in the area in April 1941. High explosive bomb strikes were also recorded to the east of the site, at Elm Lane, to the south at Hollow Lane and to the north-east near Church Road. Several Anti-Aircraft gun sites were located in the area to defend against air attack, the nearest of which was an Anti-Aircraft Searchlight battery located approximately 450m to the south-east. There was an extensive military presence on Hayling Island during WWII, and various holiday camps were requisitioned for military use and training activities which took place across the island.

This preliminary UXO assessment determined 'low risk' for hand dug excavations and limited mechanical excavations or trenching. However, the risk for drilling or sampling was determined 'medium'. The preliminary assessment recommended a Detailed UXO Desk Top Study to more accurately define the risk level and to complete detailed assessment on the lifetime mitigation requirements for the completed development. As a consequence, a detailed UXO risk assessment for the site was carried out by MACC in October 2020, reference No. 6690. The detailed UXO report is included in Appendix D and a summary of its findings is presented in Table 2.4

Table 2.4: Summary of MACC detailed UXO risk assessment – WWII records

Historical information	Comment	Risk
Manned air raids & unmanned rocket attack reports during WWII	On December 1942, a parachute mine fell approximately 600m to the north-east of the site in a meadow near the junction of Church Road and Manor Road. High Explosible bomb strikes were also recorded to the east of the site at Elm Lane and to the south at Hollow Lane. However, no records were found to confirm or otherwise indicate a bomb strike within the site footprint or immediately adjacent land.	Unlikely
Air-dropped sub-munitions' reports during WWII	No records were found to indicate such strikes within the site footprint.	Unlikely
Anti-aircraft ammunition (AAA) reports during WWII	An Anti-Aircraft Searchlight Battery was located approximately 450m to the south-east of the site.	Credible
Abandoned bomb reports WWII	No records were found to confirm or otherwise indicate that an unexploded bomb was abandoned within the site footprint.	Unlikely
Migration of UXO	It is considered possible; albeit unlikely, that a bomb was imported onto the site from other bomb sites. Additionally, where land ground levels have been increased or in-filled using Marine Dredged Aggregates there is a high potential for the aggregate to contain items of UXO.	Potential
Bombing decoys during WWII	Two bombing decoys were located approximately 1.6km to the north-west of the site and approximately 2.2km to the south-west at Sinah Common. However, no bombing decoys were recorded within the immediate vicinity of the site.	Unlikely
Military use during WWII	Various holiday camps were requisitioned for military use and training activities took place across Hayling Island. However, no	Unlikely

Historical information	Comment	Risk
	formal records or anecdotal accounts were found to indicate military use of the site footprint itself.	
Downed / crashed military aircraft during WWII	No records were found to indicate that an armed aircraft crashed within the site footprint.	Unlikely

The detailed UXO risk assessment has determined the UXO risk within the site boundary is considered to be low in post war worked ground increasing within the un-worked post war ground for some processes. The assessment recommends UXO mitigation to permit the work to proceed in the safest “acceptable” manner in compliance with current legislation and best practices. This includes the following mitigation measures:

- Risk Communication & Safety Planning: Stakeholders should be made aware of the UXO risk levels within the project boundary and the possible impact an encounter may have on the project and third parties. Consequently, a UXO Safety Plan should be drawn up and included within the overall project safety planning.
- Safety Training: In keeping with CDM Regulations concerning all sub-surface hazards, UXO Safety Induction Training should be provided to everyone working or visiting the site. The training should be commensurate with the individual’s responsibilities and duties on site. The training should be provided by a competent individual (preferably a trained EOD Engineer) and delivered as a separate module of the Site Safety Induction Course or as a Toolbox Talk.

2.6 Geology

The geology of the site area is shown on the 1:10,000 British Geological Survey (BGS) map extract reproduced as part of the Groundsure report and is summarised in Table 2.5.

Extracts from the geological maps are shown in Figure 2.7 and Figure 2.8.

Table 2.5: Geology

Ref. for Figures	Location	Stratigraphic Name	Description
Superficial Deposits (Figure 2.7)			
1	On site.	River Terrace Deposits (undifferentiated)	Sand, Silt and Clay.
Solid Geology (Figure 2.8)			
1	On site.	London Clay Formation	Clay, silt and sand



Figure 2.7: Superficial deposits.
(Reproduced with permission from Groundsure)



Figure 2.8: Solid geology.
(Reproduced with permission from Groundsure)

A number of borehole logs from the BGS archive have been reviewed. Selected records are summarised below:

- SZ79NW13, located 83m N of the site (NGR 471690E, 99860N), drilled to a depth of 4.26m and recorded:
 - Firm, brown, sandy CLAY between ground level and 1.86m below ground level (bgl) (probable Brickearth);
 - Grey/ brown, sandy clayey GRAVEL between 1.86m and 2.44m bgl (probable Raised Beach);
 - Grey, silty CLAY between 2.44m and 3.35m bgl (probable London Clay Formation);
 - Brown, compact SAND between 3.35m and 3.81m bgl; and
 - Grey, sandy CLAY with flints between 3.81m and 4.26m bgl.
 - Groundwater is recorded at 2.1m bgl.
- SZ79NW96, located 124m SE of the site (NGR 471720E, 99470N), drilled to a depth of 3.35m and recorded:
 - Topsoil between ground level and 0.60m bgl;
 - Stiff, brown mottled sandy CLAY between 0.60m and 1.83m bgl (probable Brickearth);
 - Firm, brown/ grey sandy CLAY with some small flints between 1.83m and 2.44m bgl (probable Raised Beach); and
 - Fine, brown SAND with some small and medium flints between 2.44m and 3.35m bgl.
 - Groundwater is recorded at 1.7m bgl (4.96m OD).
- SZ79NW12, located 179m NW of the site (NGR 471420E, 99750N), drilled to a depth of 3.65m and recorded:
 - Topsoil between ground level and 0.46m bgl;
 - Light brown, sandy CLAY with small flints between 0.46m and 1.06m bgl (probable Brickearth);
 - Brown sandy GRAVEL between 1.06m and 2.90m bgl (probable Raised Beach);
 - Brown, sandy CLAY between 2.90m and 3.35m bgl (probable London Clay Formation); and

- Grey, silty CLAY between 3.35m and 3.65m bgl.
- SZ79NW11, located circa 360m NW of the site (NGR 471330E, 99780N), drilled to a depth of 9.91m and recorded:
 - Topsoil between ground level and 0.25m bgl;
 - Firm, brown CLAY between 0.25m and 1.00m bgl (probable Brickearth);
 - Coarse sandy GRAVEL between 1.00m and 2.40m bgl (probable Raised Beach);
 - Firm, brown silty CLAY between 2.40m and 2.70m bgl (probable London Clay Formation); and
 - Firm, grey clayey SILT between 2.70m to 9.91 m bgl with a layer of mudstone between 7.80m and 8.30m bgl (probably London Clay Formation)

These boreholes indicate that the depth to the top of the London Clay under the River Terrace Deposits in the vicinity of the site is approximately 3m. However, due to the type of depositional environment, the depth is likely to vary considerably.

2.7 Hydrogeology

2.7.1 Groundwater

2.7.2 Aquifer designations

Based on the inferred geological sequence presented in Section 2.5 and the Environment Agency's interactive aquifer designation map, the aquifer system presented in Table 2.6 applies. Additional information on the hydraulic characteristics of the geological units has been abstracted from Allen et al (1997) and Jones et al (2000).

Table 2.6: Aquifer system

Stratum	Aquifer Designation	Hydraulic Characteristics
Superficial Deposits		
River Terrace Deposits (undifferentiated)	Secondary A	Intergranular permeability. Dominated by low to high permeability layers of sand and occasional gravel, interbedded with low permeability clay.
Solid Geology		
London Clay Formation	Unproductive	Very low to moderate permeability layers of clay with interbedded sand. According to Jones et.al, "Due to its clayey nature, the majority of London Clay Formation is of little significance as an aquifer".

2.7.3 Groundwater abstraction

There is one active licensed groundwater abstraction within 2000m of the site. This is located at 1536m W of the site and its purpose of abstraction is spray irrigation for Hayling Island Golf Club.

2.7.4 Groundwater source protection zones and groundwater vulnerability

The site is not within a groundwater Source Protection Zone (SPZ).

2.7.5 Groundwater levels, recharge, and flow

In view of the geology of the site, its low elevation (approximately 7m OD), and its proximity to the coast, groundwater is expected to be at relatively shallow depth.

From BGS historical borehole records in the vicinity of the site indicate groundwater levels are between 1.7m and 3.0m bgl, within River Terrace Deposits, although these are likely to vary. The hydraulic gradient is likely to be towards the north and east, following the site's topography. The groundwater is likely to be in hydraulic continuity with the sea and local estuaries.

2.7.6 Groundwater quality

According to the Water Framework Directive, there are no records of groundwater bodies within the East Hampshire Rivers Operational Catchment.

In view of the proximity of the site to the coast, it is possible that the groundwater is brackish or saline.

2.7.7 Groundwater flooding

The Groundsure report indicates the site is within a moderate to high risk of groundwater flooding.

2.8 Hydrology

2.8.1 Surface water system and drainage

During the walkover, a drainage ditch was observed along the north and east boundary of the site.

There are 9 water network records (OS Master Map), which includes 7 surface water features, recorded within 250m of the site as summarised in Table 2.7Table 2.6

Table 2.7: Surface water features

Feature	Location Relative to Site
Inland river not influenced by normal tidal action.	On site.
Inland river not influenced by normal tidal action.	5 entries recorded off site, the nearest being 3m north of the site.
Pond	169m east of the site.

2.8.2 Surface water abstractions and discharges

There is one active licensed surface water abstraction within 2,000m of the site, located at 1,281m east of the site, for agricultural use (spray Irrigation – storage). There are no potable water abstractions recorded within 2,000m of the site.

There is no one active licensed surface water discharge within 1,000m of the site. However, there is a record of an effluent discharge located 349m NW of the site since 1995, which was revoked in 1997.

2.8.3 Surface water quality

Reference to the Environment Agency website shows the site is located within the operational catchment of the East Hampshire Rivers. However, it is not part of a specific river water body as it is classified as a coastal water body. There are no records of ecological or chemical classification for this specific water body.

2.8.4 Surface water flooding

The desk study information indicates the proposed development is in a medium flood risk area (a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%)). According to the government website the site is within a low risk surface water flooding and very low risk for river and sea flooding.

No further consideration of flood risk is undertaken in this report. Specialist flood risk advice should be sought with regard to drainage and flooding.

2.9 Mining and mineral extraction

There are no records for mining or mineral related extraction on site. However, a significant 'Historical Mineral Planning Area' named 'Higworth Farm' is recorded immediately North of the site. This relates to what is understood to have been a proposed 'surface mineral working' of sand and gravel. It is noted that records of planning status indicate this was refused in 1967.

There are historical records for two surface ground workings within 250m of the site during the period 1931 to 1938. These are located at 94m W and 221 SE of the site respectively, both of which are referred in the Groundsure Report to as 'ponds', probably related to small-scale extraction of sand and gravel.

2.10 Natural ground instability

Cohesive material within River Terrace Deposits may be affected by potential for shrink-swell ground movements in clays as a result of changes in moisture content from seasonal changes and removal or growth of trees. The underlying London Clay Formation may also be affected by shrink-swell ground movements in clays.

Mature trees are present around the North, East and West boundaries and sporadically across the site.

2.11 Waste management

There are two waste management sites recorded within 500m of the site, as listed in Table 2.8.

Table 2.8: Waste management sites within 500m

Site Name and Location	Details
Hayling Island Holiday Park, 353m and 354m to the North	Waste exemption for the site to burn waste in the open (not on a farm).
116 Elm Grove Hayling Island, 486m to the East	Waste exemption for storing non-agricultural waste in a secure place.

2.12 Regulatory Information

Information in the Groundsure Report (Appendix D), relating to various regulatory controls has been reviewed, with a summary presented below in Table 2.9.

Table 2.9: Regulatory information within 500m of the site

Regulatory Data	Distance from Site	Details	Potential Risk	Comment
Local Authority Pollution Prevention and Controls	472m E	Dry cleaner pollutant release licensed.	No	Due to the distance to the site.
Pollution Incidents	358m E	January 2002, atmospheric pollutant (smoke), air impact category 3 – minor incident	No	Due to the distance to the site and classification as minor incident.
Trade Directory Entries	145m S 231m W	Electricity Sub Station	No	Due to the distance from the site.
	167m W 180m W	Sewage Pumping Station	No	Due to the distance from the site.
	168m W	Lift servicing and repairing.	No	Due to the nature of the service provided.
	226m SW	Marine equipment retailer	No	Due to the nature of the service provided.
Fuel Station Entries	261m SW	Obsolete Petrol station	Yes	Due to the distance to the site and the hydraulic gradient.
Control of major accident hazards sites (COMAH)	N/A	No entries on COMAH were recorded within 500m of the site.	No	-
Registered radioactive substances	N/A	No entries on registered radioactive substances were recorded within 500m of the site.	No	-
Notification of installations handling hazardous substances	N/A	No entries on notification of installations handling hazardous substances were recorded within 500m of the site.	No	-

2.13 Consultations

The Havant Borough Council Environmental Health team was contacted on the 7th September 2020 regarding information related to possible land contamination records within or affecting the site. The full response, received on 9th October 2020, is attached within Appendix D. The council's response is summarised as follows:

A manual research of the Council's historical OS map records indicates some potential sources of contamination (generally matching records detailed above), which could include the possible presence of tanks, storage and handling of potentially contaminating liquid products, these are presented below:

- 1867: Farm activities and Smithy works in the vicinity of the site, over 200m to the west, southwest and east.
- 1932: Holiday Park and nursery Gardens.
- 1969: Retail sales of fuel and garage services to the southwest of the site, Police station, telephone exchange, postal sorting and distribution office and holiday camp.
- Regarding historical landfills, the Council states that there is one landfill feature within the area, related to a suspected infilled drainage pond located at Newtown House Hotel circa 100m to the north west of the site, which comprises an area of 200m². However, it is expected to be of negligible significance other than in the immediate vicinity.

2.14 Natural soil chemistry

Information contained within the environmental data report (Appendix D) gives indicative natural concentration values (estimated) for the natural soils at the site for a selection of Contaminants of Potential Concern (CoPC). These have been reproduced in Table 2.10.

Table 2.10: Natural soil chemistry

Element	Arsenic	Cadmium	Chromium	Lead	Nickel
Concentration (mg/kg)	15	1.8	60 - 90	100	15 - 30

The data in Table 2.10 is taken into account within the geo-environmental assessment. Based on the concentrations presented, the potential for naturally occurring elevated CoPC is considered low.

2.15 Radon

The radon risk is reported in the Groundsure report. This indicates that the site is in a Radon Affected Area where recorded radon levels in 1-3% of homes are above the action level but no radon protection measures are required for new buildings at this location in line with current guidance. However, consideration should be given to fitting basic protection measures on the 'as low as reasonably practicable' principle in view of advice given to householders and the legal responsibilities of rental landlords and employers with commercial properties (see reference in Appendix J for further details).

3. OUTLINE CONCEPTUAL MODEL

3.1 Introduction

The outline Conceptual Model (oCM) incorporates evidence from the site walkover, the Desk Study and previous investigations carried out at the site. The formulation of an outline Conceptual Model is a key component of the LCRM methodology. The oCM incorporates a ground model of the site physical conditions and an exposure model of the possible contaminant linkages; it forms the basis for Generic Quantitative Risk Assessment (GQRA) in accordance with current guidelines.

3.2 Ground model

The preliminary ground model presented in Section 2 provides an understanding of the ground conditions and is the basis for preparing the preliminary geotechnical hazard assessment (Section 3.3) and the preliminary geo-environmental exposure model (Section 3.4).

3.3 Geotechnical hazard identification

3.3.1 Context

The preliminary geotechnical hazard identification has been undertaken in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622.

The following section sets out the identified geotechnical hazards and the development elements potentially affected (see Table J.1 in Appendix H for further information).

3.3.2 *Plausible geotechnical hazards*

Plausible geotechnical hazards identified at the site are:

- Uncontrolled Made Ground (variable strength and compressibility).
- Soft / loose compressible ground (low strength and high settlement potential).
- Shrink swell of the clay fraction of soils under the influence of vegetation.
- Variable lateral and vertical changes in ground conditions.
- Attack of buried concrete by aggressive ground conditions.
- Running sands and loose Made Ground, leading to difficulty with excavation and collapse of side walls.
- Shallow groundwater.
- Changing groundwater conditions.
- Risk from flooding.

3.3.3 *Potential development elements affected*

Development elements affected by potential geotechnical Hazards are:

- Buildings – foundations.
- Buildings – floor Slabs

- Roads and pavements.
- Services.
- General slopes.
- Gardens.
- Construction staff, vehicles and plant operators.
- Concrete below ground.
- Earthworks control, inability to place and compact fill.
- Insufficient fill to complete earthworks.

Health and safety risks to site Contractors and maintenance workers have not been assessed during these works and will need to be considered separately during design.

The above plausible geotechnical hazards and development elements affected have been carried forward for investigation and assessment. The investigation is presented in Section 5 and the assessment is presented in Section 6.

3.4 Geo-environmental exposure model

3.4.1 Context

The preliminary exposure model is used to identify geo-environmental hazards and to establish potential pollution linkages, based on the source-pathway-receptor (SPR) approach.

A viable pollution linkage requires all the components of an SPR to be present. If only one or two are present, there is no linkage and no further assessment is required.

3.4.2 Potential contaminants

For the purpose of this assessment the potential contaminants have been separated according to whether they are likely to have originated from on-site or off-site sources.

Potential on-site sources of contamination

- S 1. Made Ground, associated with historical construction activities and imported fill, possibly including elevated concentrations of metals, metalloids, asbestos fibres, Asbestos Containing Materials (ACM), PAH and petroleum hydrocarbons.
- S 2. Made Ground, potentially containing asbestos fibres and Asbestos Containing Materials from demolition of former structures.
- S 3. Ground gases (carbon dioxide and methane) from organic materials in the Made Ground.

Potential off-site sources of contamination

- S 4. Residual organic contaminants in shallow soils from pesticides and herbicides used during cultivation of crops in the field located at the east of the site and other farm activities in the surrounding areas.

- S 5. Residual heavy metal and other contaminants from high explosive bombs from WWII at the south west and east of the site, including: Lead, Zinc, Brass, Copper, Steel, Mercury, Silver and Aluminium. Other chemical Compounds including; Trinitrophenol, Trinitrotolulene, Trimethylene Trinitramine, Ammonium, Sodium Nitrate, Nitro-glycerine and White Phosphorus.
- S 6. Residual concentrations of PHC and other contaminants from gas works located 400m W of the site and former fuel station located at 261m SW of the site.
- S 7. Residual heavy metals and other contaminants from smithy works over 200m to the west, southwest and east of the site.

3.4.3 *Potential pathways*

The following potential pathways have been identified.

- P 1. Humans: ingestion, skin contact, inhalation of dust and outdoor air.
- P 2. Buildings: direct contact with substances deleterious to building materials.
- P 3. Buildings: methane ingress via permeable soils and/or construction gaps.
- P 4. Plant life: root uptake.
- P 5. Surface water: overland flow.
- P 6. Surface water: drainage discharge.
- P 7. Surface water: base flow from groundwater
- P 8. Underlying groundwater: migration of contaminant via leachate dispersion through the unsaturated zone in the River Terrace Deposits.

3.4.4 *Potential receptors*

The following potential receptors in relation to the proposed land use have been identified.

- R 1. Humans (neighbours, site end users).
- R 2. Development end use (buildings, utilities and landscaping).
- R 3. Groundwater: Secondary A aquifer status of the River Terrace Deposits.
- R 4. Surface water: on-site drainage ditch at the north and east of the site.
- R 5. Solent Estuarine system.
- R 6. Ecology: the identified surface water features are likely to be ecological habitats.
- R 7. Plant life: areas of proposed soft-scaping within the development

Health and safety risks to site development contractors and maintenance workers have not been assessed as part of this study and will need to be considered separately.

The above sources, pathways and receptors have been considered as part of the Preliminary Risk Assessment in accordance with LCRM (2019), are considered to be plausible in the context of this site and have been carried forward for investigation and assessment. The investigation is presented in Section 5 and the assessment is presented in Section 7. An assessment of the Source – Pathway – Receptor linkages is undertaken following the assessment (Section 7) and is presented in Appendix I (Table K.1).

4. GROUND INVESTIGATIONS

4.1 Investigation rationale

The ground investigation rationale was based on the findings of the preliminary risk assessment and is summarised in Table 4.1.

For the investigation rationale of the historical investigations, please refer to the historical reports in Appendix D.

Table 4.1: Investigation rationale

Location	Purpose
SA 01-03	To assess shallow ground conditions. To allow collection of samples for contamination testing. To conduct Infiltration testing for soakaway assessment. Targeted for potential soakaway location areas, depending on access to location.
TP 01-04	To assess shallow ground conditions. To allow collection of samples for geotechnical characterisation. To allow collection of samples for contamination testing. Non-Targeted, depending on access to locations.
WS 01-05	To assess shallow ground conditions. To assess deeper ground conditions and to allow SPTs to be undertaken To allow collection of samples for geotechnical characterisation. To allow collection of samples for contamination testing. Installation of groundwater monitoring and sampling wells. Non-Targeted, depending on access to locations.
DP 01-12	To investigate strength profile of shallow deposits for pavement design. Non-Targeted, depending on access to locations.

4.2 Constraints

Gravel was used in SA02 and SA03 to support the holes while infiltration testing was being undertaken. As the infiltration rate was very slow in all three infiltration test locations, only one infiltration test could be carried out in the time available at each location.

~~Due to the presence of dense brambles and mature trees across the site, all locations were selected to wherever was accessible.~~

The locations were also limited because JCB movements were restricted to the tracks to minimise ecological disturbance.

WS01 was terminated and relocated three times due to obstruction at 1.70m. Locations WS02, WS03 and WS04 were terminated at 3.00m bgl due to refusal. Location WS05 was terminated at 2.50m bgl due to refusal.

4.3 Site works

The fieldworks took place between Monday 27/10/2020 and Tuesday 28/10/2020 and are summarised in Table 4.2. The ground investigation locations were surveyed and recorded using a Total Station GPS

survey instrument and are shown on the Exploratory Hole Location Plan (Hydrock Drawing 16117-HYD-XX-XX-DR-GE-1002) in Appendix A.

The exploratory hole logs, including details of ground conditions, soil sampling, *in situ* testing and any installations, are presented in Appendix E.

The weather conditions during the fieldworks and for the previous week were rainy and wet.

Table 4.2: Summary of site works

Activity	Method	No.	Depth Maximum (m bgl)	<i>In situ</i> tests	Notes (e.g. installations)
<i>Drilling, Pitting and Probing</i>					
Boreholes (WS01-05)	Windowless sampler	5	3.00	SPT	42mm HDPE wells with gas taps in 5 holes
Trial pits (TP01-03-04)	Machine (JCB 3X)	4	2.00	Hand shear vane (HSV)	
Trial pit (TP02)	Hand-excavated	1	0.70	Hand shear vane (HSV)	
Probes (DCP01-12)	TRL dynamic cone penetrometer	12	1.00	California Bearing Ratio (CBR)	
<i>Other in situ testing or monitoring</i>					
Infiltration	BRE 365			3	SA01-02-03
Hydrogeological					1 GW monitoring visit

Wells for monitoring groundwater levels were installed in all of the windowless sampler boreholes. A summary of the monitoring well installations is presented in Table 4.3.

Table 4.3: Summary of monitoring installations

Location	Ground level (m OD)	Standpipe diameter (mm)	Screen top and base depth (m bgl)	Screen top and base elevation (m OD)	Strata targeted
WS01B	7.80	42	0.70 to 1.70	6.10 to 7.10	River Terrace Deposits
WS02	7.14	42	1.00 to 3.00	4.14 to 6.14	
WS03	7.00	42	1.00 to 3.00	4.00 to 6.00	
WS04	6.30	42	1.00 to 3.00	3.30 to 5.30	
WS05	6.57	42	0.50 to 2.50	4.57 to 6.07	

4.4 Geo-environmental testing

4.4.1 Sampling strategy and protocols

Exploratory hole positions were determined by reference to the site conditions and uncertainties identified in the Initial Conceptual Model.

No specific features were identified during the desk study as requiring targeted investigation and a reasonably even spacing was used. No specific sampling statistics or grid were utilised in this instance.

Samples were taken, stored and transported in general accordance with BS 10175:2011+A2:2017.

4.4.2 Geo-environmental monitoring

Groundwater level monitoring boreholes have been monitored on one occasion. The results are presented in Appendix E.

Ground gas concentrations was considered insignificant as the potential sources were located between 200m and 400m away from the site; therefore, ground was monitoring was not included in the investigation. Furthermore, Made Ground at the site is not considered to be of significant thickness and both Made Ground and Natural Deposits are considered to have low potential for gas generation.

4.4.3 Geo-environmental laboratory analyses

The chemical test certificates for testing undertaken by a specialist laboratory on behalf of Hydrock are provided in Appendix G. Wherever possible, UKAS and MCERTS accredited procedures have been used.

The geo-environmental analyses undertaken on soils are summarised in Table 4.4.

Table 4.4: Geo-environmental analyses of soils

Determinand Suite	Topsoil	Made Ground
Hydrock minimum suite of determinands for solids*	4	4
Speciated aliphatic and aromatic banding Total petroleum hydrocarbons by HS-GC/MS and GC/FID (Hydrock Tier 2 TPH Suite)	2	2
Pesticide screen	2	0
*Hydrock minimum soil suite comprises: As, B (water soluble), Be, Cd, Cr (total), Cr (VI), Cu, Hg, Ni, Pb, S (elemental), Se, V, Zn, cyanide (total), sulfide, pH, asbestos fibres, speciated polynuclear aromatic hydrocarbons (PAH, by GC-FID), total phenols and fraction of organic carbon		

The soils chemical test data are interpreted and assessed in Sections 7.3 and 7.4.

4.5 Geotechnical testing

The geotechnical tests undertaken by a specialist laboratory on behalf of Hydrock are summarised in

Table 4.5 and the test certificates are provided in Appendix F. Wherever possible, UKAS accredited procedures have been used.

Table 4.5: Summary of sample numbers for geotechnical tests

Test	Made Ground	River Terrace Deposits
Natural moisture content	-	9
Atterberg limits	-	9
Particle size distribution (wet sieve)	-	1
Sulfate and aggressive chemical environment classification for buried concrete classification (full BRE SD1 suite)	1	4

The geotechnical test data are presented in Appendix F, is summarised in Section 5.4 and interpreted in Section 6.

5. GROUND INVESTIGATION RECORDS AND DATA

5.1 Physical ground conditions

5.1.1 Summary of strata encountered

The following presents a summary of the ground and groundwater conditions encountered, and their geotechnical properties based on field observations, interpretation of the field data and laboratory test results, taking into account drilling, excavation and sampling methods, transport, handling and specimen preparation.

All relevant data from the Hydrock investigation discussed in Section 4 are used from this point forward.

Details of the Hydrock ground investigation works are provided in the logs in Appendix E, previous data are provided in Appendix D, a summary of the ground model is presented in Table 5.1 and the individual strata are described in the sections below.

Table 5.1: Strata encountered

Stratum	Depth to top (m bgl)	Depth to base (m bgl)	Thickness (m) (range)	Thickness (m) (average)
Topsoil / Made Ground	0.00	0.15	0.15	0.15
Topsoil	0.00	0.15	0.15	0.15
Made Ground	0.15	0.30 - 0.80	0.30 – 0.65	0.23
River Terrace Deposits	0.15 – 0.45	1.90-3.00*	1.45 – 2.85*	2.13*

*base not encountered

The London Clay is expected to underlie the River Terrace Deposits but was not proven in any of the boreholes at the depths penetrated due to refusal in all WS locations between 1.70 and 3.00m bgl.

5.1.2 Surface covering

The following surface cover was identified during the field reconnaissance and the fieldworks:

- Pavement hardstanding at the south of the site (Southleigh Grove), covering approximately 5% of the site and noted to be in good condition.
- Grass with sporadic mature trees, covering approximately 50% of the site.
- Brambles, covering approximately 45% of the site.

5.1.3 Pavement

No boreholes were excavated in the pavement hardstanding area.

5.1.4 Topsoil

Topsoil was encountered across the north and centre of the site in all remaining locations. Topsoil was generally 0.15m thick and comprised soft (wet), brown, slightly gravelly slightly sandy silty clay or slightly gravelly clayey silt with abundant roots and rootlets. Gravel is subrounded to subangular fine to medium of flint.

For the purposes of this report, topsoil is defined as the upper layer of an *in situ* soil profile, usually darker in colour and more fertile than the layer below (subsoil), which is a product of natural chemical,

physical, biological and environmental processes, but does not imply compliance with BS 3882:2015. Reuse of topsoil as a growing medium at the site should be determined by the landscape architect or the landscape Contractors.

5.1.5 Topsoil / Made Ground

Below the surface covering, Topsoil with occasional Made Ground was encountered across the southern area of the site at locations WS01, WS01A, WS01B, WS02, SA01, TP01. In general, the Topsoil / Made Ground comprises soft, brown, slightly gravelly slightly sandy clayey silt with abundant twigs, roots and rootlets. Gravel is subrounded to subangular, fine to medium of flint and rare/ occasional brick, concrete and asphalt fragments.

5.1.6 Made Ground

Made Ground was encountered underneath topsoil across the southern area of the site at locations WS01, WS01A, WS01B, WS02, SA01, TP01 with an average thickness of 0.30m. The maximum depth of Made Ground was 0.80m bgl at location WS01B, and generally comprising light brown, slightly gravelly slightly sandy clayey silt with occasional roots and rootlets. Gravel is subrounded to subangular, fine to coarse of flint and occasional/rare brick, concrete and asphalt fragments. Made ground was expected to be found across this area due to previous structures noted in 1968 OS map.

5.1.7 River Terrace Deposits

River Terrace Deposits were encountered underlying the Made Ground and Topsoil across the site between 1.45m and 2.85m thick, with an average thickness of 2.13m. This generally consisted of firm to stiff, orangish light brown and light grey mottled slightly sandy clay with inclusions of black fibrous organic material. Medium dense to dense, orange, slightly gravelly slightly clayey fine sand was encountered from 2.20m – 2.30m bgl at locations WS02, WS04 and WS05.

In addition, a small proportion of dense, light grey mottled orange, sandy slightly clayey gravel with rare flint cobbles was encountered at 1.80m bgl at location WS03 and at 2.90m bgl at location WS04.

5.2 Obstructions

Obstructions were encountered in one borehole during the investigation. These intrusive locations are summarised in Table 5.2.

Table 5.2: Obstructions encountered

Stratum	Location	Depth (m bgl)	Description
Made Ground	WS01	0.30	Concrete surface
Made Ground	WS01A	0.30	Concrete surface

5.3 Groundwater

5.3.1 Groundwater observations and levels

Groundwater encountered during the investigation is listed in Table 5.3. A groundwater observation represents the depth at which groundwater was first observed and is likely to be deeper than the actual water table level at that location.

Table 5.3: Groundwater occurrence

Stratum	Date	Location	Groundwater observation (m bgl)	Comment
River Terrace Deposits	28/10/20	WS03	2.75	Slow groundwater seepage
		WS05	2.00	Slow groundwater seepage

Groundwater levels recorded during post-fieldwork monitoring in the standpipes installed are summarised in Table 5.4.

Table 5.4: Groundwater level data summary

Stratum	Date range	Location	Post-fieldwork monitoring	
			Depth to groundwater (m bgl)	Groundwater elevation (m OD)
River Terrace Deposits	16/11/20	WS02	2.73	4.41
		WS03	2.39	4.62
		WS04	1.93	4.37
		WS05	0.27	6.30

5.3.2 Infiltration tests

The results of the infiltration testing undertaken are summarised in Table 5.5. The results sheets are presented in Appendix E.

The infiltration testing was carried out in accordance with Hydrock's 1-day assessment methodology (see reference in Appendix J). This is in general accordance with BRE Digest 365 (BRE DG 2016) where infiltration rates allow three test runs during a working day (or where there is no infiltration), but where low infiltration rates were encountered the available time may not have been sufficient to fully comply with the BRE test method (i.e. three runs of the test).

Table 5.5: Infiltration test results

Stratum	Location	Depth to base of pit (m bgl)	Infiltration rate (m/s)			
			Run 1	Run 2	Run 3	Notes
River Terrace Deposits	SA01	2.0	Rate not determined	_**	_**	Due to slow infiltration, measured over the course of two days, a meaningful rate of infiltration could not be determined.
	SA02	1.9	Rate not determined	_**	_**	
	SA03	2.20	Rate not determined	_**	_**	

**Where less than three tests were possible in a particular location the results provided should be considered indicative only and should not be used for design purposes. If infiltration is critical to the development of the site, multi-day infiltration testing should be undertaken.

5.3.3 Groundwater summary

In general, groundwater was encountered within the River Terrace Deposits towards the base of the stratum, except for the south-east corner of the site where groundwater was not encountered, specifically at location WS01B, where Made Ground was found. The monitoring indicates that the groundwater level is above the base of the River Terrace Deposits, and the hydraulic gradient is consistent with flow from south to north across the site, appearing to be topographically controlled.

Negligible infiltration was recorded in the River Terrace Deposits. This stratum is dominated by cohesive soils, and as a consequence it is not expected to provide suitable infiltration potential for soakaways at the site.

5.4 Geotechnical data

5.4.1 Introduction

Laboratory test results are contained in Appendix F with *in situ* test results shown on the relevant exploratory hole log or datasheet in Appendix E. The following sections summarise the main findings and provide interpretation where appropriate.

5.4.2 Plasticity

The volume change potentials in terms of NHBC Standards (Chapter 4.2) with respect to building near trees have been determined from the results of plasticity index tests on samples of soil. These are summarised in Table 5.6. The results indicate that the River Terrace Deposits should be considered as of 'Medium' volume change potential.

Table 5.6: Volume change potential

Stratum	No. of tests	Plasticity Index			Modified Plasticity Index			Plasticity designation	Volume Change Potential
		Min.	Max.	Av.	Min.	Max.	Av.		
River Terrace Deposits	9	15	28	21	11	27	20	Low to Medium	Low to Medium

5.4.3 Particle size distribution

Particle Size Distribution test (PSDs) results are summarised in Table 5.7 and summary descriptions and PSD plots of the material analysed are presented in Appendix F.

Table 5.7: PSD results summary

Stratum	No. of tests	Silt/Clay %	Sand %	Gravel %	General description
River Terrace Deposits	1	58	39	3	Slightly gravelly very sandy CLAY.

5.4.4 Soil strength

Table 5.8 summarises information pertaining to the shear strength of the soils according to geological stratum. Factual results are summarised for laboratory tests, field tests (e.g. hand shear vane) and uncorrected Standard Penetration Tests (SPT). Where the SPT is used to infer shear strength by published correlation, this is also tabulated. A SPT N300 value versus depth summary plot is presented in Figure 5.1 and a plot of inferred shear strength versus depth is presented in Figure 5.2.

Table 5.8: Soil strength results and derived values

Stratum	No. of tests	SPT (N-value) (range)	c _u (kPa)	Method
River Terrace	9	9 - 48	50 - 260*	SPT – windowless sampler boreholes.
	13	-	49 - 86	Hand shear vane (0.8m bgl to 1.9m bgl)
*An f1 value of 5.5 has been used based on a typical modified plasticity index of 21. (Tomlinson (2001), after Stroud)). SPT N values of 50 were removed due to flint cobble interferences.				

Figure 5.1: SPT 'N300' value versus depth summary

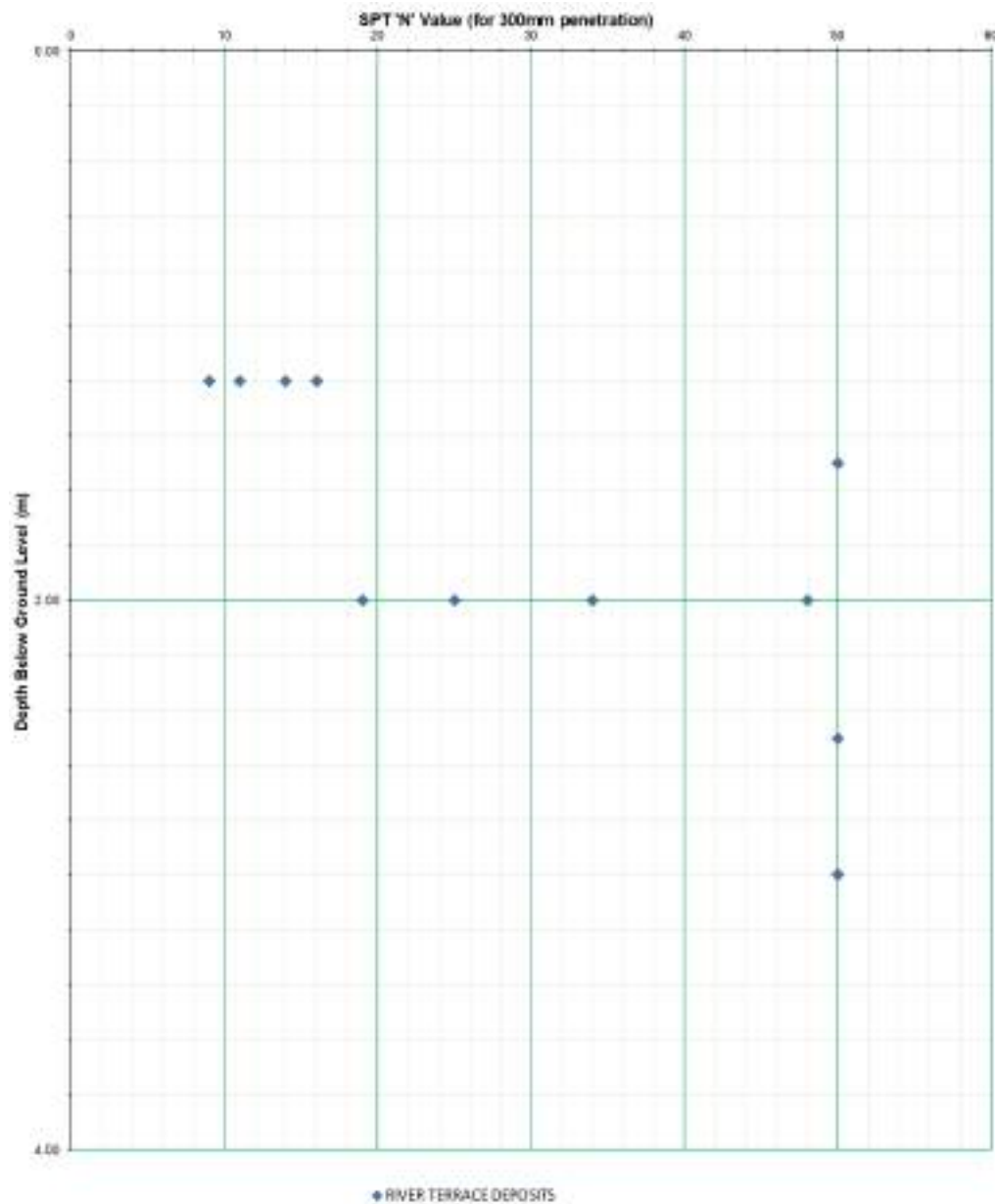
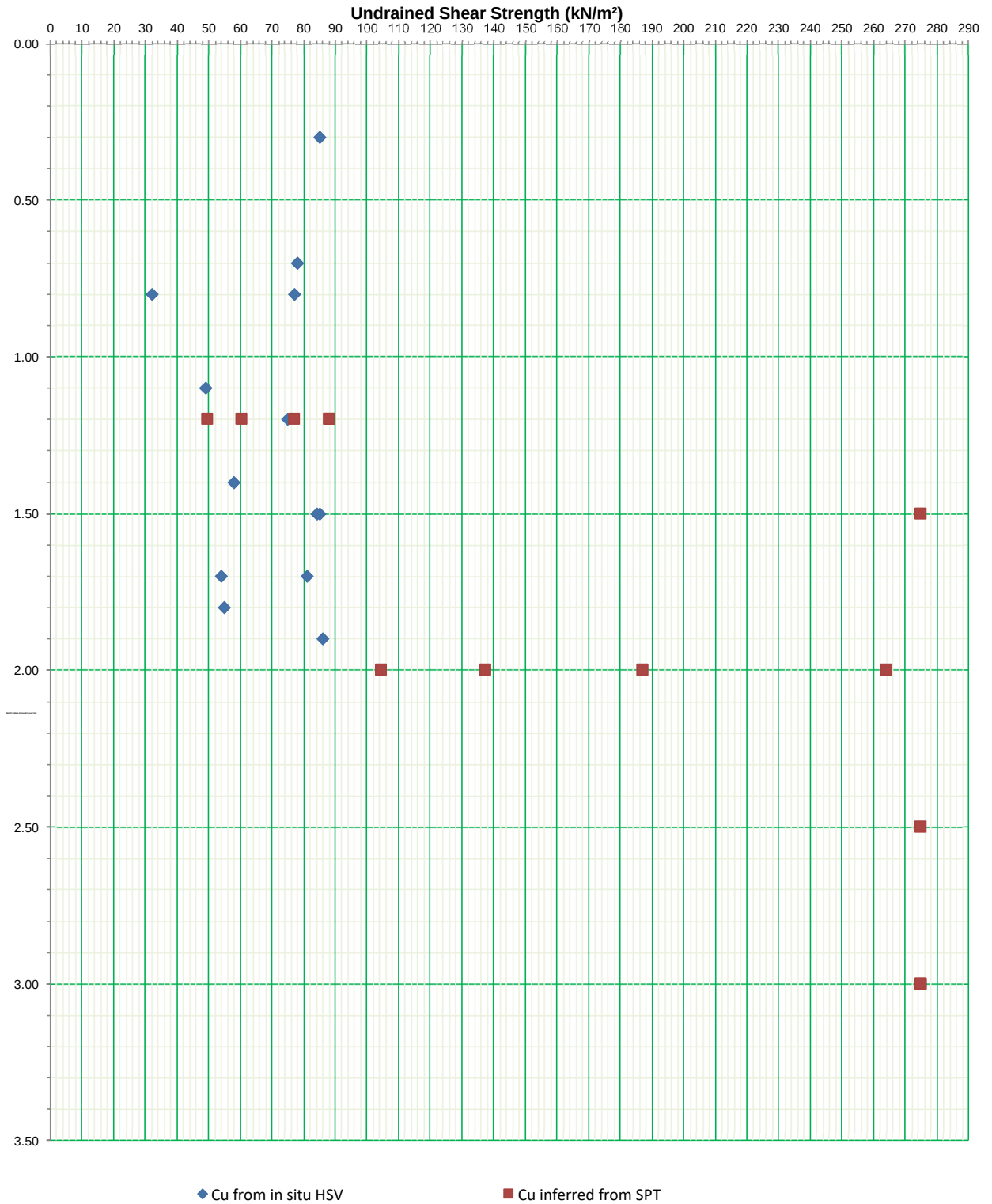


Figure 5.2: Undrained shear strength versus depth summary



SPT N values of the cohesive River Terrace Deposits are shown within Figure 5.1 to increase with depth with N values at 1.2m bgl being from 9 – 16, increasing to 19 – 48 at 2m bgl.

As shown by Figure 5.2, the shear strength profile of the River Terrace Deposits reflects soils of medium strength with inferred undrained shear strength values between 49 to 58 kPa below 1.0m bgl; and soils of high strength with inferred undrained shear strength values between 75 to 86 kPa at variable depths from 0.3m to 1.90m bgl. One undrained shear strength value shows clay of low strength at 0.8m bgl (location TP01), however, for the purpose of this investigation, this value is considered negligible and may be the result of drilling disturbance.

5.4.5 Relative density

Table 5.9 summarises information pertaining to the relative density proportion of the granular soils according to geological stratum, in this instance a single SPT result within the granular River Terrace Deposits at 2.00m bgl. SPT 'N' value is summarised in Table 5.9.

Table 5.9: Relative density results and derived values

Stratum	No. of tests	Method	SPT (N-value) (Range)	phi' (°)
River Terrace Deposits	1	SPT – windowless sampler boreholes (Peck et. al. (1967).	34*	37
*uncorrected for Energy Ratio SPT N values of 50 were removed.				

The result indicates medium dense to dense at a depth of 2.00m bgl.

5.4.6 Compressibility

Table 5.10 presents a summary of the derived parameters for coefficient of consolidation and compressibility based on inference from the SPT N values using the correlation by Stroud (1975). Using an f_2 value of 0.55, the data indicate that the clay in the River Terrace Deposits is generally of medium compressibility at depths between 1.20m and 2.0m bgl., with an M_v value of approximately 0.11 m^2/MN .

Table 5.10: Summary of compressibility

Stratum	No. of tests / results	Method	Coefficient of volume compressibility (m_v) (m^2/MN)
River Terrace Deposits	9	Correlation with SPT*	0.04 – 0.20
* An f_2 value of 0.55 has been used based on a plasticity index of 21. (Tomlinson (2001), after Stroud)).			

5.4.7 Subgrade stiffness

The subgrade stiffness (CBR and Modulus of Subgrade Reaction) results are summarised for data collected at a nominal depth at 600mm below ground level in Table 5.11. Further data is presented in Appendix F, in DCP test results. In total 12No DCP tests were undertaken. DCP 1 was terminated at shallow depth due to obstruction.

Table 5.11: CBR results and derived values

Stratum	No. tests	Method	Modulus of Subgrade Reaction k (MN/m ² /m) (Range)	CBR (%) (Range)
River Terrace Deposits	11	Correlation in accordance with IAN 73/06 Rev 1 based on plasticity and thin construction	43-91	-
	11	TRL DCP	-	4-13
Where using the IAN method, 'k' has been back calculated from the Equivalent CBR.				

5.4.8 Sulfate content

In accordance with BRE (Special Digest 1) and TRL 447, the sulphate content of the soils across the site are summarised in Table 5.13.

Table 5.12: Summary of sulphate content in soil

Stratum	No. tests	Depth (m bgl)	pH (automated)	Water Soluble Sulphate WS (mg/l SO ₄)	Total Sulphur TS (% S)	Total Potential Sulphate TPS (% SO ₄)
River Terrace Deposits	5	0.5 - 1.2	8.1 – 8.4	7.4 – 39.1	0.014 – 0.022	0 – 0.1

In accordance with BRE (Special Digest 1), the Design Sulfate (DS) classification and the Aggressive Chemical Environment for Concrete (ACEC) classification are presented in Table 5.13. The assessment summary sheet is presented in Appendix F.

Table 5.13: Aggressive chemical environment concrete classification

Stratum	No. tests	DS	ACEC
River Terrace Deposits	5	DS-1	AC-1s

6. GEOTECHNICAL ASSESSMENT

6.1 Geotechnical categorization of the proposed development

Eurocode 7, Section 2 advocates the use of geotechnical categorization of the proposed structures to establish the design requirements.

The proposed development is to comprise low rise (2 to 3 storey) residential dwellings, with associated gardens, Public Open Space and infrastructure. Based on this, for the purposes of this investigation, the proposed structures have been classed as Geotechnical Category 1. The guidance in NHBC Standards Part 4: Foundations should be followed in the foundation design, noting that for foundations deeper than 2.50m deep, these must be Engineer designed in accordance with technical Note R5.

Following ground investigation and as part of the assessment provided in the following section, the preliminary geotechnical hazard identification undertaken in Section 3.3 has been updated.

Assessment has been undertaken in accordance with the general requirements of ICE/DETR Document 'Managing Geotechnical Risk' and the HE documents HD 41/15 and CD 622. The preliminary Geotechnical Risk Register following investigation is provided in Appendix H (Table J.3) and will need to be updated during future design works.

6.2 Characteristic design values

For design of Category 1 structures in accordance with BS EN ISO 1997-1 (EC 7), the geotechnical parameters given in Table 6.1 can be used for design.

These values have been determined from laboratory testing, *in situ* testing and by professional judgement using published data together with knowledge and experience of the ground conditions. Care should be exercised in using these assumed soil strength parameters for any purpose beyond the scope of this report because it may be that additional sampling and testing is required for certain purposes. The reader should refer to the original test results summarised in Section 5 and provided in Appendix E and Appendix F.

Table 6.1: Geotechnical parameters recommended for design of Geotechnical Category 1 Structures (EC7)

Parameter	Effective angle of internal friction °	Undrained shear strength kN/m ²	Coefficient of compressibility m ² /MN	Modulus of subgrade reaction (IAN73/06) MN/m ² /m	Bulk Unit Weight kN/m ³
Stratum	$\phi'^{b,c}$	c_u^e	m_v^f	k^g	γ
River Terrace Deposits (granular)	37*	-	-	-	18**
River Terrace Deposits (cohesive)	-	55	0.30	50	18**

*Based on single recorded SPT within granular soils

**based on guidance of BS8002 for bulk unit weight of soils

6.3 Groundwork

6.3.1 *Site preparation*

The development will involve demolition of several existing houses. This should be undertaken to an appropriate Specification to ensure any asset materials generated are geotechnically suitable for re-use if this is required.

Buried obstructions were encountered during this investigation associated with concrete surface encountered within WS01 and WS01A, and there is a possibility of further such obstructions being encountered both from the existing houses and from historical features which may or may not be recorded in the available mapping.

Topsoil should be removed from beneath all building and hardstanding areas prior to construction.

6.3.2 *Groundworks*

Following breaking out of hardstanding and obstructions, excavation of shallow soils should generally be feasible using conventional plant and equipment. However, excavation through any buried construction may require heavy-duty excavation plant and/or the use of specialist breaking equipment.

Trial pit faces were noted to remain generally vertical without collapse. The faces of shallow, near vertically sided excavations put down at the site are likely to remain stable for short periods of time. However, excavation sides may be liable to collapse particularly in soft cohesive or granular soils, and if ground water is encountered. Groundwater observations typically range between 1.7 and 3.0m bgl and observation during ground investigation indicates slow seepage.

Temporary trench support, or battering of excavation sides, is recommended for all excavations that are to be left open for any length of time and will definitely be required where man entry is required. Particular attention should be paid to excavation at, or close to, site boundaries where collapse of excavation faces could result in risks to site safety and to nearby structures.

A risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015); Construction Information Sheet 47: Inspections and Reports (2005) and HSG47: Avoiding Danger from Underground Services.

To ensure no loads are imposed on the sides of the excavation, spoil should not be placed immediately adjacent to the excavation. Spoil should be placed a suitable distance from the side of the excavation (as assessed by a competent person).

Based on site observations, the rate of water ingress to the proposed excavations is likely to be slow. In these circumstances, groundwater control by sump pumping is likely to be sufficient.

However, it should be recognised that groundwater levels may vary from those at the time of the investigation, for example in response to seasonal fluctuations and the timing of construction may dictate the extent of groundwater control required.

Any water pumped from excavations may need to be passed via settlement tanks (to reduce suspended solids) before being discharged to the sewer.

6.3.3 *Earthworks/reuse of site-won materials*

At this stage, Hydrock is not aware of proposals for earthworks at the site.

Should earthworks be required, supplementary earthworks testing and an earthworks Specification will be necessary to ensure the appropriate management and reuse of the existing soils.

If significant earthworks are required, the works may be Category 2 in accordance with BS EN ISO 1997-1 (EC 7) and further geotechnical design may be necessary. Once site proposals have been further defined more specific consideration will need to be given to the reuse of materials and reference should be made back to this office.

6.3.4 *Consolidation settlement from land raising*

Should land raising be required, this is likely to induce consolidation settlement in the underlying cohesive strata. Supplementary site investigation and separate geotechnical design may be required to fully assess the impact of settlement from ground level raising. Site monitoring during earthwork construction may be required to confirm the amount and rate of settlements. Once site proposals have been further defined more specific consideration will need to be given and reference should be made back to Hydrock.

6.4 Slope stability

There are no significant existing slopes on the site and, and no significant slopes are anticipated as part of the proposed development. Therefore, Hydrock does not believe the existing or planned slopes will present a significant constraint to the development. However, the above preliminary conclusions should be reviewed following any potential revision to development plans.

6.5 Retaining walls

At this stage, Hydrock is not aware of proposals for retaining walls at the site. Should retaining walls be required, supplementary site investigation and separate geotechnical design may be required.

6.6 Foundations

This section provides recommendations for the foundations for houses, garages, apartment buildings up to 3 storeys high and related buildings. No structural loadings or other details have been provided and the following comments are subject to consideration pending such design information.

The recommendations in this report are based on the current NHBC Standards (2021).

The houses and flats proposed for the site are considered to be Geotechnical Category 1. Preliminary foundation recommendations for the foundations for houses and related buildings in this section are based on the geotechnical parameters provided in Section 6.2.

The safe bearing pressures for foundations quoted for Category 1 structures in this report take into consideration traditional factors of safety against the risk of shear failure of the ground and should prevent undue or excessive total and differential settlement from the anticipated structural loadings, nominally 25mm and 1/500 respectively.

Subject to detailed geotechnical design, the safe bearing pressures for foundations in this report take into consideration the risk of shear failure of the ground (ultimate limit state). However, they do not

assess acceptable limits of settlement (serviceability limit state). Serviceability limit state assessment will need to be undertaken as part of the separate geotechnical design.

6.6.1 Foundation type

It is noted that the updated SDA proposed site layout, 19-1105-005-1ST (Appendix A), includes additional areas of development in the vicinity of mature trees.

On the basis of the ground conditions indicated from the current investigation, the foundation recommended are as follows, based on clays of medium volume change potential:

- Strip/trench fill foundations across the majority of the site to a depth of at least 0.90m, to take account of the risk of seasonal changes in weather or to 1.50m to take account of planting of trees and shrubs as described in NHBC Standards.
- Foundation depths should be increased in the influence distance of trees, following an arboricultural tree survey or using worst case assumptions of tree types and heights as described in NHBC Standards Ch4.2 Building near Trees.
- Foundations designed to NHBC Standards can be taken to a maximum depth of 2.5m bgl.
- Foundations deepened due to tree influence in shrinkable soils to depths in excess of 2.5m bgl, will require engineer designed foundation trench fill solution and/or piling.

Strip or trench fill foundations are considered suitable in the north-eastern corner and northern edge of the site and should be below any Made Ground and at least 300mm into the undisturbed natural strata, which comprise firm (or better) clay and medium dense (or better) sands and gravels of the River Terrace Deposits.

A safe net bearing pressure of 110kN/m² is considered appropriate.

Where foundation depths are stepped, for instance to match changes in depths due to trees or changes in ground conditions, the steps should be designed in accordance with the requirements of the NHBC Standards.

If trees are to be removed, the roots should be grubbed out and foundations extended to below the zone of disturbance created by this activity and to below any remaining root hairs. In addition, deepening of foundations in accordance with NHBC Standards will be required where strip or trench fill foundations are within the zone of influence of existing, removed or proposed trees and proposed shrub planting. A tree survey should be undertaken by an arboriculturist in accordance with BS 5837:2012 to identify the type, and height of existing trees on the site and including any off-site trees, which could have an effect on foundation design.

Where foundations are within the zone of potential desiccation from trees and are deeper than 1.5m bgl, a suitable compressible material or void former will be required on the inside faces of foundations to external walls and beneath ground bearing floor slabs.

Excavation of trench fill foundations in excess of 2.5m bgl is unlikely to be economic and may be impracticable to undertake due to water bearing soils, which may result in trench collapse. In addition, if foundations in excess of 2.5m depth are proposed, they should be designed by a Structural Engineer in accordance with the requirements of the NHBC Standards (Chapter 4.2.8) and NHBC Technical Requirement R5. In addition, Hydrock recommends when trench fill foundations are deeper than 2.5m

due to trees, the design should take into account soil desiccation risk from plot specific testing if within the influencing distance of trees.

Foundation formations should be inspected by a geotechnical engineer or other suitably competent person to ensure the founding conditions are suitable and as indicated in this report. Any formation materials deemed as unsuitable should be excavated and replaced with lean mix concrete or deepened to suitable strata. If this is not possible, alternative solutions (such as piling) should be undertaken.

Although significant lateral variation is not anticipated, where ground conditions at formation level are found to be of variable type and stiffness, it is recommended that foundation concrete should be reinforced with mesh, installed at the top and bottom of the foundation, across the zone of variable soil conditions.

Foundation excavations should be protected from rainfall, inflow of surface water, frost and freezing conditions. They should also be protected from drying out in hot dry weather.

Groundwater observations indicate a shallow groundwater table and excavations may be difficult to undertake. Inflow is anticipated to be slow, however alternative methods of groundwater control may be required should fast groundwater ingress be encountered, which could result in unstable excavations.

6.6.2 *Piled foundations*

Piled foundations may be required in the vicinity of trees, to deepen foundations to below the influence of trees and for the apartment building, where the derived foundation depth is greater than 2.50m.

Depending on column loads and layouts, piles should extend through the Made Ground and to a suitable depth into the underlying granular River Terrace Deposits or London Clay Formation.

Driven piles, bored piles with the use of casing or CFA piles should be suitable to support the foundations for the structures. However, the choice of piling system should be undertaken by a specialist piling Contractor and the design of piles is beyond the scope of this report. The decision on pile type and design should take into account the following factors relevant to the site:

- Further investigation will be required to provide the geotechnical design parameters for strata deeper than 3.0m to allow pile design;
- Obstructions in the ground are expected from the previous structures present on site, which could cause piles to stop shallower than the design depths, or to deviate from the vertical, thereby reducing their capacity. In some circumstances, obstructions can lead to pile breakage.
- Pile installation can create preferential pathways for the migration of contaminants to the groundwater.
- Boring of piles through coarse soils can result in loosening of the material, with resultant risk of shaft collapse prior to concreting and reduced shaft friction.
- Shallow groundwater would necessitate the use of temporary casing for bored piles. If CFA piles are used, concrete is placed as the auger is withdrawn, which can balance the water pressure if the operation is undertaken carefully.
- Piles should extend a minimum of five pile diameters into a suitable bearing horizon which is expected to be into the London Clay Formation to mobilise sufficient shaft friction and end-bearing

resistance to carry the required loads without unacceptable settlement. It should be noted that recent investigations did not penetrate below the River Terrace Deposits and supplementary investigation will be required for design of piled foundations.

- As piles would be constructed through compressible soils and may have fill placed over them, they may also need to be designed to cater for the potential down-drag effects of negative skin friction on piles from the secondary consolidation / creep of the fill.
- Collapse of the pile shaft can be caused by ‘necking’ of the pile in running sand conditions, leading to pile failure.
- Where foundations are constructed on clay soils within the influencing distance of trees design should include for the upper section of the pile to be sleeved or additional length allowed for to resist stresses from clay swelling or shrinkage. In addition, heave protection may be required on the inside faces and underside of the ground beams.

6.6.3 Foundation works risk assessment

As there is a low risk to Controlled Waters, Hydrock believes that a foundation works risk assessment is not required as the piling will not result in a significant increase in risk of pollution to Controlled Waters.

6.6.4 Working platform

A working platform will be required prior to the arrival on site of tracked piling plant. This should be designed and installed in accordance with BR470 (BRE 2004) based on data on the specific plant in accordance with an FPS certificate for the rig loadings.

6.7 Ground floor slabs

In accordance with the NHBC standards, as Made Ground is locally greater than 600mm thick and clay soils of medium volume change potential are present at the site, it is recommended that suspended floor slabs with a void be adopted.

Slabs without a void (ground bearing or suspended cast *in situ* onto the ground) may be used if all of the following criteria are satisfied:

- the foundation depth (such as due to the influence of trees) is less than 1.5m;
- any fill is suitable, well-compacted granular material and less than 600mm thick;
- it is demonstrated that the soils are not desiccated and are at their equilibrium moisture content; and
- ground floor construction is not undertaken when the surface soils are seasonally desiccated (i.e. during summer and autumn), unless NHBC is satisfied the soil is not desiccated.

6.8 Roads and pavements

Based on the test results and subject to *in situ* testing during construction, it is considered likely an CBR of 5% will be achievable over the majority of the site. Proof rolling of the formation level will be required and any loose or soft spots should be removed and replaced with an engineered fill, in accordance with a suitable Specification. The formation level will also need to be protected during inclement weather from deterioration; all slopes should be trimmed to falls to shed rain water and the surface sealed to limit infiltration.

Prior to the placement of the founding materials and the construction of the road pavement, the sub-formation and formation will need to be inspected and checked in accordance with a suitable specification to ensure the ground conditions are as expected. All testing should be carried out in accordance with DMRB IAN 73/06 to confirm that the ground conditions at time of construction are consistent with the previous design parameters.

6.9 Drainage

Indicative infiltration rates for the ground investigation are presented in Appendix F and are summarised in Table 5.5.

Soakaways are considered unsuitable for the site based on the low infiltration rates observed during testing. However, the infiltration rates recorded may assist with attenuation as part of a Sustainable Urban Drainage System (SUDS).

6.10 Buried concrete

Based on guidelines provided in BRE Special Digest 1 (BRE 2005) and the information presented in Section 5.4.8 (Table 5.13):

- The shallow soils (River Terrace Deposits) can be classified as Design Sulfate Class DS-1 and ACEC Class AC-1.

This equates to a Design Chemical Class² of:

- DC-1 for the shallow soils (River Terrace Deposits).

The underlying London Clay Formation was not encountered by the scope of these investigations and it should be noted that associated concrete classes are likely to be different to those of the River Terrace Deposits.

The designer should check and confirm the classification of concrete using the information presented in Appendix E and Appendix F during the design.

² The calculated ACEC class can be used in accordance with BS 8500-1+A2 (2019), Table A.9 to select the Designated Concrete (DC) class for an intended working life of 50 years. However, the designer is referred to BS 8500-1+A2 (2019), for full details and notes to Table A.9, including any Additional Protective Measures (APMs).

7. GEO-ENVIRONMENTAL ASSESSMENT

7.1 Updated conceptual model

7.1.1 *Updated ground model*

The preliminary ground model developed from the desk study and field reconnaissance survey (Section 2) has been updated using the findings of the ground investigation and is presented in Section 5. This ground model is the basis for the geo-environmental assessment presented in this section.

7.1.2 *Updated exposure model*

Following the ground investigation, the plausible contaminant sources, receptors and pathways identified in the preliminary geo-environmental exposure model (Section 3), have been updated or confirmed as follows.

Sources

The following potential sources have been removed from the exposure model.

- As no putrescible materials were noted within the Made Ground, which is noted to generally be of limited depth, risk of Ground Gas has been discounted.
- No visual or olfactory evidence of contamination typically associated with gas works and former fuel station located off site were not observed during investigation works. Screening for associated determinands is included in the assessment, however this source can be discounted at this stage.
- Residual heavy metals and other contaminants from smithy works located off site.

Pathways

The following potential pathways have been removed from the exposure model.

- Buildings; methane ingress via permeable soils and/or construction gaps.

Receptors

No potential receptors have been removed from, or added to, the exposure model.

With reference to the updated ground model and updated exposure model reported above, generic risk assessment is undertaken below.

7.2 Risk assessment approach

Generic risk assessments have been undertaken in accordance with the principles of LCRM (Environment Agency, 2019) using the CM that has been updated following the ground investigation.

Firstly, the risks associated with the identified potential contaminant linkages have been estimated using standardised methods (typically involving comparison of site data with published 'screening values'). Secondly, where screening values are exceeded, the result has been evaluated in an authoritative review of the findings with other pertinent information to determine whether or not the exceedance is, or is not acceptable in the site-specific circumstances. Further explanation is presented in Appendix J.

The data sets used in the assessment comprise the analytical results obtained by Hydrock as listed in Section 4.

In cases where unacceptable risks are indicated, actions such as more advanced stages of risk assessment or remediation are proposed in Section 7.10.

7.3 Human health risk assessment

This is a Tier 2 assessment using soil screening values applicable to the residential with plant uptake, CLEA land use scenario.

The soil screening values used are generic assessment criteria (GAC). It should be noted that Category 4 Screening Levels (C4SL) for lead have been used as there is no recognised GAC for lead and the use of the term 'GAC' in this report includes the C4SL for lead.

Statistical testing is used where data sets are suitable. The critical issue is sample numbers. For data sets with low sample numbers or where sampling is targeted at specific areas, individual sample test results are compared directly with the screening values. Larger and non-targeted data sets are subject to statistical testing.

The phrase 'further assessment required' is used to denote soil concentrations that are equal to, or exceed, a GAC. This does not necessarily mean that the soil is 'contaminated' or not otherwise suitable for use. The assessment and any mitigation required are to ensure the site does not pose an 'unacceptable risk'.

The results of the assessment are presented in Appendix G.

7.3.1 Averaging areas

The 'averaging area' used in this report is based on the conceptual model and the proposed development, and is taken to be the entire area of the site, with the data separated into Made Ground, natural soils.

7.3.2 Risk estimation (without statistical testing)

Hydrock default list of determinands

Based on individual test results that exceed the GAC, the chemicals of potential concern which require further assessment are summarised in Table 7.1.

Table 7.1: Chemicals of potential concern for which further assessment is required (human health)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	No. samples exceeding generic criterion
<i>Made Ground</i>						
Asbestos	Presence	GAC	4	Absent	<0.001	1
<i>Topsoil</i>						
No Exceedances						

Asbestos

Although no visual evidence of asbestos was noted during the logging, asbestos was identified by laboratory screening and testing of soil samples as provided in Table 7.2.

Table 7.2: Asbestos in soil samples (laboratory testing)

Location	Depth (m bgl)	% Asbestos (w/w)	Comment
WS01B	0.50	<0.001	Fibres (amosite within Made Ground, possibly from ACM in the construction of former structures (roller skating park))

The presence of asbestos fibres in soil is considered further in Section 2.3.3.

Petroleum hydrocarbons (PHC)

Analysis of 4 No samples collected from Made Ground and Topsoil across the site returned PHC concentrations generally below laboratory detection limits. Trace concentrations of Aromatic Hydrocarbons between species C16 and C44 were detected in Made Ground samples from WS01B and TP01. However, recorded concentrations are well below the relevant human health criteria.

Pesticide and Herbicides

Screening of pesticide and herbicides was undertaken by Tentative Identification of Compounds. Several semi volatile organic compounds were tentatively identified within the Made Ground; however, these are not compounds commonly associated with use as pesticides and herbicides. It is concluded that risk to human health from pesticides and herbicides can be discounted.

As SVOCs that were detected above laboratory detection limits are noted to fall below the relevant GAC, these tentatively identified compounds are not considered to be of concern.

7.3.3 Risk evaluation

The screening exercise has identified asbestos in one sample of Made Ground soils. This is considered further here to assess if the exceedance may be acceptable with respect to the proposed development. The phrase 'further assessment' does not necessarily mean that the soil is 'contaminated' or not fit for use.

Asbestos

Asbestos fibres were identified as amosite in the laboratory screening process in a single sample of Made Ground (WS01B at 0.50m bgl). However, the concentration detected was below the lower limit of detection (<0.001%v/v).

Guidance on the assessment of risk associated with asbestos in soils was published by CIRIA C733 in 2014. This proposed a semi-quantitative risk assessment methodology for asbestos, based on potential for inhalation of airborne fibres. As many factors affect the potential magnitude of fibre inhalation in addition to concentration, it is not practicable to derive generic screening criteria for asbestos concentrations in soil. Risk factors applicable to the site are considered below:

- No visible evidence of asbestos materials was noted in the exploratory holes, suggesting that asbestos materials are present only as very minor constituents in the soil.

- Where asbestos was identified by laboratory testing, the concentration was assessed as being less than the limit of detection (0.001%).
- The asbestos fibres were identified as amosite (brown) asbestos. Amosite is considered more hazardous than chrysotile, the most commonly encountered form.
- The materials in which the asbestos was identified were of mixed composition but were noted to be predominantly granular. The likelihood of asbestos fibres being released from granular soils is greater than may be anticipated from cohesive soils.

Subject to regulatory and NHBC approval, Hydrock consider it plausible for asbestos to be present in any of the Made Ground soils at the site. However, the risk associated with the identified presence of asbestos is considered to be low. Nevertheless, mitigation is recommended to ensure risks to site users from asbestos fibres in the soil remains acceptably low. This is discussed further in Section 7.10.

7.4 Plant life risk assessment

7.4.1 Risk estimation

Priority phytotoxic chemical concentrations have been screened against published values to determine the likely risk to plant growth and the findings presented in Appendix G. As with human health, statistical testing is used where data sets are suitable, otherwise individual sample test results are compared directly with the screening values.

Table 7.3: Pervasive chemicals of potential concern for which further assessment is required (risk to plants)

Chemical of potential concern	Generic criterion (mg/kg)	Basis for generic criterion	No. samples	Min. (mg/kg)	Max. (mg/kg)	US ₉₅ (mg/kg)	No. samples exceeding generic criterion
<i>Made Ground and Topsoil</i>							
No Exceedances							

Screening of pesticide and herbicides was undertaken by Tentative Identification of Compounds. Several semi volatile organic compounds were tentatively identified within the Made Ground. However, these are not compounds commonly associated with use as pesticides and herbicides. It is concluded that risk to plant life from pesticides and herbicides can be discounted.

7.4.2 Risk evaluation

No exceedances of plant life GAC are noted and it is considered that there is no unacceptable risk to plant life from contamination and no additional consideration is required with regard to risks to plant life.

Notwithstanding the above, it may be necessary to import physically and chemically suitable growing medium, subject to recovery of topsoil during site strip. The site is in part densely vegetated and once roots/significant organics have been removed, import of further topsoil may be required.

7.5 Pollution of controlled waters risk assessment

7.5.1 Risk estimation

- The River Terrace Deposits are noted to be a Secondary A Aquifer. However, these were encountered predominantly as cohesive deposits with pockets or horizons of granular soil with clayey matrix.
- The underlying London Clay Formation typically comprises cohesive strata or clay rich sands and is noted to be Unproductive Strata by the Environment Agency.
- There are no groundwater or surface water abstractions within 1km of the site and it is not considered likely that strata bodies present on the site will be utilised for water abstraction purposes.
- There is a low risk of surface water runoff or contaminants leached from the Made Ground entering the drainage ditches on site due to predominantly cohesive nature of natural deposits and negligible contaminant concentrations.

7.5.2 Risk evaluation

Surface water and groundwater bodies at the site are not considered to be at risk due to the low hazard potential of negligible contaminant concentrations noted to be present. It is considered that no further assessment of risk to controlled waters is required.

7.6 Ground gases risk assessment

CL:AIRE RB17 (Card et al 2012) states that where there are natural soils with no credible methane source, with Made Ground less than 1.0m thick, composed of non-putrescible materials, no gas protection is required as this represents CS1. As such, no ground gas protection is required.

7.6.1 Off-site risks from carbon dioxide and methane

The National Planning Policy Framework requires that a developed site should be incapable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990. This position includes a consideration of the potential for off-site migration of ground gases that may impact on adjacent properties.

Consequently, it may be necessary to consider the imposition of measures to protect adjacent, off-site receptors. In this case there is no credible source of gas presenting risk of off-site migration.

7.7 Construction materials risk assessment

7.7.1 Water pipelines

A formal water pipe investigation and risk assessment is beyond the scope of this report. However, the findings of this investigation have been compared to the threshold values in Water UK HBF (2014), Table 1 as far as is practicable, to give an indication of the possible restrictions to the use of plastic pipes for water supply to the site (see the reference in Appendix J for further information).

The site is previously undeveloped and the preliminary risk assessment and investigation has indicated no plausible contaminant sources. It is envisaged that standard pipework will be suitable for supply of potable water to the site. However, confirmation should be sought from the water supply company at the earliest opportunity.

7.7.2 *Other construction materials*

Plastic pipes for drains and sewers are manufactured from unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) or polyethylene (PE). These materials may be affected by the presence of organic compounds in the soil.

In accordance with the British Plastics Federation Guidance (August, 2018), as the concentrations of PAH, and BTEX are below 100mg/kg and the concentrations of petroleum hydrocarbons (TPH) are below 200 mg/kg, PVC-U, PP or PE pipework is considered suitable.

The implications for buried concrete are discussed in Section 6.10.

7.8 Contamination risks to ground workers

7.8.1 *Introduction*

Whilst risks to construction workers are not discussed in detail, the following section discusses potential risks that should be considered.

Information presented in this document is provided to assist in managing the risk associated with contamination in soil and groundwater at the site but is not definitive. The Contractors are responsible for undertaking their own assessments and assessing what risks are present and what control measures are required.

Task specific risk assessments and method statements should be in place, and risks and required mitigation measures communicated to all relevant personnel prior to the works commencing. Appropriate PPE and, if required, RPE should be provided and utilised.

7.8.2 *Metals, metalloids, PAH and petroleum hydrocarbons*

The soils contain metals, metalloids, PAH and petroleum hydrocarbons, recorded at concentrations likely to be representative of background levels and are not considered to present risk to human health.

7.8.3 *Ground Gas*

As concentrations of carbon dioxide (an asphyxiant) in the soil have not been measured as part of this assessment caution should be exercised. Ground gas concentrations may exceed HSE Workplace Exposure Limits for personnel in the working environment of 1.5% for short term (15 minutes) exposure and / or 0.5% for long term exposure. Furthermore, soil concentrations of oxygen may be below the HSE recommendations of 18%.

As such, all Contractors and maintenance workers should be made aware of the possible presence of carbon dioxide and should take all necessary health and safety precautions when working in trenches or confined spaces.

7.8.4 *Asbestos*

Whilst no clearly identifiable ACM has been seen during the site walkover or during the ground investigation, the laboratory testing has identified low concentrations of asbestos fibres (<0.001%) in the soils.

All site staff should be made aware of the possibility to encounter unidentified fragments of asbestos within the Made Ground soils anywhere on the site at any stage of the development. It is advised that

the Contractor should consider supplying suitable and sufficient 'Asbestos Awareness' training (specific to asbestos in soils) to all site staff who could foreseeably encounter asbestos containing materials during the course of their work.

The Contractor for each stage of works must undertake a suitable and sufficient Risk Assessment in accordance the Regulation 6 of the Control of Asbestos Regulations 2012 (CAR2012). The results of the assessment should be used to compile a methodology in accordance with Regulation 7 of CAR2012, which limits the potential exposure and spread of asbestos fibre. Appropriate training should be provided to all site staff identified within the risk assessment as having the potential to be exposed or encounter asbestos during their work in accordance with Regulation 10 of CAR2012.

It is the responsibility of the Contractor to ensure that mitigation measures are suitable and sufficient to prevent exposure to airborne asbestos so far as is reasonably practicable in accordance with Regulation 11 of CAR2012. However, the asbestos fibres detected at the site are within a soil matrix, if the soils are kept damp and appropriate site hygiene measures are in place, this should assist in minimising the risk of the release of airborne fibres.

7.9 Findings of the generic contamination risk assessments

The potential sources, pathways and receptors identified in the desk study (Section 2) have been investigated (Sections 4 and 5) and assessed (Sections 7.2 to 7.7). A Source-Pathway-Receptor linkage assessment has been undertaken and is presented in Appendix I (Table K.2).

A summary of the Source-Pathway-Receptor (SPR) contaminant linkages for which the risks may be unacceptable and require mitigation (those that are moderate or higher) are discussed in Table 7.4.

Table 7.4 assumes the following SPR linkages which have been discounted (subject to agreement) at the risk evaluation stage are confirmed by the regulators and the warranty provider as not requiring further consideration (mitigation). If these assumptions are not agreed during regulatory discussions, the conclusions as noted in Table 7.4 will need to be updated:

- Presence of asbestos fibres (<0.001 %v/v) within the Made Ground

Table 7.4: Residual risks following risk evaluation

Contaminant Linkage				Comments	
Pollutant Linkage	Sources	Pathways	Receptors	General	Mitigation
PL 1.	Asbestos fibres in soil or asbestos-containing materials in the Made Ground	Inhalation of fugitive dust.	Human health.	Made Ground seen to contain asbestos-containing materials. Asbestos fibres measured in soil samples.	Mitigation required in in garden areas / POS in the form of an engineered cover system or excavation and removal of Made Ground and replacement with suitable soils. In addition, any ACM encountered during earthworks will need to be handpicked and removed from site.

7.10 Mitigation measures

The outline remediation strategy presented below is provided for guidance only, and does not represent a 'Remediation Options Appraisal', or a 'Remediation Strategy', prepared in accordance with LCRM (2020).

As shown in Table 7.4 (and subject to regulatory (and NHBC) agreement), Hydrock consider the following mitigation is required to ensure the site is suitable for use for the proposed end use. The mitigation measures include:

- The installation of a 600mm engineered cover system in gardens and 450mm in public open space, comprising a geotextile marker layer, subsoil beneath a topsoil thickness of between 150mm and 300mm (PL1); and/or
- Removal and appropriate disposal of Made Ground soils down to natural and placement of nominal thickness of chemically suitable growing medium, in gardens and areas of public open space.

Development of the site may necessitate reduction of levels such that a thickness of Made Ground is removed and disposed of appropriately. This may mean that areas of the site no longer have Made Ground soils present, where this is the case, implementation of a cover system is not considered necessary and a nominal thickness of chemically suitable growing medium can be placed.

The methodology for the remediation should be set out in a Remediation Strategy (which will include the 'Implementation Plan', the 'Verification Plan' and the 'Long Term Monitoring and Maintenance Plan'), which will need to be submitted to the warranty provider and the regulatory authorities for approval.

In addition, the production of a Materials Management Plan and its approval by a Qualified Person will be required to allow reuse of suitable material at the site in accordance with waste regulations.

Verification reports by a competent independent geo-environmental specialist will be required following completion of any remedial works (including ground gas membrane installation).

8. WASTE AND MATERIALS MANAGEMENT

8.1 Introduction

The Waste Framework Directive (WFD) (2009/98/EC) defines waste as ‘*any substance which the holder discards or intends to discard.*’ In a geo-environmental context, the waste is most often ‘soil’ and the two main scenarios are offsite disposal of the material as a waste and/or reuse of the material on site. For cost and sustainability reasons, reuse is preferred to off-site disposal.

Section 8.2 below describes the key issues relating to off-site disposal to landfill and Section 8.3 considers requirements relating to reuse of soils and materials management.

8.2 Waste disposal

8.2.1 Principles

Based on the WFD, any material excavated on site may be classified as waste and it is the responsibility of the producer of a material to determine whether or not it is waste. Where off-site disposal is undertaken, the following guidance applies.

Classification is a staged process:

- A hazardous waste is defined under the WFD as one which possesses one or more of fifteen defined hazardous properties. If a waste is not defined as hazardous, then it is non-hazardous.
- Where the materials are soil, it is then be assigned using the ‘List of Waste Codes’, which classifies the material as either:
 - hazardous (17-05-03), which is defined as “*soil and stones containing hazardous substances*”; or
 - non-hazardous (17-05-04), which is defined as “*soil and stones other than those mentioned in 17-05-03*”.
 - Hydrock utilise the proprietary assessment tool, HazWasteOnline™ to undertake this assessment.
- Waste Acceptance Criteria (WAC) testing is then undertaken if required, and are only applicable following classification of the waste, and only where the waste is destined for disposal to landfill. The WAC are both qualitative and quantitative. The WAC and the associated laboratory analyses (leaching tests) are not suitable for use in the determination of whether a waste is hazardous or non-hazardous.

It should be noted that some non-hazardous wastes may be suitable for disposal at an inert landfill as non-hazardous waste, subject to meeting the appropriate waste acceptance criteria.

It should be noted that classification must be undertaken on the waste produced, by the waste producer. Necessary sampling frequency to adequately characterise a soil population is defined within WM3.

Further discussion with regards to the characterisation process for different scenarios and waste types is provided below.

Topsoil and Peat / organic material

Topsoil, peat and organic material are biodegradable, therefore if they are surplus to requirements and cannot be re-used in accordance with a Materials Management Plan, they cannot be classified as inert. As such, topsoil and peat need to be classified by a staged assessment and sampling process and would either be classified as hazardous or non-hazardous, depending upon the results of the assessment.

Greenfield Sites

Waste from completely greenfield sites may be accepted at a landfill as inert waste if it meets the requirements of paragraph 10 (wastes acceptable without testing at landfills for inert waste) of the Landfill (England and Wales) (Amendment) Regulations (2005) ('the Regulations') can be met. Paragraph 10 of the Regulations states, "*soils may be able to be classified as inert waste without testing, if:*

- *they are single stream waste of a single waste type;*
- *there is no suspicion of contamination and they do not contain other material or substances such as metals, asbestos, plastics, chemicals, etc....."*

As such, where the site is greenfield and the waste producer is confident about the quality of a soil (i.e. naturally occurring and uncontaminated), further sampling and laboratory testing is not necessary for the Basic Characterisation and this can be undertaken on qualitative Waste Acceptance Criteria testing.

In this instance the waste producer can characterise the waste based on visual assessment and written description of the waste in addition to supporting evidence such as a desk study assessment of the greenfield status. However, it should be noted this characterisation is subject to agreement by the landfill operator who may require testing to be undertaken to confirm classification.

Contaminated or potentially contaminated sites

If the site is brownfield, contaminated or potentially contaminated, the waste must undergo an initial waste classification exercise using background information on the source and origin of the waste and assessment of chemical test data in accordance with Environment Agency Technical Guidance WM3.

If following the initial waste classification exercise, the soils are acceptable for disposal to a non-hazardous landfill, further qualitative Waste Acceptance Criteria (WAC) testing is not required.

However, if soils are potentially able to be disposed to an inert landfill as non-hazardous waste, or require testing to determine if they can be disposed of to a stable non-reactive hazardous or hazardous class of landfill, the next stage of assessment is to undertake qualitative WAC testing. This will determine the Basic Characterisation and the landfill category at which the soils can be accepted.

Hazardous material must be subjected to WAC testing to determine whether it requires treatment before it can be accepted at the hazardous landfill, while non-hazardous material can be tested to determine whether it may be suitable for placement in an inert landfill.

8.2.2 *HazWasteOnline™ assessment*

As the site is greenfield, HazWasteOnline™ assessment is not technically required. However, it has been undertaken for completeness during the site investigation. The output of the HazWasteOnline™ assessment is provided in Appendix G and a summary of the preliminary waste classification is provided below in Section 8.2.4.

8.2.3 *WAC Testing*

The site is brownfield. However, WAC testing has not been undertaken to date but will be required on the excavated soils that are to be disposed of, to assist with waste disposal options prior to disposal. A summary of the preliminary waste disposal options is provided below in Section 9.2.4.

8.2.4 *Preliminary waste disposal options*

The site is brownfield and based on the site history and HazWasteOnline™ assessment, if suitable segregation of different types of waste is put in place, for soils to be disposed of, it is considered that:

- The topsoil generally has a high organic content (as indicated by Fraction of Organic Carbon testing) and is likely to be classified as hazardous waste.
- The natural uncontaminated subsoils are likely to be classified as 'inert' waste and subject to WAC testing should be able to be disposed of at an inert landfill.
- The 'General' Made Ground is likely to be classified as non-hazardous waste.
- Any soils containing > 0.1% asbestos or visible asbestos containing materials would be considered as hazardous.

8.2.5 *General waste comments*

It should be noted that:

- It is the waste producer's responsibility to segregate the waste at source and waste producers must not mix waste materials/streams or dilute hazardous components, for example by mixing with less or non-hazardous waste on site to meet WAC limit values.
- The above preliminary assessment has been made on the basis of the soils tested as part of the ground investigation, using the HazWasteOnline™ assessment. However, the formal classification of waste can only be undertaken on the material to be disposed of, and by the waste producer and the receiving landfill as license conditions vary from landfill to landfill.
- Basic Characterisation should be undertaken in accordance with Environment Agency guidance by the waste producer. Hydrock can assist if required and this report will assist the characterisation. However, Basic Characterisation does not form part of the current commission and would require further assessment and testing on the wastes actually to be disposed.
- Once the waste producer has undertaken an initial Basic Characterisation on each waste stream, they can manage the soils as part of the on-site processing programme (for example, stockpiling, treatment, screening and separation). The waste producer and landfill operator will then need to agree the suite of compliance testing for regularly generated waste to demonstrate compliance with the initial Basic Characterisation prior to disposal.
- At the time of disposal, additional testing on the excavated soils to be disposed of, will likely be necessary.

- Non-hazardous and hazardous soils require pre-treatment (separation, sorting and screening) prior to disposal.
- The costs for disposal of non-hazardous and hazardous soils are significant compared to disposal of inert material.
- In addition to disposal costs, landfill tax will be applicable. Non-hazardous and hazardous waste will generally be subject to the Standard Rate Landfill Tax. Inert or inactive waste will generally be subject to the Lower Rate Landfill Tax. The landfill tax value changes each April and can be found at <https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2013>.
- Before a waste producer can move waste to a landfill site for disposal, they need to check the landfill site has the appropriate permit and must have completed the following³:
 - Duty of care transfer note / Hazardous Waste consignment note, including comment as to if pre-treatment has been undertaken; and
 - Basic Characterisation of the waste, to include: description of the waste; waste code (using list of wastes); composition of the waste (by testing, if necessary) and; WAC testing (if required).

8.3 Materials management

8.3.1 Introduction

Soils that are to remain on site, should be managed and reused in accordance with a Materials Management Plan (MMP), prepared in accordance with 'The Definition of Waste: Development Industry Code of Practice', Version 2 (CL:AIRE), known as the DoWCoP. Where all aspects of the DoWCoP are followed the soils are considered not to be waste, because they were never discarded in the first place.

Version 2 of the DoWCoP clearly sets out the principles and an outline of the requirements of a MMP. The following compliance criteria must be seen to apply to the MMP for the site:

- Factor 1: Protection of human health and protection of the environment.
- Factor 2: Suitability for use, without further treatment.
- Factor 3: Certainty of Use.
- Factor 4: Fixed Quantity of Material.

The reuse of soils at sites should be considered during the planning and development design process so that compliance with issues such as fixed quantity and certainty of use clearly relate to agreed site levels. Suitability of Use is normally evident from the remediation strategy or the design statement, which form an integral part of a MMP. However, some soils may need to be tested post-excavation to prove they are suitable for use.

Once the MMP is finalised, it must be declared by a Qualified Person (QP). The Declaration is an on-line submission as part of which the QP is required to confirm that the declaration is being made before the relevant works have commenced (i.e. it is not a retrospective application).

³ ENVIRONMENT AGENCY. November 2010. Guidance on waste acceptance procedures and criteria. Waste acceptance at landfills. The Environment Agency.

Once all material movements have been completed in accordance with the MMP a verification report must be produced, kept for 2 years and provided to the EA on request.

It should be noted that failure to comply with the requirements of the DoWCoP when re-using materials has potentially significant consequences for the waste holder. The risk is that the reused materials are still regarded as a waste that has been illegally deposited. From 1 April 2018, the scope of Landfill Tax has been extended to sites operating without the appropriate environmental disposal permit, and operators of illegal waste sites will now be liable for Landfill Tax. Further information is available at: <https://www.gov.uk/government/publications/landfill-tax-disposals-not-made-at-landfill-sites/landfill-tax-disposals-not-made-at-landfill-sites>.

If soils are excavated and reused on sites (or moved to another site) without a MMP, exemption, or appropriate Permit in place, anyone who knowingly facilitates the disposal may be ‘*jointly and severally liable*’ to any assessment of tax, fines or prosecution.

8.3.2 *Materials management scenarios*

The materials management scenarios present on site are discussed below.

It should be noted that more than one scenario may apply, dependent upon where the soils are proposed for reuse.

Clean, naturally occurring materials – reused on the site of origin

Where soils are naturally occurring, uncontaminated and are reused on the site they are excavated (i.e. greenfield site with documented site history, with no Made Ground), they will fall outside the Waste Framework Directive (WFD) (i.e. they will not be a waste when reused on the site of origin).

However, there needs to be certainty of that reuse, and evidence is necessary to support this strategy, for example through information provided during the planning process. The onus is on the developer to demonstrate that the materials are not a waste and will never become a waste. As such, a Materials Re-use Strategy is recommended to show certainty. Alternatively, if the volume of material is under 1,000 tonnes, then a U1 waste exemption may be applied for from the Environment Agency.

It may be noted that some ‘clean naturally occurring materials’ may still fail the ‘suitable for use’ test, for example, soils with a naturally high organic content may not be suitable for use because of their propensity to produce ground gases such as methane. Rules regarding other more unusual circumstances such as where natural soils contain an unacceptably high mineral content are described in the DoWCoP.

Clean, naturally occurring materials – transferred to other sites

Where soils are naturally occurring, uncontaminated and are transferred to other sites (i.e. direct transfer), they will not become waste as long as the transfer is undertaken in accordance with the DoWCoP. A MMP must be prepared for the receiving site and the materials movement must be noted in the MMP of the Donor site. This movement must have been declared to CL:AIRE prior to the works commencing.

Made Ground and other contaminated soils

On sites where Made Ground or contaminated soils are present, any soils excavated will be a waste as soon as they are excavated (even if they are clean, naturally occurring materials), unless they are subject to reuse in accordance with the DoWCoP. As such, for any brownfield site or a site where Made Ground is present and soils are being moved and reused, the materials could be deemed a waste, subject to either:

- a Materials Management Plan (MMP), to prevent the material being classified as a waste following reuse; or
- an exemption (for limited volumes); or
- an environmental permit, dependant on its status.

Other commonly occurring circumstances are:

If Made Ground is being moved between sites, it must be ensured that appropriate permits are in place to ensure the soils are not classified as a waste. Made Ground cannot be moved between sites under DoWCoP alone and would require relevant permits as part of the MMP documentation for the Hub site the material is being treated at.

Made Ground and other contaminated soils

All recycled materials (6F2 etc.) must be produced under the 2013 WRAP 'Quality Protocol: Aggregates from inert waste', whether on site or off-site. If they are not, they will be deemed a waste and can only be used on site under a permit. More information can be found at <https://www.gov.uk/government/publications/quality-protocol-production-of-aggregates-frm-inert-waste>.

Geotechnical improvement requirements

Construction activities carried out on uncontaminated soils solely for the purpose of improving geotechnical properties e.g. lime / cement modification, are not generally regarded as waste treatment operations and do not require a permit.

However, should processing be needed (such as screening, treatment or improvement), that would constitute a waste activity and require a mobile treatment permit. This may be as simple as removing oversize material with an excavator bucket, to using a riddle bucket to remove hardcore to full mechanical screening.

9. UNCERTAINTIES AND LIMITATIONS

9.1 Site-specific comments

The western limit of the development site includes an area that presently comprises five residential properties and gardens. This area of the site could not be investigated. Although considered unlikely, the possibility of varied ground conditions or localised contamination cannot be ruled out in this area.

Windowless sampler boreholes undertaken at the site were progressed to refusal between 1.70m and 3.0m bgl where they terminated within very stiff or very dense soils. The underlying London Clay Formation was not encountered and its depth and geotechnical properties at the site are not known. Nearest BGS archive records, summarised in Section 2.6, shows that London Clay Formation in the area is typically found at shallow depth (around 3.0m bgl) in the area.

Due to high relative density or stiffness of the River Terrace Deposits below 3.0m, the recent investigations did not penetrate the full depth of the River Terrace Deposits meaning that the depth and geotechnical characteristics of the underlying London Clay Formation are not presently known. Therefore, if foundations require deepening due to proximity to trees beyond depth of 2.5m, supplementary investigation may be required to inform deep foundation or pile design.

9.2 General comments

Hydrock Consultants Limited (Hydrock) has prepared this report in accordance with the instructions of Taylor Wimpey UK Ltd (Southern Counties) (the Client), by e-mail dated 10th August 2020 under the terms of appointment for Hydrock, for the sole and specific use of the Client and parties commissioned by them to undertake work where reliance is placed on this report. Any third parties who use the information contained herein do so at their own risk. Hydrock shall not be responsible for any use of the report or its contents for any purpose other than that for which it was prepared or for use of the report by any parties not defined in Hydrock's appointment.

This report details the findings of work carried out in October 2020. The report has been prepared by Hydrock on the basis of available information obtained during the study period. Although every reasonable effort has been made to gather all relevant information, not all potential environmental constraints or liabilities associated with the site may have been revealed.

Hydrock has used reasonable skill, care and diligence in the design of the investigation of the site and in its interpretation of the information obtained. The inherent variation of ground conditions allows only definition of the actual conditions at the locations and depths of trial pits and boreholes at the time of the investigation. At intermediate locations, conditions can only be inferred.

Groundwater data are only representative of the dates on which they were obtained and both levels and quality may vary.

Unless otherwise stated, the recommendations in this report assume that ground levels will remain as existing. If there is to be any re-profiling (e.g. to create development platforms or for flood alleviation) then the recommendations may not apply.

Information provided by third parties has been used in good faith and is taken at face value; however, Hydrock cannot guarantee its accuracy or completeness.

Where the existing documentation prepared by others have been provided by the Client, it is assumed that these have been either commissioned by the Client, or can be assigned to the Client, and can be relied upon by Hydrock. Should this not be the case Hydrock should be informed immediately as additional work may be required. Hydrock is not responsible for any factual errors or omissions in the supplied data, or for the opinions and recommendations of others. It is possible that the conditions described may have since changed through natural processes or later activities.

The work has been carried out in general accordance with recognised best practice. The various methodologies used are referenced in Appendix J. Unless otherwise stated, no assessment has been made for the presence of radioactive substances or unexploded ordnance. Where the phrase 'suitable for use' is used in this report, it is in keeping with the terminology used in planning control and does not imply any specific warranty or guarantee offered by Hydrock.

The chemical analyses reported were scheduled for the purposes of risk assessment with respect to human health, plant life and controlled waters as discussed in the report. Whilst the results may be useful in applying the Hazardous Waste Assessment Methodology given in Environment Agency Technical Guidance WM3, they are not primarily intended for that purpose and additional analysis will be required at the time of disposal to fully classify waste. Discussion and comment with regards to waste classification are preliminary and do not form the requirements of 'Basic Characterisation' as required.

Assessment and testing for the presence of coal tar has only been completed at the locations of exploratory holes undertaken for risk assessment purposes. This investigation is not designed to provide a definitive assessment of the risk from coal tar, nor the waste classification for bituminous bound pavement arisings at the site.

Unless otherwise stated, at the time of this investigation the future routes of water supply pipes had not been established. This investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling and chemical testing may be required at a later date once the routes of the supply pipes are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

Whilst the preliminary risk assessment process has identified potential risks to construction workers, consideration of occupational health and safety issues is beyond the scope of this report.

Please note that notwithstanding any site observations concerning the presence or otherwise of archaeological sites, asbestos-containing materials or invasive weeds, this report does not constitute a formal survey of these potential constraints and specialist advice should be sought.

Any site boundary line depicted on plans does not imply legal ownership of land.

10. RECOMMENDATIONS FOR FURTHER WORK

Following the ground investigation works undertaken to date, the following further works will be required:

- demolition asbestos survey prior to demolition of the five properties in the west of the site, constructed in the 1980s;
- care taken to avoid asbestos from demolished buildings entering the soils;
- discussion and agreement with utility providers regarding the materials suitable for pipework;
- discussions with regulatory bodies and the warranty provider regarding the conclusions of this report;
- arboricultural tree survey;
- assessment of tree influence on foundations and design of foundations;
- supplementary investigation to inform deepened foundations (piled foundation solution),
- discussions with piling Contractors regarding conclusions of this report and design of the piles, if required;
- production of a Remediation Strategy and Verification Plan (and agreement with the regulatory bodies and the warranty provider);
- production of a Materials Management Plan relating to reuse of soils at the site and import of soils to the site (if appropriate);
- remediation and mitigation works; and
- verification of the remediation and mitigation works.

Other constraints such as ecological precautions may also be required, as recommended in specialist reports by others.

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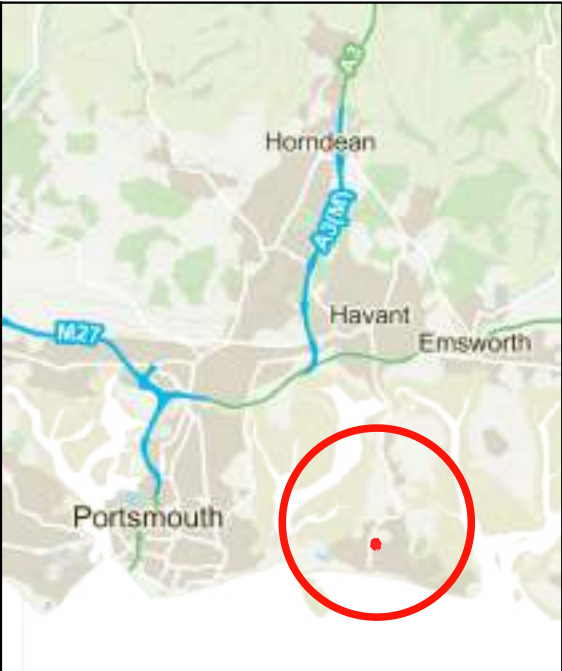
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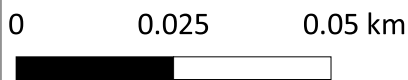
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Appendix A

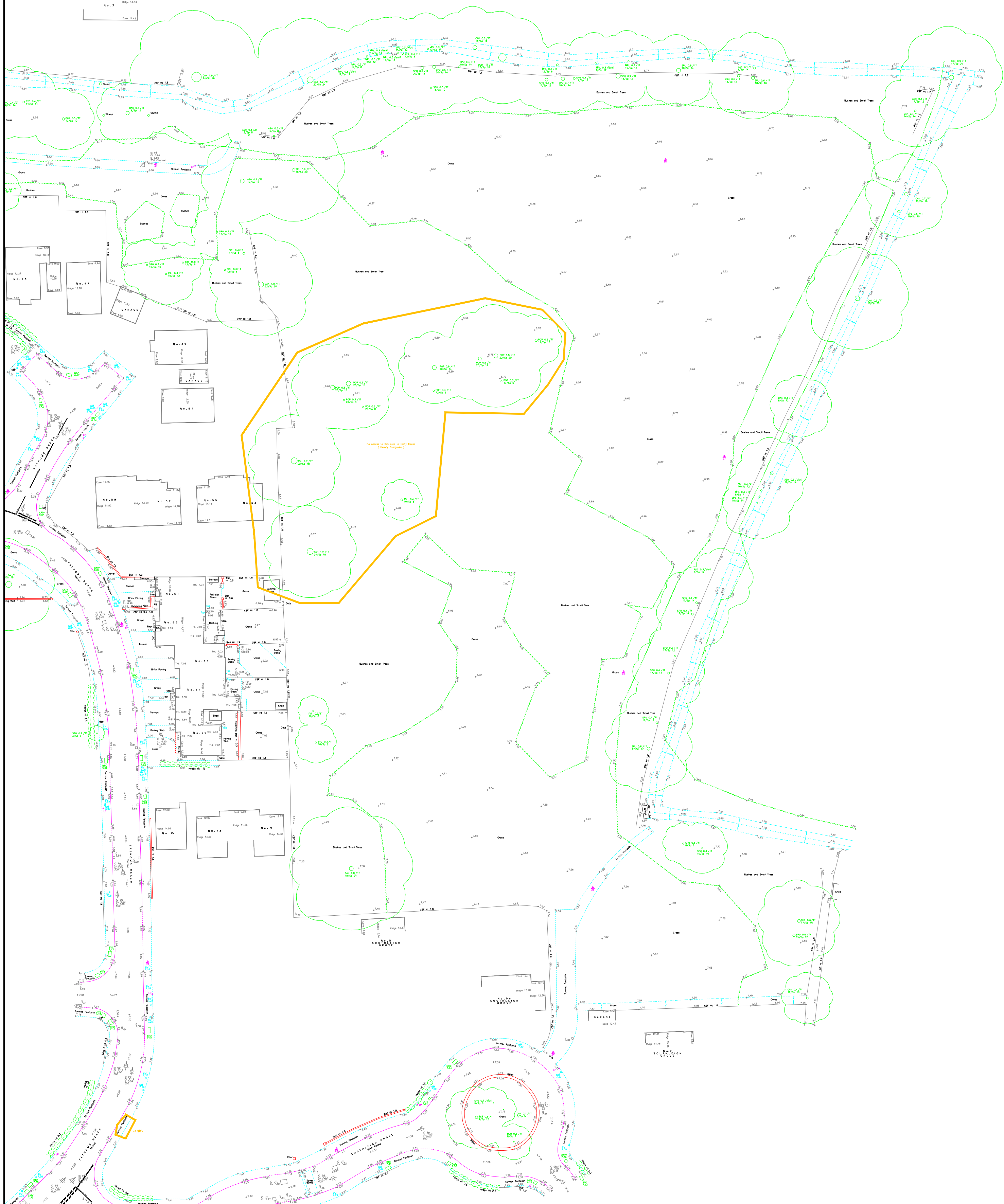
Drawings



KEY PLAN Site Boundary	NOTES Site Plan for indicative purposes only. - Contains OS data © Crown copyright and database right 2020 - Where you use Code-Point Open data, you must also use the following attribution statements: - Contains Royal Mail data © Royal Mail copyright and Database right 2020 - Contains National Statistics data © Crown copyright and database right 2020	REVISIONS				Hydrock Hydrock White Building 1-4 Cumberland Place Southampton SO15 2NP Tel: +44 (0)2382 140 907	TITLE Site Location Plan		
		P01	FIRST ISSUE EXAMPLE				CLIENT Taylor Wimpey UK Ltd.	HYDROCK PROJECT NO. 16117-GELS	SCALE @ A3 As shown
			DRAWN BY YP	CHECKED BY AJ	APPROVED BY AJ	DATE 30/09/2020			
		REV.	REVISION NOTES/COMMENTS				PROJECT Land at Fathoms Reach, Hayling Island	DRAWING NO. 16117-HYD-XX-XX-DR-GE-1000	REVISION P01
DRAWN BY YP	CHECKED BY AJ		APPROVED BY AJ	DATE 30/09/2020					
						PURPOSE OF ISSUE SUITABLE FOR INFORMATION		STATUS S2	



KEY PLAN		NOTES Site Plan for indicative purposes only. - Contains OS data © Crown copyright and database right 2020 - Where you use Code-Point Open data, you must also use the following attribution statements: - Contains Royal Mail data © Royal Mail copyright and Database right 2020 - Contains National Statistics data © Crown copyright and database right 2020		REVISIONS		Hydrock Hydrock White Building 1-4 Cumberland Place Southampton SO15 2NP Tel: +44 (0)2382 140 907		TITLE Exploratory Hole Location Plan			
Site Boundary						HYDROCK PROJECT NO. 16117-GELS		SCALE @ A3 1:1,200			
Locations						CLIENT TAYLOR WIMPEY UK LTD.		PURPOSE OF ISSUE SUITABLE FOR INFORMATION		STATUS S2	
Trial Pit				P01	ORIGINAL ISSUE		PROJECT FATHOMS REACH, HAYLING ISLAND		DRAWING NO. 16117-HYD-XX-XX-DR-GE-1002		REVISION P01
Hand Pit					DRAWN BY YP	CHECKED BY AJ	APPROVED BY AJ	DATE 16/11/2020			
Window Sampling		REV.	REVISION NOTES/COMMENTS								
Soakaway			DRAWN BY YP	CHECKED BY AJ	APPROVED BY AJ	DATE 16/11/2020					
Installation											



KEY

NOTES

1. All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.

2. This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.

3. This drawing has been based on the following drawings and information:
Digital Terrain Surveys LLP drawing number: DTS270720-SW2A dated: May 2017.

PO1	FIRST ISSUE				
	SD	25/11/2020	YP	25/11/2020	AJ
REV.	REVISION NOTES/COMMENTS				
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY



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CLIENT

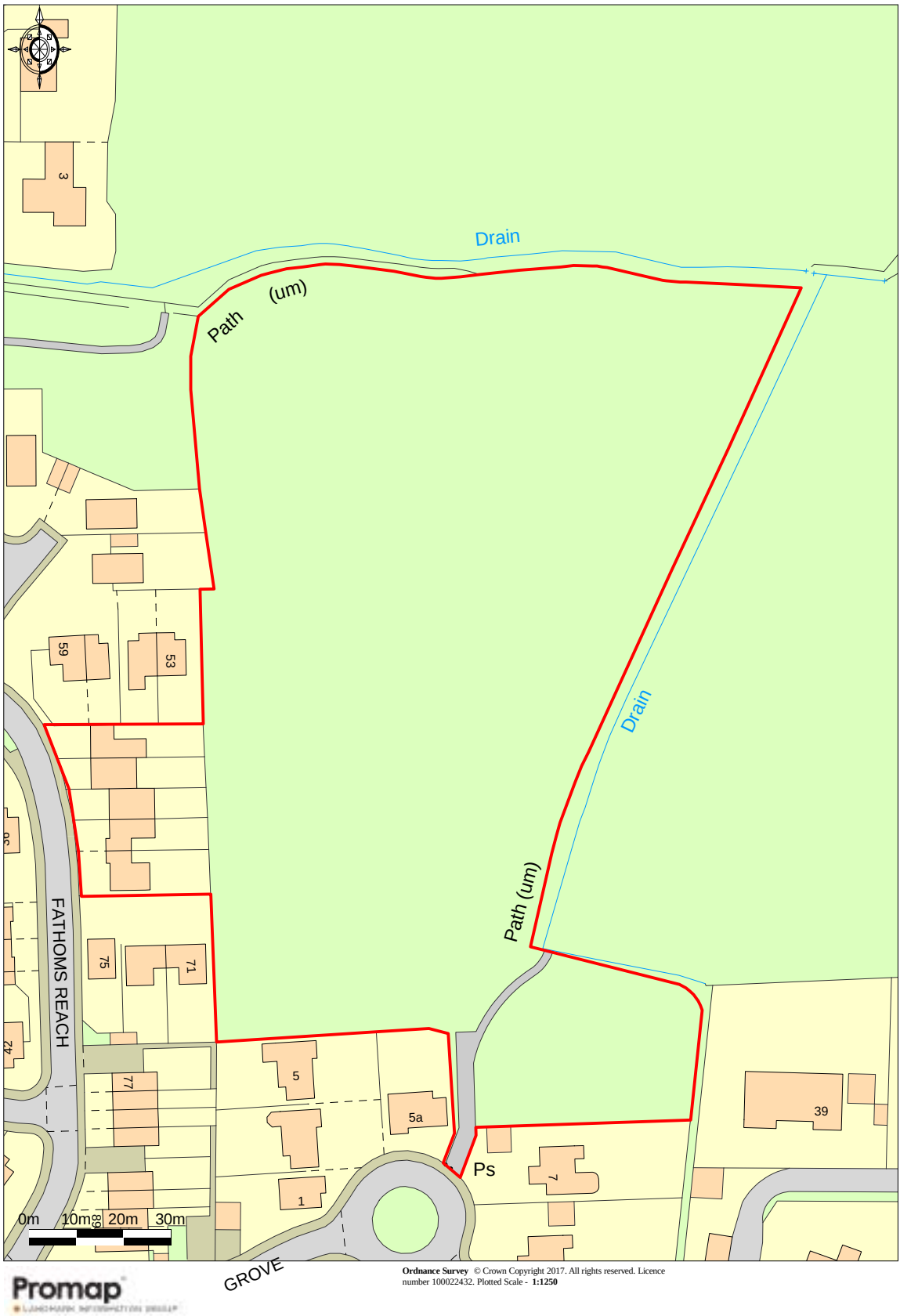
Taylor Wimpey Southern Counties

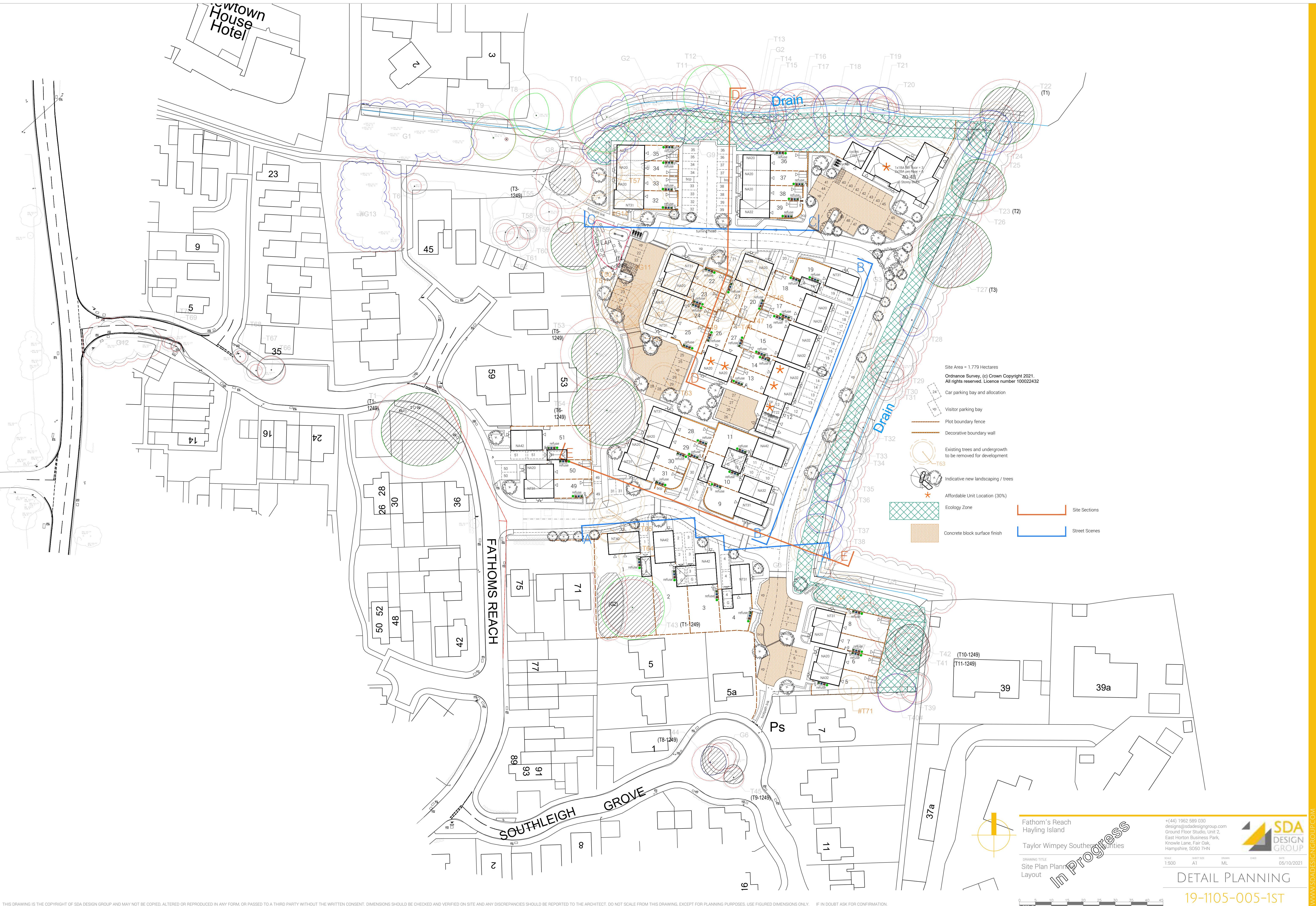
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Fathoms Reach, Hayling Island

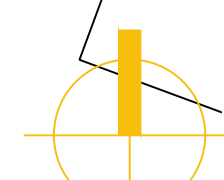
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DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)		REVISION	
16117-HYD-XX-ZZ-DR-GE-1001		P01	

Location Plan - Land at Fathoms Reach Hayling Island





- Site Area = 1.779 Hectares
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- Car parking bay and allocation
 - Visitor parking bay
 - Plot boundary fence
 - Decorative boundary wall
 - Existing trees and undergrowth to be removed for development
 - Indicative new landscaping / trees
 - Affordable Unit Location (30%)
 - Ecology Zone
 - Concrete block surface finish
 - Site Sections
 - Street Scenes



Fathom's Reach
Hayling Island
Taylor Wimpey Southern Counties

In Progress

+ (44) 1962 589 030
designs@sdadesigngroup.com
Ground Floor Studio, Unit 2,
East Horton Business Park,
Knowle Lane, Fair Oak,
Hampshire, SO50 7HN

SDA
DESIGN
GROUP

DRAWING TITLE: Site Plan Planning Layout
SCALE: 1:500
SHEET SIZE: A1
DRAWN: ML
CHECKED: ML
DATE: 05/10/2021

DETAIL PLANNING
19-1105-005-1ST

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Appendix B

Field Reconnaissance Photographs

DS Photograph 1	
Date: 26/08/2020	
Direction Photograph Taken: Looking East	
Description: View of Southleigh Grove Roundabout and residential housing estate	

DS Photograph 2	
Date: 26/08/2020	
Direction Photograph Taken: Looking North	
Description: Entrance to the site through Southleigh Grove roundabout	

DS Photograph 3	
Date: 26/08/2020	
Direction Photograph Taken: Looking North	
Description: Pavement at the site entrance through Southleigh Grove Roundabout	

DS Photograph 4	
Date: 26/08/2020	
Direction Photograph Taken: Looking North	
Description: Pavement at the site entrance through Southleigh Grove Roundabout	

DS Photograph 5	
Date: 26/08/2020	
Direction Photograph Taken: Looking South	
Description: Pavement at the entrance of the Southleigh Grove Roundabout	

DS Photograph 6	
Date: 26/08/2020	
Direction Photograph Taken: North	
Description: Public footpath at the East side of the site	

DS Photograph 7	
Date: 26/08/2020	
Direction Photograph Taken: Looking North East	
Description: Evidence of drainage between footpath and Agricultural Field along the East side of the site	

DS Photograph 8	
Date: 26/08/2020	
Direction Photograph Taken: East	
Description: Agricultural Field located at the East of the site	

DS Photograph 9	
Date: 26/08/2020	
Direction Photograph Taken: North	
Description: Mature trees along the north boundary of the site.	

DS Photograph 10	
Date: 26/08/2020	
Direction Photograph Taken: West	
Description: Public footpath surrounded by mature trees (to the left) and drainage and vegetation (to the right) along the north boundary of the site.	

DS Photograph 11	
Date: 26/08/2020	
Direction Photograph Taken: North	
Description: Grass at the north side of the site. Mature trees at the north boundary.	

DS Photograph 12	
Date: 26/08/2020	
Direction Photograph Taken: Looking East	
Description: Access to the side through north west	

DS Photograph 13	
Date: 26/08/2020	
Direction Photograph Taken: Looking west	
Description: Access to the site by small pathway towards Manor Rd	

DS Photograph 14	
Date: 26/08/2020	
Direction Photograph Taken: South	
Description: Brambles and vegetation at the south of the site	

DS Photograph 15	
Date: 26/08/2020	
Direction Photograph Taken: Looking North West	
Description: High grass and brambles located in the middle of the site. Mature trees on the west boundary can be seen at the back.	

DS Photograph 16	
Date: 26/08/2020	
Direction Photograph Taken: Looking west	
Description: Grass and dense brambles at the west boundary of the site. Residential housing at the back.	

DS Photograph 17	
Date: 26/08/2020	
Direction Photograph Taken: Looking North	
Description: Residential housing and mature trees along the west boundary of the site.	

DS Photograph 18	
Date: 26/08/2020	
Direction Photograph Taken: Looking South	
Description: Evidence of rubbish along the north boundary of the site	

DS Photograph 19	
Date: 26/08/2020	
Direction Photograph Taken: Looking North	
Description: Evidence of rubbish at the west boundary of the site	

DS Photograph 20	
Date: 26/08/2020	
Direction Photograph Taken: Looking North	
Description: Heavy vegetation (brambles) at the middle of the site	

DS Photograph 21	
Date: 26/08/2020	
Direction Photograph Taken: Looking North	
Description: Sporadic trees along the site.	

DS Photograph 22	
Date: 26/08/2020	
Direction Photograph Taken: Looking East	
Description: Vegetation at the south of the East boundary of the site, next to pavement entrance through Southleigh Grove	

DS Photograph 23	
Date: 26/08/2020	
Direction Photograph Taken: Looking South	
Description: Vegetation at the south of the East boundary of the site	

DS Photograph 24	
Date: 26/08/2020	
Direction Photograph Taken: Looking South East	
Description: Vegetation at the south of the East boundary of the site	

Appendix C

Historical Ordnance Survey Maps

Site Details:

STREET RECORD, FATHOMS
REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1866

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1866
Revised 1888
Edition N/A
Copyright N/A
Levelled N/A

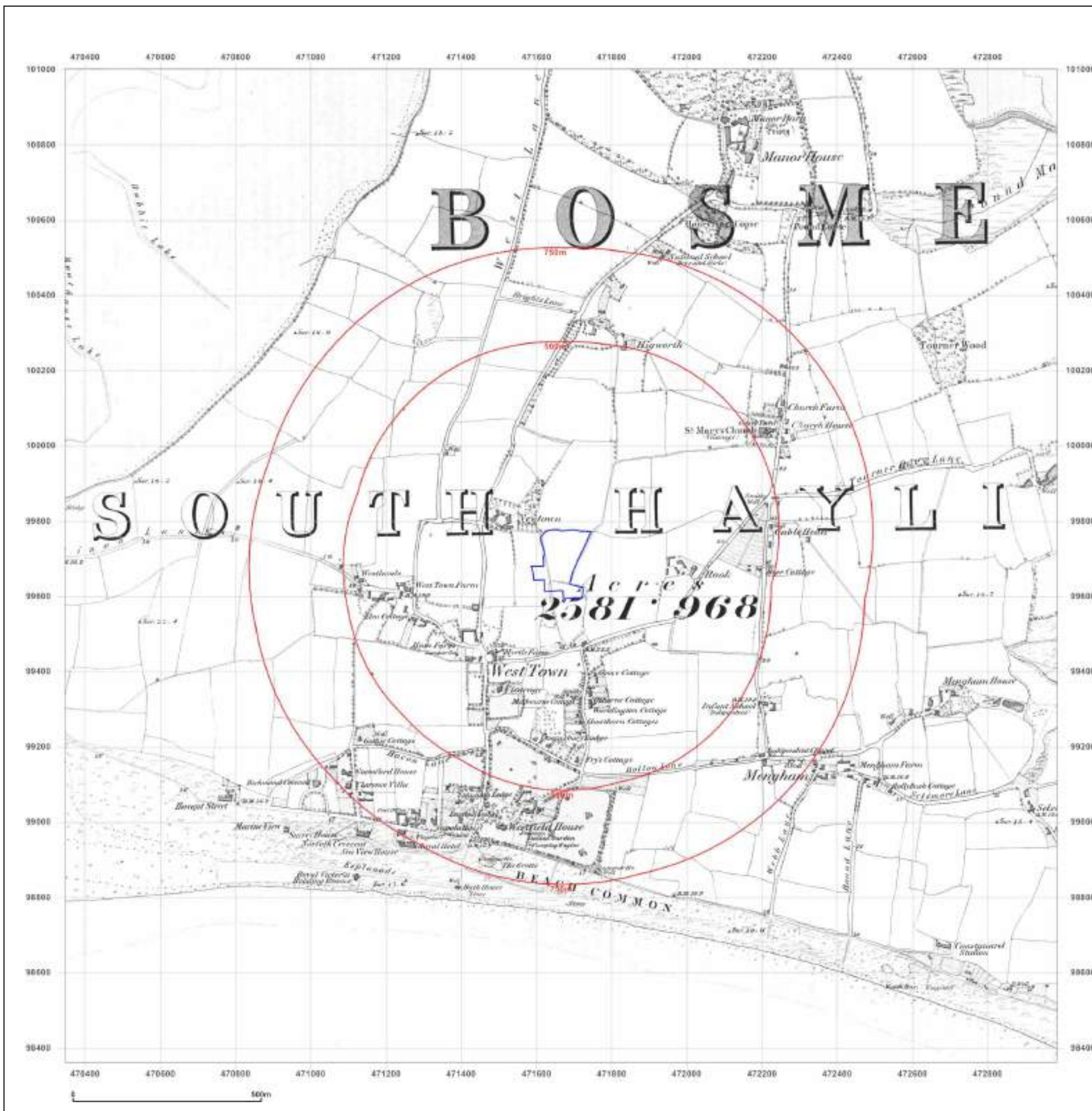


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REACH, HAYLING ISLAND,
PO11 0RR

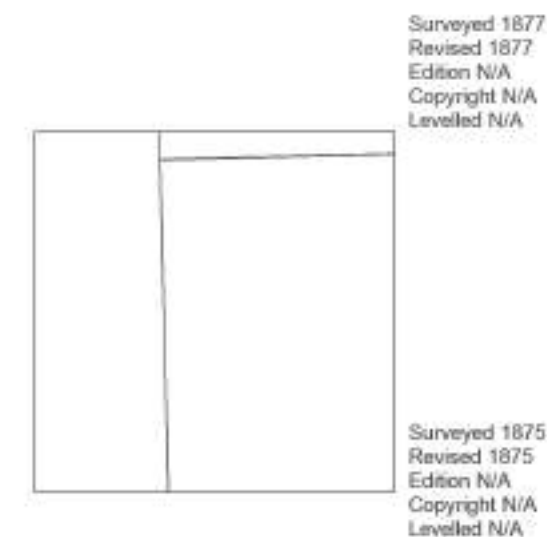
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Printed at: 1:10,560

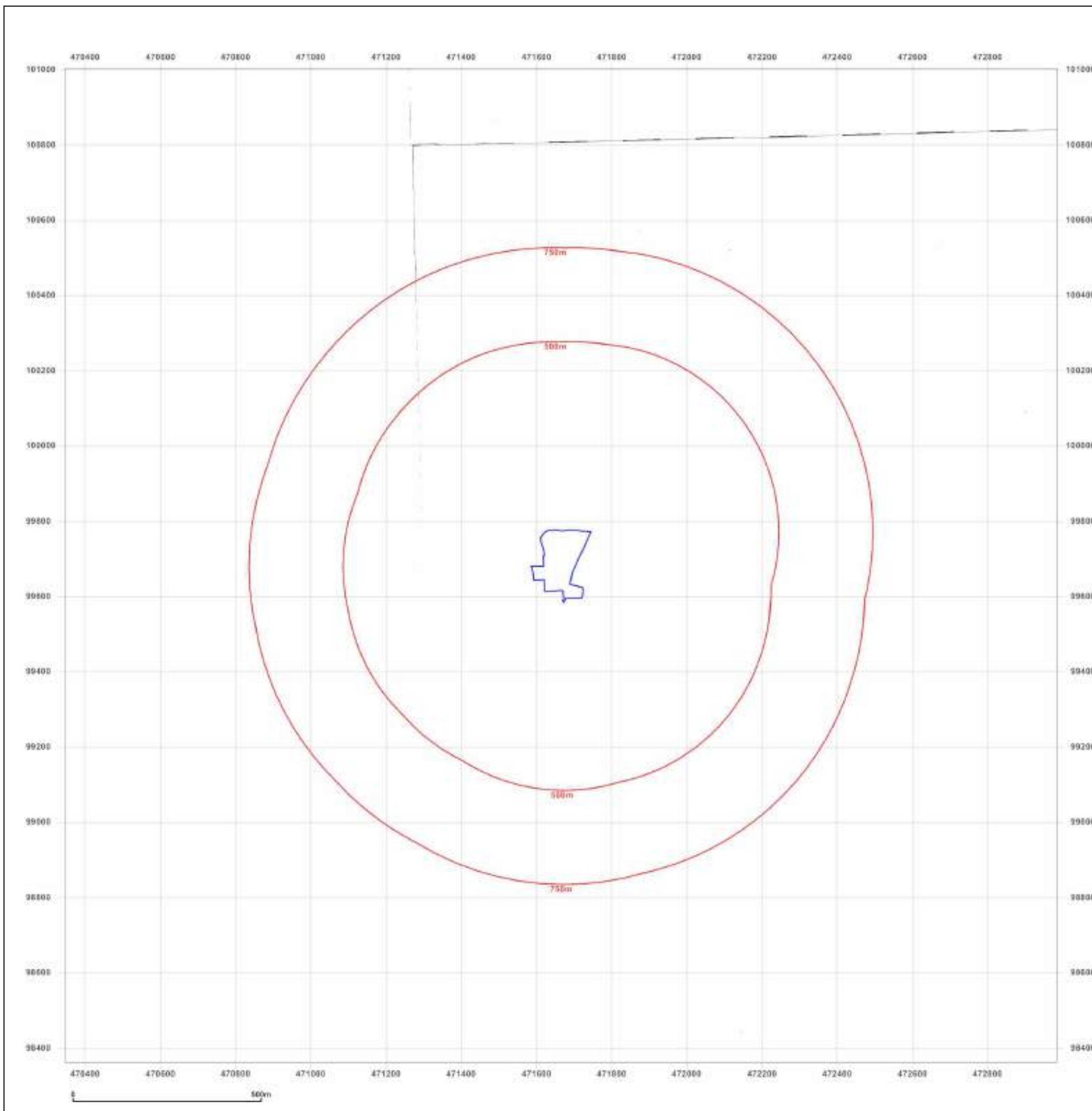


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Site Details:

STREET RECORD, FATHOMS
REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1896-1898

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1868
Revised 1896
Edition N/A
Copyright N/A
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Surveyed 1873
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1866
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Copyright N/A
Levelled N/A

Surveyed 1875
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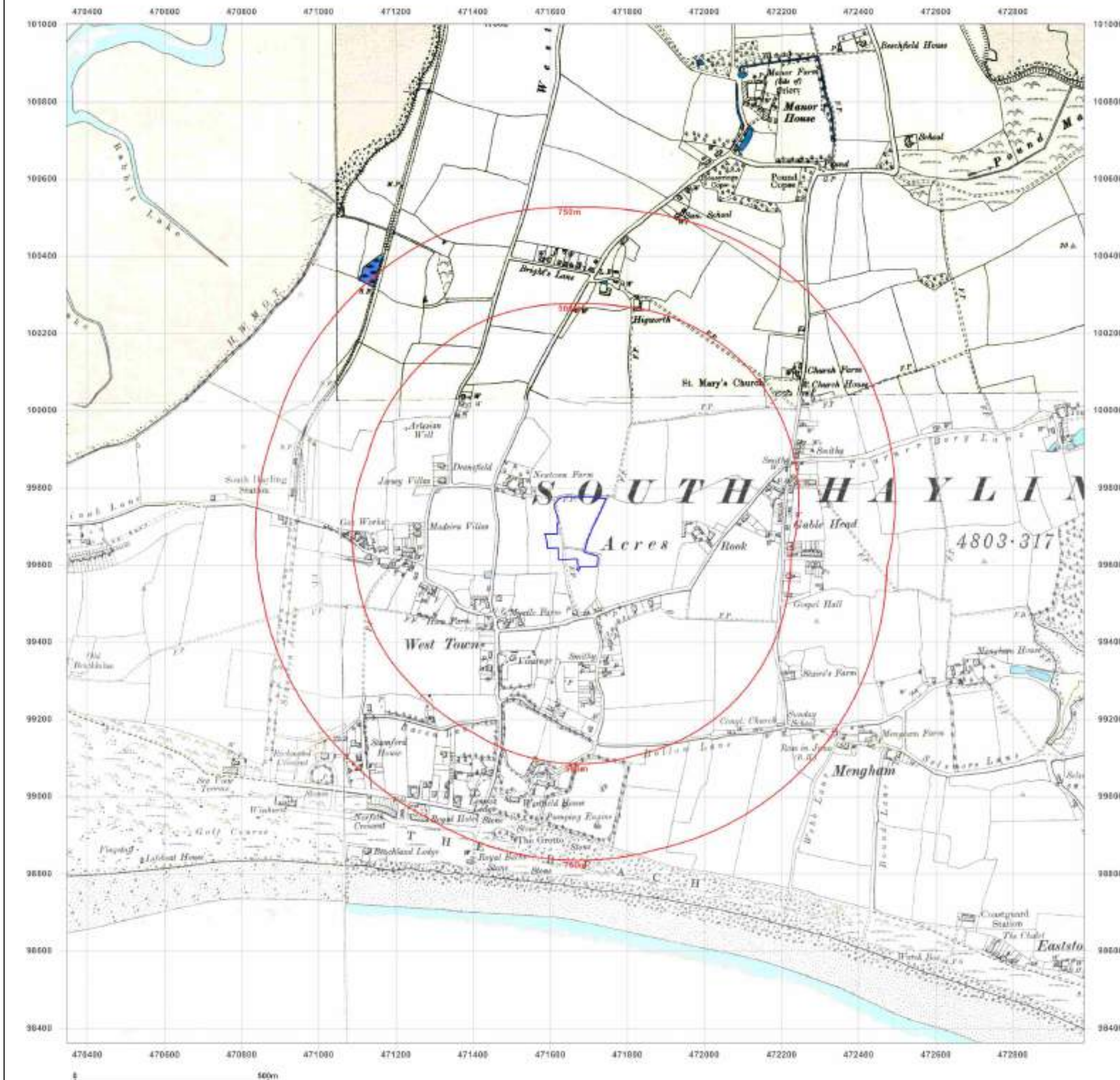


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Site Details:

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REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1896-1898

Scale: 1:10,560

Printed at: 1:10,560



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

Surveyed 1888
Revised 1896
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1866
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1875
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A



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Site Details:

STREET RECORD, FATHOMS
REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1907

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1858
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1858
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1858
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1858
Revised 1907
Edition N/A
Copyright N/A
Levelled N/A

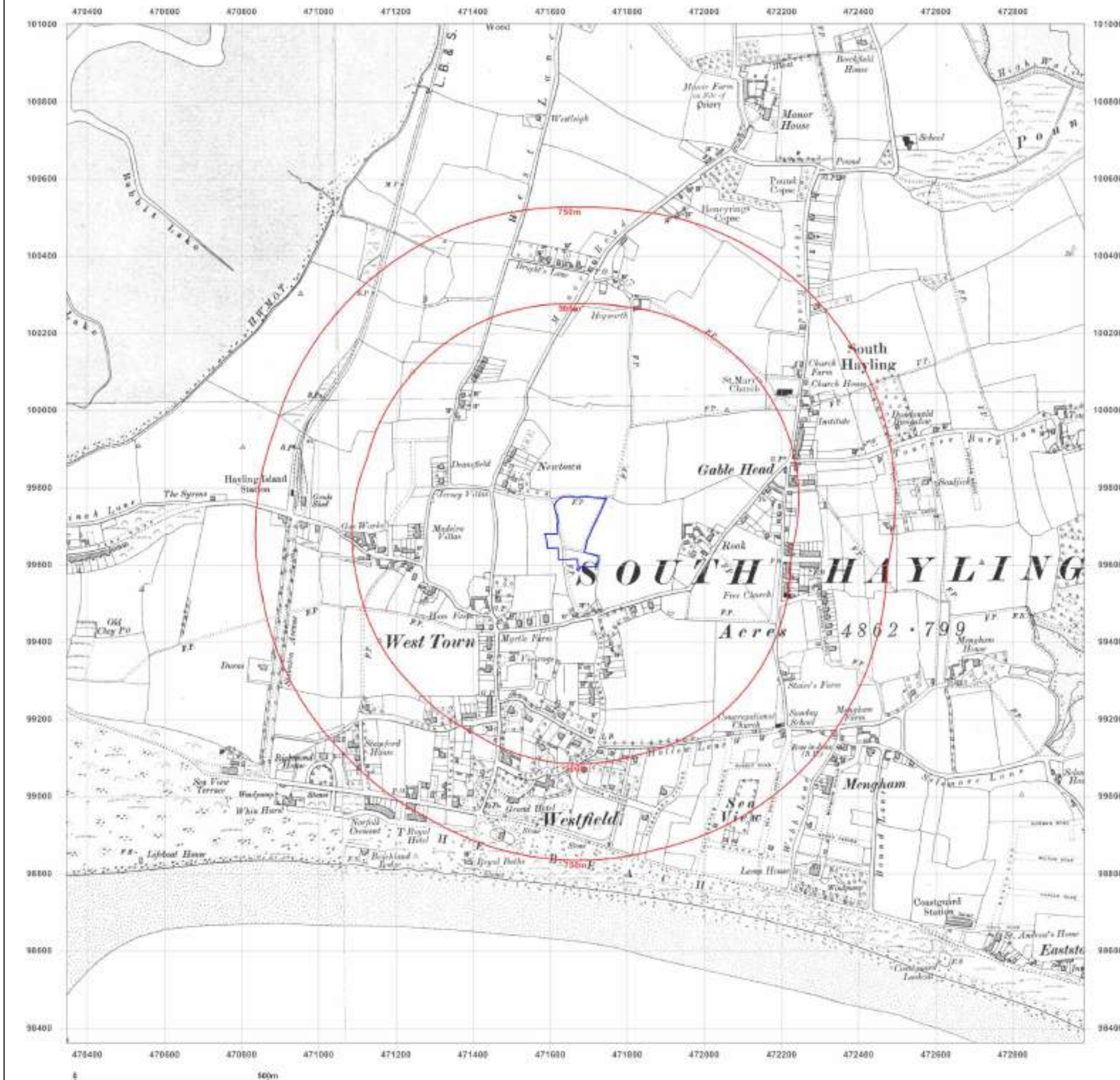


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Site Details:

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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1909-1911

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1873
Revised 1911
Edition N/A
Copyright N/A
Levelled N/A

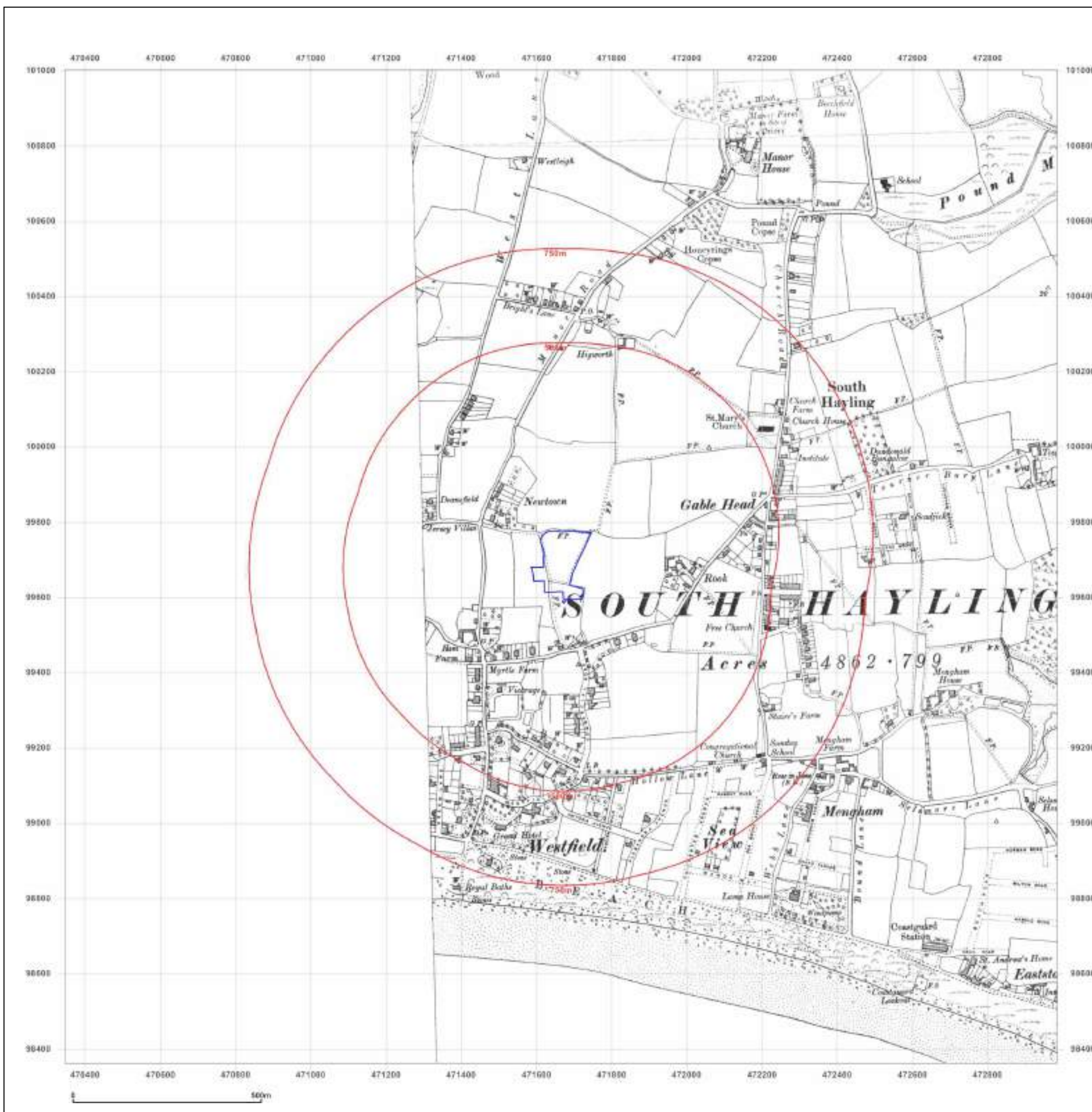


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REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1909-1913

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1873
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1873
Revised 1913
Edition 1913
Copyright N/A
Levelled N/A

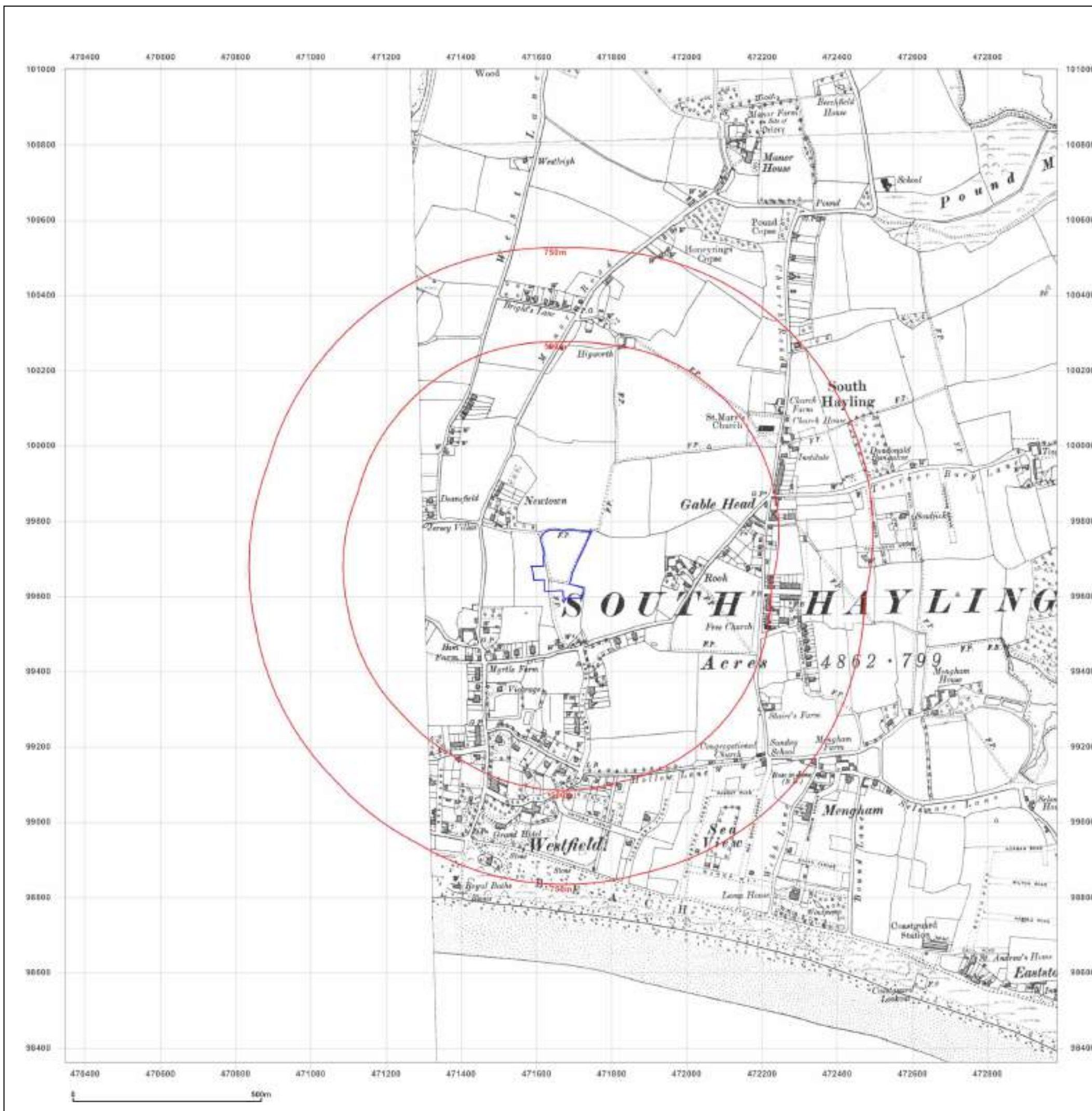


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

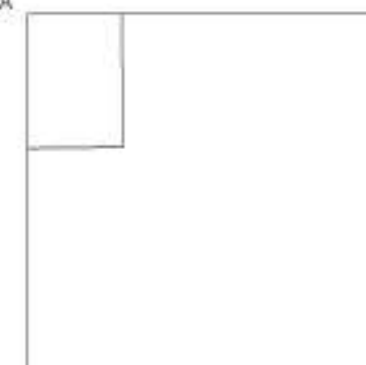
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Surveyed 1858
Revised 1931
Edition N/A
Copyright N/A
Levelled N/A

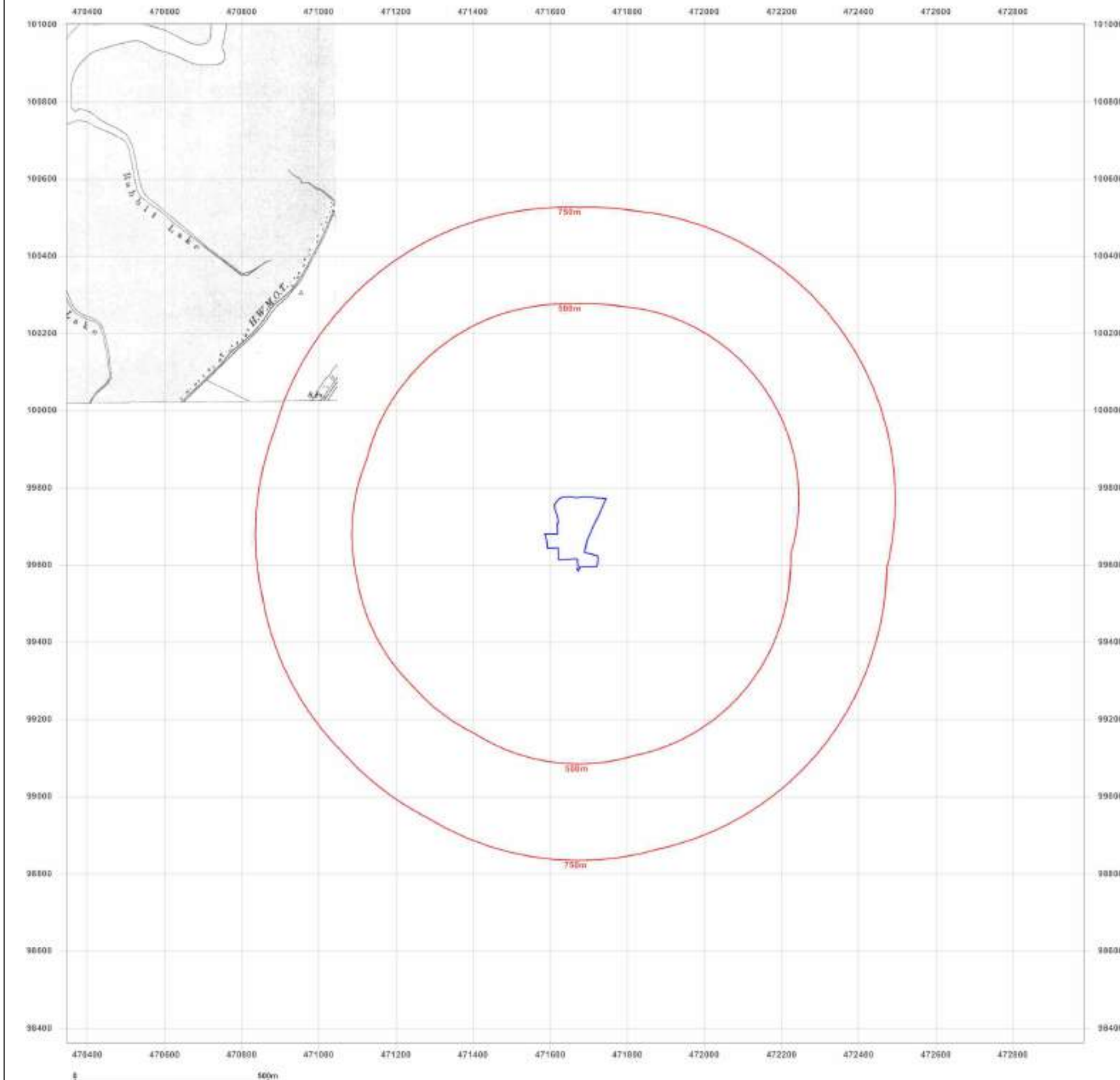


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1938-1942

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1858
Revised 1942
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1858
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1858
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1858
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

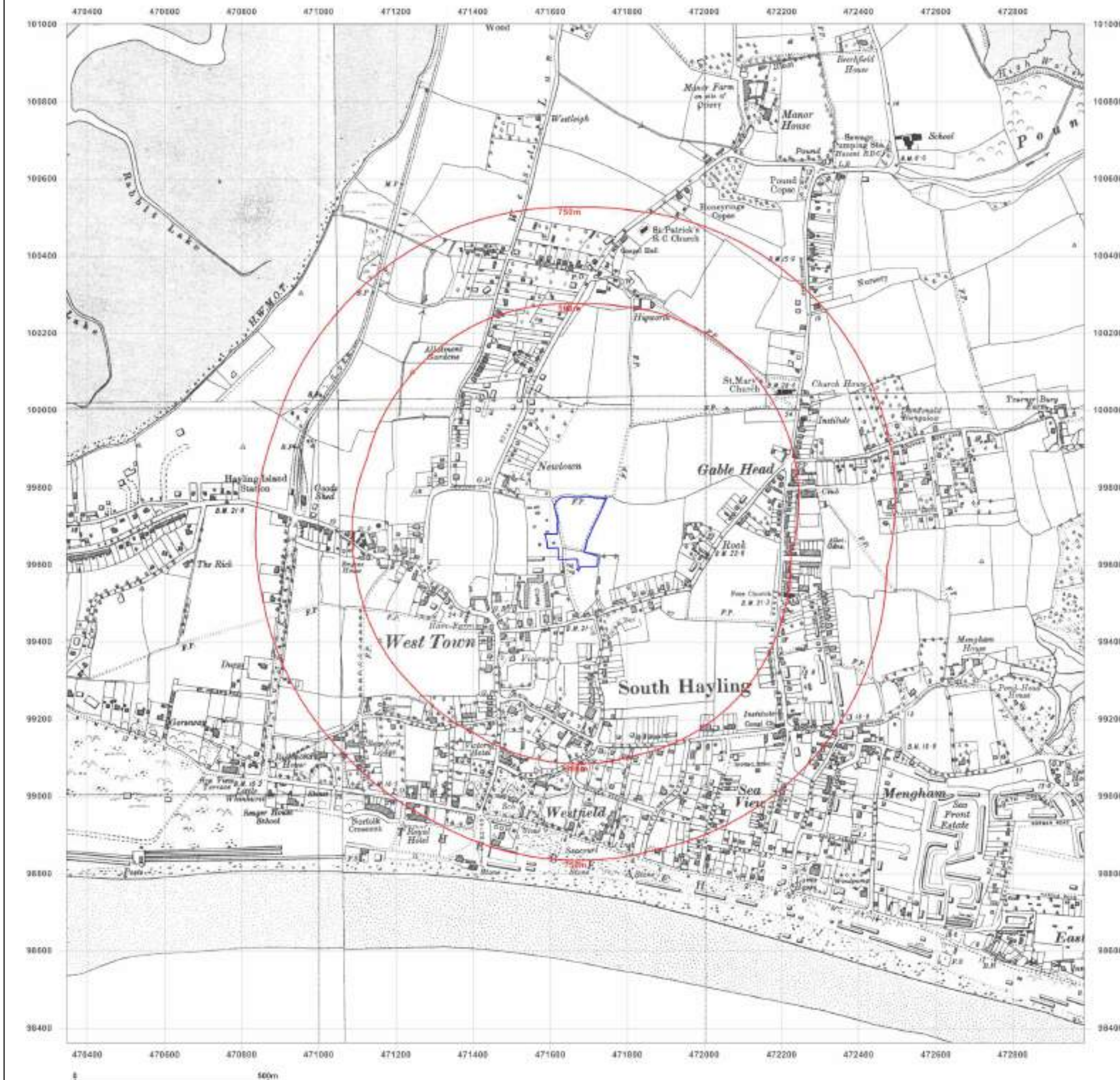


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: Provisional

Map date: 1957

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1957
Revised 1957
Edition N/A
Copyright N/A
Levelled N/A

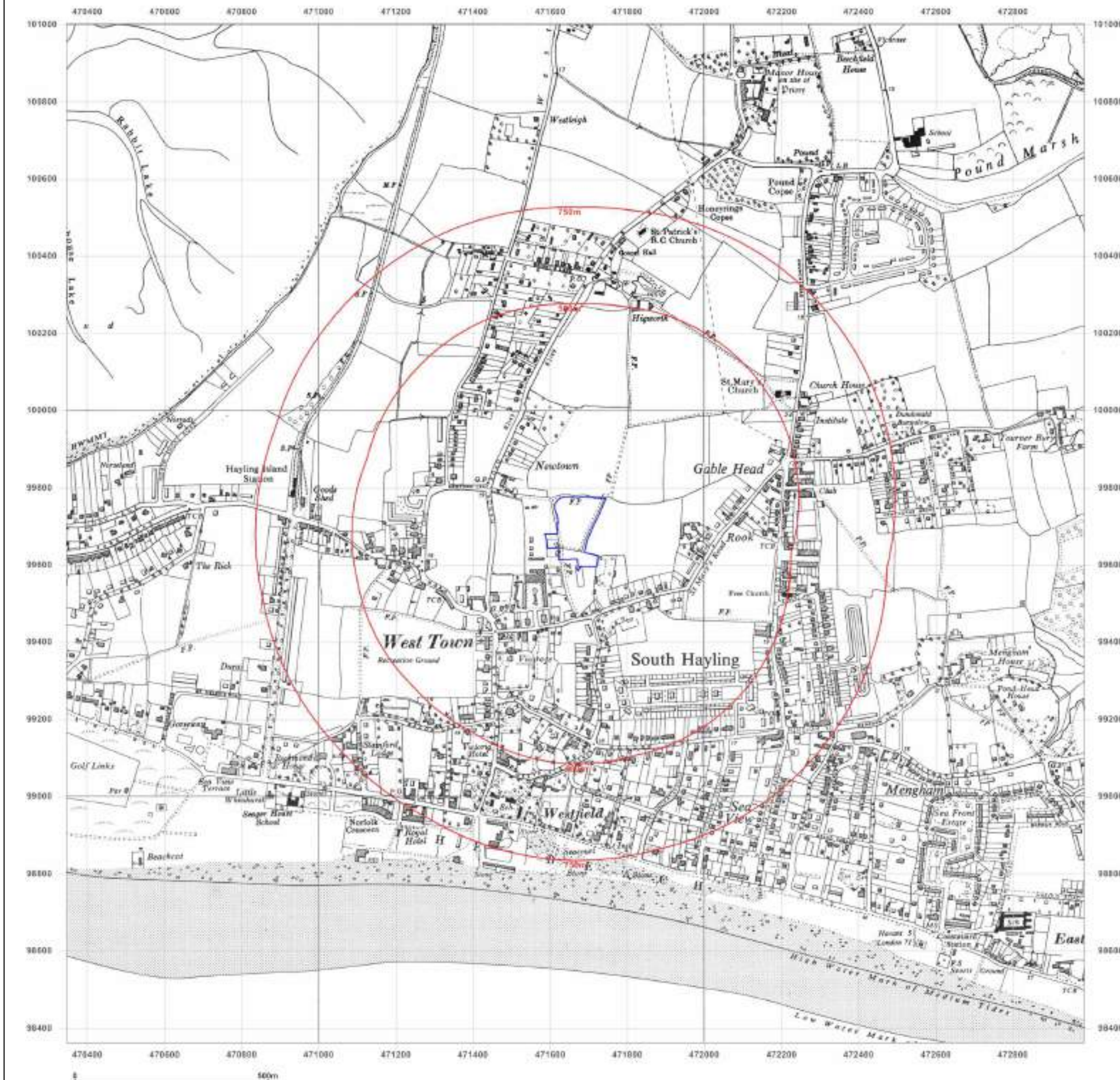


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

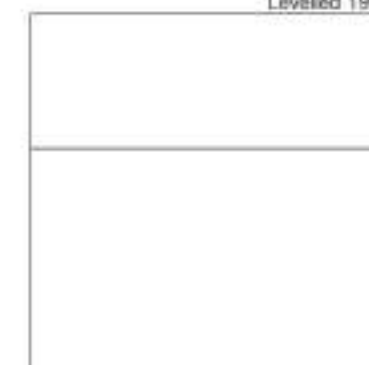
Map date: 1972

Scale: 1:10,000

Printed at: 1:10,000



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

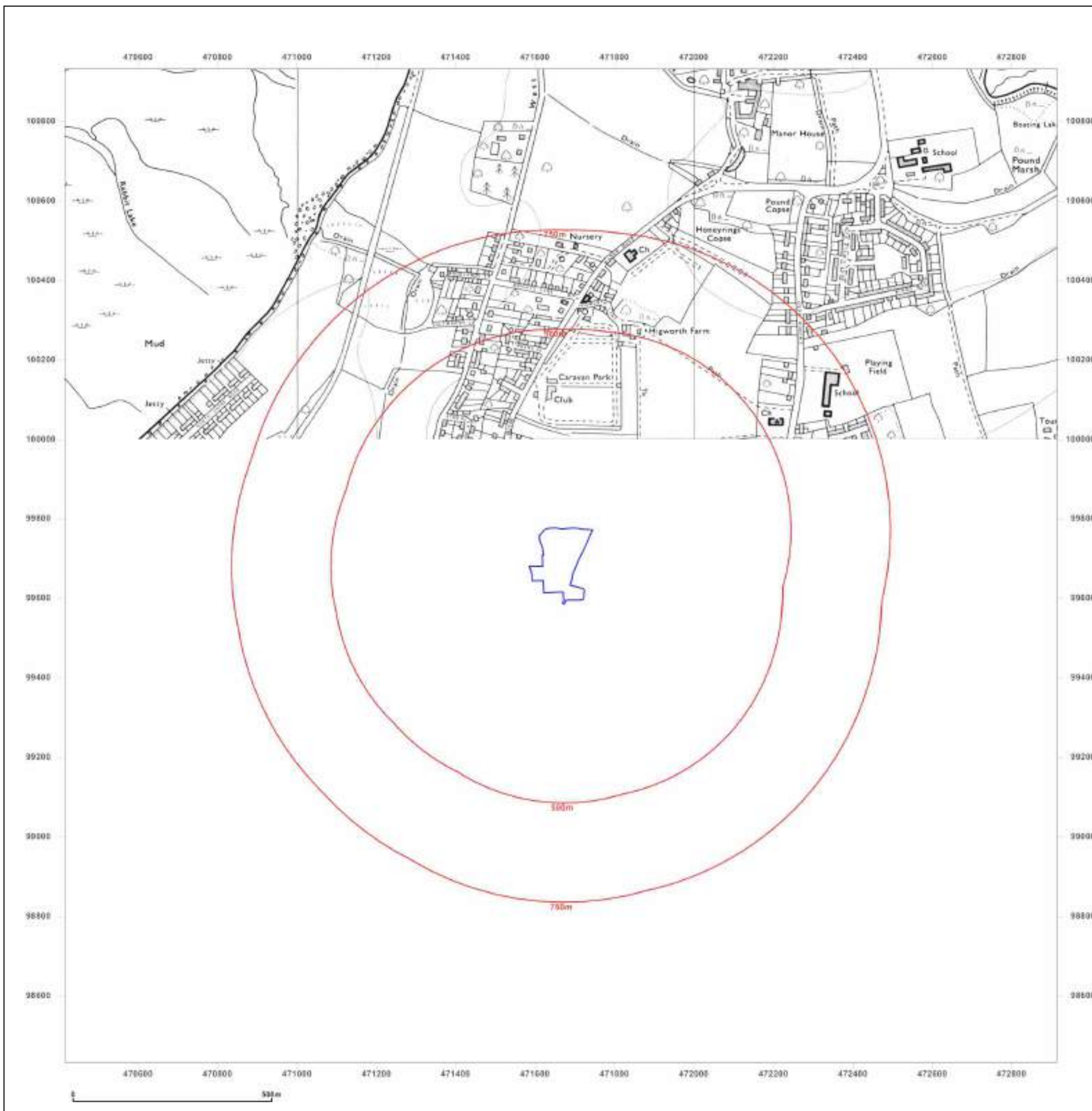


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1990

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1989
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

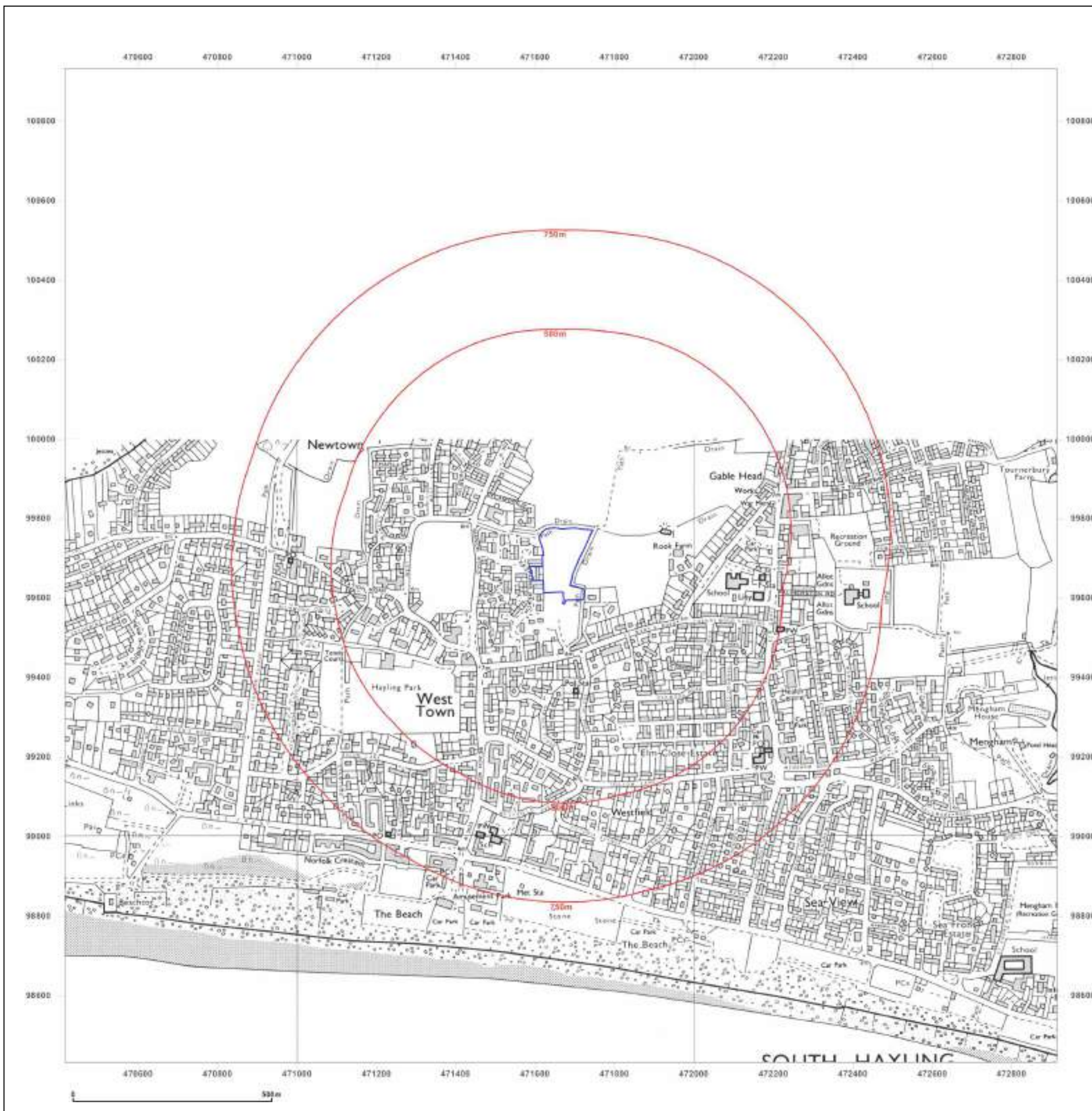


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 2001

Scale: 1:10,000

Printed at: 1:10,000

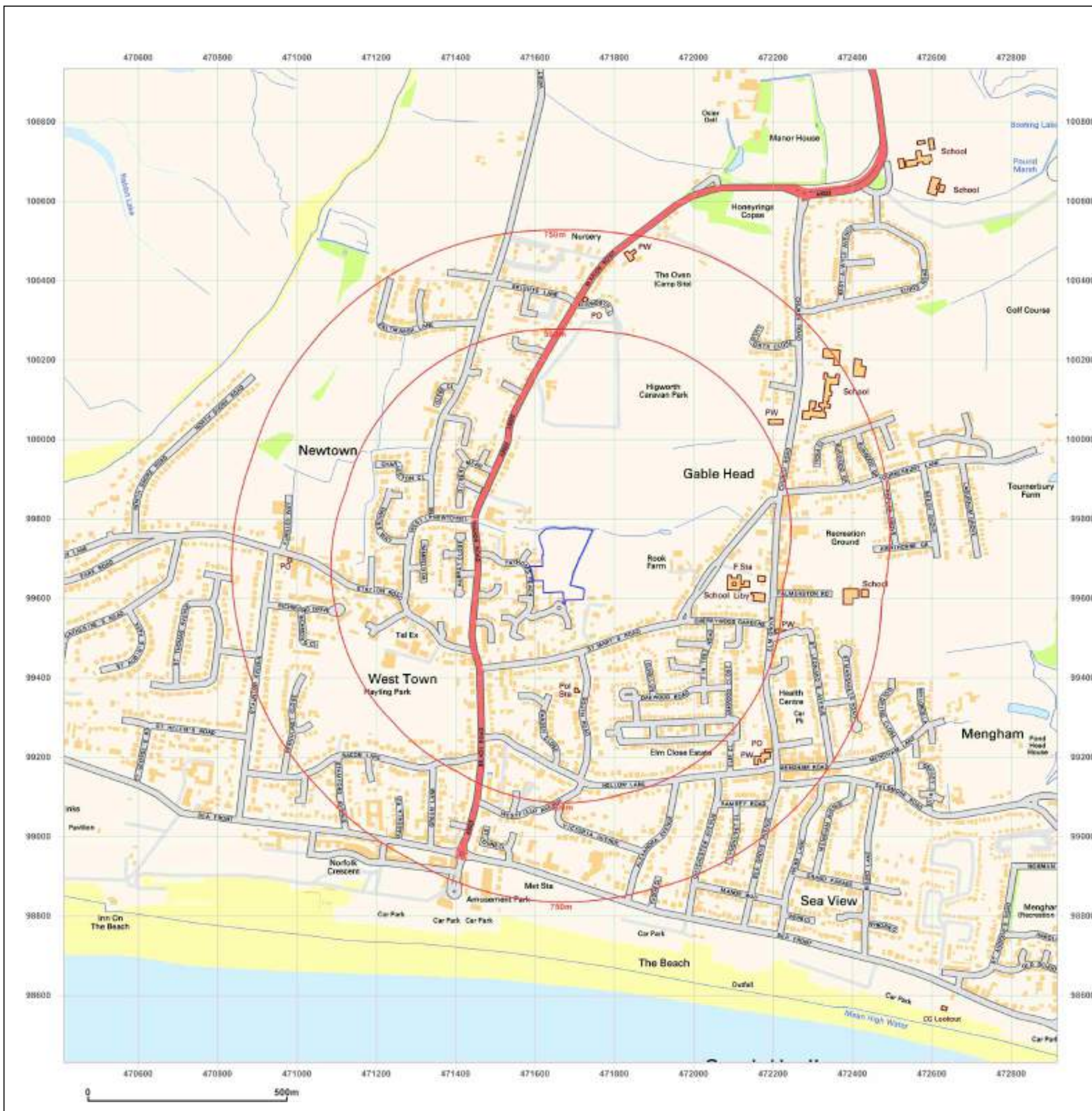


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000

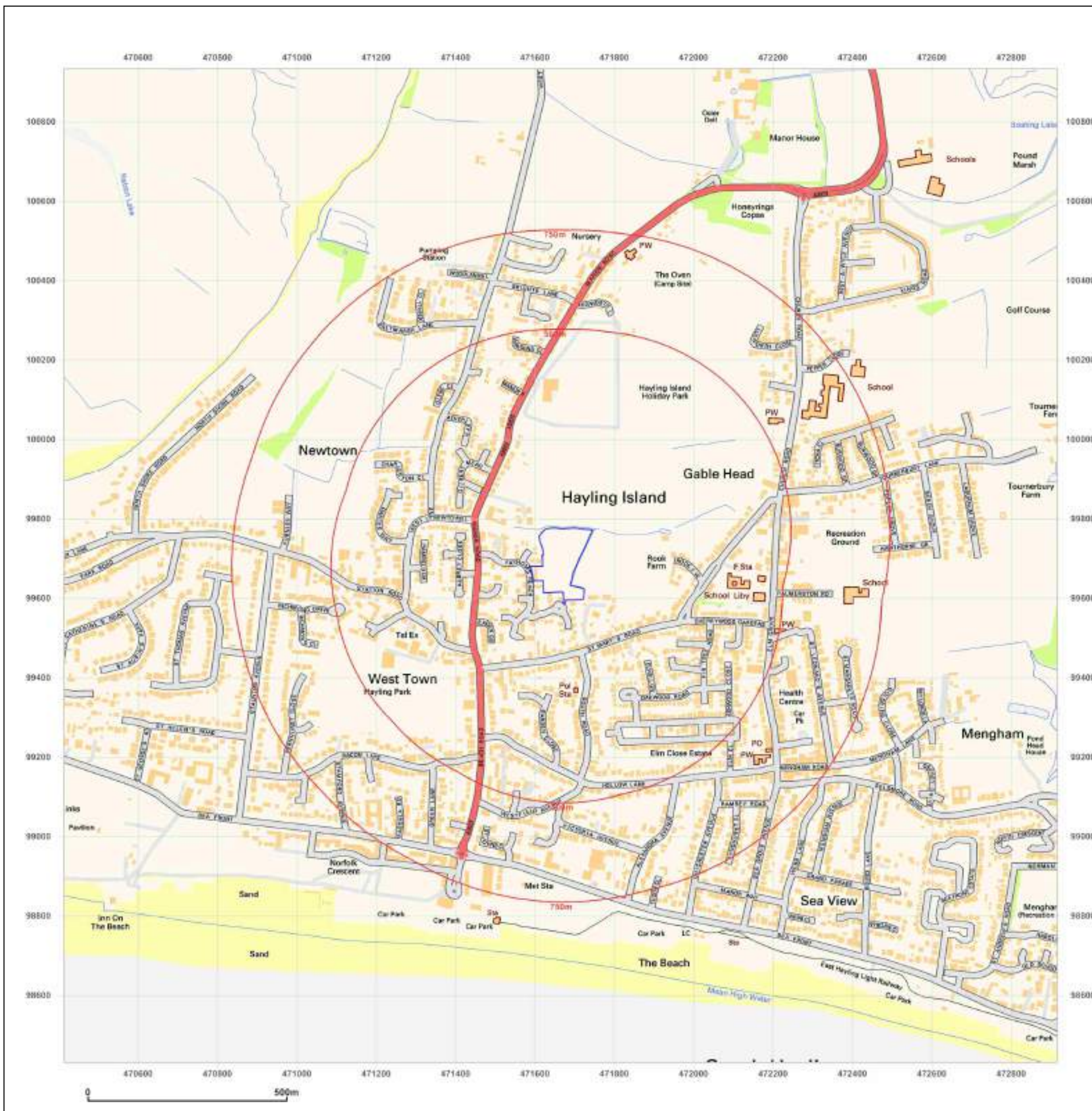


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PO11 0RR

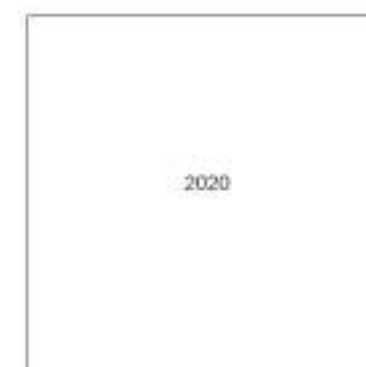
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Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 2020

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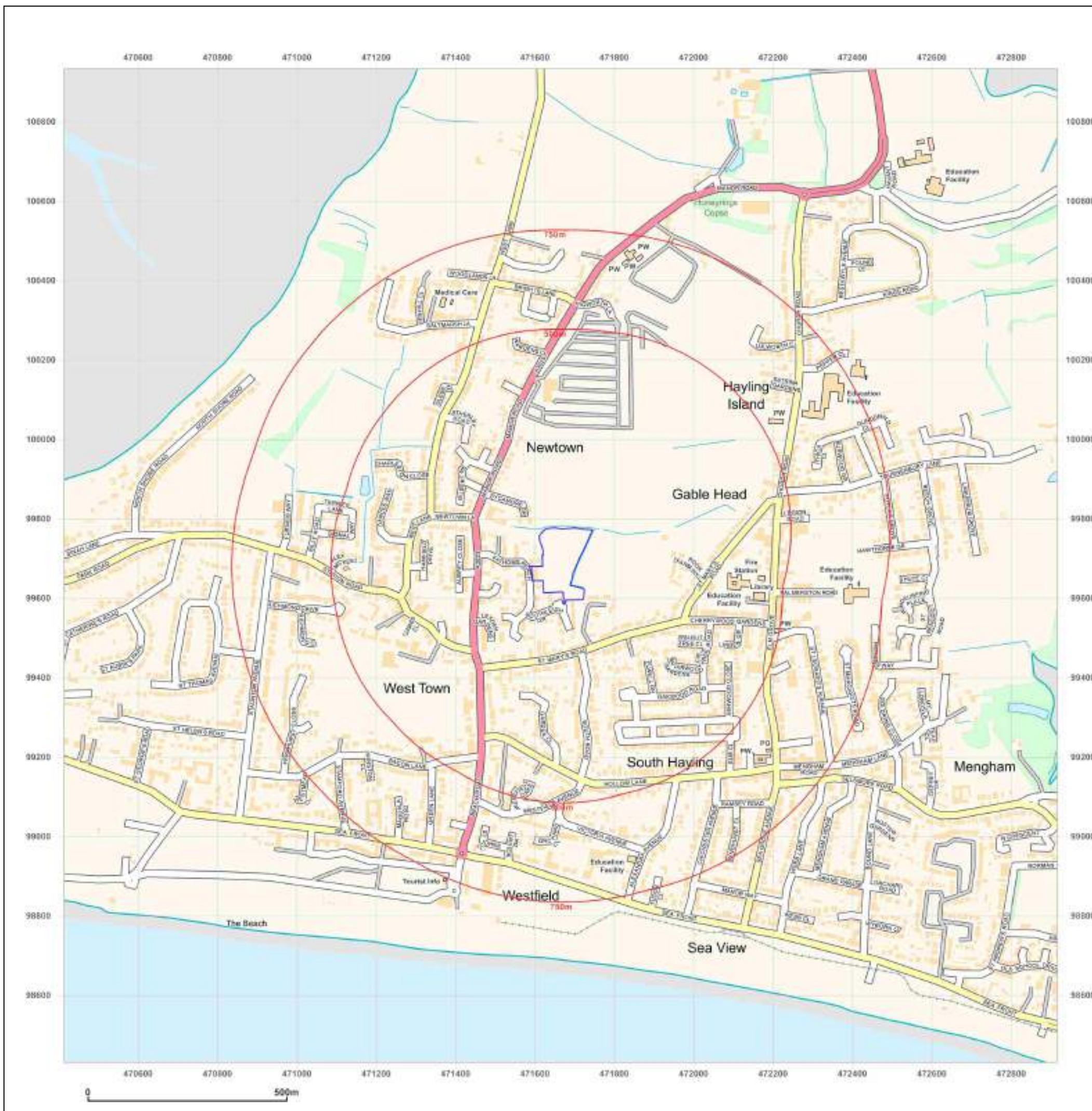


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1867

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1867
Revised 1867
Edition N/A
Copyright N/A
Levelled N/A

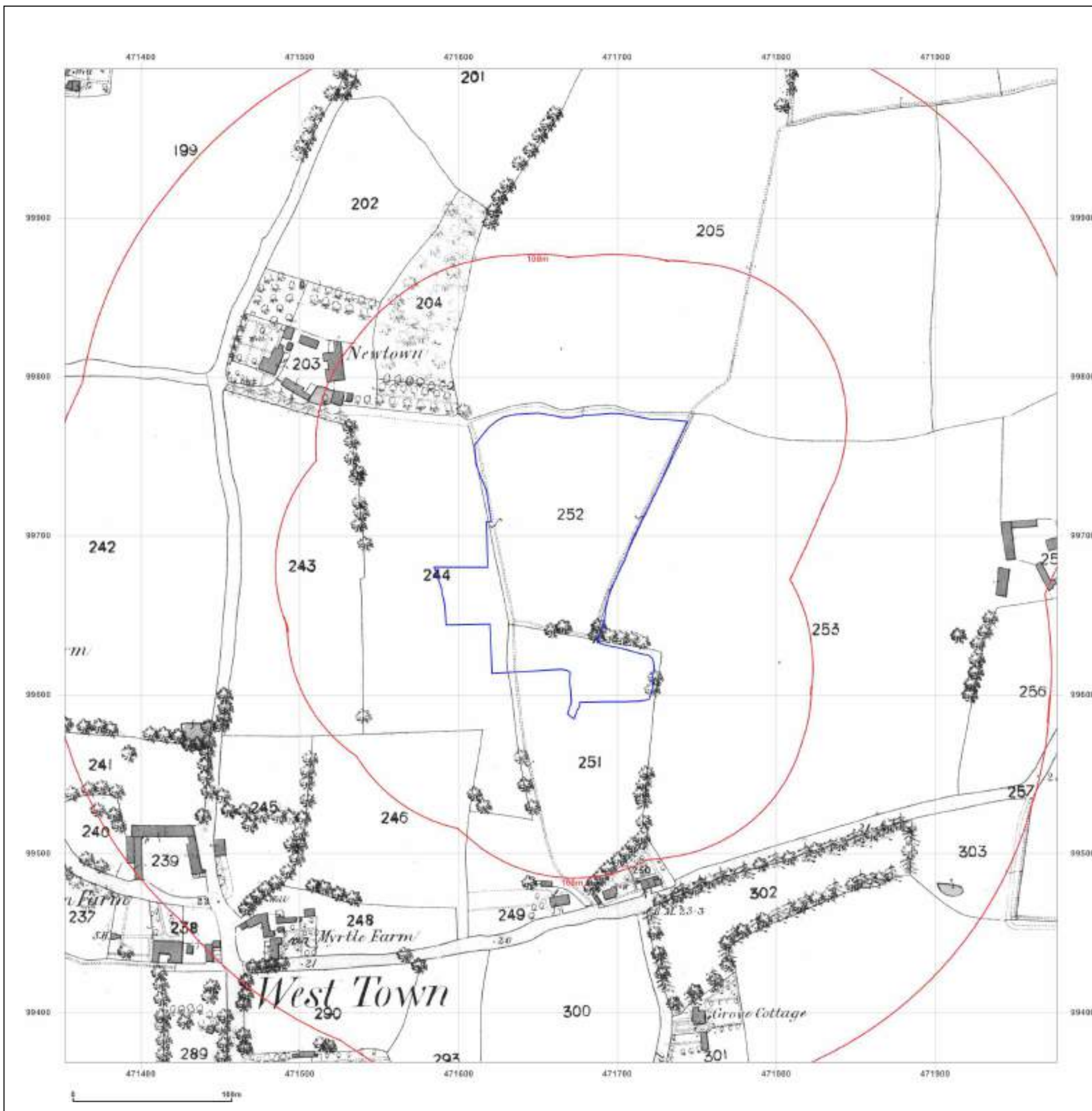


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Site Details:

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Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

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

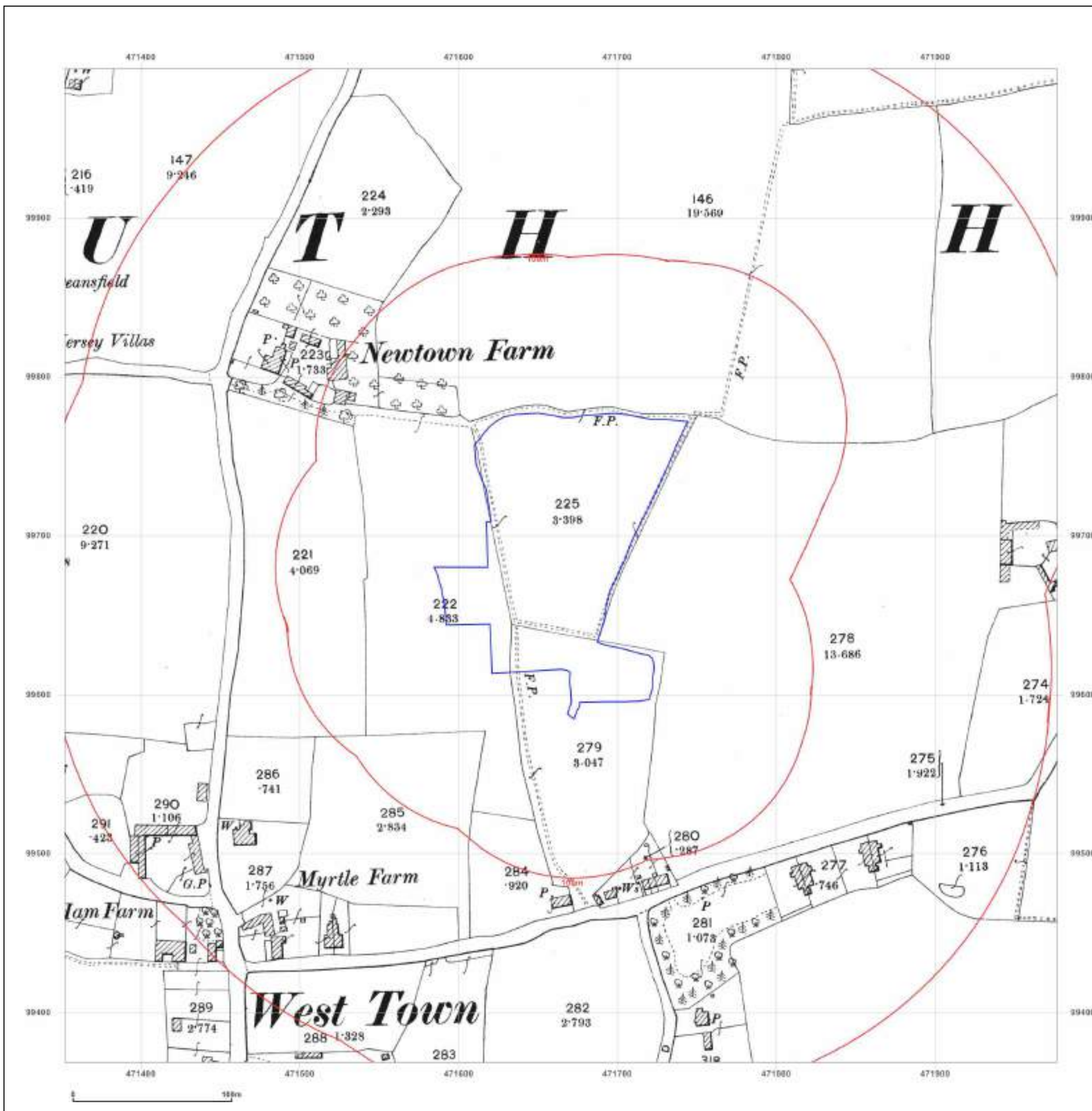


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Site Details:

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REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1908

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1908
Revised 1908
Edition N/A
Copyright N/A
Levelled N/A

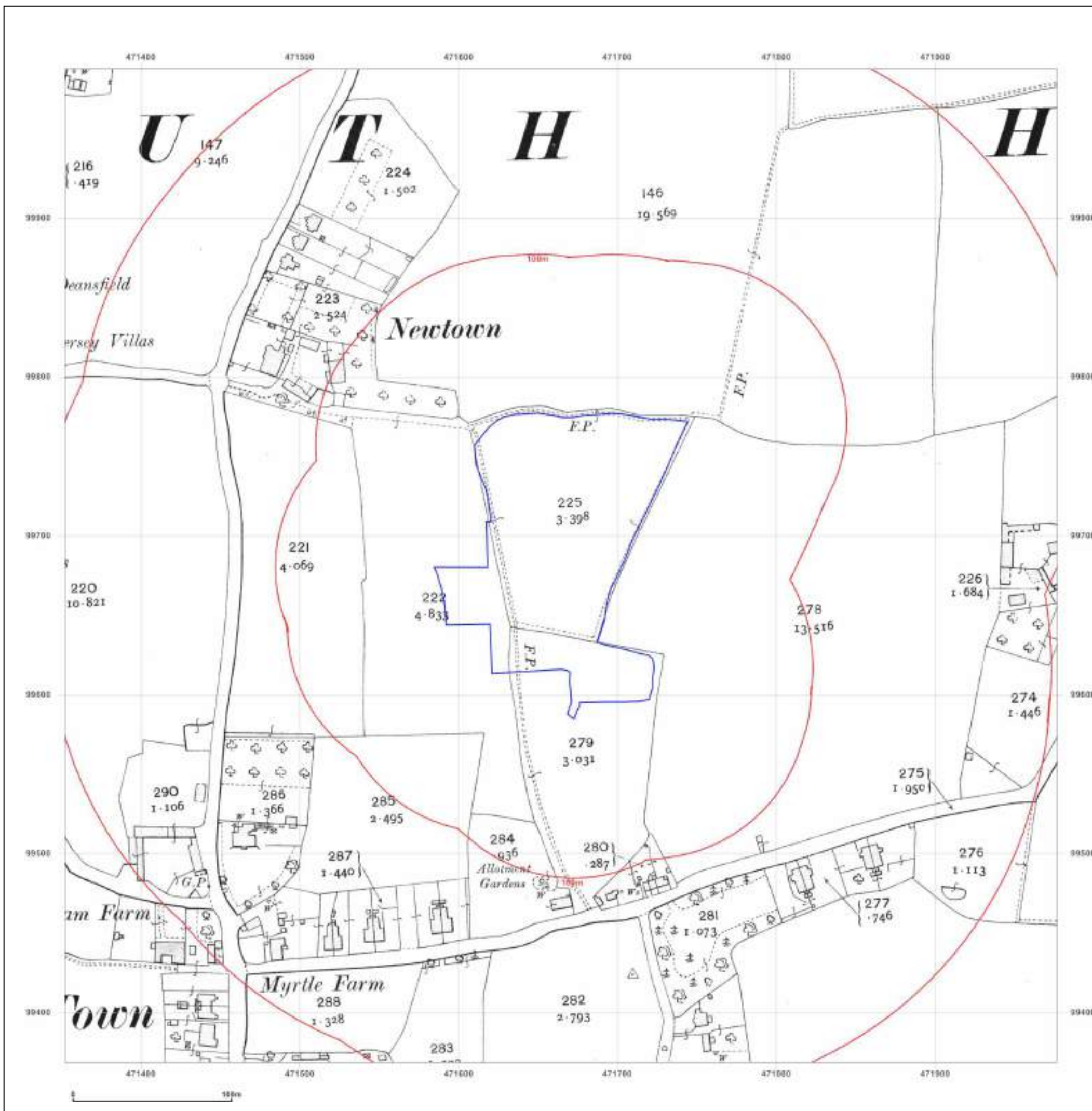


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1932

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1932
Revised 1932
Edition N/A
Copyright N/A
Levelled N/A

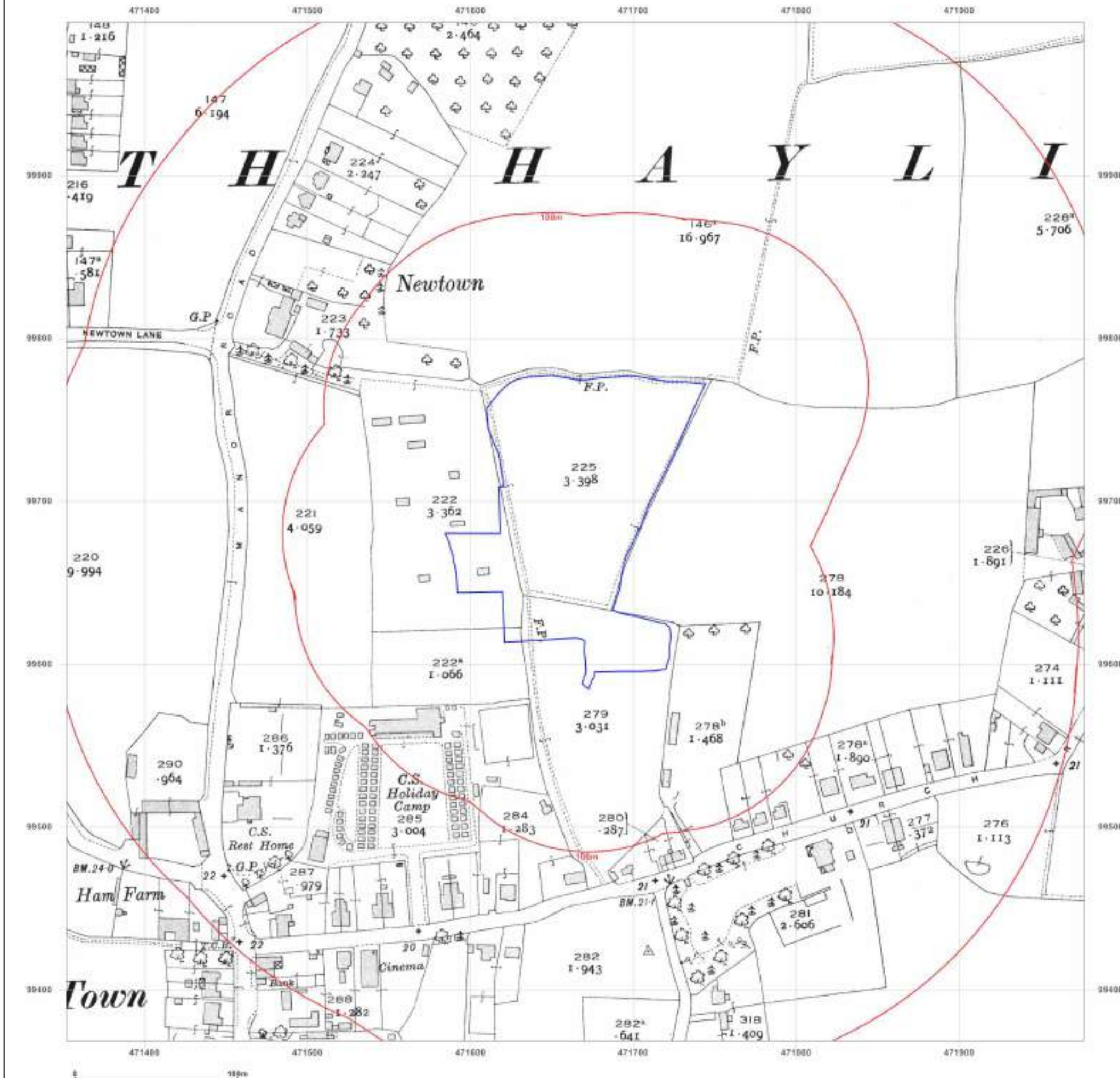


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Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: County Series

Map date: 1937

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1937
Revised 1937
Edition N/A
Copyright N/A
Levelled N/A

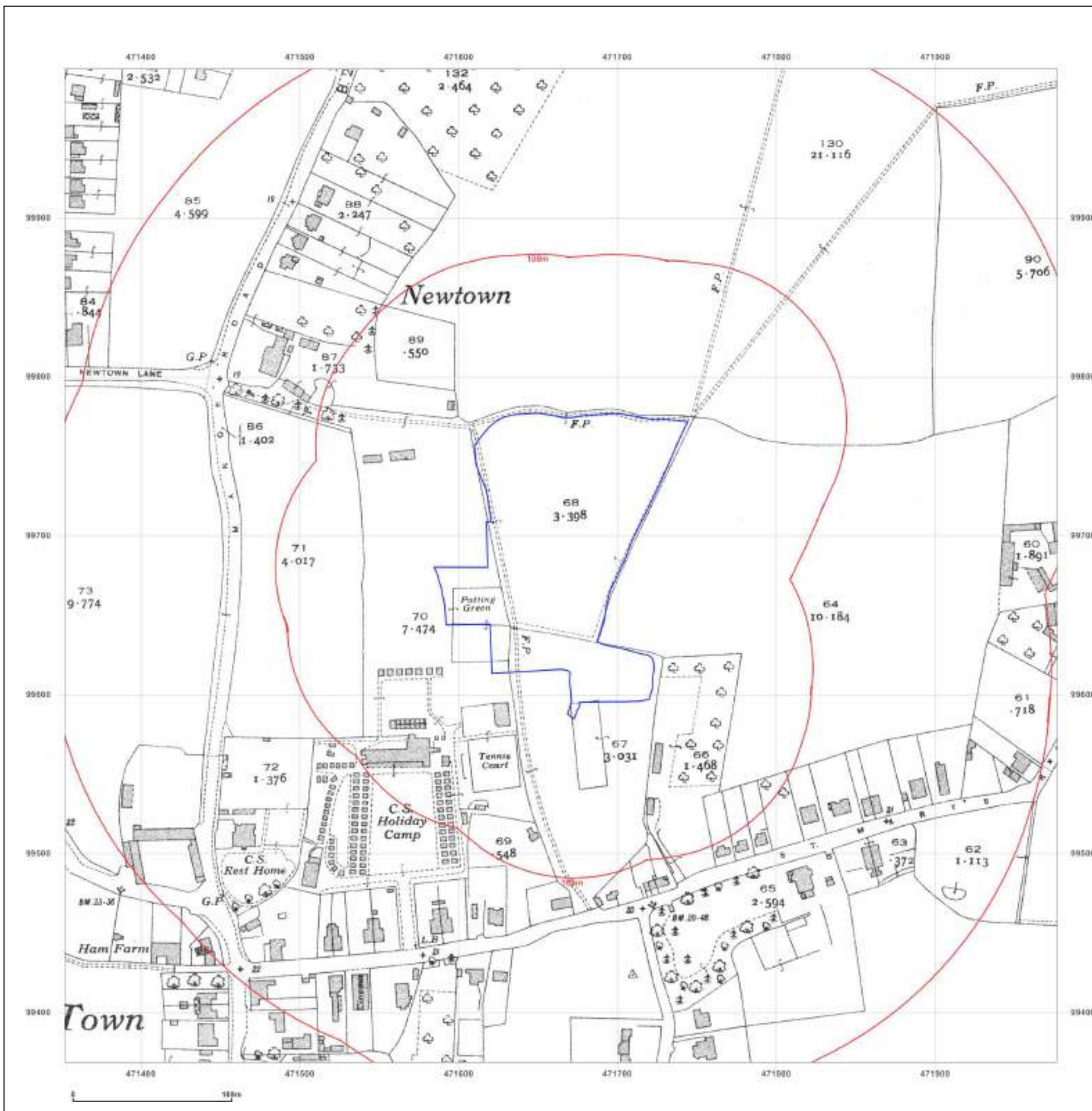


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1969

Scale: 1:2,500

Printed at: 1:2,500



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

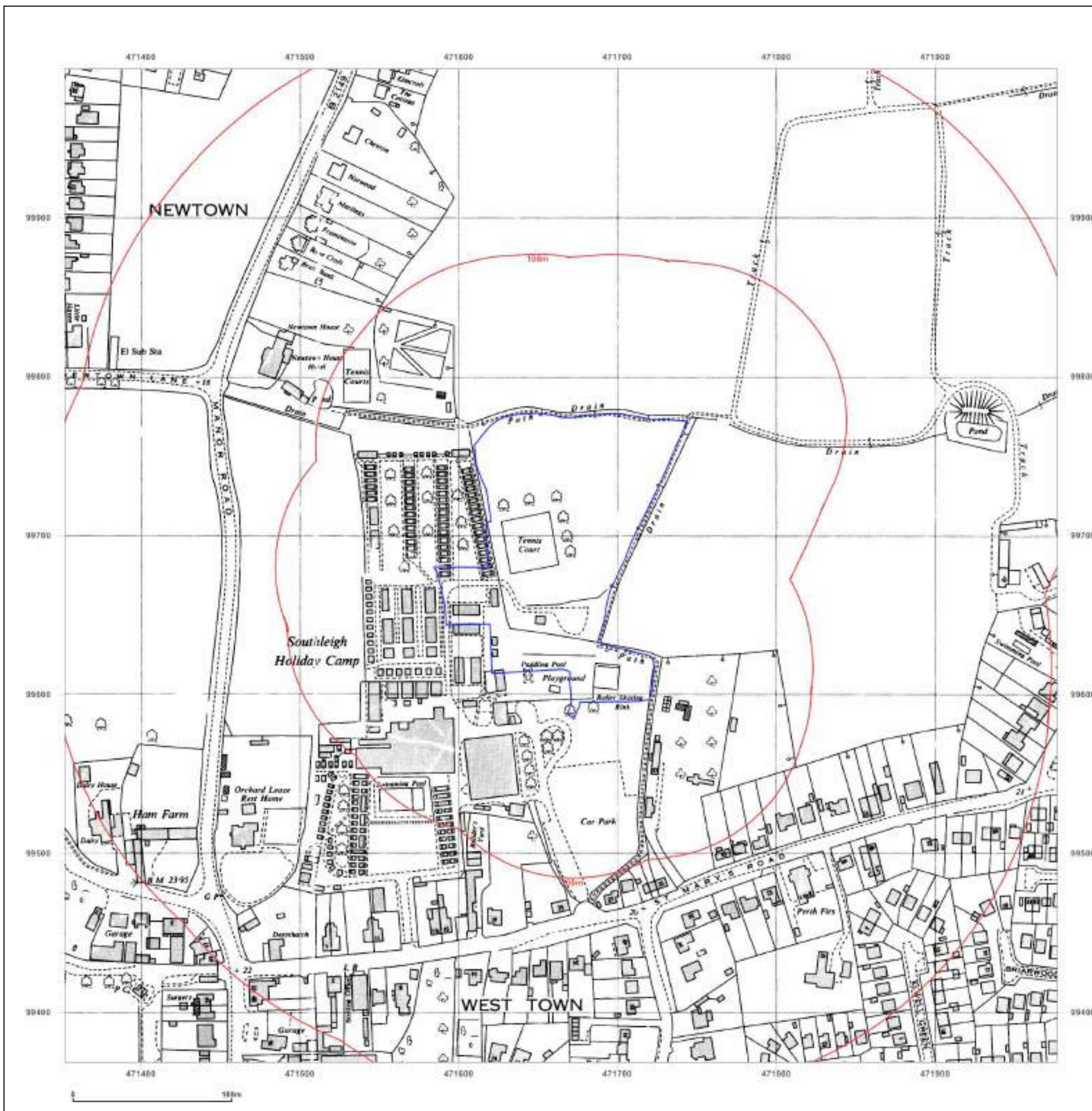


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REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1987

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1957
Revised 1987
Edition N/A
Copyright 1987
Levelled 1957

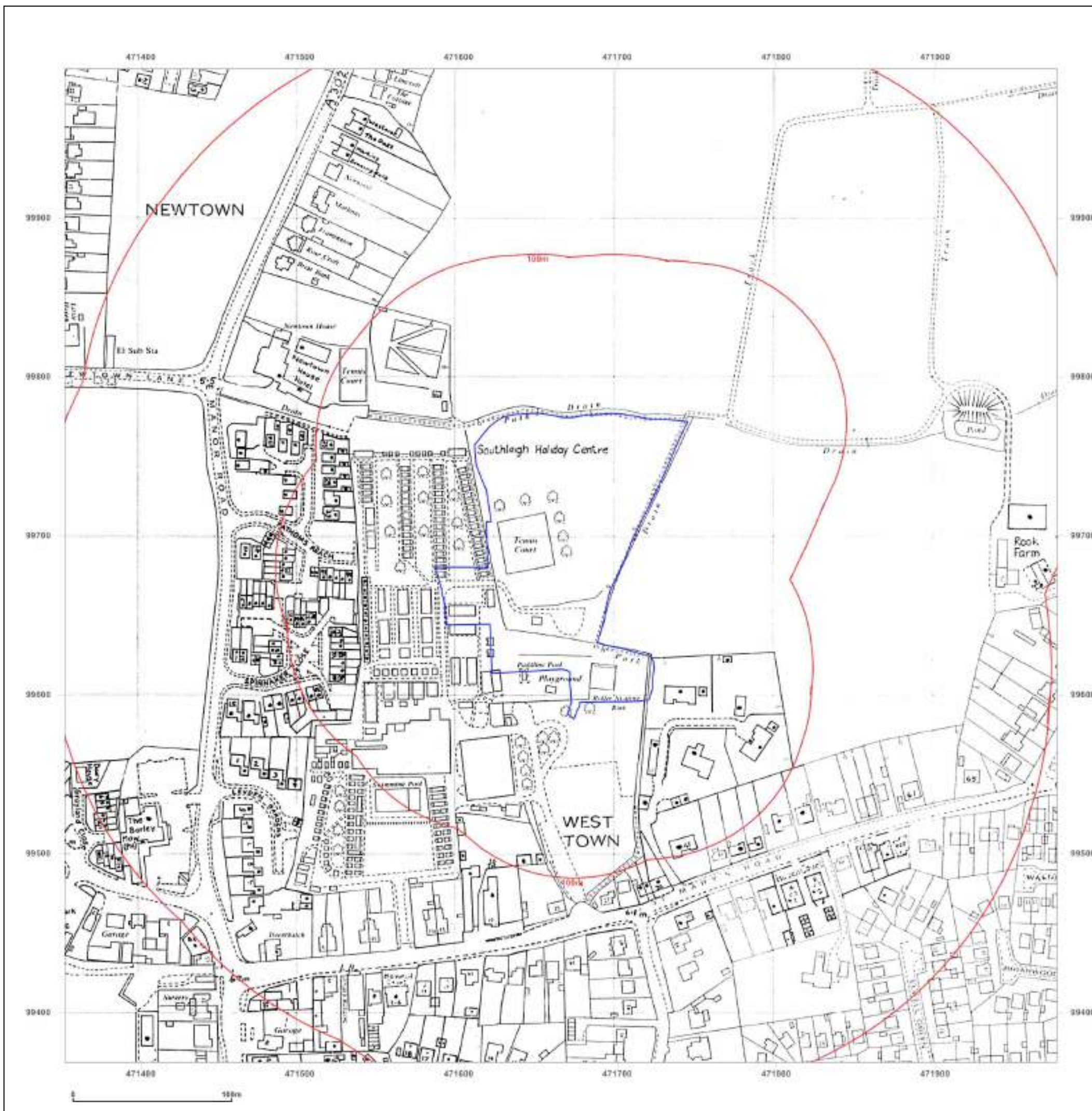


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1987

Scale: 1:2,500

Printed at: 1:2,500



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

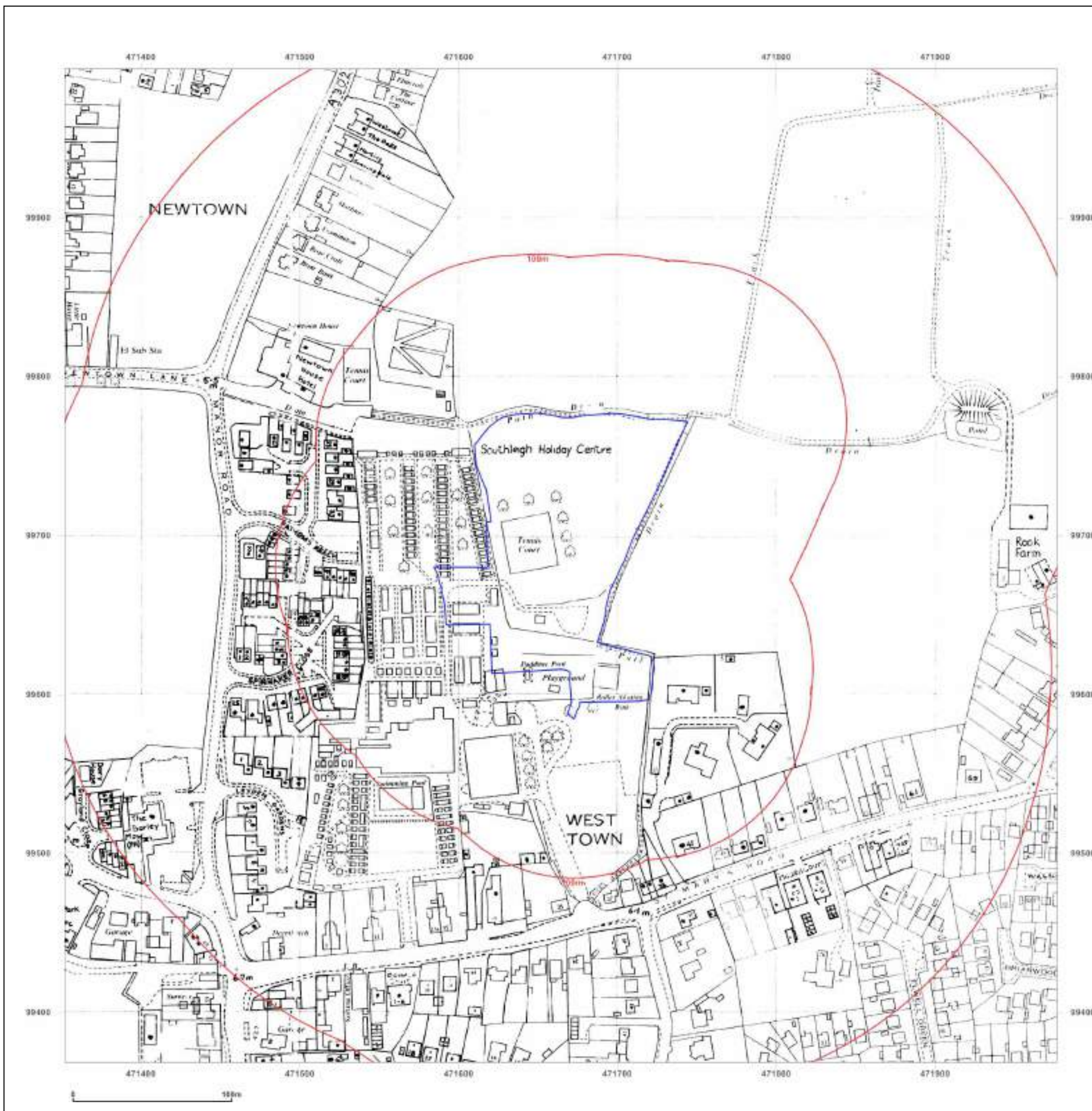


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1989

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1989
Revised 1989
Edition N/A
Copyright 1990
Levelled N/A

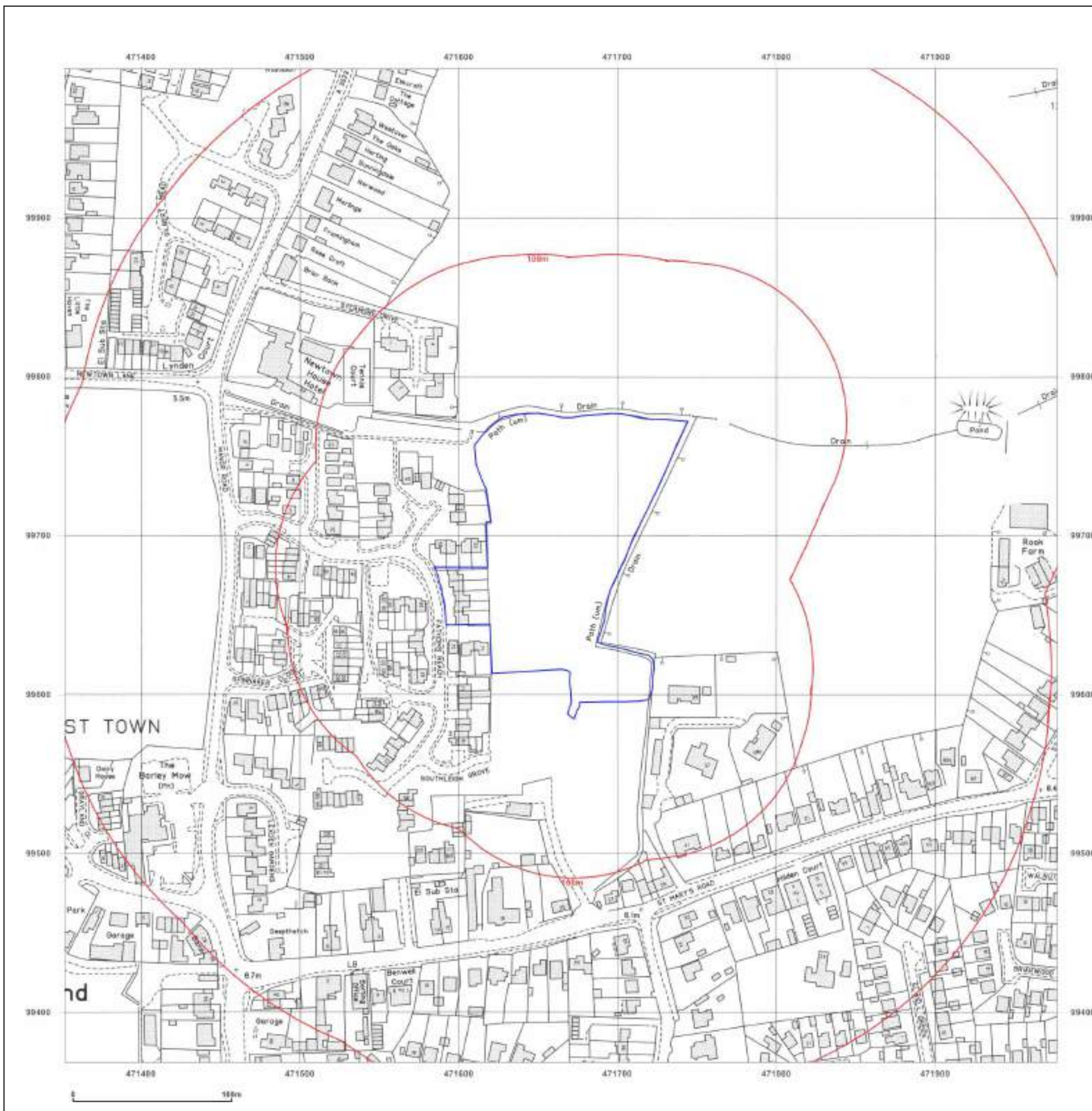


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1990

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1968
Revised 1989
Edition N/A
Copyright 1990
Levelled N/A

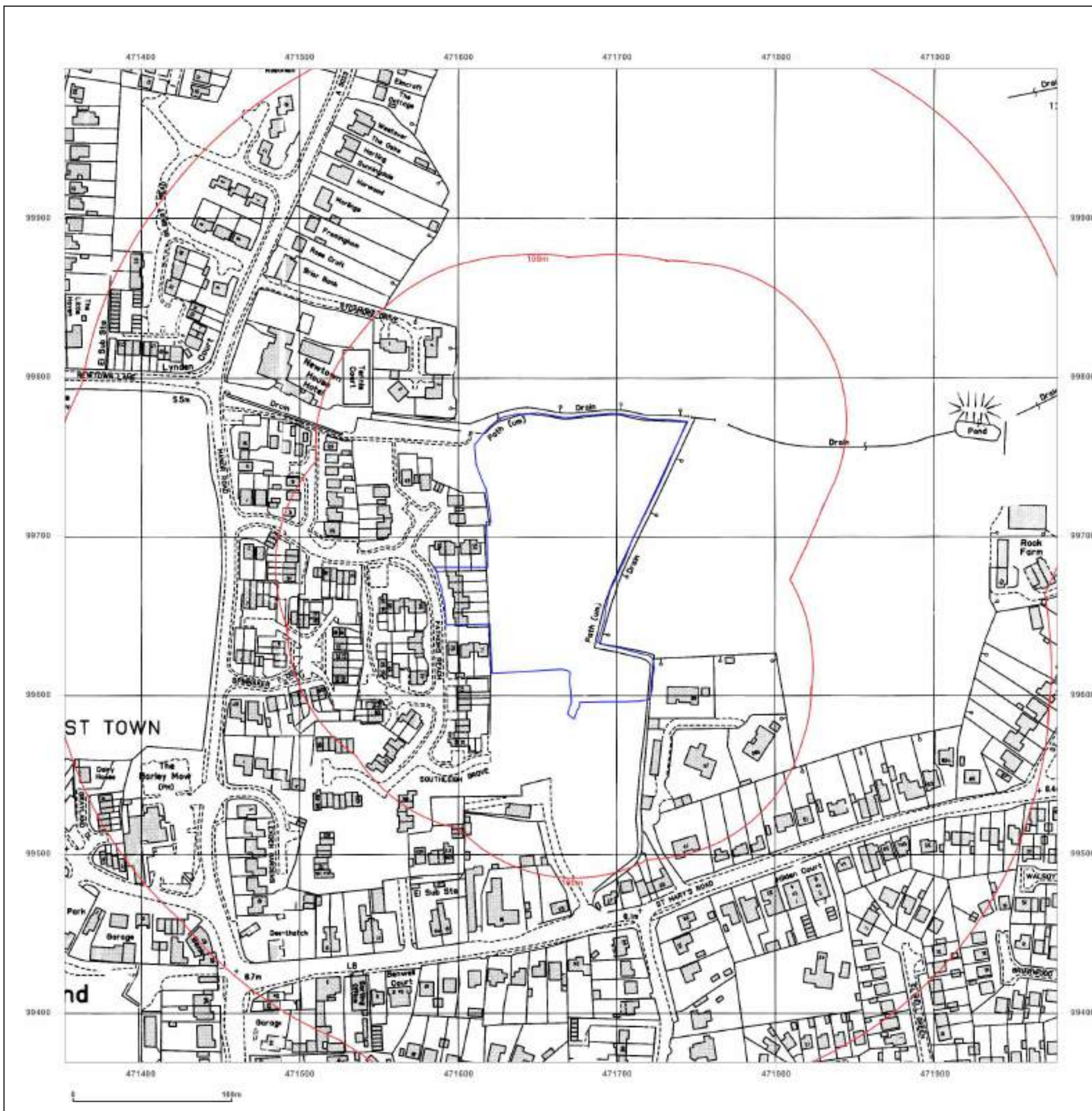


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PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1990

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1990
Revised 1990
Edition N/A
Copyright 1990
Levelled N/A

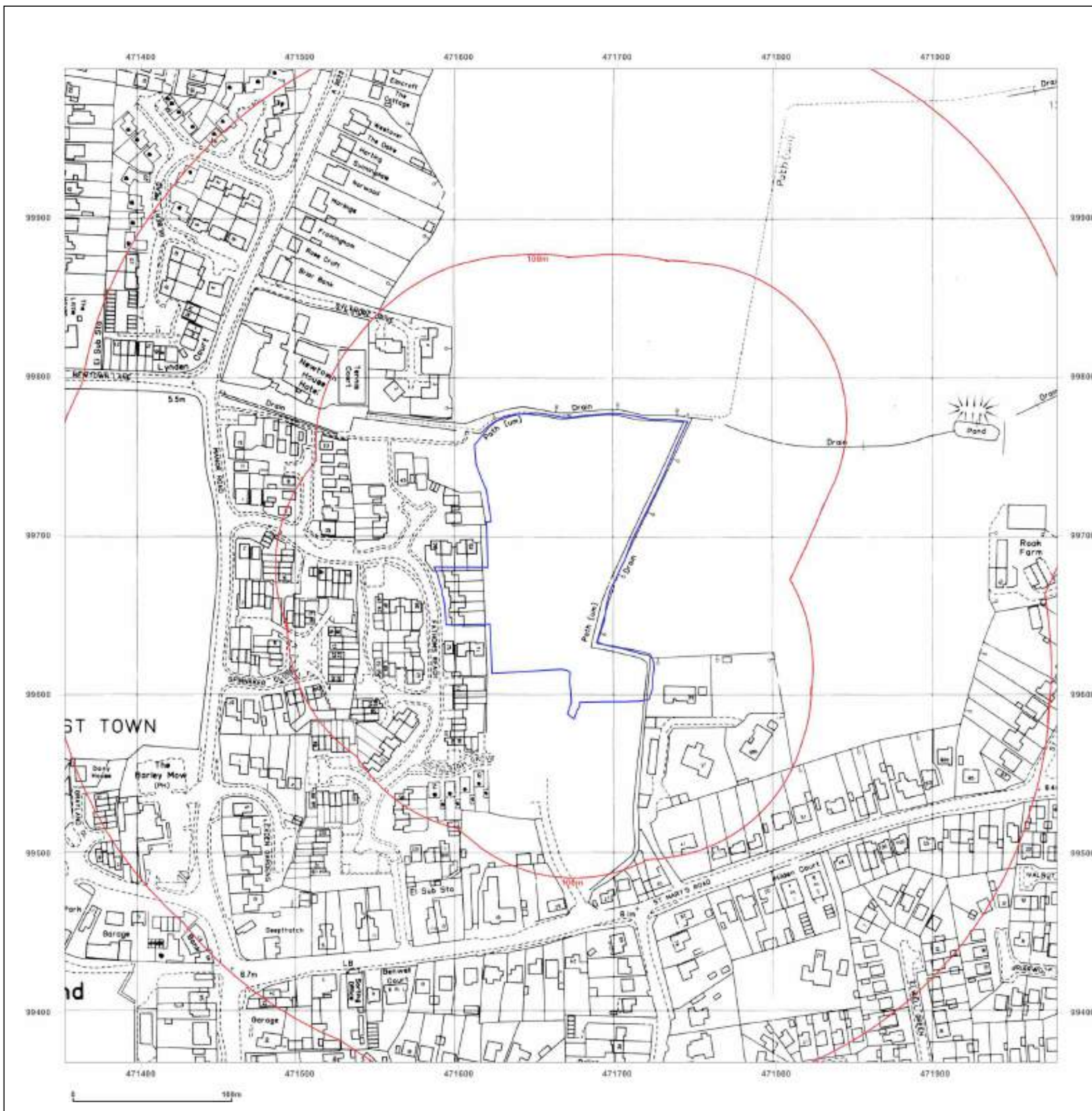


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Site Details:

STREET RECORD, FATHOMS
REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: National Grid

Map date: 1993

Scale: 1:2,500

Printed at: 1:2,500



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

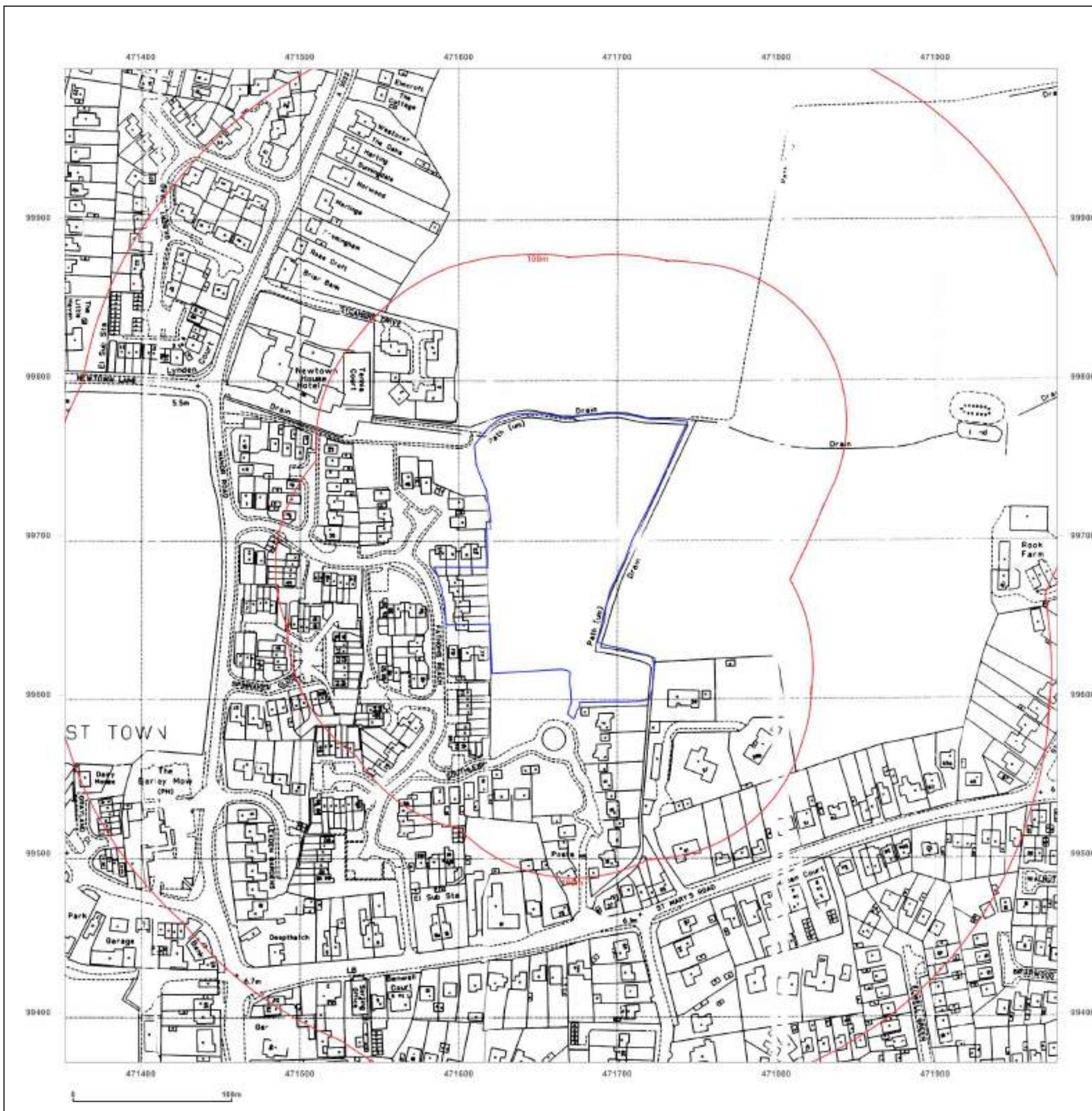


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Site Details:

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REACH, HAYLING ISLAND,
PO11 0RR

Client Ref: PO01780
Report Ref: GS-7030271
Grid Ref: 471664, 99681

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



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Appendix D

Desk Study Research Information

Groundsure Geo Insight Database Report

STREET RECORD, FATHOMS REACH, HAYLING ISLAND, PO11 0RR

Order Details

Date: 07/09/2020
Your ref: PO01780
Our Ref: GS-7030272
Client: Hydrock Consultants Ltd.

Site Details

Location: 471665 099672
Area: 1.75 ha
Authority: [Havant Borough Council](#)



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Summary of findings

p. 2 **Aerial image**

p. 8

OS MasterMap site plan

p.13 groundsure.com/insightuserguide

Contact us with any questions at:

info@groundsure.com

08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
14	1.1	Historical industrial land uses	0	1	4	14	-
15	1.2	Historical tanks	0	0	1	9	-
16	1.3	Historical energy features	0	0	3	20	-
17	1.4	Historical petrol stations	0	0	0	0	-
18	1.5	Historical garages	0	0	4	8	-
18	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
19	2.1	Historical industrial land uses	0	1	4	18	-
20	2.2	Historical tanks	0	0	1	18	-
21	2.3	Historical energy features	0	0	10	43	-
24	2.4	Historical petrol stations	0	0	0	0	-
24	2.5	Historical garages	0	0	6	15	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
26	3.1	Active or recent landfill	0	0	0	0	-
26	3.2	Historical landfill (BGS records)	0	0	0	0	-
27	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
27	3.4	Historical landfill (EA/NRW records)	0	0	0	0	-
27	3.5	Historical waste sites	0	0	0	0	-
27	3.6	Licensed waste sites	0	0	0	0	-
27	3.7	Waste exemptions	0	0	0	3	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
29	4.1	Recent industrial land uses	0	0	6	-	-
30	4.2	Current or recent petrol stations	0	0	0	1	-
30	4.3	Electricity cables	0	0	0	0	-
30	4.4	Gas pipelines	0	0	0	0	-
31	4.5	Sites determined as Contaminated Land	0	0	0	0	-



31	4.6	Control of Major Accident Hazards (COMAH)	0	0	0	0	-
31	4.7	Regulated explosive sites	0	0	0	0	-
31	4.8	Hazardous substance storage/usage	0	0	0	0	-
31	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
32	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
32	4.11	<u>Licensed pollutant release (Part A(2)/B)</u>	0	0	0	1	-
32	4.12	Radioactive Substance Authorisations	0	0	0	0	-
32	4.13	<u>Licensed Discharges to controlled waters</u>	0	0	0	1	-
33	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
33	4.15	Pollutant release to public sewer	0	0	0	0	-
33	4.16	List 1 Dangerous Substances	0	0	0	0	-
33	4.17	List 2 Dangerous Substances	0	0	0	0	-
34	4.18	<u>Pollution Incidents (EA/NRW)</u>	0	0	0	2	-
34	4.19	Pollution inventory substances	0	0	0	0	-
34	4.20	Pollution inventory waste transfers	0	0	0	0	-
35	4.21	Pollution inventory radioactive waste	0	0	0	0	-
Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
36	5.1	<u>Superficial aquifer</u>	Identified (within 500m)				
38	5.2	<u>Bedrock aquifer</u>	Identified (within 500m)				
40	5.3	<u>Groundwater vulnerability</u>	Identified (within 50m)				
41	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
41	5.5	Groundwater vulnerability- local information	None (within 0m)				
42	5.6	<u>Groundwater abstractions</u>	0	0	0	0	1
43	5.7	<u>Surface water abstractions</u>	0	0	0	0	1
43	5.8	Potable abstractions	0	0	0	0	0
44	5.9	Source Protection Zones	0	0	0	0	-
44	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-
Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
45	6.1	<u>Water Network (OS MasterMap)</u>	0	7	2	-	-



46	6.2	<u>Surface water features</u>	0	4	1	-	-
47	6.3	<u>WFD Surface water body catchments</u>	1	-	-	-	-
47	6.4	WFD Surface water bodies	0	0	0	-	-
47	6.5	WFD Groundwater bodies	0	-	-	-	-
Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
48	7.1	Risk of Flooding from Rivers and Sea (RoFRaS)	None (within 50m)				
49	7.2	<u>Historical Flood Events</u>	0	0	2	-	-
49	7.3	Flood Defences	0	0	0	-	-
49	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
50	7.5	Flood Storage Areas	0	0	0	-	-
51	7.6	Flood Zone 2	None (within 50m)				
51	7.7	Flood Zone 3	None (within 50m)				
Page	Section	Surface water flooding					
52	8.1	<u>Surface water flooding</u>	1 in 30 year, 0.1m - 0.3m (within 50m)				
Page	Section	Groundwater flooding					
54	9.1	<u>Groundwater flooding</u>	Moderate-High (within 50m)				
Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
55	10.1	<u>Sites of Special Scientific Interest (SSSI)</u>	0	0	0	0	3
56	10.2	<u>Conserved wetland sites (Ramsar sites)</u>	0	0	0	0	2
57	10.3	<u>Special Areas of Conservation (SAC)</u>	0	0	0	0	1
57	10.4	<u>Special Protection Areas (SPA)</u>	0	0	0	0	3
58	10.5	National Nature Reserves (NNR)	0	0	0	0	0
58	10.6	<u>Local Nature Reserves (LNR)</u>	0	0	0	0	1
59	10.7	Designated Ancient Woodland	0	0	0	0	0
59	10.8	Biosphere Reserves	0	0	0	0	0
59	10.9	Forest Parks	0	0	0	0	0
59	10.10	Marine Conservation Zones	0	0	0	0	0
59	10.11	Green Belt	0	0	0	0	0
60	10.12	Proposed Ramsar sites	0	0	0	0	0



60	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
60	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
60	10.15	Nitrate Sensitive Areas	0	0	0	0	0
61	10.16	<u>Nitrate Vulnerable Zones</u>	1	0	0	0	0
62	10.17	<u>SSSI Impact Risk Zones</u>	1	-	-	-	-
63	10.18	<u>SSSI Units</u>	0	0	0	0	13
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
71	11.1	World Heritage Sites	0	0	0	-	-
72	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
72	11.3	National Parks	0	0	0	-	-
72	11.4	<u>Listed Buildings</u>	0	0	2	-	-
73	11.5	Conservation Areas	0	0	0	-	-
73	11.6	Scheduled Ancient Monuments	0	0	0	-	-
73	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
74	12.1	<u>Agricultural Land Classification</u>	Grade 2 (within 250m)				
75	12.2	Open Access Land	0	0	0	-	-
76	12.3	Tree Felling Licences	0	0	0	-	-
76	12.4	Environmental Stewardship Schemes	0	0	0	-	-
76	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
77	13.1	Priority Habitat Inventory	0	0	0	-	-
77	13.2	Habitat Networks	0	0	0	-	-
77	13.3	Open Mosaic Habitat	0	0	0	-	-
77	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
78	14.1	<u>10k Availability</u>	Identified (within 500m)				
79	14.2	Artificial and made ground (10k)	0	0	0	0	-
80	14.3	<u>Superficial geology (10k)</u>	1	0	1	0	-

81	14.4	Landslip (10k)	0	0	0	0	-
82	14.5	<u>Bedrock geology (10k)</u>	1	1	1	0	-
83	14.6	Bedrock faults and other linear features (10k)	0	0	0	0	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
84	15.1	<u>50k Availability</u>	Identified (within 500m)				
85	15.2	Artificial and made ground (50k)	0	0	0	0	-
85	15.3	Artificial ground permeability (50k)	0	0	-	-	-
86	15.4	<u>Superficial geology (50k)</u>	1	0	0	0	-
87	15.5	<u>Superficial permeability (50k)</u>	Identified (within 50m)				
87	15.6	Landslip (50k)	0	0	0	0	-
87	15.7	Landslip permeability (50k)	None (within 50m)				
88	15.8	<u>Bedrock geology (50k)</u>	1	1	0	0	-
89	15.9	<u>Bedrock permeability (50k)</u>	Identified (within 50m)				
89	15.10	Bedrock faults and other linear features (50k)	0	0	0	0	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
90	16.1	<u>BGS Boreholes</u>	0	0	8	-	-
Page	Section	Natural ground subsidence					
92	17.1	<u>Shrink swell clays</u>	Low (within 50m)				
93	17.2	<u>Running sands</u>	Low (within 50m)				
94	17.3	<u>Compressible deposits</u>	Negligible (within 50m)				
95	17.4	<u>Collapsible deposits</u>	Low (within 50m)				
96	17.5	<u>Landslides</u>	Very low (within 50m)				
97	17.6	<u>Ground dissolution of soluble rocks</u>	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
98	18.1	Natural cavities	0	0	0	0	-
99	18.2	BritPits	0	0	0	0	-
99	18.3	<u>Surface ground workings</u>	0	0	5	-	-
99	18.4	Underground workings	0	0	0	0	0
99	18.5	<u>Historical Mineral Planning Areas</u>	0	1	0	0	-



100	18.6	Non-coal mining	0	0	0	0	0
100	18.7	Mining cavities	0	0	0	0	0
100	18.8	JPB mining areas	None (within 0m)				
100	18.9	Coal mining	None (within 0m)				
101	18.10	Brine areas	None (within 0m)				
101	18.11	Gypsum areas	None (within 0m)				
101	18.12	Tin mining	None (within 0m)				
101	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
<u>102</u>	<u>19.1</u>	<u>Radon</u>	Between 1% and 3% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
<u>103</u>	<u>20.1</u>	<u>BGS Estimated Background Soil Chemistry</u>	1	1	-	-	-
103	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
103	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
104	21.1	Underground railways (London)	0	0	0	-	-
104	21.2	Underground railways (Non-London)	0	0	0	-	-
104	21.3	Railway tunnels	0	0	0	-	-
104	21.4	Historical railway and tunnel features	0	0	0	-	-
104	21.5	Royal Mail tunnels	0	0	0	-	-
105	21.6	Historical railways	0	0	0	-	-
105	21.7	Railways	0	0	0	-	-
105	21.8	Crossrail 1	0	0	0	0	-
105	21.9	Crossrail 2	0	0	0	0	-
105	21.10	HS2	0	0	0	0	-



Recent aerial photograph



Capture Date: 23/07/2018

Site Area: 1.75ha



Recent site history - 2017 aerial photograph



Capture Date: 21/06/2017

Site Area: 1.75ha



Recent site history - 2013 aerial photograph



Capture Date: 20/08/2013

Site Area: 1.75ha



Recent site history - 2005 aerial photograph



Capture Date: 17/04/2005

Site Area: 1.75ha



Recent site history - 1999 aerial photograph



Capture Date: 04/09/1999

Site Area: 1.75ha



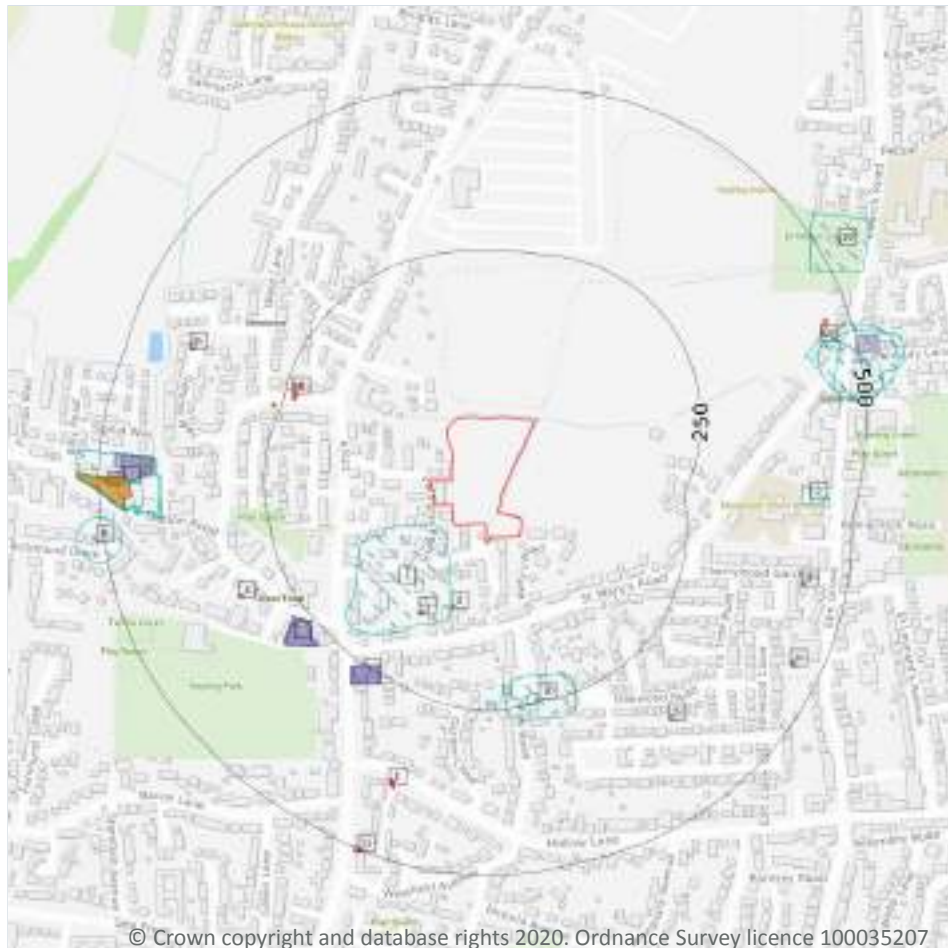
OS MasterMap site plan



Site Area: 1.75ha



1 Past land use



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features
- Historical garages

1.1 Historical industrial land uses

Records within 500m

19

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 1:10,560 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
1	18m SW	Military Camp	1957	1970412



ID	Location	Land use	Dates present	Group ID
A	207m S	Smithy	1896	1976437
A	214m S	Police Station	1990	1973029
A	235m S	Smithy	1866	1976169
A	238m S	Smithy	1896	1971041
F	406m W	Unspecified Commercial/Industrial	1931	1975171
F	406m W	Unspecified Commercial/Industrial	1938	1975996
F	408m W	Gas Works	1907	1983875
7	414m E	Fire Station	1990	1970256
G	419m E	Unspecified Works	1990	1970767
F	425m W	Unspecified Tank	1931 - 1938	1980961
F	435m W	Gas Works	1896	1975296
G	437m E	Smithy	1896	1978681
G	455m E	Smithy	1896	1978153
F	467m W	Unspecified Tank	1931 - 1938	1980003
9	472m W	Engine House	1931 - 1938	1980536
10	472m NE	Grave Yard	1866	2365689
F	480m W	Gasometer	1896	1971689
G	488m E	Smithy	1866	1976475

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m

10

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**



ID	Location	Land use	Dates present	Group ID
2	104m SW	Unspecified Tank	1987	328868
D	283m SW	Unspecified Tank	1932 - 1937	330112
F	428m W	Unspecified Tank	1932 - 1937	331433
F	449m W	Gas Works	1898 - 1908	331263
H	453m SE	Unspecified Tank	1968 - 1980	330617
H	453m SE	Unspecified Tank	1979 - 1996	331008
F	468m W	Gasometers	1908	329323
F	468m W	Gasometer	1898	329613
F	468m W	Unspecified Tank	1932 - 1937	331682
F	484m W	Gasometer	1898	329612

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m

23

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
3	137m S	Electricity Substation	1989 - 1997	214406
B	230m W	Electricity Substation	1968 - 1997	214965
B	233m W	Electricity Substation	1987 - 1990	213777
B	259m NW	Gas Governor	1997	213393
B	259m NW	Gas Governor	1996	215208
B	259m NW	Gas Governor	1989	215003
B	261m NW	Gas Governor	1990	215626
4	319m SW	Electricity Substation	1989 - 1997	215664



ID	Location	Land use	Dates present	Group ID
5	353m SE	Electricity Substation	1989 - 1997	213429
E	383m S	Electricity Substation	1990	214998
E	383m S	Electricity Substation	1987	215879
E	384m S	Electricity Substation	1996 - 1997	213938
E	385m S	Electricity Substation	1989	214916
6	398m W	Electricity Substation	1968 - 1997	217202
8	432m E	Electricity Substation	1968 - 1996	214276
G	449m E	Electricity Substation	1968	212940
F	449m W	Gas Works	1898 - 1908	213396
G	463m E	Electricity Substation	1980 - 1996	214977
F	468m W	Gasometers	1908	213229
F	468m W	Gasometer	1898	213345
F	484m W	Gasometer	1898	213344
G	484m E	Electricity Substation	1979	216740
11	497m SW	Electricity Substation	1968	212920

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.



1.5 Historical garages

Records within 500m

12

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale, intelligently grouped into contiguous features. To prevent misrepresentation of the size of historical features at any given time, features are only grouped if they have similar geometries within immediately preceding or succeeding map editions. See section 2 for a breakdown of grouping if required. Grouped and the original ungrouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use map on **page 14**

ID	Location	Land use	Dates present	Group ID
C	238m SW	Garage	1968	65699
C	239m SW	Garage	1996 - 1997	66627
C	240m SW	Garage	1987 - 1990	66459
C	246m SW	Garage	1989	65910
D	255m SW	Garage	1968 - 1989	66307
D	258m SW	Garage	1987	65808
D	260m SW	Garage	1990	65691
D	265m SW	Garage	1996 - 1997	66178
F	418m W	Garage	1996 - 1997	66330
F	419m W	Garage	1989	66040
F	419m W	Garage	1987 - 1990	66168
G	497m E	Garage	1968 - 1986	66629

This data is sourced from Ordnance Survey / Groundsure.

1.6 Historical military land

Records within 500m

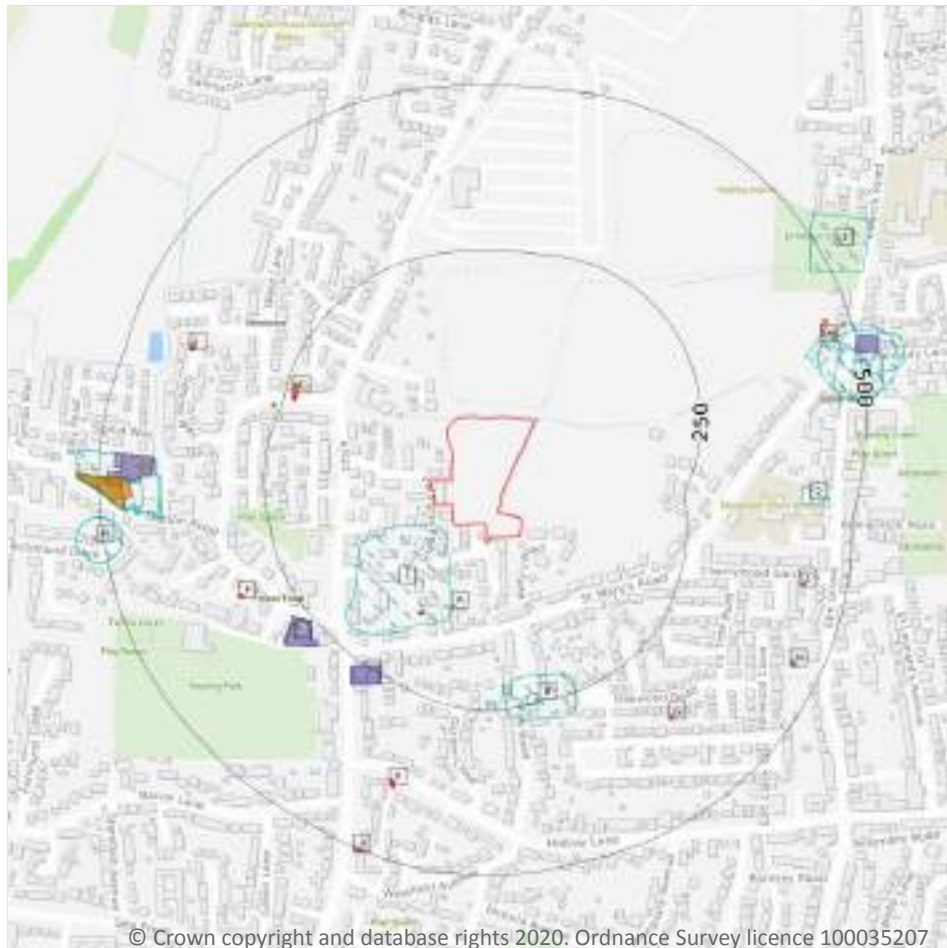
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Areas of military land digitised from multiple sources including the National Archives, local records, MOD records and verified other sources, intelligently grouped into contiguous features.

This data is sourced from Ordnance Survey / Groundsure / other sources.



2 Past land use - un-grouped



- Site Outline
- Search buffers in metres (m)
- Historical industrial land uses
- Historical tanks
- Historical energy features
- Historical garages

2.1 Historical industrial land uses

Records within 500m

23

Potentially contaminative land use features digitised from historical Ordnance Survey mapping at 1:10,000 and 10,560 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19**

ID	Location	Land Use	Date	Group ID
1	18m SW	Military Camp	1957	1970412
B	207m S	Smithy	1896	1976437
B	214m S	Police Station	1990	1973029

ID	Location	Land Use	Date	Group ID
B	235m S	Smithy	1866	1976169
B	238m S	Smithy	1896	1971041
J	406m W	Unspecified Commercial/Industrial	1938	1975996
J	406m W	Unspecified Commercial/Industrial	1931	1975171
J	408m W	Gas Works	1907	1983875
2	414m E	Fire Station	1990	1970256
K	419m E	Unspecified Works	1990	1970767
J	425m W	Unspecified Tank	1938	1980961
J	425m W	Unspecified Tank	1931	1980961
J	435m W	Gas Works	1896	1975296
K	437m E	Smithy	1896	1978681
K	455m E	Smithy	1896	1978153
J	467m W	Unspecified Tank	1938	1980003
J	467m W	Unspecified Tank	1931	1980003
K	468m E	Smithy	1896	1978153
N	472m W	Engine House	1938	1980536
N	472m W	Engine House	1931	1980536
3	472m NE	Grave Yard	1866	2365689
J	480m W	Gasometer	1896	1971689
K	488m E	Smithy	1866	1976475

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m

19

Tank features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19**



ID	Location	Land Use	Date	Group ID
A	104m SW	Unspecified Tank	1987	328868
E	283m SW	Unspecified Tank	1932	330112
E	283m SW	Unspecified Tank	1937	330112
J	428m W	Unspecified Tank	1932	331433
J	428m W	Unspecified Tank	1937	331433
J	449m W	Gas Works	1908	331263
M	453m SE	Unspecified Tank	1980	330617
M	453m SE	Unspecified Tank	1968	330617
M	453m SE	Unspecified Tank	1996	331008
M	454m SE	Unspecified Tank	1979	331008
M	454m SE	Unspecified Tank	1979	331008
M	454m SE	Unspecified Tank	1986	331008
M	454m SE	Unspecified Tank	1989	331008
J	461m W	Gas Works	1898	331263
J	468m W	Gasometers	1908	329323
J	468m W	Gasometer	1898	329613
J	468m W	Unspecified Tank	1932	331682
J	468m W	Unspecified Tank	1937	331682
J	484m W	Gasometer	1898	329612

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m

53

Energy features digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19**

ID	Location	Land Use	Date	Group ID
A	137m S	Electricity Substation	1996	214406



ID	Location	Land Use	Date	Group ID
A	137m S	Electricity Substation	1997	214406
A	140m S	Electricity Substation	1989	214406
A	140m S	Electricity Substation	1990	214406
C	230m W	Electricity Substation	1968	214965
C	230m W	Electricity Substation	1989	214965
C	231m W	Electricity Substation	1996	214965
C	231m W	Electricity Substation	1997	214965
C	233m W	Electricity Substation	1987	213777
C	233m W	Electricity Substation	1990	213777
C	259m NW	Gas Governor	1996	215208
C	259m NW	Gas Governor	1997	213393
C	259m NW	Gas Governor	1989	215003
C	261m NW	Gas Governor	1990	215626
F	319m SW	Electricity Substation	1989	215664
F	319m SW	Electricity Substation	1996	215664
F	319m SW	Electricity Substation	1997	215664
F	320m SW	Electricity Substation	1990	215664
G	353m SE	Electricity Substation	1990	213429
G	355m SE	Electricity Substation	1996	213429
G	355m SE	Electricity Substation	1997	213429
G	355m SE	Electricity Substation	1989	213429
H	383m S	Electricity Substation	1987	215879
H	383m S	Electricity Substation	1990	214998
H	384m S	Electricity Substation	1996	213938
H	384m S	Electricity Substation	1997	213938
H	385m S	Electricity Substation	1989	214916
I	398m W	Electricity Substation	1996	217202
I	398m W	Electricity Substation	1997	217202

ID	Location	Land Use	Date	Group ID
I	399m W	Electricity Substation	1968	217202
I	399m W	Electricity Substation	1989	217202
I	401m W	Electricity Substation	1987	217202
I	401m W	Electricity Substation	1990	217202
L	432m E	Electricity Substation	1980	214276
L	432m E	Electricity Substation	1968	214276
L	432m E	Electricity Substation	1996	214276
L	433m E	Electricity Substation	1979	214276
L	433m E	Electricity Substation	1979	214276
L	433m E	Electricity Substation	1986	214276
L	433m E	Electricity Substation	1989	214276
K	449m E	Electricity Substation	1968	212940
J	449m W	Gas Works	1908	213396
J	461m W	Gas Works	1898	213396
K	463m E	Electricity Substation	1980	214977
K	464m E	Electricity Substation	1996	214977
K	465m E	Electricity Substation	1986	214977
K	465m E	Electricity Substation	1989	214977
J	468m W	Gasometers	1908	213229
J	468m W	Gasometer	1898	213345
J	484m W	Gasometer	1898	213344
K	484m E	Electricity Substation	1979	216740
K	484m E	Electricity Substation	1979	216740
4	497m SW	Electricity Substation	1968	212920

This data is sourced from Ordnance Survey / Groundsure.



2.4 Historical petrol stations

Records within 500m

0

Petrol stations digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m

21

Garages digitised from historical Ordnance Survey mapping at high-detail 1:1,250 and 1:2,500 scale. Any records shown are available intelligently grouped in section 1. Grouped and the original un-grouped features can be cross-referenced across sections 1 and 2 using the 'Group ID'.

Features are displayed on the Past land use - un-grouped map on **page 19**

ID	Location	Land Use	Date	Group ID
D	238m SW	Garage	1968	65699
D	239m SW	Garage	1996	66627
D	239m SW	Garage	1997	66627
D	240m SW	Garage	1990	66459
D	240m SW	Garage	1987	66459
D	246m SW	Garage	1989	65910
E	255m SW	Garage	1968	66307
E	255m SW	Garage	1989	66307
E	258m SW	Garage	1987	65808
E	260m SW	Garage	1990	65691
E	265m SW	Garage	1996	66178
E	265m SW	Garage	1997	66178
J	418m W	Garage	1996	66330
J	418m W	Garage	1997	66330
J	419m W	Garage	1989	66040
J	419m W	Garage	1990	66168

ID	Location	Land Use	Date	Group ID
J	419m W	Garage	1987	66168
K	497m E	Garage	1980	66629
K	497m E	Garage	1968	66629
K	497m E	Garage	1979	66629
K	497m E	Garage	1986	66629

This data is sourced from Ordnance Survey / Groundsure.



3 Waste and landfill



- Site Outline
- Search buffers in metres (m)
- Waste exemptions

3.1 Active or recent landfill

Records within 500m

0

Active or recently closed landfill sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.2 Historical landfill (BGS records)

Records within 500m

0

Landfill sites identified on a survey carried out on behalf of the DoE in 1973. These sites may have been closed or operational at this time.

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m

0

Landfill sites identified from Local Authority records and high detail historical mapping.

This data is sourced from the Ordnance Survey/Groundsure and Local Authority records.

3.4 Historical landfill (EA/NRW records)

Records within 500m

0

Known historical (closed) landfill sites (e.g. sites where there is no PPC permit or waste management licence currently in force). This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where a licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.5 Historical waste sites

Records within 500m

0

Waste site records derived from Local Authority planning records and high detail historical mapping.

This data is sourced from Ordnance Survey/Groundsure and Local Authority records.

3.6 Licensed waste sites

Records within 500m

0

Active or recently closed waste sites under Environment Agency/Natural Resources Wales regulation.

This data is sourced from the Environment Agency and Natural Resources Wales.

3.7 Waste exemptions

Records within 500m

3

Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

Features are displayed on the Waste and landfill map on **page 26**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	353m N	Hayling Island Holiday Park, Manor Road, Hayling Island, PO11 0QS	WEX231559	Disposing of waste exemption	Not on a farm	Burning waste in the open



ID	Location	Site	Reference	Category	Sub-Category	Description
A	354m N	Hayling Island Holiday Park, Manor Road, Hayling Island, PO11 0QS	WEX087905	Disposing of waste exemption	Not on a farm	Burning waste in the open
1	486m E	116 Elm Grove Hayling Island HANTS PO11 9EH	EPR/WE5987Y Q/A001	Storing waste exemption	Non-Agricultural Waste Only	Storage of waste in a secure place

This data is sourced from the Environment Agency and Natural Resources Wales.



4 Current industrial land use



- Site Outline
- Search buffers in metres (m)
- Recent industrial land uses
- △ Current or recent petrol stations
- ◆ Licensed pollutant release (Part A(2)/B)
- ◆ Licensed Discharges to controlled waters
- Pollution Incidents (EA/NRW)

4.1 Recent industrial land uses

Records within 250m

6

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Company	Address	Activity	Category
1	145m S	Electricity Sub Station	Hampshire, PO11	Electrical Features	Infrastructure and Facilities
A	167m W	Sewage Pumping Station	Hampshire, PO11	Waste Storage, Processing and Disposal	Infrastructure and Facilities



ID	Location	Company	Address	Activity	Category
2	168m W	Hampshire Lift Services Ltd	4, Aubrey Close, Hayling Island, Hampshire, PO11 0SU	Industrial Repairs and Servicing	Repair and Servicing
A	180m W	Sewage Pumping Station	Hampshire, PO11	Waste Storage, Processing and Disposal	Infrastructure and Facilities
3	226m SW	Sail Style	Unit 6 2, St. Marys Road, Hayling Island, Hampshire, PO11 9BY	Marine Equipment Including Boats and Ships	Industrial Products
4	231m W	Electricity Sub Station	Hampshire, PO11	Electrical Features	Infrastructure and Facilities

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	1
----------------------------	----------

Open, closed, under development and obsolete petrol stations.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Company	Address	LPG	Status
5	261m SW	PROTEUS	5, Station Road, Hayling Island, Hampshire, PO11 0EA	Not Applicable	Obsolete

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	0
----------------------------	----------

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	0
----------------------------	----------

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.



4.5 Sites determined as Contaminated Land

Records within 500m**0**

Contaminated Land Register of sites designated under Part 2a of the Environmental Protection Act 1990.

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m**0**

Control of Major Accident Hazards (COMAH) sites. This data includes upper and lower tier sites, and includes a historical archive of COMAH sites and Notification of Installations Handling Hazardous Substances (NIHHS) records.

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m**0**

Sites registered and licensed by the Health and Safety Executive under the Manufacture and Storage of Explosives Regulations 2005 (MSER). The last update to this data was in April 2011.

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m**0**

Consents granted for a site to hold certain quantities of hazardous substances at or above defined limits in accordance with the Planning (Hazardous Substances) Regulations 2015.

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m**0**

Integrated Pollution Control (IPC) records of substance releases to air, land and water. This data represents a historical archive as the IPC regime has been superseded.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.10 Licensed industrial activities (Part A(1))

Records within 500m

0

Records of Part A(1) installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.11 Licensed pollutant release (Part A(2)/B)

Records within 500m

1

Records of Part A(2) and Part B installations regulated under the Environmental Permitting (England and Wales) Regulations 2016 for the release of substances to the environment.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Address	Details	
7	472m E	Spotless Too, 122 Elm Grove, Hayling Island, PO11 9EH	Process: Dry Cleaning Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m

0

Records of the storage, use, accumulation and disposal of radioactive substances regulated under the Radioactive Substances Act 1993.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.13 Licensed Discharges to controlled waters

Records within 500m

1

Discharges of treated or untreated effluent to controlled waters under the Water Resources Act 1991.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Address	Details	
6	349m NW	NEWT WN LANE	Effluent Type: UNSPECIFIED Permit Number: H00079 Permit Version: 1 Receiving Water: FRESHWATER RIVER	Status: LAPSED UNDER SCHEDULE 23 ENVIRONMENT ACT 1995 Issue date: 22/01/1965 Effective Date: 22/01/1965 Revocation Date: 31/03/1997

This data is sourced from the Environment Agency and Natural Resources Wales.

4.14 Pollutant release to surface waters (Red List)

Records within 500m	0
----------------------------	----------

Discharges of specified substances under the Environmental Protection (Prescribed Processes and Substances) Regulations 1991.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.15 Pollutant release to public sewer

Records within 500m	0
----------------------------	----------

Discharges of Special Category Effluents to the public sewer.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.16 List 1 Dangerous Substances

Records within 500m	0
----------------------------	----------

Discharges of substances identified on List I of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.17 List 2 Dangerous Substances

Records within 500m	0
----------------------------	----------

Discharges of substances identified on List II of European Directive E 2006/11/EC, and regulated under the Environmental Damage (Prevention and Remediation) Regulations 2015.

This data is sourced from the Environment Agency and Natural Resources Wales.

4.18 Pollution Incidents (EA/NRW)

Records within 500m

2

Records of substantiated pollution incidents. Since 2006 this data has only included category 1 (major) and 2 (significant) pollution incidents.

Features are displayed on the Current industrial land use map on **page 29**

ID	Location	Details	
B	358m E	Incident Date: 01/01/2002 Incident Identification: 50041 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
B	358m E	Incident Date: 01/01/2002 Incident Identification: 50041 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

This data is sourced from the Environment Agency and Natural Resources Wales.

4.19 Pollution inventory substances

Records within 500m

0

The pollution inventory (substances) includes reporting on annual emissions of certain regulated substances to air, controlled waters and land. A reporting threshold for each substance is also included. Where emissions fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.

4.20 Pollution inventory waste transfers

Records within 500m

0

The pollution inventory (waste transfers) includes reporting on annual transfers and recovery/disposal of controlled wastes from a site. A reporting threshold for each waste type is also included. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.



4.21 Pollution inventory radioactive waste

Records within 500m

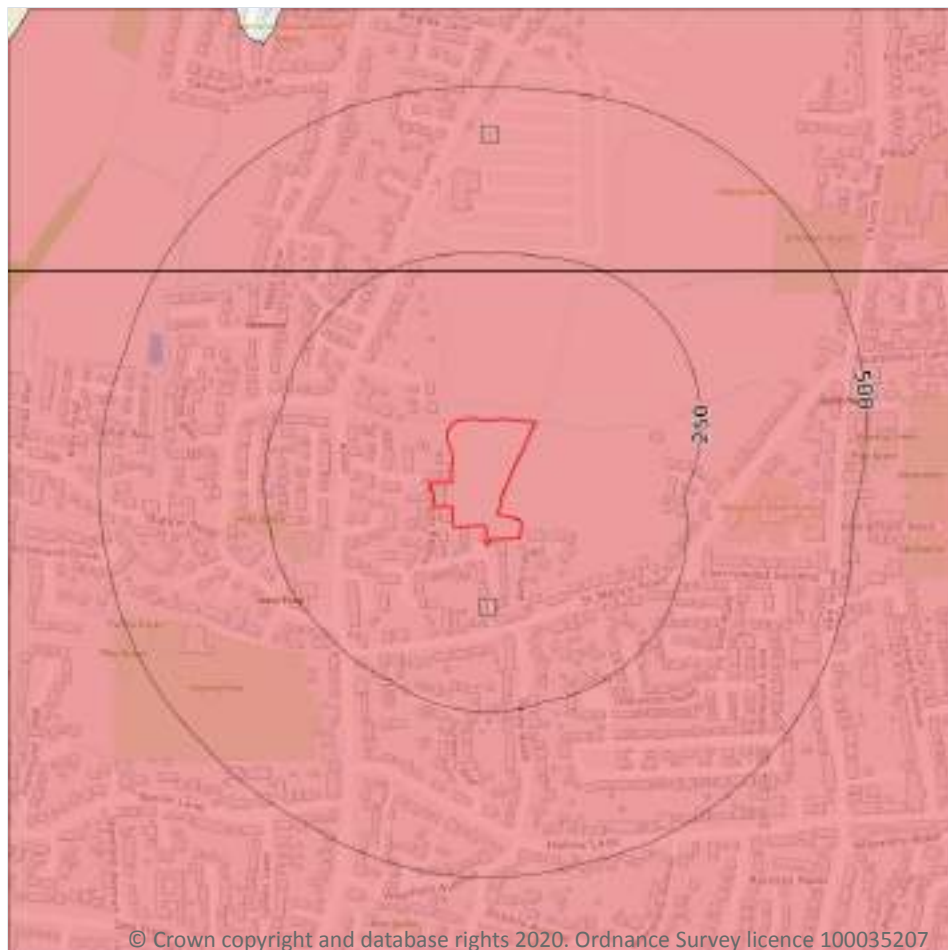
0

The pollution inventory (radioactive wastes) includes reporting on annual releases of radioactive substances from a site, including the means of release. Where releases fall below the reporting threshold, no value will be given. The data is given for the most recent complete year available.

This data is sourced from the Environment Agency and the Scottish Environment Protection Agency.



5 Hydrogeology - Superficial aquifer



- Site Outline
- Search buffers in metres (m)
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive
 - Unknown

5.1 Superficial aquifer

Records within 500m

2

Aquifer status of groundwater held within superficial geology.

Features are displayed on the Hydrogeology map on **page 36**

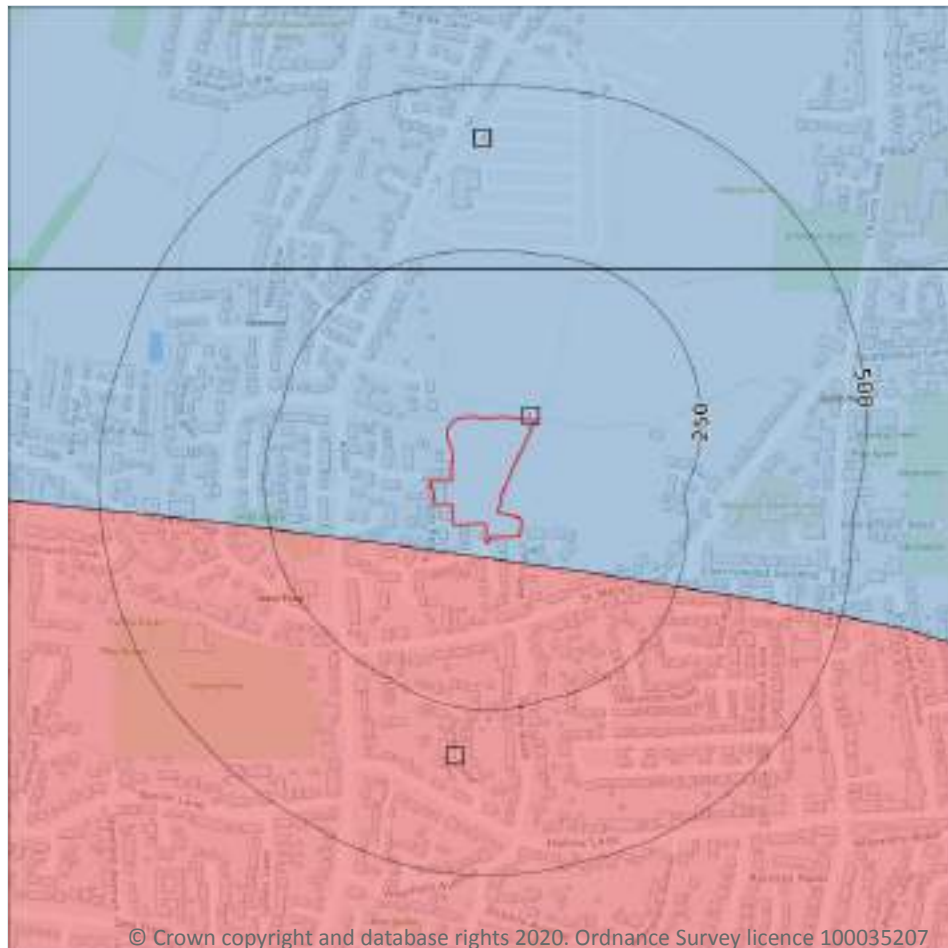
ID	Location	Designation	Description
1	On site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	223m N	Secondary A	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



This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.



Bedrock aquifer



- Site Outline
- Search buffers in metres (m)
- Principal
 - Secondary A
 - Secondary B
 - Secondary Undifferentiated
 - Unproductive

5.2 Bedrock aquifer

Records within 500m

3

Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 38**

ID	Location	Designation	Description
1	On site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	21m S	Secondary A	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

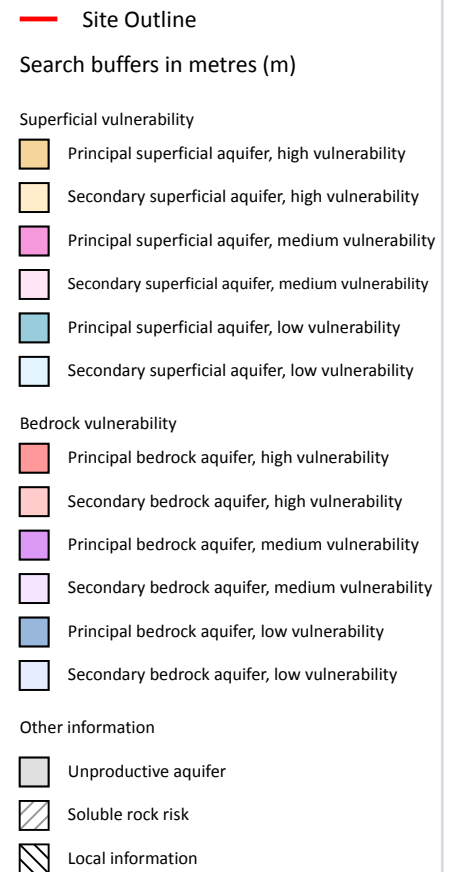


ID	Location	Designation	Description
3	223m N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.



Groundwater vulnerability



5.3 Groundwater vulnerability

Records within 50m

2

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological, hydrogeological and soil properties within a one kilometre square grid. Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

Features are displayed on the Groundwater vulnerability map on **page 40**



ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
1	On site	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Unproductive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300- 550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: 3-10m Patchiness value: >90% Recharge potential: High	Vulnerability: Unproductive Aquifer type: Unproductive Flow mechanism: Mixed
2	21m S	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300- 550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: 3-10m Patchiness value: >90% Recharge potential: High	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Mixed

This data is sourced from the British Geological Survey, the Environment Agency and Natural Resources Wales.

5.4 Groundwater vulnerability- soluble rock risk

Records on site

0

This dataset identifies areas where solution features that enable rapid movement of a pollutant may be present within a 1km grid square.

This data is sourced from the British Geological Survey and the Environment Agency.

5.5 Groundwater vulnerability- local information

Records on site

0

This dataset identifies areas where additional local information affecting vulnerability is held by the Environment Agency. Further information can be obtained by contacting the Environment Agency local Area groundwater team through the Environment Agency National Customer Call Centre on 03798 506 506 or by email on enquiries@environment-agency.gov.uk.

This data is sourced from the British Geological Survey and the Environment Agency.



Abstractions and Source Protection Zones



- Site Outline
- Search buffers in metres (m)
- Source Protection Zone 1
Inner catchment
- Source Protection Zone 2
Outer catchment
- Source Protection Zone 3
Total catchment
- Source Protection Zone 4
Zone of Special Interest
- Source Protection Zone 1c
Inner catchment - confined aquifer
- Source Protection Zone 2c
Outer catchment - confined aquifer
- Source Protection Zone 3c
Total catchment - confined aquifer
- Drinking water abstraction licences
Polygon features
- Drinking water abstraction licences
Linear features
- Groundwater abstraction licence (point)
- Groundwater abstraction licence (area)
- Groundwater abstraction licence (linear)
- Surface Water Abstractions (point)
- Surface Water Abstractions (area)
- Surface Water Abstractions (linear)

5.6 Groundwater abstractions

Records within 2000m

1

Licensed groundwater abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, between two points (line data) or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 42**

ID	Location	Details	
-	1536m W	Status: Active Licence No: 11/42/39/2 Details: Spray Irrigation - Direct Direct Source: Southern Region Groundwater Point: HAYLING ISLAND GOLF CLUB Data Type: Line Name: Hayling Golf Club Ltd Easting: 469730 Northing: 99420	Annual Volume (m ³): 20,900 Max Daily Volume (m ³): 300 Original Application No: - Original Start Date: 23/12/1965 Expiry Date: - Issue No: 101 Version Start Date: 31/03/2016 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.7 Surface water abstractions

Records within 2000m

1

Licensed surface water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

Features are displayed on the Abstractions and Source Protection Zones map on **page 42**

ID	Location	Details	
-	1281m E	Status: Active Licence No: 28/038CA Details: Spray Irrigation - Storage Direct Source: Southern Region Surface Waters Point: UNNAMED WATERCOUSE AT TOURNERBURY FARM, HAYLING ISLAND Data Type: Line Name: A G Phillips & Son Ltd Easting: 473010 Northing: 99970	Annual Volume (m ³): 12,000 Max Daily Volume (m ³): 110 Original Application No: - Original Start Date: 15/11/1993 Expiry Date: - Issue No: 100 Version Start Date: 01/04/2016 Version End Date: -

This data is sourced from the Environment Agency and Natural Resources Wales.

5.8 Potable abstractions

Records within 2000m

0

Licensed potable water abstractions for sites extracting more than 20 cubic metres of water a day and includes active and historical records. The data may be for a single abstraction point, a stretch of watercourse or a larger area.

This data is sourced from the Environment Agency and Natural Resources Wales.



5.9 Source Protection Zones

Records within 500m**0**

Source Protection Zones define the sensitivity of an area around a potable abstraction site to contamination.

This data is sourced from the Environment Agency and Natural Resources Wales.

5.10 Source Protection Zones (confined aquifer)

Records within 500m**0**

Source Protection Zones in the confined aquifer define the sensitivity around a deep groundwater abstraction to contamination. A confined aquifer would normally be protected from contamination by overlying geology and is only considered a sensitive resource if deep excavation/drilling is taking place.

This data is sourced from the Environment Agency and Natural Resources Wales.



6 Hydrology



- Site Outline
- Search buffers in metres (m)
- Water Network (OS MasterMap)
- Surface water features (wider than 5m)
- Surface water features (narrower than 5m)
- ... WFD River, canal and surface water transfer water bodies
- WFD Lake water bodies
- WFD Transitional and coastal water bodies
- WFD Surface water body catchments boundaries
- WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m

9

Detailed water network of Great Britain showing the flow and precise central course of every river, stream, lake and canal.

Features are displayed on the Hydrology map on **page 45**

ID	Location	Type of water feature	Ground level	Permanence	Name
A	On site	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-



ID	Location	Type of water feature	Ground level	Permanence	Name
B	3m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	4m N	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
C	4m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	6m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
C	17m E	Inland river not influenced by normal tidal action.	Underground	Watercourse contains water year round (in normal circumstances)	-
D	26m E	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
3	169m E	Lake, loch or reservoir.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
E	208m E	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m

5

Covering rivers, streams and lakes (some overlap with OS MasterMap Water Network data in previous section) but additionally covers smaller features such as ponds. Rivers and streams narrower than 5m are represented as a single line. Lakes, ponds and rivers or streams wider than 5m are represented as polygons.

Features are displayed on the Hydrology map on **page 45**

This data is sourced from the Ordnance Survey.



6.3 WFD Surface water body catchments

Records on site

1

The Water Framework Directive is an EU-led framework for the protection of inland surface waters, estuaries, coastal waters and groundwater through river basin-level management planning. In terms of surface water, these basins are broken down into smaller units known as management, operational and water body catchments.

Features are displayed on the Hydrology map on **page 45**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
1	On site	Coastal Catchment	Not part of a river WB catchment	216	East Hampshire Rivers	East Hampshire

This data is sourced from the Environment Agency and Natural Resources Wales.

6.4 WFD Surface water bodies

Records identified

0

Surface water bodies under the Directive may be rivers, lakes, estuary or coastal. To achieve the purpose of the Directive, environmental objectives have been set and are reported on for each water body. The progress towards delivery of the objectives is then reported on by the relevant competent authorities at the end of each six-year cycle. The river water body directly associated with the catchment listed in the previous section is detailed below, along with any lake, canal, coastal or artificial water body within 250m of the site. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each water body listed.

This data is sourced from the Environment Agency and Natural Resources Wales.

6.5 WFD Groundwater bodies

Records on site

0

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place. Click on the water body ID in the table to visit the EA Catchment Explorer to find out more about each groundwater body listed.

This data is sourced from the Environment Agency and Natural Resources Wales.

7 River and coastal flooding



- Site Outline
- Search buffers in metres (m)
- Environment Agency river and coastal flooding:
 - High
 - Medium
 - Low
 - Very Low
- Historical Flood Events
- Areas Used for Flood Storage
- Areas Benefiting from Flood Defences
- Flood Defences

7.1 Risk of Flooding from Rivers and Sea (RoFRaS)

Records within 50m

0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance).

This data is sourced from the Environment Agency and Natural Resources Wales.

7.2 Historical Flood Events

Records within 250m

2

Records of historic flooding from rivers, the sea, groundwater and surface water. Records began in 1946 when predecessor bodies started collecting detailed information about flooding incidents, although limited details may be included on flooding incidents prior to this date. Takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding, and includes flood extents that may have been affected by overtopping, breaches or blockages.

Features are displayed on the River and coastal flooding map on **page 48**

ID	Location	Event name	Date of flood	Flood source	Flood cause	Type of flood
1	125m W	Unconfirmed - 07128feg01378feb01070	Unconfirmed Unconfirmed	Unconfirmed - Unknown	Channel capacity exceeded (no raised defences)	No data
2	131m SW	Unconfirmed - 07128feg01348feb01031	Unconfirmed Unconfirmed	Unconfirmed - Unknown	Other	No data

This data is sourced from the Environment Agency and Natural Resources Wales.

7.3 Flood Defences

Records within 250m

0

Records of flood defences owned, managed or inspected by the Environment Agency and Natural Resources Wales. Flood defences can be structures, buildings or parts of buildings. Typically these are earth banks, stone and concrete walls, or sheet-piling that is used to prevent or control the extent of flooding.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.4 Areas Benefiting from Flood Defences

Records within 250m

0

Areas that would benefit from the presence of flood defences in a 1 in 100 (1%) chance of flooding each year from rivers or 1 in 200 (0.5%) chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.



7.5 Flood Storage Areas

Records within 250m

0

Areas that act as a balancing reservoir, storage basin or balancing pond to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel or to delay the timing of a flood peak so that its volume is discharged over a longer period.

This data is sourced from the Environment Agency and Natural Resources Wales.



River and coastal flooding - Flood Zones

7.6 Flood Zone 2

Records within 50m

0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land between Flood Zone 3 (see next section) and the extent of the flooding from rivers or the sea with a 1 in 1000 (0.1%) chance of flooding each year.

This data is sourced from the Environment Agency and Natural Resources Wales.

7.7 Flood Zone 3

Records within 50m

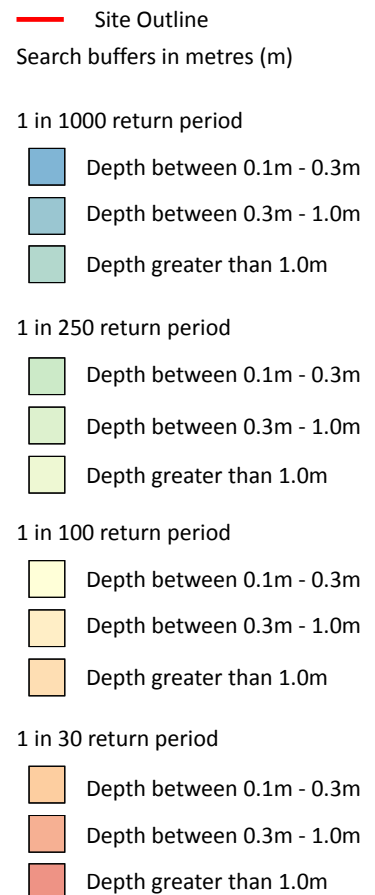
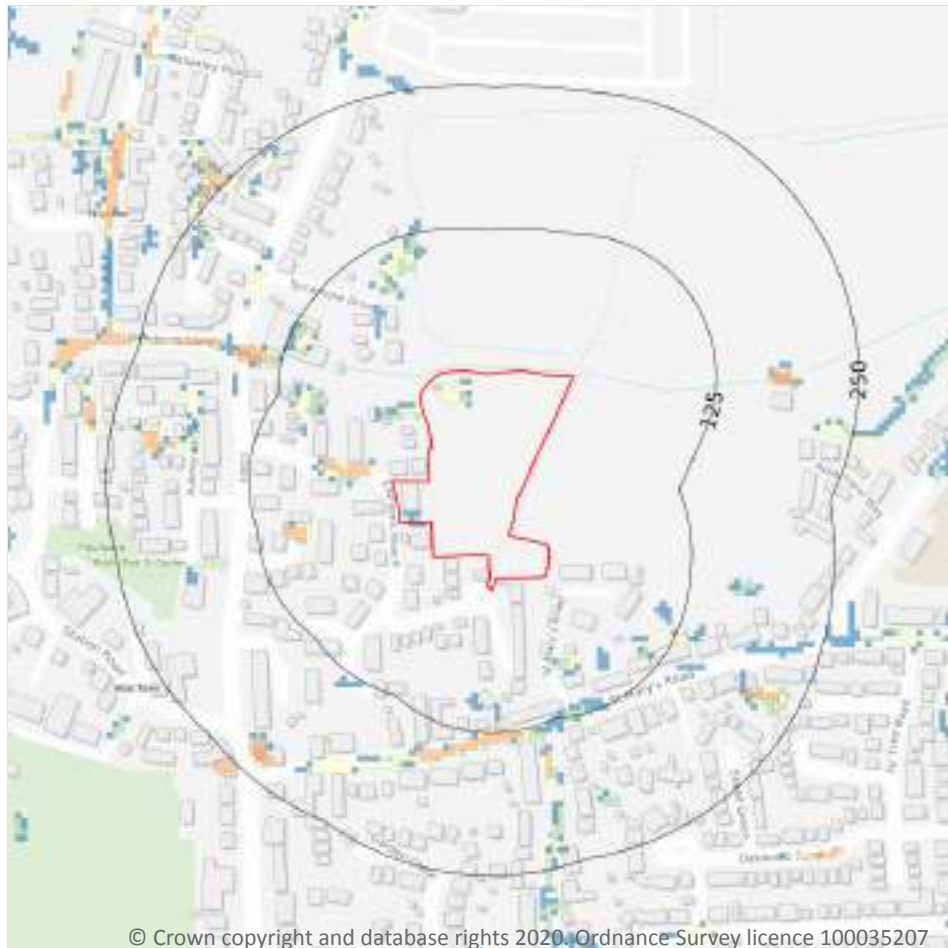
0

Areas of land at risk of flooding, when the presence of flood defences are ignored. Covering land with a 1 in 100 (1%) or greater chance of flooding each year from rivers or a 1 in 200 (0.5%) or greater chance of flooding each year from the sea.

This data is sourced from the Environment Agency and Natural Resources Wales.



8 Surface water flooding



8.1 Surface water flooding

Highest risk on site

1 in 100 year, 0.1m - 0.3m

Highest risk within 50m

1 in 30 year, 0.1m - 0.3m

Ambiental Risk Analytics surface water (pluvial) FloodMap identifies areas likely to flood as a result of extreme rainfall events, i.e. land naturally vulnerable to surface water ponding or flooding. This data set was produced by simulating 1 in 30 year, 1 in 100 year, 1 in 250 year and 1 in 1,000 year rainfall events. Modern urban drainage systems are typically built to cope with rainfall events between 1 in 20 and 1 in 30 years, though some older ones may flood in a 1 in 5 year rainfall event.

Features are displayed on the Surface water flooding map on **page 52**

The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

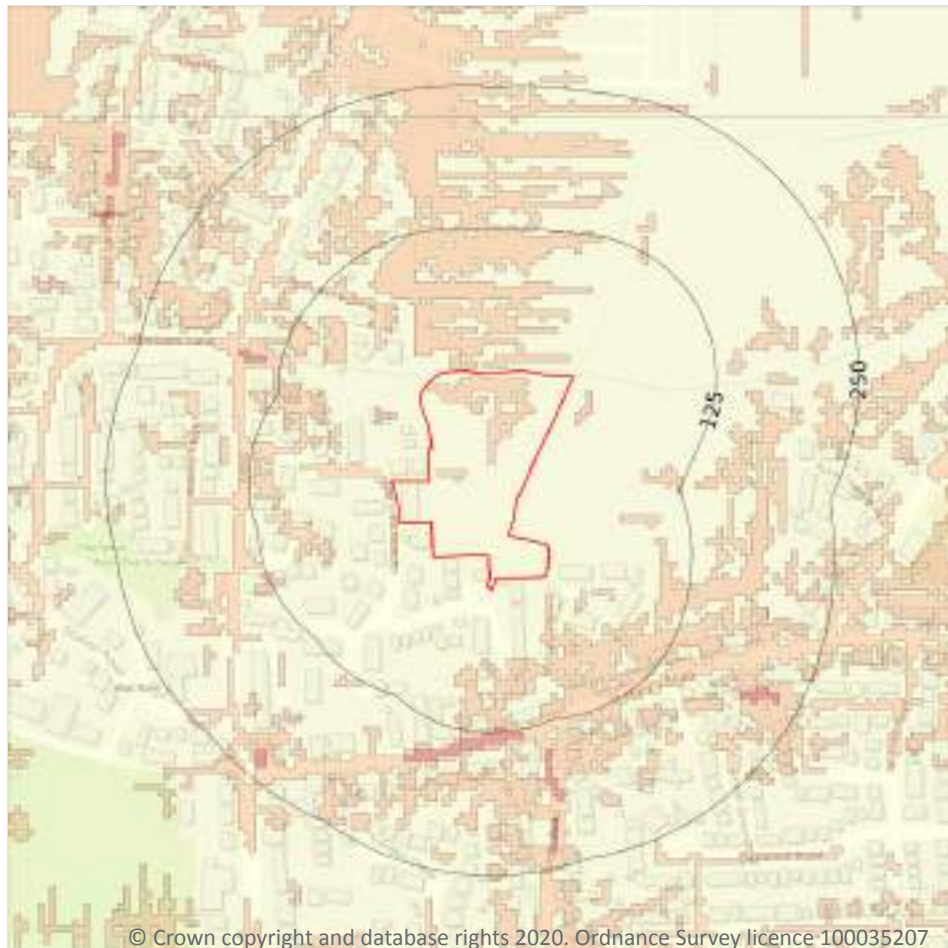
The table below shows the maximum flood depths for a range of return periods for the site.

Return period	Maximum modelled depth
1 in 1000 year	Between 0.1m and 0.3m
1 in 250 year	Between 0.1m and 0.3m
1 in 100 year	Between 0.1m and 0.3m
1 in 30 year	Negligible

This data is sourced from Ambiantal Risk Analytics.



9 Groundwater flooding



— Site Outline
Search buffers in metres (m)

- High
- Moderate - High
- Moderate
- Low
- Negligible

9.1 Groundwater flooding

Highest risk on site

Moderate-High

Highest risk within 50m

Moderate-High

Groundwater flooding is caused by unusually high groundwater levels. It occurs when the water table rises above the ground surface or within underground structures such as basements or cellars. Groundwater flooding tends to exhibit a longer duration than surface water flooding, possibly lasting for weeks or months, and as a result it can cause significant damage to property. This risk assessment is based on a 1 in 100 year return period and a 5m Digital Terrain Model (DTM).

Features are displayed on the Groundwater flooding map on **page 54**

This data is sourced from Ambiantal Risk Analytics.

10 Environmental designations



- Site Outline
- Search buffers in metres (m)
- / Sites of Special Scientific Interest (SSSI)
- X Conserved wetland sites (Ramsar sites)
- + Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- + Local Nature Reserves (LNR)

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m

3

Sites providing statutory protection for the best examples of UK flora, fauna, or geological or physiographical features. Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs were re-notified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and (in Scotland) by the Nature Conservation (Scotland) Act 2004 and the Wildlife and Natural Environment (Scotland) Act 2010.

Features are displayed on the Environmental designations map on **page 55**

ID	Location	Name	Data source
2	677m S	Sinah Common	Natural England



ID	Location	Name	Data source
A	808m NW	Langstone Harbour	Natural England
B	1133m E	Chichester Harbour	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m

2

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. They cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. These sites cover a broad definition of wetland; marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and even some marine areas.

Features are displayed on the Environmental designations map on **page 55**

ID	Location	Site	Details
A	808m NW	Name: Chichester and Langstone Harbours Site status: Listed Data source: Natural England	Overview: Chichester and Langstone Harbours are large, sheltered estuarine basins comprising extensive mud and sand flats exposed at low tide. The site is of particular significance for over-wintering wildfowl and waders and also a wide range of coastal and transitional habitats supporting important plant and animal communities. Ramsar criteria: Ramsar criterion 1 Two large estuarine basins linked by the channel which divides Hayling Island from the main Hampshire coastline. The site includes intertidal mudflats, saltmarsh, sand and shingle spits and sand dunes.
B	1132m E	Name: Chichester and Langstone Harbours Site status: Listed Data source: Natural England	Overview: Chichester and Langstone Harbours are large, sheltered estuarine basins comprising extensive mud and sand flats exposed at low tide. The site is of particular significance for over-wintering wildfowl and waders and also a wide range of coastal and transitional habitats supporting important plant and animal communities. Ramsar criteria: Ramsar criterion 1 Two large estuarine basins linked by the channel which divides Hayling Island from the main Hampshire coastline. The site includes intertidal mudflats, saltmarsh, sand and shingle spits and sand dunes.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.



10.3 Special Areas of Conservation (SAC)

Records within 2000m

1

Areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive.

Features are displayed on the Environmental designations map on **page 55**

ID	Location	Name	Features of interest	Habitat description	Data source
4	883m NW	Solent Maritime	Subtidal sandbanks; Estuaries; Intertidal mudflats and sandflats; Lagoons; Annual vegetation of drift lines; Coastal shingle vegetation outside the reach of waves; Glasswort and other annuals colonising mud and sand; Cord-grass swards; Atlantic salt meadows; Shifting dunes with marram; Dune grassland; Desmoulin's whorl snail; Otter; Common seal.	Broad-leaved deciduous woodland; Shingle, Sea cliffs, Islets; Coastal sand dunes, Sand beaches, Machair; Salt marshes, Salt pastures, Salt steppes; Tidal rivers, Estuaries, Mud flats, Sand flats, Lagoons (including saltwork basins); Marine areas, Sea inlets	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.4 Special Protection Areas (SPA)

Records within 2000m

3

Sites classified by the UK Government under the EC Birds Directive, SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union.

Features are displayed on the Environmental designations map on **page 55**

ID	Location	Name	Species of interest	Habitat description	Data source
3	808m NW	Chichester and Langstone Harbours	Sandwich tern; Common redshank; Ruddy turnstone; Common tern; Ringed plover; Eurasian wigeon; Northern shoveler; Northern pintail; Bar-tailed godwit; Eurasian teal; Sanderling; Grey plover; Red-breasted merganser; Dark-bellied brent goose; Eurasian curle	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites); Inland water bodies (Standing water, Running water); Heath, Scrub, Maquis and Garrigue, Phygrana; Humid grassland, Mesophile grassland; Coastal sand dunes, Sand beaches	Natural England



ID	Location	Name	Species of interest	Habitat description	Data source
5	944m NW	Chichester and Langstone Harbours	Sandwich tern; Common redshank; Ruddy turnstone; Common tern; Ringed plover; Eurasian wigeon; Northern shoveler; Northern pintail; Bar-tailed godwit; Eurasian teal; Sanderling; Grey plover; Red-breasted merganser; Dark-bellied brent goose; Eurasian curle	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites); Inland water bodies (Standing water, Running water); Heath, Scrub, Maquis and Garrigue, Phygrana; Humid grassland, Mesophile grassland; Coastal sand dunes, Sand beaches	Natural England
B	1133m E	Chichester and Langstone Harbours	Sandwich tern; Common redshank; Ruddy turnstone; Common tern; Ringed plover; Eurasian wigeon; Northern shoveler; Northern pintail; Bar-tailed godwit; Eurasian teal; Sanderling; Grey plover; Red-breasted merganser; Dark-bellied brent goose; Eurasian curle	Other land (including Towns, Villages, Roads, Waste places, Mines, Industrial sites); Inland water bodies (Standing water, Running water); Heath, Scrub, Maquis and Garrigue, Phygrana; Humid grassland, Mesophile grassland; Coastal sand dunes, Sand beaches	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.5 National Nature Reserves (NNR)

Records within 2000m

0

Sites containing examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats, provide special opportunities for scientific study or to provide public recreation compatible with natural heritage interests.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.6 Local Nature Reserves (LNR)

Records within 2000m

1

Sites managed for nature conservation, and to provide opportunities for research and education, or simply enjoying and having contact with nature. They are declared by local authorities under the National Parks and Access to the Countryside Act 1949 after consultation with the relevant statutory nature conservation agency.

Features are displayed on the Environmental designations map on **page 55**

ID	Location	Name	Data source
1	638m NW	Hayling Billy	Natural England

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.



10.7 Designated Ancient Woodland

Records within 2000m**0**

Ancient woodlands are classified as areas which have been wooded continuously since at least 1600 AD. This includes semi-natural woodland and plantations on ancient woodland sites. 'Wooded continuously' does not mean there is or has previously been continuous tree cover across the whole site, and not all trees within the woodland have to be old.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.8 Biosphere Reserves

Records within 2000m**0**

Biosphere Reserves are internationally recognised by UNESCO as sites of excellence to balance conservation and socioeconomic development between nature and people. They are recognised under the Man and the Biosphere (MAB) Programme with the aim of promoting sustainable development founded on the work of the local community.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.9 Forest Parks

Records within 2000m**0**

These are areas managed by the Forestry Commission designated on the basis of recreational, conservation or scenic interest.

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m**0**

A type of marine nature reserve in UK waters established under the Marine and Coastal Access Act (2009). They are designated with the aim to protect nationally important, rare or threatened habitats and species.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

10.11 Green Belt

Records within 2000m**0**

Areas designated to prevent urban sprawl by keeping land permanently open.

This data is sourced from the Ministry of Housing, Communities and Local Government.



10.12 Proposed Ramsar sites

Records within 2000m**0**

Ramsar sites are areas listed as a Wetland of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) 1971. The sites here supplied have a status of 'Proposed' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m**0**

Special Areas of Conservation are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs are designated under the EC Habitats Directive. Those sites supplied here are those with a status of 'Possible' having been identified for potential adoption under the framework.

This data is sourced from Natural England and Natural Resources Wales.

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m**0**

Special Protection Areas (SPAs) are areas designated (or 'classified') under the European Union Wild Birds Directive for the protection of nationally and internationally important populations of wild birds. Those sites supplied here are those with a status of 'Potential' having been identified for potential adoption under the framework.

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m**0**

Areas where nitrate concentrations in drinking water sources exceeded or was at risk of exceeding the limit of 50 mg/l set by the 1980 EC Drinking Water Directive. Voluntary agricultural measures as a means of reducing the levels of nitrate were introduced by DEFRA as MAFF, with payments being made to farmers who complied. The scheme was started as a pilot in 1990 in ten areas, later implemented within 32 areas. The scheme was closed to further new entrants in 1998, although existing agreements continued for their full term. All Nitrate Sensitive Areas fell within the areas designated as Nitrate Vulnerable Zones (NVZs) in 1996 under the EC Nitrate Directive (91/676/EEC).

This data is sourced from Natural England.



10.16 Nitrate Vulnerable Zones

Records within 2000m

1

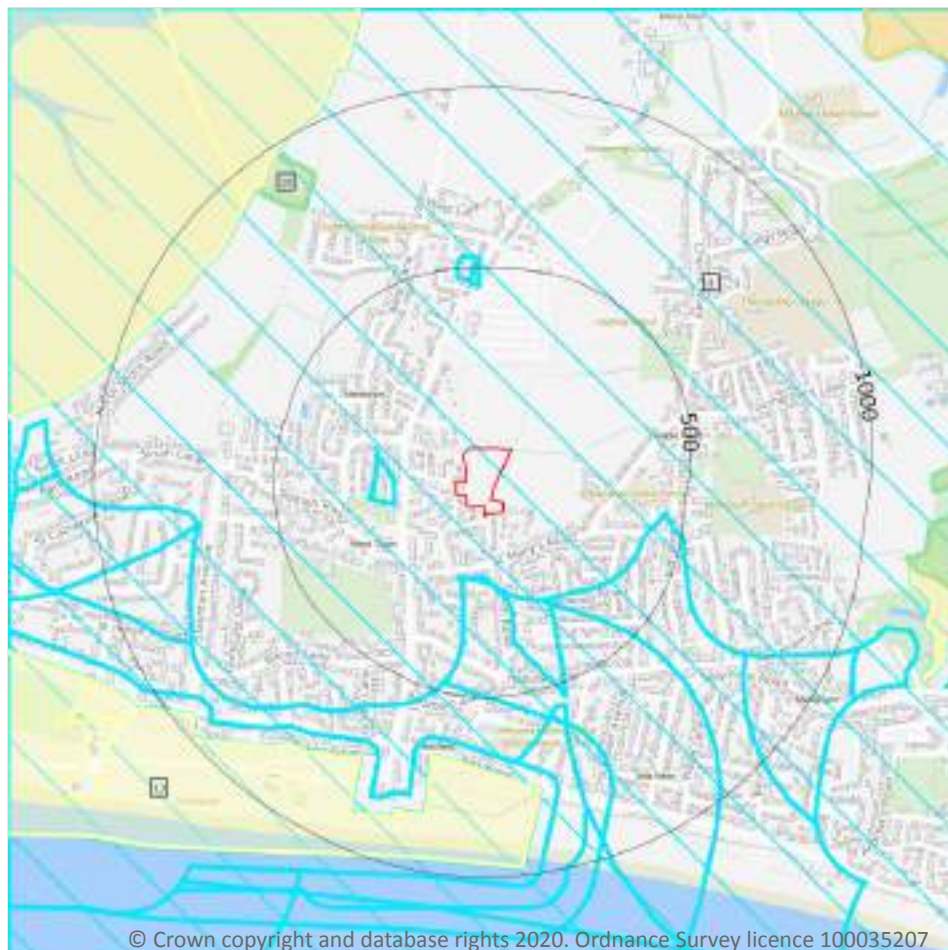
Areas at risk from agricultural nitrate pollution designated under the EC Nitrate Directive (91/676/EEC). These are areas of land that drain into waters polluted by nitrates. Farmers operating within these areas have to follow mandatory rules to tackle nitrate loss from agriculture.

Location	Name	Type	NVZ ID	Status
On site	Chichester,Langstone and Portsmouth Harbours Eutrophic NVZ (TraC)	Eutrophic Water	ET2	Existing

This data is sourced from Natural England and Natural Resources Wales.



SSSI Impact Zones and Units



- Site Outline
- Search buffers in metres (m)
- SSSI Impact Risk Zones
- SSSI Units
- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

10.17 SSSI Impact Risk Zones

Records on site

1

Developed to allow rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts.

Features are displayed on the SSSI Impact Zones and Units map on **page 62**

ID	Location	Type of developments requiring consultation
1	On site	All applications - All Planning Applications - Except Householder Applications. Notes: For new residential development in this area financial contributions are required to mitigate increased recreational disturbance on coastal SPAs and Ramsar Sites. Check with Local Planning Authority. SOLENT NUTRIENT IMPACT AREA. For new development with overnight accommodation Reg 63 of the Conservation of Habitats and Species Regulations 2017 must be applied. LPA to refer to Natural England's Solent Nutrient Neutrality Advice Note June 2019.

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	13
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Divisions of SSSIs used to record management and condition details. Units are the smallest areas for which Natural England gives a condition assessment, however, the size of units varies greatly depending on the types of management and the conservation interest.

Features are displayed on the SSSI Impact Zones and Units map on **page 62**

ID: 13
 Location: 677m S
 SSSI name: Sinah Common
 Unit name: Beachlands
 Broad habitat: Supralittoral Sediment
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
Fixed dune grassland	Not Recorded	01/01/1900
Lowland calcareous grassland (CG7)	Not Recorded	01/01/1900
Lowland dry acid grassland (U1b,c,d,f)	Not Recorded	01/01/1900
Lowland dry heath	Not Recorded	01/01/1900
Population of Schedule 8 plant - Petrorhagia nanteuilii, Childing Pink	Not Recorded	01/01/1900
SM4-28 - Saltmarsh	Not Recorded	01/01/1900
Sand dune; strandline, embryo and mobile dunes (SD1-6)	Not Recorded	01/01/1900
Vascular plant assemblage	Not Recorded	01/01/1900



ID: 18
 Location: 808m NW
 SSSI name: Langstone Harbour
 Unit name: Hayling Billy Marsh
 Broad habitat: Neutral Grassland - Lowland
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
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ID: 20
 Location: 883m NW
 SSSI name: Langstone Harbour
 Unit name: Sinah Lake
 Broad habitat: Littoral Sediment
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
H1110 Sandbanks which are slightly covered by sea water all the time	Unfavourable - Recovering	29/11/2010
H1130 Estuaries	Unfavourable - Recovering	21/09/2018
H1140 Mudflats and sandflats not covered by seawater at low tide	Unfavourable - Recovering	29/11/2010
H1210 Annual vegetation of drift lines	Favourable	29/11/2010
H1220 Perennial vegetation of stony banks	Favourable	29/11/2010
H1310 Salicornia and other annuals colonising mud and sand	Unfavourable - Recovering	29/11/2010
H1320 Spartina swards (Spartinion maritima)	Unfavourable - Recovering	29/11/2010
H1330 Atlantic salt meadows (Glaucio-Puccinellietalia maritima)	Unfavourable - Recovering	29/11/2010
SM4-28 - Saltmarsh	Unfavourable - Recovering	29/11/2010

ID: 21
 Location: 921m NW
 SSSI name: Langstone Harbour
 Unit name: Langstone Hbr East
 Broad habitat: Littoral Sediment
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
H1110 Sandbanks which are slightly covered by sea water all the time	Favourable	29/11/2010
H1130 Estuaries	Unfavourable - Recovering	21/09/2018
H1140 Mudflats and sandflats not covered by seawater at low tide	Unfavourable - Recovering	29/11/2010
H1210 Annual vegetation of drift lines	Favourable	29/11/2010
H1220 Perennial vegetation of stony banks	Favourable	29/11/2010
H1310 Salicornia and other annuals colonising mud and sand	Unfavourable - Recovering	29/11/2010
H1320 Spartina swards (Spartinion maritimae)	Unfavourable - Recovering	29/11/2010
H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Unfavourable - Recovering	29/11/2010
SM4-28 - Saltmarsh	Unfavourable - Recovering	29/11/2010

ID: 29
 Location: 1133m E
 SSSI name: Chichester Harbour
 Unit name: Tournerbury Foreshore
 Broad habitat: Littoral Sediment
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
H1110 Sandbanks which are slightly covered by sea water all the time	Unfavourable - Recovering	29/11/2010
H1130 Estuaries	Unfavourable - No change	26/09/2018
H1140 Mudflats and sandflats not covered by seawater at low tide	Unfavourable - Recovering	29/11/2010
H1210 Annual vegetation of drift lines	Favourable	29/11/2010
H1310 Salicornia and other annuals colonising mud and sand	Unfavourable - Recovering	29/11/2010
H1320 Spartina swards (Spartinion maritimae)	Unfavourable - Recovering	29/11/2010
H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Unfavourable - Recovering	29/11/2010
Littoral sediment	Unfavourable - Recovering	13/08/2014
SM4-28 - Saltmarsh	Unfavourable - Recovering	29/11/2010



ID: 30
 Location: 1133m E
 SSSI name: Chichester Harbour
 Unit name: Tournier Bury Plantation
 Broad habitat: Broadleaved, Mixed And Yew Woodland - Lowland
 Condition: Favourable
 Reportable features:

Feature name	Feature condition	Date of assessment
Lowland mixed deciduous woodland	Favourable	09/07/2010

ID: -
 Location: 1266m E
 SSSI name: Chichester Harbour
 Unit name: Tournier Bury Marsh
 Broad habitat: Neutral Grassland - Lowland
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Bar-tailed godwit, <i>Limosa lapponica</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Black-tailed godwit, <i>Limosa limosa islandica</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Brent goose (dark-bellied), <i>Branta bernicla bernicla</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Curlew, <i>Numenius arquata</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Dunlin, <i>Calidris alpina alpina</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Greenshank, <i>Tringa nebularia</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Grey plover, <i>Pluvialis squatarola</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Redshank, <i>Tringa totanus</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Ringed plover, <i>Charadrius hiaticula</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Sanderling, <i>Calidris alba</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Shelduck, <i>Tadorna tadorna</i>	Unfavourable - Recovering	31/08/2012
Aggregations of non-breeding birds - Teal, <i>Anas crecca</i>	Unfavourable - Recovering	31/08/2012
Lowland neutral grassland (MG5)	Unfavourable - Recovering	31/08/2012

ID: -
 Location: 1406m W
 SSSI name: Sinah Common
 Unit name: Beachlands
 Broad habitat: Supralittoral Sediment
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
Fixed dune grassland	Not Recorded	01/01/1900
Lowland calcareous grassland (CG7)	Not Recorded	01/01/1900
Lowland dry acid grassland (U1b,c,d,f)	Not Recorded	01/01/1900
Lowland dry heath	Not Recorded	01/01/1900
Population of Schedule 8 plant - Petrorhagia nanteuilii, Chiding Pink	Not Recorded	01/01/1900
SM4-28 - Saltmarsh	Not Recorded	01/01/1900
Sand dune; strandline, embryo and mobile dunes (SD1-6)	Not Recorded	01/01/1900
Vascular plant assemblage	Not Recorded	01/01/1900

ID: -
 Location: 1433m W
 SSSI name: Sinah Common
 Unit name: Hayling Golf Club
 Broad habitat: Supralittoral Sediment
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
Fixed dune grassland	Not Recorded	01/01/1900
Lowland calcareous grassland (CG7)	Not Recorded	01/01/1900
Lowland dry acid grassland (U1b,c,d,f)	Not Recorded	01/01/1900
Lowland dry heath	Not Recorded	01/01/1900
Population of Schedule 8 plant - Petrorhagia nanteuilii, Chiding Pink	Not Recorded	01/01/1900
SM4-28 - Saltmarsh	Not Recorded	01/01/1900
Sand dune; strandline, embryo and mobile dunes (SD1-6)	Not Recorded	01/01/1900
Vascular plant assemblage	Not Recorded	01/01/1900

ID: 38
 Location: 1481m NE
 SSSI name: Chichester Harbour
 Unit name: North Hayling Foreshore
 Broad habitat: Littoral Sediment
 Condition: Unfavourable - No change
 Reportable features:

Feature name	Feature condition	Date of assessment
H1110 Sandbanks which are slightly covered by sea water all the time	Unfavourable - Recovering	29/11/2010
H1130 Estuaries	Unfavourable - No change	26/09/2018
H1140 Mudflats and sandflats not covered by seawater at low tide	Unfavourable - Recovering	29/11/2010
H1210 Annual vegetation of drift lines	Unfavourable - Recovering	29/11/2010
H1310 Salicornia and other annuals colonising mud and sand	Unfavourable - Recovering	29/11/2010
H1320 Spartina swards (Spartinion maritimae)	Unfavourable - Recovering	29/11/2010
H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Unfavourable - Recovering	29/11/2010
H2120 Shifting dunes along the shoreline with Ammophila arenaria ('White dunes')	Favourable	29/11/2010
Littoral sediment	Unfavourable - Recovering	13/08/2014
SM4-28 - Saltmarsh	Unfavourable - Recovering	29/11/2010

ID: -
 Location: 1704m W
 SSSI name: Sinah Common
 Unit name: Beachlands
 Broad habitat: Supralittoral Sediment
 Condition: Unfavourable - Recovering
 Reportable features:

Feature name	Feature condition	Date of assessment
Fixed dune grassland	Not Recorded	01/01/1900
Lowland calcareous grassland (CG7)	Not Recorded	01/01/1900
Lowland dry acid grassland (U1b,c,d,f)	Not Recorded	01/01/1900
Lowland dry heath	Not Recorded	01/01/1900
Population of Schedule 8 plant - Petrorhagia nanteuilii, Childing Pink	Not Recorded	01/01/1900



Feature name	Feature condition	Date of assessment
SM4-28 - Saltmarsh	Not Recorded	01/01/1900
Sand dune; strandline, embryo and mobile dunes (SD1-6)	Not Recorded	01/01/1900
Vascular plant assemblage	Not Recorded	01/01/1900

ID: -
 Location: 1765m E
 SSSI name: Chichester Harbour
 Unit name: Eastoke Foreshore
 Broad habitat: Littoral Sediment
 Condition: Unfavourable - No change
 Reportable features:

Feature name	Feature condition	Date of assessment
H1110 Sandbanks which are slightly covered by sea water all the time	Unfavourable - Recovering	29/11/2010
H1130 Estuaries	Unfavourable - No change	26/09/2018
H1140 Mudflats and sandflats not covered by seawater at low tide	Unfavourable - Recovering	29/11/2010
H1210 Annual vegetation of drift lines	Unfavourable - Recovering	29/11/2010
H1310 Salicornia and other annuals colonising mud and sand	Unfavourable - Recovering	29/11/2010
H1320 Spartina swards (Spartinion maritimae)	Unfavourable - Recovering	29/11/2010
H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	Unfavourable - Recovering	29/11/2010
Littoral sediment	Unfavourable - Recovering	13/08/2014
SM4-28 - Saltmarsh	Unfavourable - Recovering	13/08/2014

ID: -
 Location: 1788m NE
 SSSI name: Chichester Harbour
 Unit name: Verner Common
 Broad habitat: Neutral Grassland - Lowland
 Condition: Unfavourable - No change
 Reportable features:

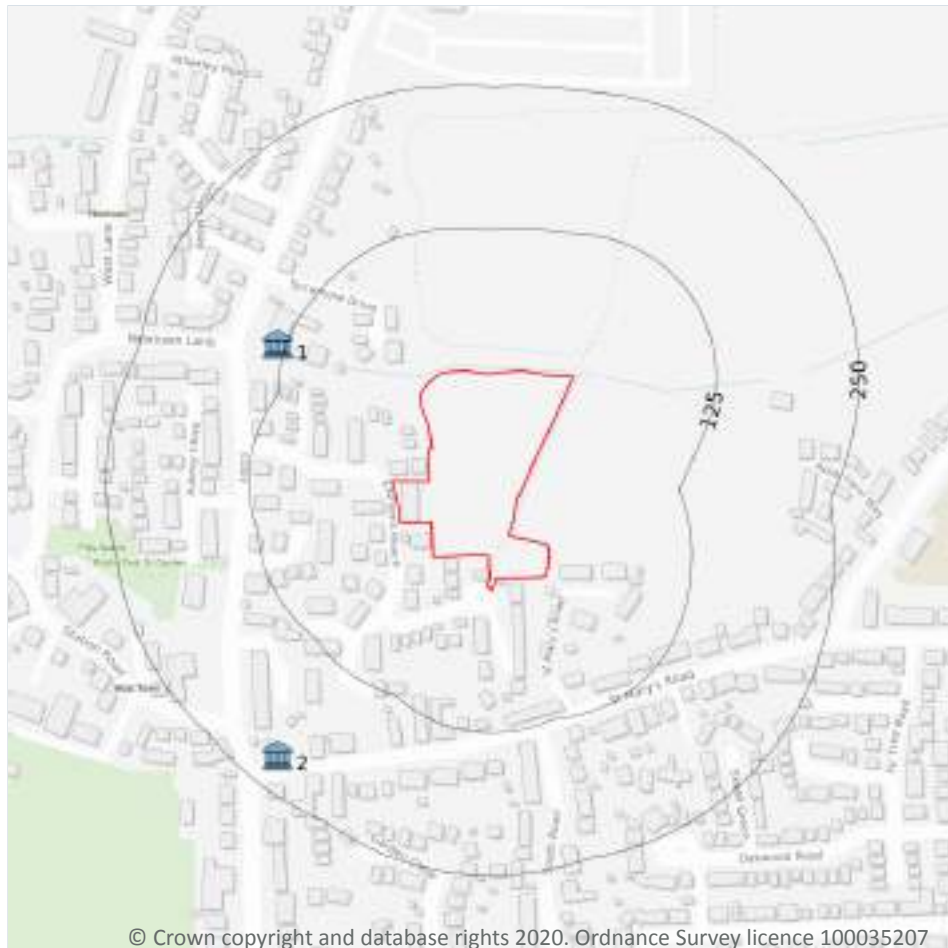
Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Bar-tailed godwit, Limosa lapponica	Favourable	31/08/2012

Feature name	Feature condition	Date of assessment
Aggregations of non-breeding birds - Black-tailed godwit, Limosa limosa islandica	Favourable	31/08/2012
Aggregations of non-breeding birds - Brent goose (dark-bellied), Branta bernicla bernicla	Favourable	31/08/2012
Aggregations of non-breeding birds - Curlew, Numenius arquata	Favourable	31/08/2012
Aggregations of non-breeding birds - Dunlin, Calidris alpina alpina	Favourable	31/08/2012
Aggregations of non-breeding birds - Greenshank, Tringa nebularia	Favourable	31/08/2012
Aggregations of non-breeding birds - Grey plover, Pluvialis squatarola	Favourable	31/08/2012
Aggregations of non-breeding birds - Redshank, Tringa totanus	Favourable	31/08/2012
Aggregations of non-breeding birds - Ringed plover, Charadrius hiaticula	Favourable	31/08/2012
Aggregations of non-breeding birds - Sanderling, Calidris alba	Favourable	31/08/2012
Aggregations of non-breeding birds - Shelduck, Tadorna tadorna	Favourable	31/08/2012
Aggregations of non-breeding birds - Teal, Anas crecca	Favourable	31/08/2012
Lowland neutral grassland (MG5)	Favourable	31/08/2012

This data is sourced from Natural England and Natural Resources Wales.



11 Visual and cultural designations



- Site Outline
- Search buffers in metres (m)
- Listed buildings
- Conservation areas
- Conservation areas - no data
- National Parks
- Areas of Outstanding Natural Beauty
- Registered parks and gardens
- Scheduled Monuments
- World Heritage Sites

11.1 World Heritage Sites

Records within 250m

0

Sites designated for their globally important cultural or natural interest requiring appropriate management and protection measures. World Heritage Sites are designated to meet the UK's commitments under the World Heritage Convention.

This data is sourced from Historic England, Cadw and Historic Environment Scotland.

11.2 Area of Outstanding Natural Beauty

Records within 250m

0

Areas of Outstanding Natural Beauty (AONB) are conservation areas, chosen because they represent 18% of the finest countryside. Each AONB has been designated for special attention because of the quality of their flora, fauna, historical and cultural associations, and/or scenic views. The National Parks and Access to the Countryside Act of 1949 created AONBs and the Countryside and Rights of Way Act, 2000 added further regulation and protection. There are likely to be restrictions to some developments within these areas.

This data is sourced from Natural England, Natural Resources Wales and Scottish Natural Heritage.

11.3 National Parks

Records within 250m

0

In England and Wales, the purpose of National Parks is to conserve and enhance landscapes within the countryside whilst promoting public enjoyment of them and having regard for the social and economic well-being of those living within them. In Scotland National Parks have the additional purpose of promoting the sustainable use of the natural resources of the area and the sustainable social and economic development of its communities. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales, and The National Parks (Scotland) Act 2000 in Scotland.

This data is sourced from Natural England, Natural Resources Wales and the Scottish Government.

11.4 Listed Buildings

Records within 250m

2

Buildings listed for their special architectural or historical interest. Building control in the form of 'listed building consent' is required in order to make any changes to that building which might affect its special interest. Listed buildings are graded to indicate their relative importance, however building controls apply to all buildings equally, irrespective of their grade, and apply to the interior and exterior of the building in its entirety, together with any curtilage structures.

Features are displayed on the Visual and cultural designations map on **page 71**

ID	Location	Name	Grade	Reference Number	Listed date
1	132m W	Newton House Hotel, Havant, Hampshire, PO11	II	1340209	25/05/1976
2	221m SW	Deep Thatch (And Outbuilding), Havant, Hampshire, PO11	II	1155098	15/05/1976

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

11.5 Conservation Areas

Records within 250m

0

Local planning authorities are obliged to designate as conservation areas any parts of their own area that are of special architectural or historic interest, the character and appearance of which it is desirable to preserve or enhance. Designation of a conservation area gives broader protection than the listing of individual buildings. All the features within the area, listed or otherwise, are recognised as part of its character. Conservation area designation is the means of recognising the importance of all factors and of ensuring that planning decisions address the quality of the landscape in its broadest sense.

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

11.6 Scheduled Ancient Monuments

Records within 250m

0

A scheduled monument is an historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Digital, Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979. The Schedule of Monuments has c.20,000 entries and includes sites such as Roman remains, burial mounds, castles, bridges, earthworks, the remains of deserted villages and industrial sites. Monuments are not graded, but all are, by definition, considered to be of national importance.

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

11.7 Registered Parks and Gardens

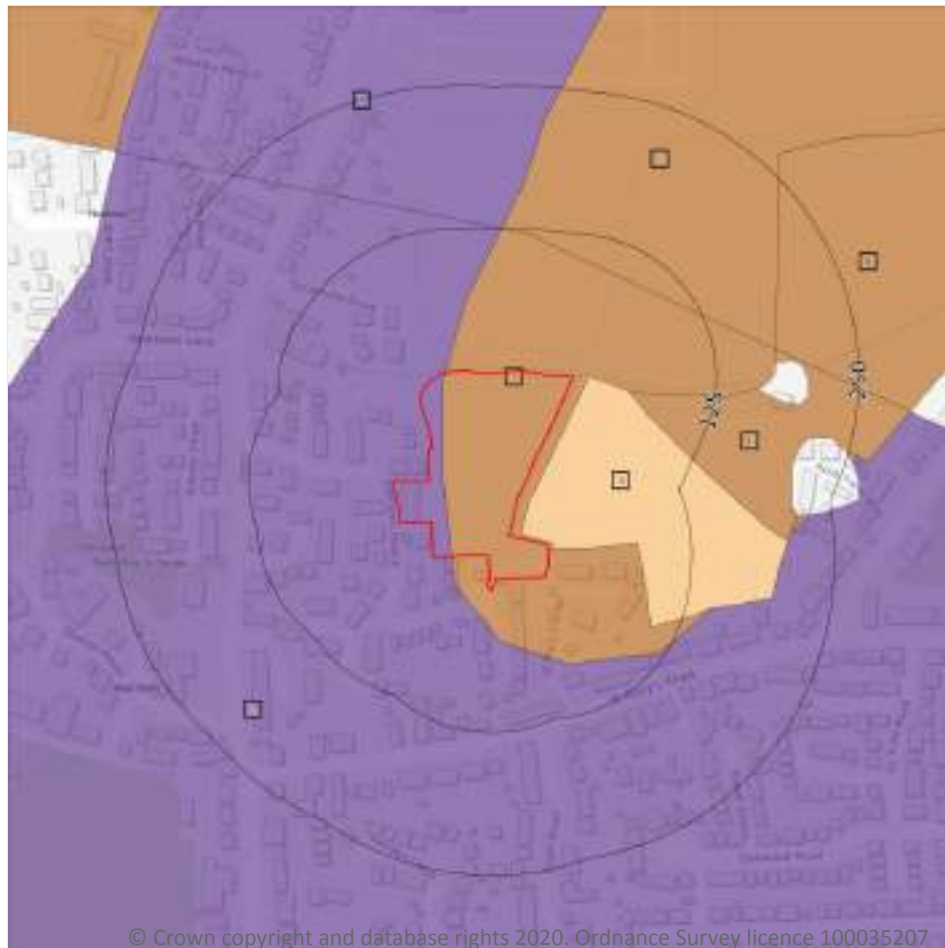
Records within 250m

0

Parks and gardens assessed to be of particular interest and of special historic interest. The emphasis being on 'designed' landscapes, rather than on planting or botanical importance. Registration is a 'material consideration' in the planning process, meaning that planning authorities must consider the impact of any proposed development on the special character of the landscape.

This data is sourced from English Heritage, Cadw and Historic Environment Scotland.

12 Agricultural designations



- Site Outline
- Search buffers in metres (m)
- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3 - good to moderate quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Non-agricultural land
- Urban land
- Exclusion land
- Tree felling licences
- Open Access land

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12.1 Agricultural Land Classification

Records within 250m

7

Classification of the quality of agricultural land taking into consideration multiple factors including climate, physical geography and soil properties. It should be noted that the categories for the grading of agricultural land are not consistent across England, Wales and Scotland.

Features are displayed on the Agricultural designations map on **page 74**

ID	Location	Classification	Description
1	On site	Grade 2	Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.
2	On site	Urban	-
3	3m N	Grade 3a	Good quality agricultural land. Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.
4	49m E	Grade 2	Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.
5	96m NE	Grade 2	Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.
6	126m N	Urban	-
8	180m E	Grade 2	Very good quality agricultural land. Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

This data is sourced from Natural England.

12.2 Open Access Land

Records within 250m

0

The Countryside and Rights of Way Act 2000 (CROW Act) gives a public right of access to land without having to use paths. Access land includes mountains, moors, heaths and downs that are privately owned. It also includes common land registered with the local council and some land around the England Coast Path. Generally permitted activities on access land are walking, running, watching wildlife and climbing.

This data is sourced from Natural England and Natural Resources Wales.



12.3 Tree Felling Licences

Records within 250m

0

Felling Licence Application (FLA) areas approved by Forestry Commission England. Anyone wishing to fell trees must ensure that a licence or permission under a grant scheme has been issued by the Forestry Commission before any felling is carried out or that one of the exceptions apply.

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m

0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m

0

Countryside Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. Main objectives are to improve the farmed environment for wildlife and to reduce diffuse water pollution.

This data is sourced from Natural England.