

**GEO-SITE ASSESSMENT REPORT
PITSTONE SPORTS PAVILION
MARSWORTH ROAD, PITSTONE
BUCKINGHAMSHIRE
LU7 9AP**

REPORT PREPARED FOR:

**PITSTONE PARISH COUNCIL
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1.0 EXECUTIVE SUMMARY

Site Setting	Sensitivity Rating	Comments	Report Section
On Site Sources	Low	Active playing fields and pavilion	Section 3.3
Offsite Receptors	Medium	Potential for dust and noise nuisance during construction on adjacent residential receptors.	Section 3.2
Proposed Use	Medium	Redevelopment for continued use as football pitches and pavilion.	Section 2.2
History	Low	Site first developed upon in 1925 with an unknown structure present on the centre of the site and then labelled as a playing field from 1980s onwards. Current site layout developed between 2003 and 2010.	Section 3.7
Hydrogeology	High	Underlain by Principal Chalk Aquifer, outside of SPZ.	Section 3.4
Hydrology	Medium	Unnamed River lies ~113m west.	Section 3.4
Flood Risk	Low	Lies outside of any flood risk zone	Section 3.4
Landfill/Infilled land	Medium	No Landfills located within 1km of the subject site. Potentially infilled land (Cuttings) located 153m southwest.	Section 3.6
Geological Hazards	Low	No requirement for additional mitigation measures	Section 3.5
Assessment Findings	Risk Rating	Comments	Report Section
Proven Ground Conditions	Low	Topsoil over gravelly clay (~1.20m), underlain by Chalk (Grade Dm). No groundwater encountered.	Section 5.2
Contamination Results	Low	<ul style="list-style-type: none"> No Exceedances of the adopted criteria for soils 	Section 7.4
Waste	Low	Encountered materials likely to be classified as Inert for offsite disposal.	Section 7.3
Ground Gas	Low	Very low ground gas risk (CS1) returned from monitoring visit. No additional monitoring or enhancement to membrane required	Section 5.2.7
Excavations	Medium	Shallow perched water may require groundwater control for excavations, particularly in periods of heavy rainfall.	Section 8.4
Foundations	Medium	Traditional strip foundations extending to 1.50m - 2m bgl in the firmer chalk materials, adopting bearing capacity of 125kN/m ²	Section 8.8
Drainage	Medium	Moderate drainage result returned (10 ⁻⁵ m/sec). Soakaways should be located >10m away from buildings in line with CIRIA guidance.	Section 8.7
Recommendations	<ul style="list-style-type: none"> No further actions are recommended on site. 		Section 9.0

2.0 INTRODUCTION

WDE Consulting Limited (WDE) was appointed by Pitstone Parish Council (the Client) to conduct a Geo-Site Assessment Report at Pitstone Sports Pavilion (Figure 1) to determine the ground conditions prior to the proposed extension to the existing pavilion building.

The works described in this report are subject to the WDE Service Constraints presented in Appendix A. This report was finalised in December 2019 and should be read in the light of any subsequent changes in legislation, statutory requirements, statutory guidance, non-statutory guidance, relevant research and industry practices. This report is currently assigned only to the *Client* for their sole reliance.

2.1 RELEVANT GUIDANCE

WDE Consulting has duly taken account of the recommendation contained within relevant guidance documents and legislation during the preparation of this report, details of which are presented in Appendix B.

2.2 PROPOSED REDEVELOPMENT

It is understood that the development is to comprise of a single storey extension to the east and west of the existing building with associated redevelopment of the car parking and soft standing areas (Figure 2).

2.3 AIMS AND OBJECTIVES

2.3.1 Aims

The aims of this report are as follows:

1. To identify whether there is any contamination onsite which is likely to cause significant harm to human health, the environment or other sensitive receptors
2. To identify the geotechnical properties of the ground to enable determining outline design parameters for foundations and drainage.

2.3.2 Objectives

In order to achieve the aims set out in Section 2.3.1 WDE proposes the following objectives:

1. Complete a Phase 1 desk based study of the site to ascertain information on the site geology, hydrology and surrounding land uses.
2. Complete walkover survey to identify any areas of potential contamination.
3. Investigate the nature of material that is present onsite through field investigations.
4. Investigate the nature and extent of any contamination onsite through field investigations.

5. Compare onsite soil and water concentrations with generic UK based assessment criteria.
6. Investigate the drainage potential of the materials onsite through field investigations

2.4 WORK AND PROGRAMME

WDE Consulting's scope of work includes the following:

- Site walkover
- Intrusive site investigation
- Groundwater and ground gas monitoring
- BRE 365 soakage testing
- Borehole permeability testing
- Laboratory analyses (contamination & geotechnical)
- Geo-Site Assessment Report

The programme of work that was undertaken comprises the following elements presented in Table 1.

Table 1 – Programme of Works

Item	Description	Start Date	Completion Date
1	Site Walkover	26/11/2019	26/11/2019
2	Intrusive Investigation	26/11/2019	26/11/2019
3	BRE 365 Soakage Testing	29/11/2019	29/11/2019
4	Monitoring Visit	29/11/2019	29/11/2019
5	Analytical Laboratory Analysis	29/11/2019	06/12/2019
6	Laboratory Geotechnical Testing	29/11/2019	11/12/2019
7	Geo-Site Assessment Report	29/11/2019	12/12/2019

3.0 PHASE 1 DESK STUDY AND SITE WALKOVER

3.1 SOURCES OF INFORMATION

The sources of information that were used during the desk study included the following items:

- Site walkover (Photos presented in Appendix C)
- Environmental database information (Appendix D)

3.2 SITE LOCATION

The site is located in Pitstone, Buckinghamshire at postcode LU7 9AP and National Grid Reference 493176, 215522 (Figure 1). The site can be found in an area of mixed residential, commercial and agricultural land use. A summary of the site surroundings are as follows:

- Northern Boundary – Open Land
- Eastern Boundary – Open Land with Residential Properties beyond
- Southern Boundary – Electricity Substation, Residential and Commercial Properties
- Western Boundary – Unspecified water feature and Railway beyond

3.3 SITE DESCRIPTION AND WALKOVER

The entire site is 2.15ha are roughly square in shape with dimensions of ~140m east to west and ~130m north to south. Access to the site is via Marsworth Road on the southern boundary. The site comprises of 2no. football pitches, a sports pavilion and associated car park (Photos 1 and 2).

The football pitches cover the majority of the site with the pavilion and car park located on the southern boundary. The existing pavilion building consists of changing room, toilet and kitchen facilities for users of the pitches (Photo 3).

Topography on site is generally level. There was no evidence of invasive plant species onsite and the closest mature tree is located ~12m from the new building, described in the topographical survey as a 9m Cherry.

3.4 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

Published geological information indicates that the bedrock is made up of the West Melbury Marly Chalk formation with no superficial deposits recorded. The bedrock has been deemed a Principal Aquifer. The site does not lie within any Environment Agency Source Protection Zones.

The nearest recorded surface water feature is an unnamed water course located 113m west with several further surface water features within 250m of the site boundaries. A large water feature is illustrated adjacent to the western boundary of site and labelled as a 'balancing pond' and understood to be part of the drainage system for the housing estate located off Westfield Road. The site does not lie within a River and Coastal Flooding Zone with a very low Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating.

3.5 GEOLOGICAL HAZARD

The Groundsure Natural Hazards Findings has identified a number of potential hazards which are summarised in Table 2 below.

Table 2 – Natural Hazard Findings

Natural Hazard	Risk Rating
Shrink Swell	Negligible
Landslides	Negligible
Soluble Rocks	Negligible
Compressible Ground	Negligible
Collapsible Rocks	Very Low
Running Sand	Negligible

The property is not in a Radon Affected Area as less than 1% of properties are above the Action Level. No radon protective measures are likely to be necessary as a result.

3.6 LAND USES ADJACENT TO SITE

3.6.1 Industrial Land Use

There are two potentially contaminative industrial sites recorded within 250m of the site boundaries, details of which are summarised below:

- Behringer Ltd (Tools including Machine Shops) – 64m SE
- Safran Electrical & Power (Electronic Equipment) – 203m S

3.6.2 Historical Potentially Contaminative Uses

There are a number of historical potentially contaminative land uses within 250m of the site boundaries, a summary of which are detailed below:

- Cement Works (1951) – 9m SE
- Cement Works (1950) – 14m SE
- Unspecified Commercial/ Industrial (1978) – 17m SE

- Railway Sidings (1877, 1950, 1978) – 57m W
- Railway Sidings (1950, 1951) – 94m SW
- Unspecified Tanks (1978) – 146m SE
- Cuttings (1882) – 153m SW

3.6.3 Potentially Infilled Land

There is one recorded area of potentially infilled land within 250m of the site boundaries, details of a summary are recorded below:

- Cuttings (1882) – 153m SW

3.6.4 Electrical Substations

There are three recorded electrical substations within 250m of the site boundaries, details of which are summarised below:

- Electricity Substation – Adjacent to site SE
- Electricity Substation – 97m SW
- Electricity Substation – 167m SE

3.6.5 Fuel Station Entries

There are no fuel station entries recorded within 250m of the site boundaries.

3.6.6 Historical Petrol and Fuel Sites

There are no historical petrol or fuel sites recorded within 250m of the site boundaries.

3.6.7 Historical Garage and Motor Vehicle Repair Database

There are no recorded historical garage and motor vehicle repair sites within 250m of the site boundaries.

3.6.8 Historical/Current Landfill/Waste Sites

There are no records of landfill or waste sites within 1km of the site boundaries.

3.6.9 Licensed Discharge Consents

There are no licensed discharge consents recorded within 250m of the site boundaries, however there is one record of water industry referral (potentially harmful discharges to public sewer), details of which are summarised below in Table 3.

Table 3 - Records of Water Industry Referrals

Name	Permission Ref	Status	Local Authority	Distance from site
Safran Power UK	SCE0104C2	Effective	Milton Keynes Council	185m S

3.6.10 Records of Part A(2) and Part B Activities

There is one Part B Activity recorded within 250m of the site boundaries, details of which are summarised below in Table 4.

Table 4 - Records of Part A(2) and Part B Activities and Enforcements

Name	Process	Status	Permit type	Distance from site
Goodrich Power Systems	Surface Cleaning	Historical Permit	Part B	201m S

3.6.11 Records of List 2 Dangerous Substances

There is one record of List 2 dangerous substances recorded within 250m of the site boundaries, details of which are summarised below:

- Goodrich Control Systems (pH) – 95m SE

3.6.12 Substantiated Pollution Incident Register

There is one pollution incident recorded within 250m of the site boundaries, details of which are summarised below in Table 5.

Table 5 – Summary of Pollution Incidents

Incident Date	Pollutant	Water Impact	Land Impact	Air Impact	Distance from site
07/07/2003	Inorganic Chemicals / Products	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	173m SE

3.6.13 Water Abstractions

There are no potable water abstractions recorded within 250m of the site boundaries. There is however one groundwater abstraction licence recorded within 250m of the site boundaries, details of which are summarised in Table 6 below.

Table 6 – Water Abstraction Records

Name	Reference	Use	Source	Status	Distance from site
Castle Cement Pitstone Ltd	6/33/06/*G/0059	General use	Groundwater	Historical	70m E

3.6.14 Historical Tank Database

There are six historical tank records within 250m of the site boundaries, details of which are summarised below:

- Tanks (1995, 1996) – 62m SW
- Tanks (1978, 1985) – 99m S
- Unspecified Tanks (1978, 1985, 1995, 1996) – 106m SE
- Tanks (1978, 1985, 1995, 1996) – 144m SE
- Tanks (1978, 1985, 1995, 1996) – 185m SE
- Tanks (1978, 1995, 1996) – 213m SE

3.6.15 Historical Energy Features

There are two recorded historical energy features within 250m of the site boundaries, details of which are summarised below:

- Electricity Substation (1978, 1985, 1995, 1996) – Adjacent to Site
- Electricity Substation (1978, 1985, 1995, 1996) – 233m SE

3.7 HISTORICAL LAND USE ON SITE AND IN SURROUNDING AREA

The historical ordnance survey maps indicate the following historical land uses on site and in the surrounding area, and is summarised in Table 7.

Table 7 – Summary of Historical Land Use

Date	On Site	Off Site
1879	Site consisted of open land.	Existing Marsworth Road runs along the southern boundary of the site labelled as the 'Lower Icknield Way'. The existing railway line also runs N to S ~100m west of the site.
1884	No significant change	No significant change
1897	The site appears to have been divided into separate fields with mapping indicating orchards.	2no. residential properties built ~120m SW adjacent to railway line.
1898	No significant change	No significant change
1899	No significant change	No significant change
1925	Structure illustrated in the centre of the site.	Allotment gardens labelled ~90m E.
1926	No significant change	No significant change
1950	No significant change	Cement works labelled south of the Marsworth road (~10m S) including new sidings and link to quarry ~1km S.
1952	No significant change	No significant change
1960	No significant change	No significant change
1980	Site labelled as a playing field	Adjacent Substation to the SE boundary. Cement works now include a number of new sidings, unspecified tanks and industrial buildings, growing significantly (~10m S). Electrical substation illustrated ~250m South. Residential extension of Pitstone ~150m NE.

1981	No significant change	No significant change
1985	No significant change	No significant change
1993	No significant change	No significant change
1995	No significant change	Unspecified tanks illustrated ~70m W of the site.
2001	No significant change	No significant change
2003	No significant change	Cement works redeveloped ~10m south.
2010	Pavilion illustrated matching existing site layout.	Cement works no longer shown ~ 10m S. Redeveloped for residential housing estate in the east and industrial land use including Harvington Park in the west.
2019	No significant change	Balancing pond illustrated ~70m W. Residential redevelopment ~50m S completed.

3.8 SENSITIVE LAND USE

There are no recorded sensitive land uses recorded within 250m of the site boundaries. The site lies within a Nitrate Vulnerable Zone.

3.9 POTENTIAL AREAS OF CONCERN

One potential area of concern has been identified within the site boundaries, details of which are outlined in Table 8.

Table 8 – Summary of the Identified Onsite Potential Areas of Concern

Ref	Item
A	Importation of potentially made ground

3.10 QUALITATIVE RISK ASSESSMENT

To assess the potential for risk, the Source → Pathway → Receptor relationships have been evaluated to determine whether there are potentially active pollutant linkages between sources and receptors. It is only when there is an active pollutant linkage, can there be a potential risk to a receptor from a source via a particular pathway. Each active pathway has been assigned a qualitative assessment as to the level of risk as explained in Table 9 as per R&D 66¹². A summary of the relevant pollutant linkages based on a source-pathway-receptors analysis is provided in Table 10.

Table 9 – Qualitative Risk Classification Scheme

		CONSEQUENCE			
		Severe	Medium	Mild	Minor
PROBABILITY (Likelihood)	High likelihood	Very High Risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table 10 – Summary of Potentially Active Source-Pathway-Target Assessment

Sources	Potential Pathway	Potential Receptor	Risk Classification
Onsite Sources	Dermal contact, ingestion outdoor inhalation and indoor inhalation	Human Health (Onsite POS/Com)	Low Risk
Onsite Sources	Vapour inhalation from organic vapours in external areas or inside buildings	Human Health (Offsite Residential)	Low Risk
Onsite Sources	Vapour inhalation from dissolved phase groundwater migrating from site to neighbouring properties	Human Health (Offsite Residential)	Low Risk
Onsite Sources	Impacted soil leaching to groundwater within Principal Aquifer	Controlled Waters (Groundwater)	Moderate Risk
Onsite Sources	Impacted soil leaching to groundwater and migration to surface water	Controlled Waters (Surface Waters)	Low Risk
Offsite Source	Vapour inhalation from dissolved phase migration from offsite sources	Human Health (Onsite POS)	Moderate Risk
Offsite Source	Ground gas generation from potentially infilled land and migration to subject site.	Human Health (Onsite Commercial)	Low Risk

4.0 INVESTIGATION WORKS

4.1 FIELD METHODS USED

The locations of the intrusive investigation are presented on Figure 3 and comprised the following:

- 3no. boreholes (BH1 to BH3) were drilled to a maximum depth of 5.00m bgl with 1no. monitoring well installations (BH3).
- 5no. Dynamic Probes (DP1 to DP5) were drilled to a maximum depth of 5.00m bgl.
- 1no. trial pit (SA1) was excavated using a JCB 3CX to a depth of 3.00m bgl for BRE soakage testing (Photo 4)
- 1no. foundation pit (FDP1) was hand dug to prove the depths of the existing foundations (Photo 5 & 6).

Boreholes and dynamic probes were drilled using a mechanical window sampling rig (Photo 7) to investigate the ground conditions. All of the fieldwork was completed under the supervision of a WDE site engineer. Logs for each of the intrusive locations are presented in Appendix E. Organic Vapour Concentrations (OVCs) were measured during the fieldwork on recovered soil samples using a Photo-ionisation Detector (PID). Soil samples were transported within a cooler box to a UKAS accredited laboratory under chain of custody conditions.

The monitoring well was installed to a depth of 5.00m bgl using 50mm diameter well material, gas valve and lockable cover, which were subsequently monitored for groundwater and ground gas levels (oxygen, carbon dioxide and methane).

4.2 FIELD RESULTS

4.2.1 Geology

A summary of the geology encountered during the intrusive investigation is summarised in Table 11 and are presented in full Appendix E.

Table 11 – Summary of Geology Proved Onsite

Description	Min – Max Depth (m bgl)	Average Depth (m bgl)
Topsoil	0.00 – 0.40	0.00 – 0.30
Gravelly Clay	0.20 – 1.40	0.30 – 1.20
Structureless Chalk (Grade Dm)	1.10 – 5.00	1.20 – 5.00

Topsoil: Dark brown slightly gravelly clay with rootlets was encountered in all the intrusive locations and proved to a maximum depth of 0.40m bgl.

Gravelly Clay: Soft to firm greyish brown gravelly clay was encountered in all locations beneath the topsoil. The gravels were found to be fine to medium and subrounded. The clay was proved to a maximum depth of 1.40m bgl.

Chalk: Structureless Chalk (Grade Dm) composed of soft to stiff beige silt was encountered at all locations and was proven to a maximum depth of 5.00m bgl.

4.2.2 Foundation Inspection Pit

The figure for the foundation inspection pit are provided in Appendix E and summarised below in Table 12.

Table 12 – Summary of Foundation Inspection Pit

Location	Depth to top of footing (m bgl)	Depth to base of footing (m bgl)	Footing Materials	Founding Material	Comments
FDP1	0.68	1.56	Concrete	Silty Gravelly Chalky Clay	Photos 5&6

4.2.3 Dynamic Probing Results

Dynamic probe testing was carried out in 5no. locations (DP1 to DP5) to a maximum depth of 5.00m bgl. A copy of the dynamic probe logs are provided in Appendix E and a summary of the calculated N-values are provided in Table 13.

Table 13 – Summary of N Values from Dynamic Probe Results

DP Depth (m)	DP1	DP2	DP3	DP4	DP5
0.0-0.3	14	4	4	4	3
0.3-0.6	6	3	3	4	3
0.6-0.9	5	5	3	3	3
0.9-1.2	5	3	3	3	3
1.2-1.5	6	3	3	4	4
1.5-1.8	5	3	4	5	6
1.8-2.1	5	3	5	6	8
2.1-2.4	13	5	6	6	5
2.4-2.7	7	5	7	6	6
2.7-3.0	8	7	9	9	6
3.0-3.3	10	6	8	-	-
3.3-3.6	10	6	10	-	-
3.6-3.9	12	11	12	-	-
3.9-4.2	21	12	13	-	-
4.2-4.5	22	20	17	-	-
4.5-4.8	21	22	20	-	-

4.2.4 Groundwater Encountered During the Intrusive Investigation

Groundwater was not encountered in the upper 5.0m of the soil profile during the intrusive investigation.

4.2.5 Contamination Observations

No grossly contaminative, visual or olfactory evidence of contamination was encountered during the intrusive investigation, with all PID readings <1 ppm (v).

4.2.6 Groundwater Monitoring Results

A summary of the groundwater monitoring results obtained on the 29th of November are presented in Table 14.

Table 14 – Groundwater Field Monitoring Results

Monitoring Well Reference	Product Thickness (mm)	Depth to Water (m bgl)	Depth to Base of Well (m bgl)	Comments
BH3	-	3.698	4.894	Bail down/ Rising head test indicates perched

4.2.7 Ground Gas Monitoring Results

A summary of the ground gas monitoring results obtained on the 29th of November 2019 are presented in Table 15 and are presented in full in Appendix F.

Table 15 – Ground Gas Field Monitoring Results

Location Reference	O ₂ (%)	CO ₂ (%)	CH ₄ (%)	Atmospheric Pressure (mB)	Flow rate (l/hr)
BH3	18.4	1.6	0.1	1004	-0.0

4.2.8 Permeability Tests

A summary of the field permeability results obtained on 29th November 2019 are presented in Table 16 and are presented in full in Appendix F. It should be noted that preceding the soakage testing, several days of persistent heavy rain fell on the site.

Table 16 – Permeability Results

Location	Test Type	Drainage (m/sec)	Comments
SA1	BRE Soakage test	1.54 x 10 ⁻⁵	Moderate Permeability
BH3	Borehole Soakage	<10 ⁻⁶	Poor permeability

5.0 GROUND GAS ASSESSMENT

5.1 PUBLISHED GUIDANCE

A ground gas assessment has been undertaken to assess risks associated with carbon dioxide and methane to new buildings and their users. The relevant guidance has been used to assess the risks posed by ground gas (Appendix B).

5.2 COMPARISON WITH SITE DATA

Taking a conservative viewpoint, the highest readings from the monitoring wells have been selected for the determination of the relevant gas screening values. If the readings were <0.01 a value of 0.01 is used in line with CIRIA, 2007 guidelines. If the flow readings were <0.1 l/hr a value of 0.1 l.hr has been adopted as a conservative assumption. A summary of gas screening calculations and the associated characterisation of the site are identified below in Table 17.

Table 17 – Summary of Gas Screening Values

Gas	Screening Value	Characterisation Situation	Comments
Methane (CH ₄)	$((0.1/100) \times 0.1) = 0.0001$	1 (Very Low)	-
Carbon Dioxide (CO ₂)	$((1.6/100) \times 0.1) = 0.00016$	1 (Very Low)	-

No source materials for the generation of ground gas have been identified during the ground investigation and a maximum characterisation value of 1 (Very Low) has been returned from the monitoring visit. It is therefore considered that there is no requirement for additional ground gas monitoring or mitigation.

6.0 CONTAMINATION ASSESSMENT

6.1 SOIL ANALYTICAL TEST RESULTS

The results from the WDE laboratory analyses of the soil samples are presented in full in Appendix G. Below detection limit is abbreviated to BDL in all subsequent tables. The Generic Assessment Criteria (GACs) that have been adopted are based on the Land Quality Management (LQM) Suitable for Use Levels (S4UL)¹. These published values are available for residential with/without home grown produce, commercial, allotment and public open space land use scenarios. As there is no current UK GAC for lead or cyanide, the Category 4 Screening Level (C4SL) will be adopted for lead and the Dutch Intervention Value (DIV) for cyanide. In the absence of any UK published value, the detection limits have been adopted. As it is proposed to use the subject site for continued recreational purposes, commercial and public open space GACs have been adopted.

Table 18 is a comparison with the adopted GACs compared against the minimum and maximum site concentrations.

Table 18 – Comparison of Soil Laboratory Results with Adopted GACs (mg/kg)

Contaminant of Concern	No.	Com. GACs	POS (Park) GACs	Source	Min	Max	No. Samples > GAC
Asbestos	3	DL	DL	WDE	Absent	Absent	0
Total Phenols	3	760	760	LQM	BDL	BDL	0
Cyanide	3	50	50	DIV	BDL	BDL	0
Naphthalene	3	190	1200	LQM	BDL	0.45	0
Acenaphthylene	3	83000	29000	LQM	BDL	0.12	0
Acenaphthene	3	84000	29000	LQM	BDL	0.20	0
Fluorene	3	63000	20000	LQM	BDL	0.10	0
Phenanthrene	3	22000	6200	LQM	BDL	1.3	0
Anthracene	3	520000	150000	LQM	BDL	0.52	0
Fluoranthene	3	23000	6300	LQM	BDL	1.8	0
Pyrene	3	54000	15000	LQM	BDL	1.7	0
Benzo(a)anthracene	3	170	49	LQM	BDL	0.57	0
Chrysene	3	350	93	LQM	BDL	0.56	0
Benzo(b)fluoranthene	3	44	13	LQM	BDL	BDL	0
Benzo(k)fluoranthene	3	1200	370	LQM	BDL	BDL	0
Benzo(a)pyrene	3	35	11	LQM	BDL	BDL	0
Indeno(1,2,3-cd)pyrene	3	500	150	LQM	BDL	BDL	0
Dibenz(a,h)anthracene	3	3.5	1.1	LQM	BDL	BDL	0
Benzo(ghi)perylene	3	3900	1400	LQM	BDL	BDL	0
Arsenic	3	640	170	LQM	14	15	0
Boron	3	240000	46000	LQM	0.53	1.4	0
Cadmium	3	190	532	LQM	0.13	0.31	0
Chromium	3	8600	33000	LQM	11	22	0
Copper	3	68000	44000	LQM	18	48	0
Lead	3	6600	1300	C4SL	12	38	0
Mercury	3	1100	240	LQM	BDL	0.13	0

¹ LQM/CIEH 2014. The LQM/CIEH S4ULs for Human Health Risk Assessment.

Nickel	3	980	3400	LQM	15	28	0
Selenium	3	12000	1800	LQM	BDL	BDL	0
Zinc	3	730000	170000	LQM	27	54	0
Benzene	3	27	90	LQM	BDL	BDL	0
Toluene	3	56000	87000	LQM	BDL	BDL	0
Ethylbenzene	3	5700	17000	LQM	BDL	BDL	0
Xylenes (sum)	3	5900	17000	LQM	BDL	BDL	0
MTBE	3	DL	DL	WDE	BDL	BDL	0
TPH - Aliphatic >C5 - C6	3	3200	95000	LQM	BDL	BDL	0
TPH - Aliphatic >C6 - C8	3	7800	150000	LQM	BDL	BDL	0
TPH - Aliphatic >C8 - C10	3	2000	14000	LQM	BDL	BDL	0
TPH - Aliphatic >C10 - C12	3	9700	21000	LQM	BDL	BDL	0
TPH - Aliphatic >C12 - C16	3	59000	25000	LQM	BDL	BDL	0
TPH - Aliphatic >C16 - C21	3	1600000	450000	LQM	BDL	BDL	0
TPH - Aliphatic >C21 - C35	3	1600000	450000	LQM	BDL	BDL	0
TPH - Aromatic >C5 - C7	3	26000	76000	LQM	BDL	BDL	0
TPH - Aromatic >C7 - C8	3	56000	87000	LQM	BDL	BDL	0
TPH - Aromatic >C8 - C10	3	3500	7200	LQM	BDL	BDL	0
TPH - Aromatic >C10 - C12	3	16000	9200	LQM	BDL	BDL	0
TPH - Aromatic >C12 - C16	3	36000	10000	LQM	BDL	BDL	0
TPH - Aromatic >C16 - C21	3	28000	7600	LQM	BDL	BDL	0
TPH - Aromatic >C21 - C35	3	28000	7800	LQM	BDL	BDL	0

None of the samples have exceeded the adopted criteria for commercial land use or public open space (park).

6.2 COMPARISON WITH WATER UK THRESHOLD CONCENTRATION VALUES

The soil laboratory results from the upper 1.35m have been compared to the UKWIR thresholds^{21,22} for the selection of water supply pipes in Table 19 with full results presented in Appendix G.

Table 19 – Comparison of Soil Laboratory Results from the upper 1.35m with UKWIR (mg/kg)

Contaminant of Concern	No. of Samples	Threshold	Source	Min	Max	No. Samples > GAC	Samples Exceeded
Total VOCs	0	0.5	UKWIR	-	-	-	
Total BTEX & MTBE	3	0.1	UKWIR	BDL	BDL	0	
Total SVOCs	0	2	UKWIR	-	-	-	
EC5-EC10 Aliphatics	3	2	UKWIR	BDL	BDL	0	
EC10-EC16 Aliphatics	3	10	UKWIR	BDL	BDL	0	
EC16-EC40 Aliphatics	3	500	UKWIR	BDL	BDL	0	
EC5-EC10 Aromatics	3	2	UKWIR	BDL	BDL	0	
EC10-EC16 Aromatics	3	10	UKWIR	BDL	BDL	0	
EC16-EC40 Aromatics	3	500	UKWIR	BDL	BDL	0	
Phenols	3	2	UKWIR	BDL	BDL	0	
Cresols chlorinated phenols	0	2	UKWIR	-	-	-	
Corrosive	3	Various	UKWIR	8.4	9.7	-	

There have been no exceedances of the UKWIR threshold values and therefore it is unlikely that additional mitigation measures in the form of protective pipe will be necessary. Further consultation should be sought with the water supply company.

6.3 WASTE CLASSIFICATION

A Waste Checker and WAC testing has been performed on the encountered materials with the full results presented in Appendix G.

The Waste Checker indicates that the natural materials encountered onsite are likely to be classified as inert waste. The WAC testing indicates that the encountered natural materials can be disposed at an inert landfill. It is likely that any made ground encountered onsite will be classified as Non-Hazardous for offsite disposal.

Table 20 provides an overview of the likely waste classification and WAC designation for onsite materials.

Table 20 – Likely Waste Classification of Onsite Materials

Material	Waste Classification	WAC Landfill Type
Made Ground	Non-Hazardous	-
Natural Materials	Inert	Inert Waste

7.0 GEOTECHNICAL ASSESSMENT

7.1 FIELD TESTING RESULTS

An appraisal of the geotechnical field parameters of the encountered strata are summarised below in Table 21. The full results and graphs plotting the N-values are presented in Appendix H.

Table 21 – Field Geotechnical Results

Description	Av Depth (m)	SPT N Value	Cu kPa	Q alt kPa	Inferred Strength of Material
Topsoil	0.00 – 0.30	3 – 14	15.4 – 72.0	21.3 – 109.7	-
Gravelly Clay	0.30 – 1.20	3 – 6	15.4 – 30.8	21.3 – 46.0	Soft to Firm
Chalk (Grade Dm)	1.20 – 5.00	3 – 22	15.4 – 113.1	21.3 – 170.4	Soft to very stiff

The SPT-N values indicate that the grade Dm chalk generally becomes firm from 1.50m bgl except in BH2 where it becomes firm from 2.00m bgl.

7.2 GEOTECHNICAL TESTING

Particle Size Distribution, Moisture Content, Atterberg Limits, triaxial, Intact dry density and saturation moisture content tests were carried out on representative soil samples collected during the intrusive investigation. A copy of the test results are presented in Appendix H and are summarised in Table 22.

Table 22 – Summary of Geotechnical Properties

Description	Average Depth To-From (m)	Moisture Content (%)	Modified Plasticity Index (%)	Dry Density (Mg/m ³)	Saturation Moisture Content (%)	Shear Strength (kPa)	PSD's (%)		
							Gravel	Sand	Fines
Gravelly Clay	0.30–1.20	26-29	27.3 – 28.5	-	-	-	13.3	24.1	62.5
Chalk (Dm)	1.20–5.00	27	42	1.34 – 1.49	30 – 37	35 -69	0.4	18.2	81.5

Testing of the gravelly clay materials returned high plasticity values. The modified plasticity index (27.3 – 28.5%) indicates a medium volume change potential of these materials.

Testing of the underlying structureless chalk has returned a high plasticity value and the plasticity index (42%) indicates that there is a high-volume change potential of the chalk. The dry density and saturation moisture content results indicate that the chalk is Low density. Shear strength results indicate that the chalk is firm between 1.00-2.00m bgl in BH1 and BH3 whilst a soft result was returned between 2.00 and 3.00m bgl in BH2.

7.3 CONCRETE DESIGN PARAMETERS

A summary of the sulphate, pH and corresponding BRE concrete in aggressive ground parameters² for concrete design are presented in Table 23.

Table 23 – Summary of BRE Concrete in Aggressive Ground Parameters

Location	Concrete Parameters
pH (pH Units)	8.4 – 9.7
Water Soluble Sulphate as (2:1 Leachate Equivalent) (mg/l)	25 - 380
ACEC Classification	AC-1
Design Sulphate Class	DS-1

Concentrations have been analysed in line with BRE Special Digest 1: 2005³

7.4 EXCAVATIONS, GROUNDWATER CONTROL AND SERVICES

No groundwater was encountered during the intrusive investigation to 5.00m bgl. However suspected perched water was encountered within the installed monitoring well. As a result, there is the potential that special provisions for dewatering of excavations may be required during periods of heavy rainfall. Excavation walls are unlikely to require additional support.

7.5 FROST SUSCEPTIBILITY

In line with Highways England guidance⁴, assuming the gravelly clay materials onsite are of intermediate permeability and have a medium to high plasticity it is considered that the material is unlikely to be susceptible to frost. It is however recommended that for prevention of frost damage, all material within 450mm of the surface should be non-frost-susceptible.

7.6 PRELIMINARY ROAD DESIGN PARAMETERS

CBR values obtained from the dynamic probes with the upper 1m of the proposed development can be calculated using the following equation:

$$\log \text{CBR} = 2.628 - 1.273 \log (\text{DCP})^5$$

Table 24 – Summary of CBR Values in the Upper 1m

Location	Proposed Location	CBR %
DP1	Adjacent to New Car Park	1.21 – 11.82
DP2	Beneath Extension	1.21 – 2.92

² BRE 2005. Concrete in Aggressive Ground. Special Digest 1.

³ Building Research Establishment (BRE) Special Digest 1: 2005 Third Edition, Concrete in aggressive Ground"

⁴ Highways England. 2016. Design Manual for Roads and Bridges HD39. February 2016.

⁵ Kleyen & Van Harden (1983)

DP3	Beneath Extension	1.21 – 2.92
DP4	New Car Park	1.21 – 2.92
DP5	New Car Park	1.21

A CBR design value of <2% should therefore be adopted for the design of the roads and hard-standing. Enhanced values are likely to be achievable following suitable compaction.

7.7 PRELIMINARY FLOOR DESIGN

The ground gas risk for the site has been characterised as a Very Low Risk. There is no requirement for the enhancement of the membrane above the standard specification.

7.8 SOAKAGE POTENTIAL

Although the borehole falling head test indicates poor permeability the BRE soakage test indicates moderate permeability onsite. Therefore discharge to ground is likely to be possible onsite; however it is recommended a drainage engineer is consulted to formulate the drainage design.

Due to the encountered low density chalk it is recommended that soakaways are located a minimum of 10m from the pavilion footprint, in line with CIRIA guidance⁶.

7.9 PRELIMINARY FOUNDATION DESIGN

It is understood that the redevelopment is to comprise construction of a single storey extension to the existing pavilion structure to both the east and west, with associated car parking.

Consideration has been given to the high-volume change potential of the underlying silty chalk materials and the cherry tree located ~12m from the new building, however in line with NHBC Chapter 4 guidance, there is no requirement to extend the foundations in relation to ground heave potential.

Traditional shallow strip foundations are therefore likely to be appropriate for consideration for the single storey building and will need to extend through the upper gravelly clay materials proving a minimum of 300mm of the natural chalk materials. It is recommended that the foundations are extended into the firm chalk materials (1.50m bgl) which would provide a bearing capacity of 125kN/m². Consideration should be given to extending the foundations around BH2 where firmer materials were encountered from 2.00m bgl.

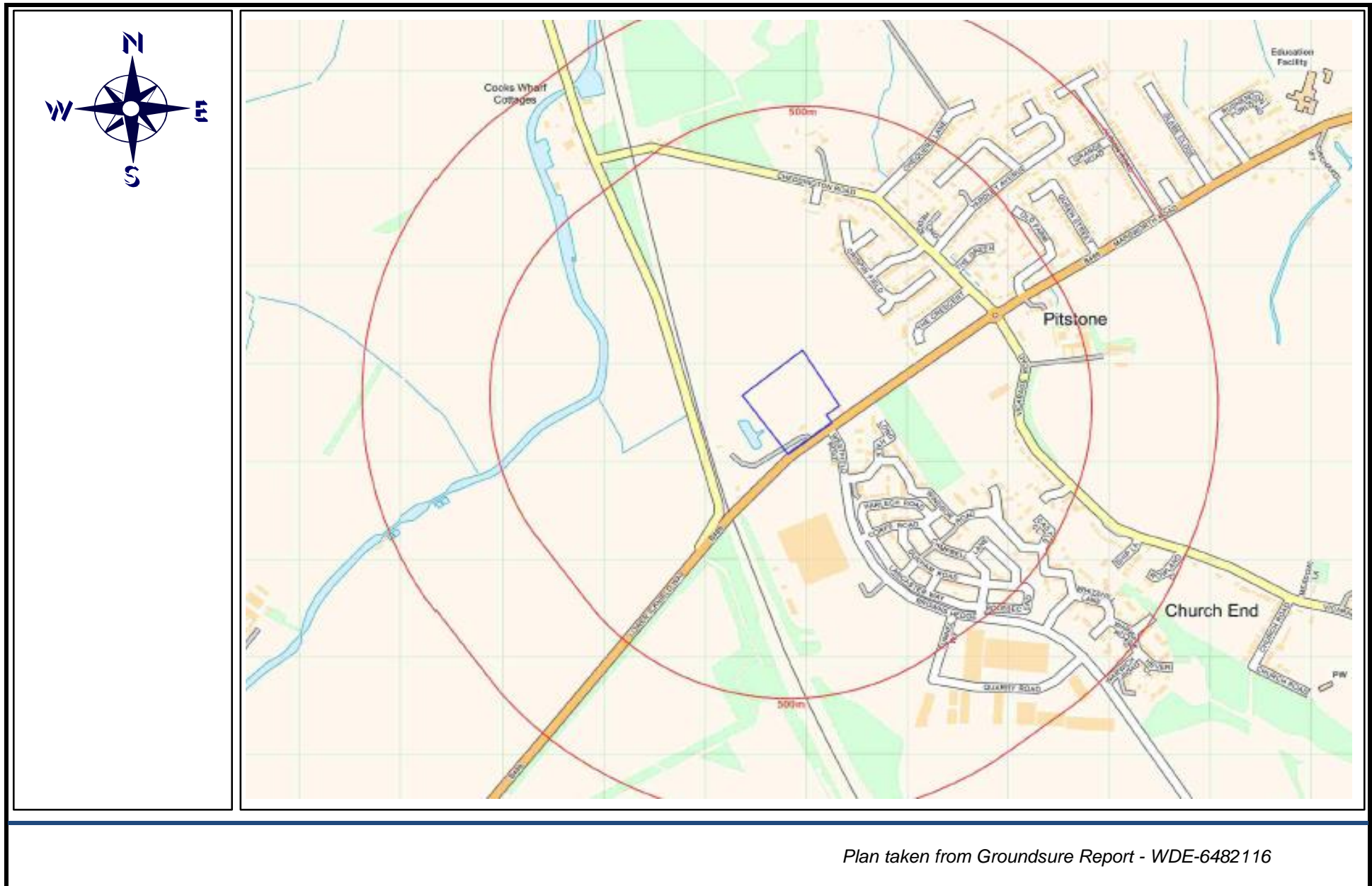
It is recommended that a structural engineer is consulted before designing foundations.

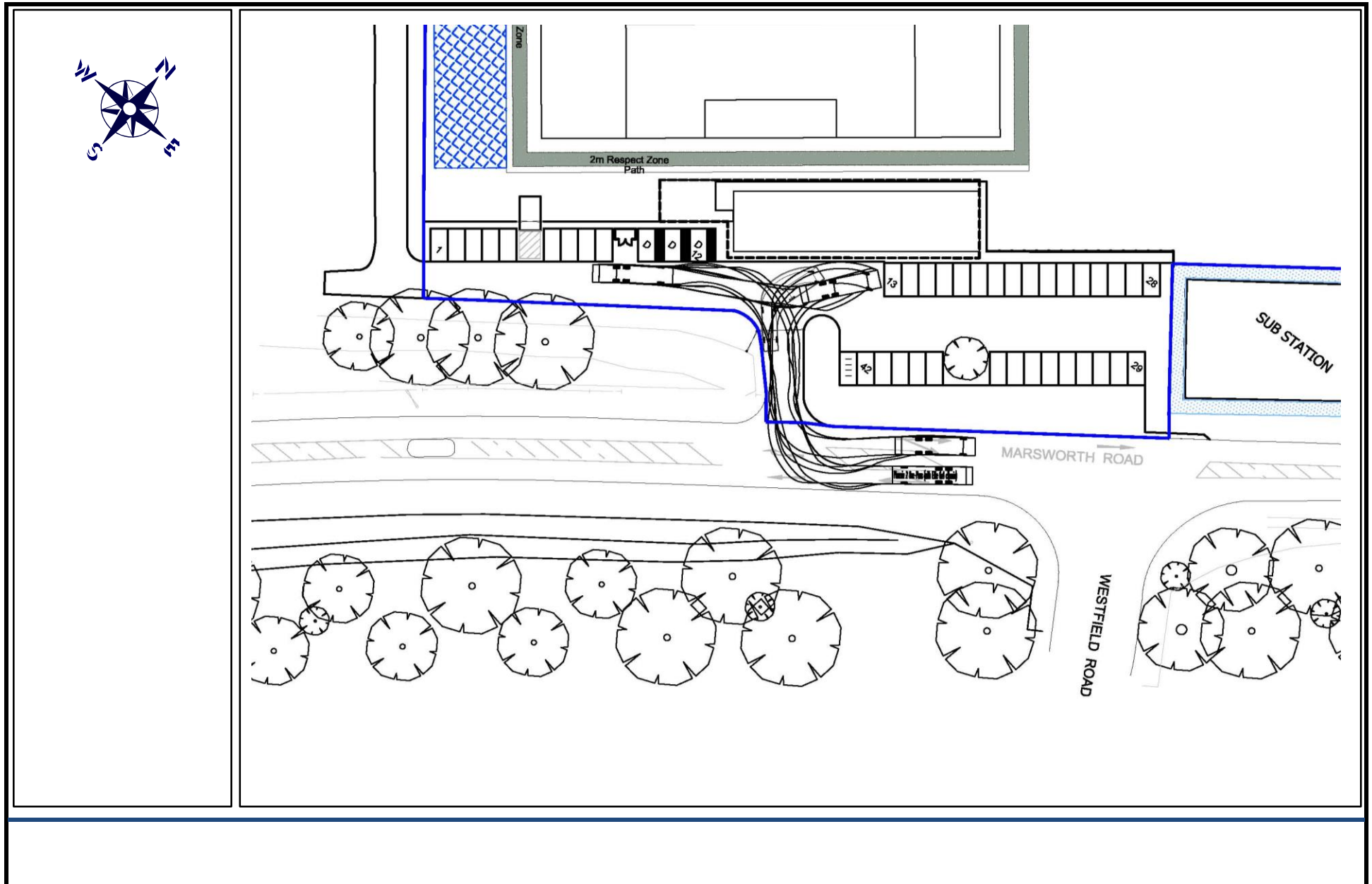
⁶ CIRIA. 2002. Engineering in Chalk. C574.

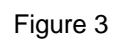
8.0 RECOMMENDATIONS

In WDE's professional opinion there are no further actions required onsite as part of the extension and redevelopment works.

FIGURES







APPENDIX A

Limitations and Exceptions

Pitstone Parish Council (the client) has requested that a Geo-Site Assessment Report be performed for Pitstone Sports Pavilion to provide information to permit formulation of an opinion as to the potential for risks to human health & controlled waters posed by identified substances of concern.

The Geo-Site Assessment Report was conducted and this report has been prepared for the sole use and reliance of the Client. This report shall not be relied upon or transferred to any other parties without the express written authorisation of WDE Consulting Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

The findings and opinions conveyed via this Geo-Site Assessment Report report are based on information obtained from a variety of sources as detailed within this report, and which WDE Consulting Limited believes are reliable. Nevertheless, WDE Consulting Limited cannot and does not guarantee the authenticity or reliability of the information it has relied upon.

The report represents the findings and opinions of experienced geo-environmental consultants. WDE Consulting Limited does not provide legal advice and the advice of lawyers may also be required.

The Client is advised that the conditions stated within reports supplied to WDE Consulting Limited are subject to change. Certain indicators of the presence of hazardous substances may have been latent at the time of the most recent site reconnaissance and may subsequently have become observable.

It is possible that WDE Consulting's research, while fully appropriate for a Geo-Site Assessment Report, failed to indicate the existence of important information sources. Assuming such sources actually exist, their information could not have been considered in the formulation of WDE Consulting's findings and opinions.

Certain indicators or evidence of hazardous substances may have been outside the very limited portion of the subsurface investigated or monitored, latent at the time of this work or only partially intercepted by the works and thus their full significance could not have been appreciated. Groundwater levels are particularly susceptible to variations due to seasonal or other effects. Any comments on groundwater conditions are based on observations and analyses made by third parties at the time the site work was carried out. Accordingly, it is possible that WDE Consulting's work, whilst fully appropriate for a Geo-Site Assessment Report failed to indicate the presence or significance of hazardous substances. Assuming such materials present a hazard, their presence could not have been considered in the formulation of WDE Consulting's findings and opinions. The subsurface geological profiles and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

Any interpretation of the results of the Geo-Site Assessment Report has been based on the proposed site usage and the findings are not valid should the proposed land use and/or the regulatory regime/guidance change. Where interpretation is based on public domain guidance/protocols/models/software/code, WDE Consulting Limited is not liable for errors in the guidance/protocols/models/software/code.

WDE Consulting Limited believes that providing information about limitations is essential to help the client identify and thereby manage their risks. These risks can be mitigated, but they cannot be eliminated, through additional research. WDE Consulting Limited will on request, advise the client of the additional research opportunities available, their impact on risk, and their cost.

In preparing this report, it has been assumed that all past and present occupants have provided all relevant and other information, especially relating to known or potential hazards. This report is not required to identify insufficiencies or mistakes in the information provided by the user/owner or from any other source, but has sought to compensate for these where obvious in the light of other information.

The work is also subject to WDE Consulting's standard terms and conditions.

APPENDIX B - RELEVANT GUIDANCE AND LEGISLATION

WDE Consulting has duly taken account of the recommendation contained within relevant guidance documents and legislation during the preparation of this report.

CONTAMINATION

Part IIa of the Environmental Protection Act 1990 defined contamination in relation to continued land use and introduced the “polluter pays” principal. The Groundwater Regulations 1998 defined List 1 and List 2 substances and the procedures for preventing them from entering groundwater. The Water Resources Act of 1991 introduced the term “controlled waters” and gave powers to the Environment Agency to require remediation where there was pollution of controlled waters.

The National Planning Policy Framework⁷ requires the following:

- The site is made suitable for its intended use, taking account of all ground conditions arising from natural and former activities, pollution arising from previous uses and proposals for mitigation including land remediation.
- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.
- Adequate site information, prepared by a competent person, is presented.

The methodology adopted for this report follows the Model Procedures for the Management of Land Contamination CLR-11 produced by DEFRA and the Agency⁸. The CLR-11 process provides a reasoned and structured process to identify potential risk issues and, where necessary, provide a way forward to develop a robust risk management strategy to address potentially unacceptable risks in an appropriate manner. Contained within the CLR-11 Framework are the following stages:

1. Stage 1 Preliminary Risk Assessment (Conceptual Model)
2. Collection of appropriate Site Information
3. Stage 2 Comparison with Generic Criteria
4. Stage 3 Detailed Quantitative Risk Assessment
5. Preparation of Remedial Options Appraisal
6. Verification Plan

British Standards has issued guidance for the Investigation of Potentially Contaminated Sites⁹ and for undertaking Site Investigations¹⁰ which have duly been considered. An update to the potential human

⁷ Department of Communities and Local Government. March 2012

⁸ Environment Agency. 2004. Model Procedures for the Management of Land Contamination. Contaminated Land Report 11

⁹ British Standards 2011. Investigation of Potentially Contaminated Sites-Codes of Practice. BS10175:2011

¹⁰ British Standards. 2015. Code of Practice for Site Investigations. BS5930

health exposure pathways is provided in the Environment Agency Soil Science Report SR3¹¹. In 2008 the Environment Agency and the National House-Building Council (NHBC), Chartered Institute of Environmental Health (CIEH) released a joint publication for the Safe Development of Housing on Land Affected by Contamination¹². Guidance is provided in the CLR Report No 4 on sampling strategies for contaminated land¹³.

WASTE MANAGEMENT

The EU Waste Framework Directive 2008 presents the legislative framework for the collection, transport, recovery and disposal of waste. This framework provides a five step hierarchical plan for managing waste comprising prevention, preparing for re-use, recycling, recovery and disposal, which have been made into UK law via the UK Waste Regulations 2011. This requires all businesses/organisations who either produces or handles waste to either prevent waste or to apply the waste hierarchy for the transfer of waste. The Environment Protection (Duty of Care) Regulations 1991 require that transfer notes are used to identify the type of waste, volume, source and intended destination along with the details of the licensed carrier.

The Agency have published guidance on the classification of Hazardous Waste¹⁴, which defines how man-made materials are classified as being hazardous by exceeding at least one of the fifteen hazardous properties (H1 to H15). Man Made materials can either be absolute hazardous, absolute non-hazardous or mirror and if mirror then an assessment needs to be made as to whether the materials poses any of the hazardous properties before classifying the materials as being either hazardous or non-hazardous. The Agency have also published guidance on the Waste Acceptance at Landfills¹⁵. Landfills are classified as to whether they can accept hazardous, non-hazardous or inert materials. Waste Acceptance Criteria (WAC) thresholds have been set to determine the class of landfill that can accept the materials. Disposal of hazardous materials requires pre-treatment. WAC limits are not to be used for determining whether waste is hazardous.

The CL:AIRE CoP of the Definition of Waste¹⁶ was developed to provide clarity on when the reuse of site won materials will cease to be waste. It requires the development of Material Management Plan (MMP) that is specific to the site and the intended reuse of materials. The MMP will need to be based on a site specific Remedial Strategy/Design Statement that will demonstrate that the reuse of the site won materials will not pose an unacceptable risk to sensitive receptors. There will then need to be a requirement for verification that the proposed reuse has been carried out as was planned.

¹¹ Environment Agency, August 2008, Updated technical background to the CLEA model, Science Report - SC050021/SR3

¹² Environment Agency, 2008. Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D 66

¹³ DOE. 1994. Sampling Strategies for Contaminated Land. CLR Report No 4

¹⁴ Environment Agency, 2013. Interpretation of the Definition and Classification of Hazardous Waste. Technical Guidance WM2

¹⁵ Environment Agency, 2010 Waste Acceptance at Landfills. Version 1.

¹⁶ CL:AIRE 2001. The Definition of Waste: Development Industry Code of Practice. Version 2.

GROUND GAS

The following relevant guidance will be used to assess the risks posed by ground gas:

- CIRIA Assessing risks posed by hazardous ground gases to buildings¹⁷
- NHBC, Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present¹⁸
- The Building Regulations Site Preparation and resistance to contaminants and moisture. ¹⁹
- British Standard. Guidance on Investigations for Ground Gas²⁰

The 2007 CIRIA guidance calculates a gas screening value to identify the protective measures required, as shown in Table 25.

Table 25 – Summary of CIRIA 2007 Guidance

Characterisation Situation	Risk Classification	Gas Screening Value	Typical Factors	Protective Measure
1	Very Low	<0.07	Methane <1% or carbon dioxide <5%; otherwise increase to Situation 2	No special precautions (see recommendation)
2	Low	<0.7	Air Flow rate <70l/hr; otherwise increase to Situation 3	Block and beam with 2,000g, Cast in situ with 1,200g. All joints and penetrations sealed
3	Moderate	<3.5	-	As above but with gas resistant membranes and passively ventilated or positive pressured sub-floor void
4	Moderate to High	<15	QRA recommended	As above but with oversite capping, in-ground venting layer and in ground wells or barriers
5 – 6	High to Very High	<70		Not suitable unless gas regime is reduced first and QRA completed

UK WATER SUPPLY PIPES

The following guidance has been followed for the selection of water supply pipes:

- UKWIR Guidance for the selection of Water Supply Pipes²¹
- Water UK Contaminated Land Assessment Guidance²²

These mainly apply to brownfield sites, although may apply to greenfield sites should the preliminary risk assessment identify there is a potential for contamination to be present.

¹⁷ CIRIA 2007. Assessing Risks Posed by Hazardous Ground Gases to Buildings. C665

¹⁸ NHBC 2007. Guidance on Evaluation of Development Proposals on Sites where methane and carbon dioxide are present

¹⁹ Building Regulations 2004. Approved Document C, Site Preparation and resistance to contaminants and moisture.

²⁰ British Standards 2013. Guidance on Investigation for Ground Gas. BS8576. 2013

²¹ UK Water Industry Research 2011. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. 10/WM/03/21

²² Water UK 2014. Contaminated Land Assessment Guidance.

SOAKAGE TESTING AND DESIGN

The following guidance has been followed during the soakage testing:

- Falling Head Tests in boreholes – BS5930¹⁰
- BRE Soakage Testing²³

The CIRIA publication²⁴ provides guidance as to the required distance of buildings from soakages to ground in chalk as follows:

- 20m distance of soakaways from buildings where dissolution features are known to be prevalent
- 10m distance of soakaways from buildings where chalk is low density or unknown
- 5m distance of soakaways from buildings where chalk is of medium to high density

²³ Building Research Establishment. 1991. Soakage Design. Digest 365

²⁴ CIRIA. 2002. Engineering in Chalk. C574.

APPENDIX C - SITE PHOTOS

Photo 1: Football pitches



Photo 2: Existing Pavilion and associated car park



Photo 3: Existing Pavilion/ Changing Room block onsite



Photo 4: JCB 3CX and Water Bowser conducting BRE soakage test onsite



Photo 5: Foundation exposure pit (FDP1)



Photo 6: Foundation exposure pit (FDP1)



Photo 7: Window sampling rig drilling in BH2



APPENDIX D

Environmental Database Information



WDE Consulting Ltd

62a, WESTERN ROAD,
TRING, HP23 4BB

Report Reference: WDE-6482115

Your Reference: 19-555

Report Date 25 Nov 2019

Report Delivery Email - pdf
Method:

Geo Insight

Address: SPORTS PAVILLION, MARSWORTH ROAD, PITSTONE, LU7 9AP

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on (T) 08444 159 000 quoting the above report reference number.

Yours faithfully,

WDE Consulting

Enc.
Groundsure Geo Insight

Address: SPORTS PAVILLION, MARSWORTH ROAD, PITSTONE, LU7 9AP
Date: 25 Nov 2019
Reference: WDE-6482115
Client: WDE Consulting Ltd



Aerial Photograph Capture date: 07-Sep-2015
Grid Reference: 493176,215522
Site Size: 2.1513ha

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Geology 1:10,000 Scale

1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	No
	1.2.2 Are there any records of landslide within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and linear features	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale

2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	No
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	No
	2.2.3 Are there any records of landslide within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and linear features

2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.

2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?

Yes

2.3.3 Are there any records of linear features within 500m of the study site boundary?

No

Section 3: Radon

3. Radon

3.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

3.2 Radon Protection

No radon protective measures are necessary.

Section 4: Ground Workings

	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	1	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities

	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	1	0	0	1	0
5.5 Non-Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

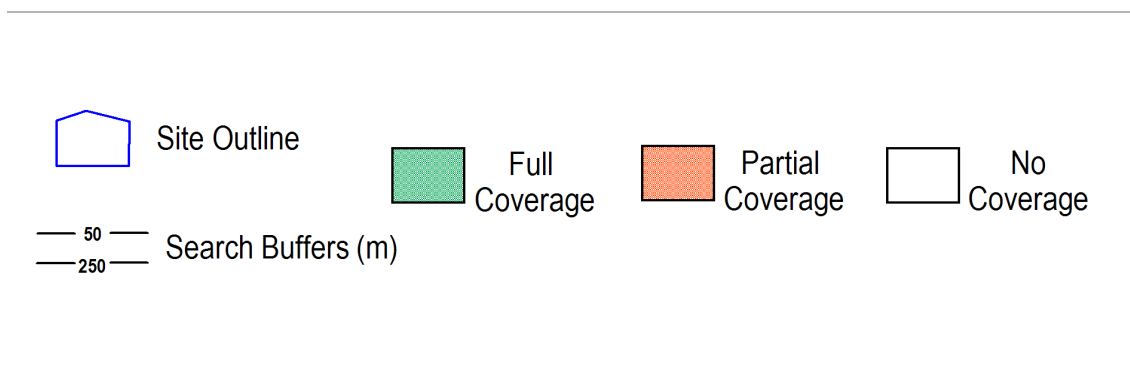
Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Cornwall and Devon Metalliferous Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0
Section 6: Natural Ground Subsidence	On-site				
6.1 Shrink-Swell Clay	Negligible				
6.2 Landslides	Negligible				
6.3 Ground Dissolution of Soluble Rocks	Negligible				
6.4 Compressible Deposits	Negligible				
6.5 Collapsible Deposits	Very Low				
6.5 Running Sand	Negligible				
Section 7: Borehole Records	On-site	0-50m	51-250		
7 BGS Recorded Boreholes	0	0	3		
Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250		
8 Records of Background Soil Chemistry	2	0	0		
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500	
9.1 Tunnels	0	0	0	Not Searched	
9.2 Historical Railway and Tunnel Features	0	0	12	Not Searched	
9.3 Historical Railways	0	0	2	Not Searched	
9.4 Active Railways	0	0	12	Not Searched	
9.5 Railway Projects	0	0	0	0	

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage

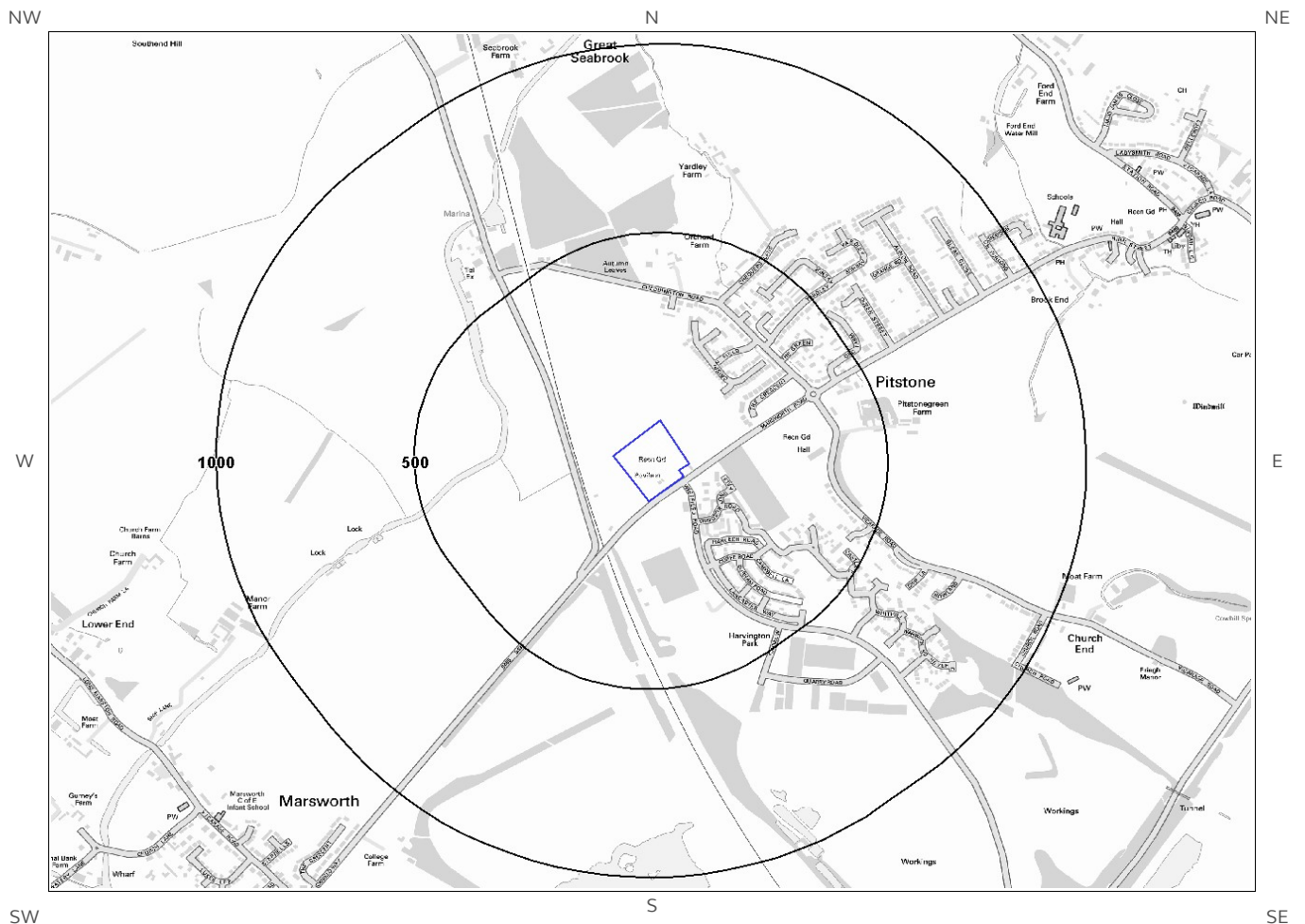
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

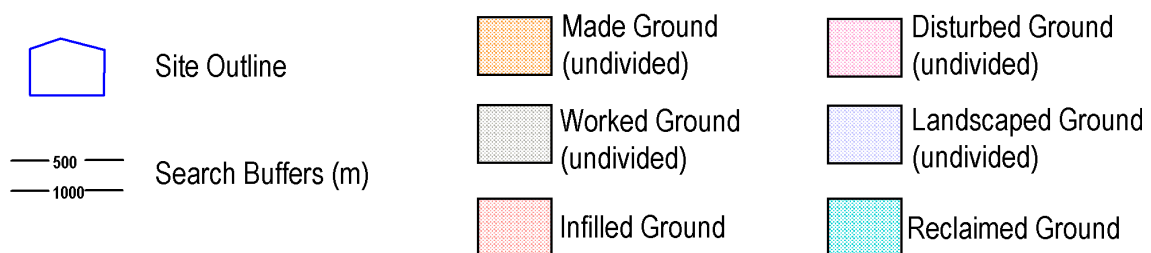
1 Geology (1:10,000 scale).

1.1 Artificial Ground map (1:10,000 scale)



Artificial Ground Legend

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1. Geology 1:10,000 scale

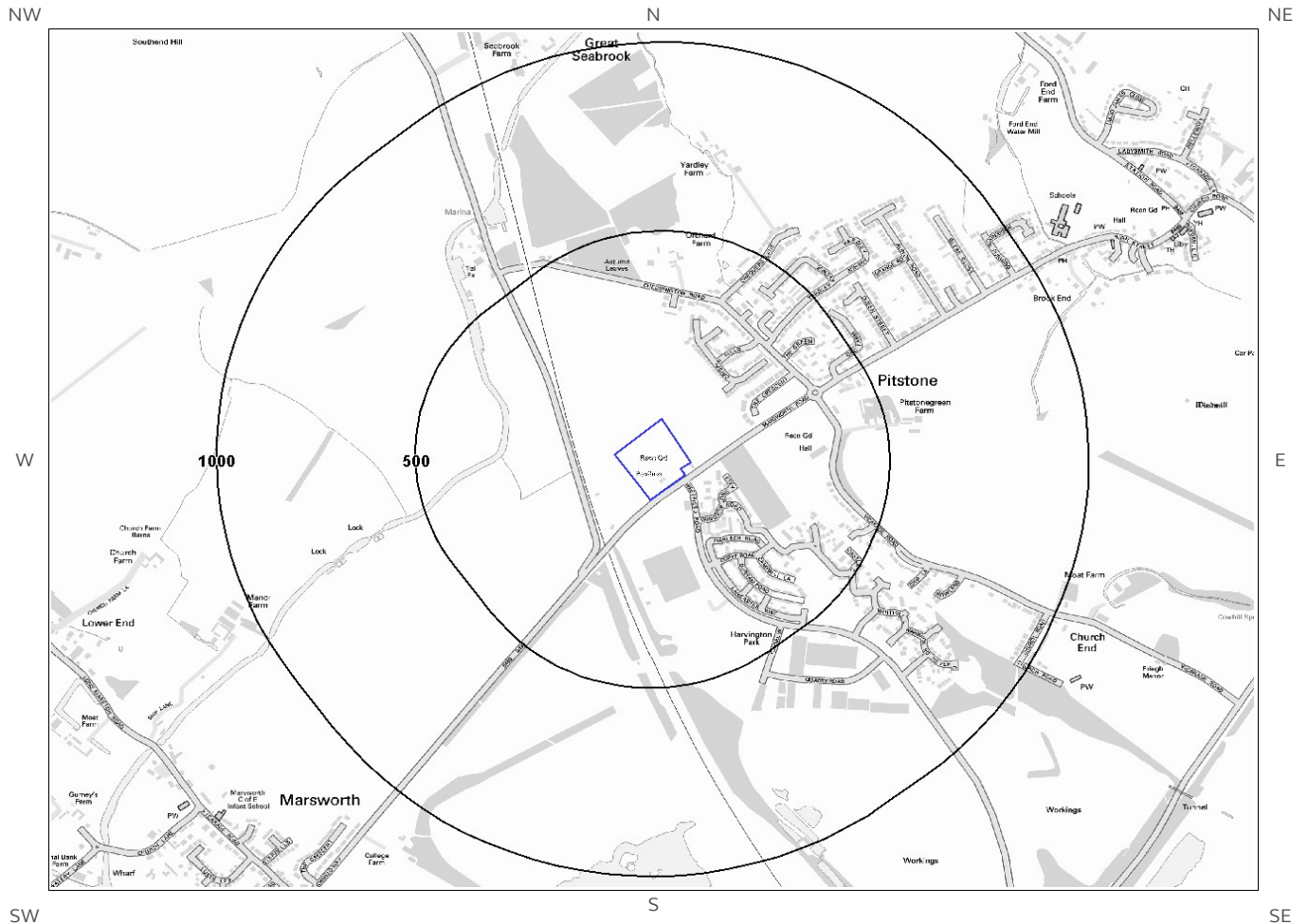
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? No

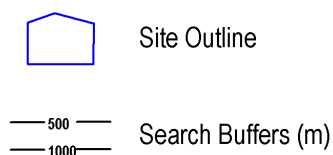
Database searched and no data found.

1.2 Superficial Deposits and Landslips map (1:10,000 scale)



Artificial Ground Legend

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1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

1.2.2 Landslip

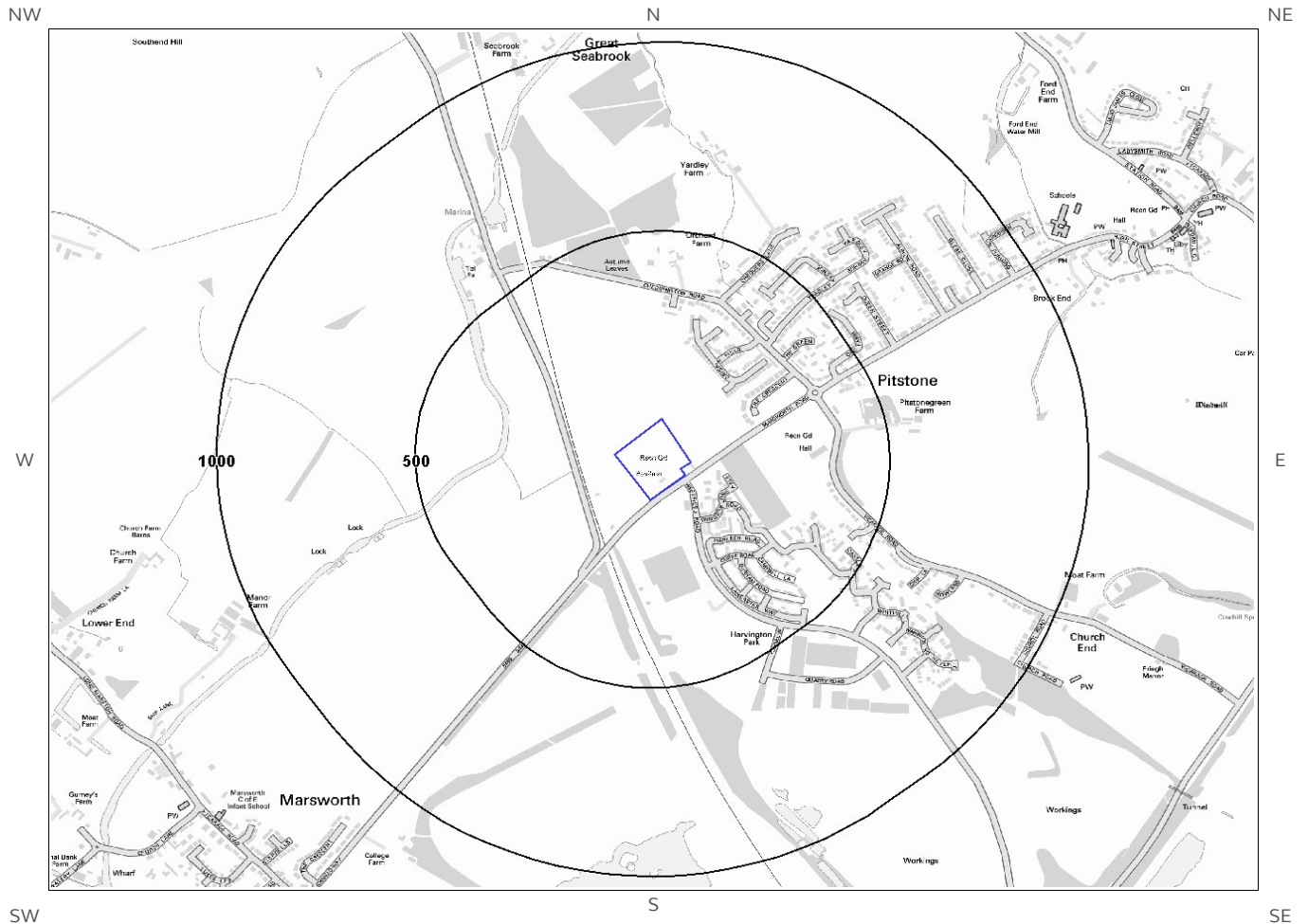
Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

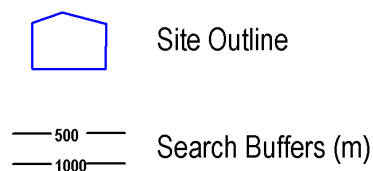
This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and linear features map (1:10,000 scale)



Bedrock and linear features Legend

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1.3 Bedrock and linear features

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

Database searched and no data found at this scale.

1.3.2 Linear features

Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale? No

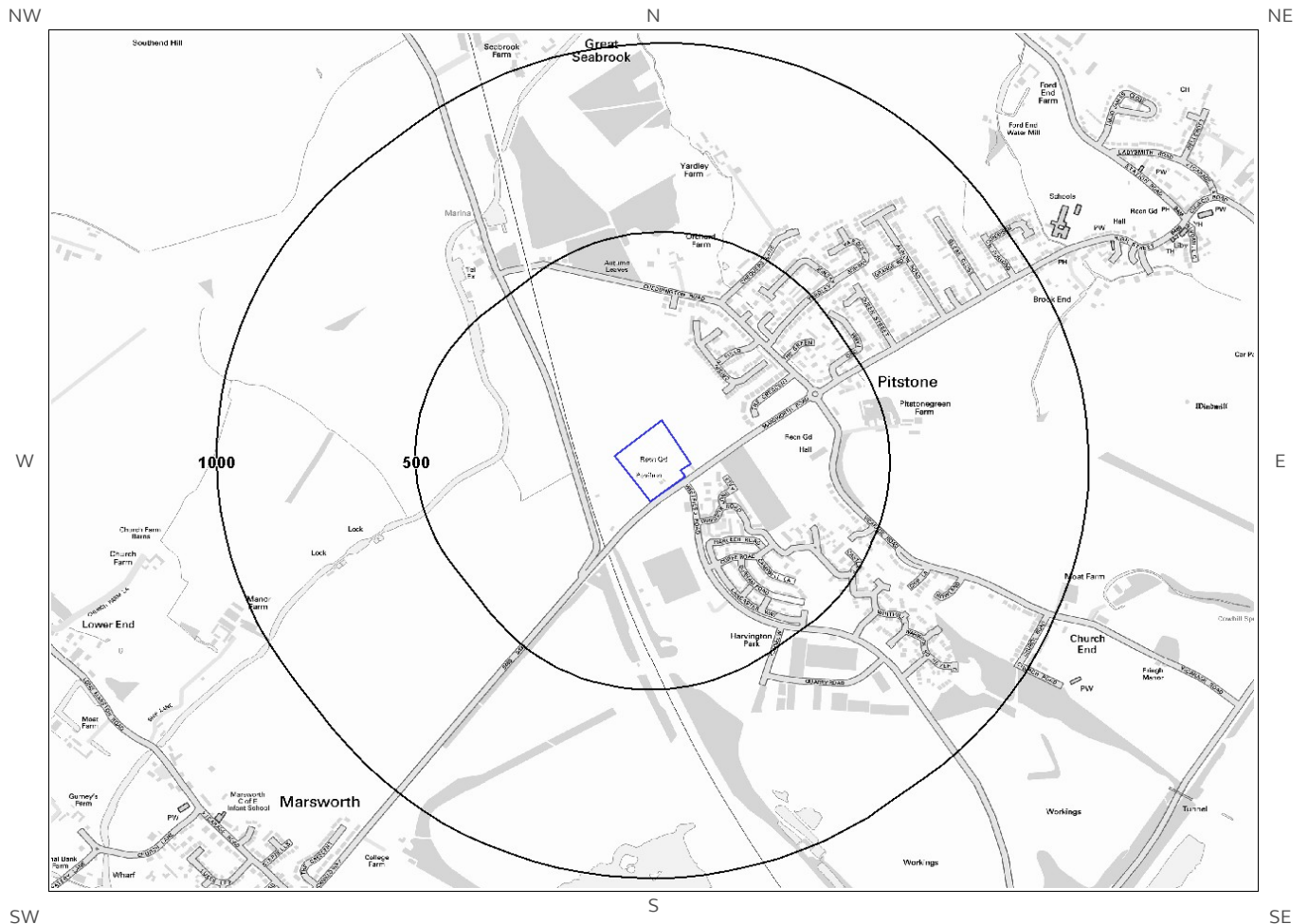
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

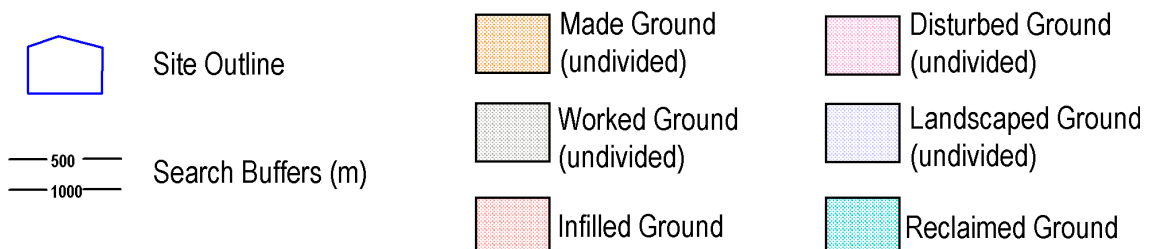
This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground map



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2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 238

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? No

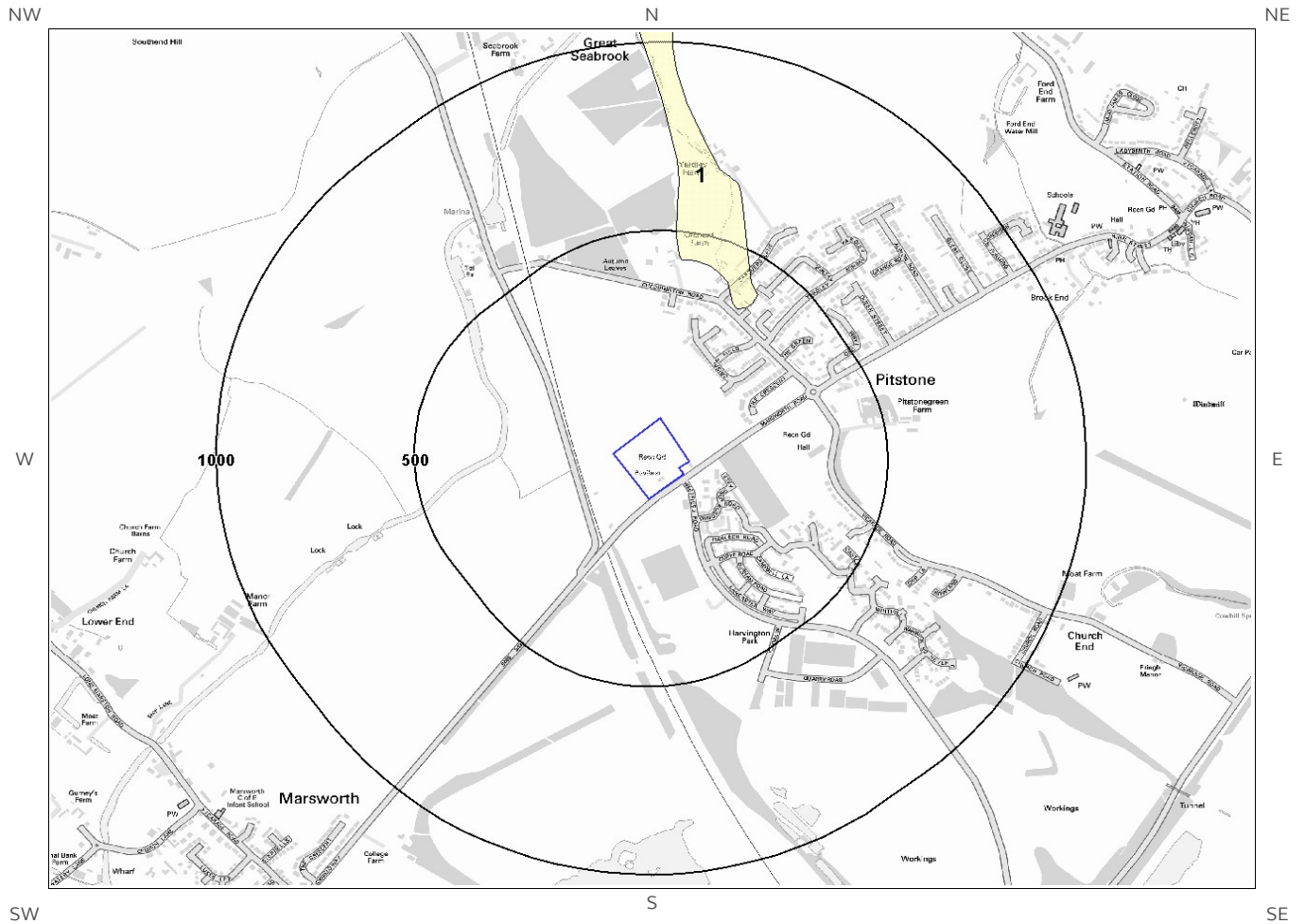
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

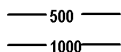
2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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Site Outline



Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	349.0	NE	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? No

Database searched and no data found.

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

Site Outline

— 500 —
— 1000 — Search Buffers (m)

2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 238

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	WZCK-CHLK	WEST MELBURY MARLY CHALK FORMATION AND ZIG ZAG CHALK FORMATION (UNDIFFERENTIATED) - CHALK	CENOMANIAN
2	169.0	N	GUGS-MDSS	GAULT FORMATION AND UPPER GREENSAND FORMATION (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE	ALBIAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Very High	High

2.3.3 Linear features

Are there any records of linear features within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

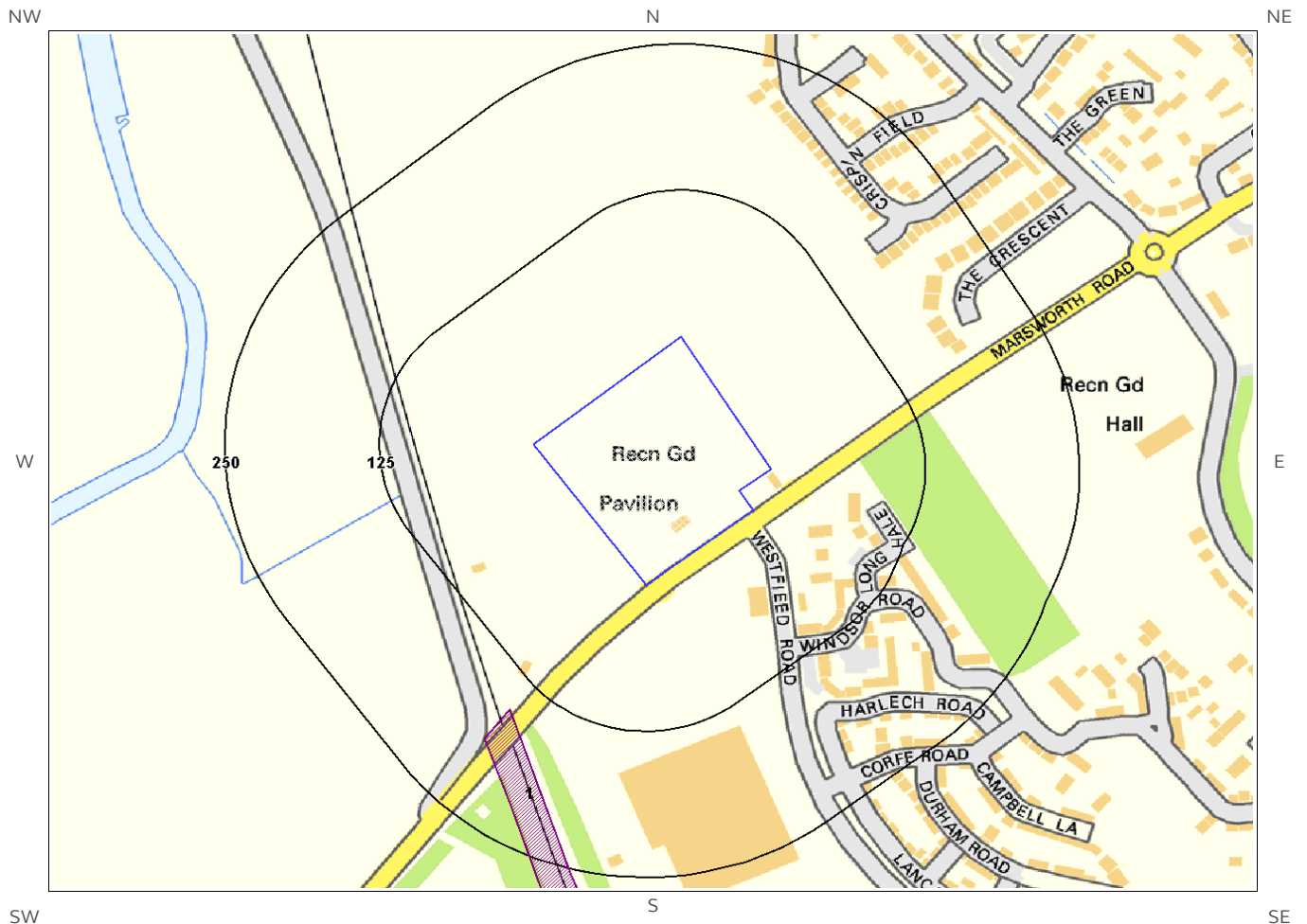
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

3.2 Radon Protection



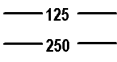


Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

4 Ground Workings map



Ground Workings Legend

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- | | | | |
|---|--------------------|---|----------------------------------|
|  | Site Outline |  | Historic Surface Ground Workings |
|  | Search Buffers (m) |  | Historic Underground Workings |
| | |  | Current Ground Workings |

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1	153.0	SW	493396 214534	Cuttings	1882

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? No

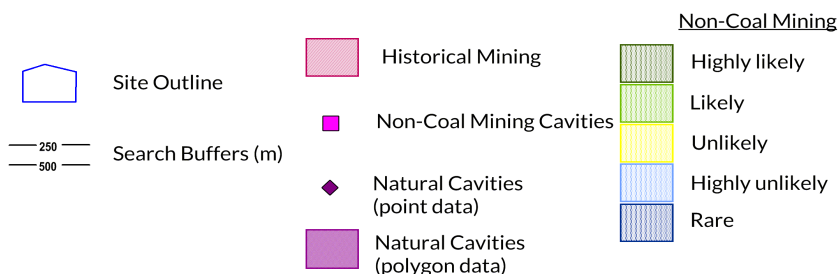
Database searched and no data found.

5 Mining, Extraction & Natural Cavities map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
2	414.0	S	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on the Peter Brett Associates natural cavities database. The dataset is made up of points and polygons. Where polygons are used these represent an area in which it is expected the cavities could be found. It does not indicate that cavities are present everywhere within the polygon, and caution should be used in the interpretation of this data.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Cornwall and Devon Metalliferous Mining

This dataset provides information on metalliferous mining areas in Cornwall/Devon and is derived from records held by Mining Searches UK.

Are there any Cornwall and Devon Metalliferous Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

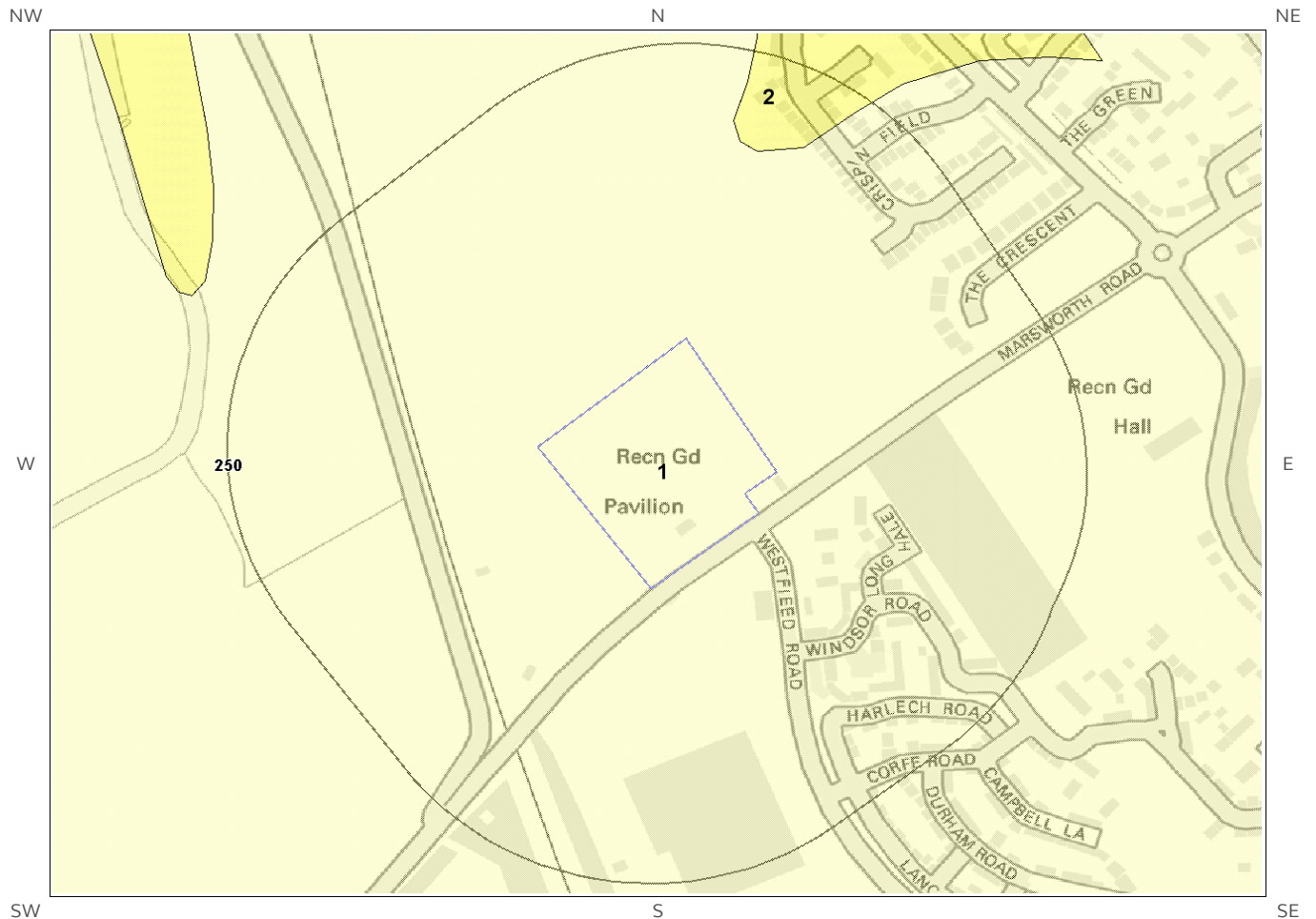
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay map

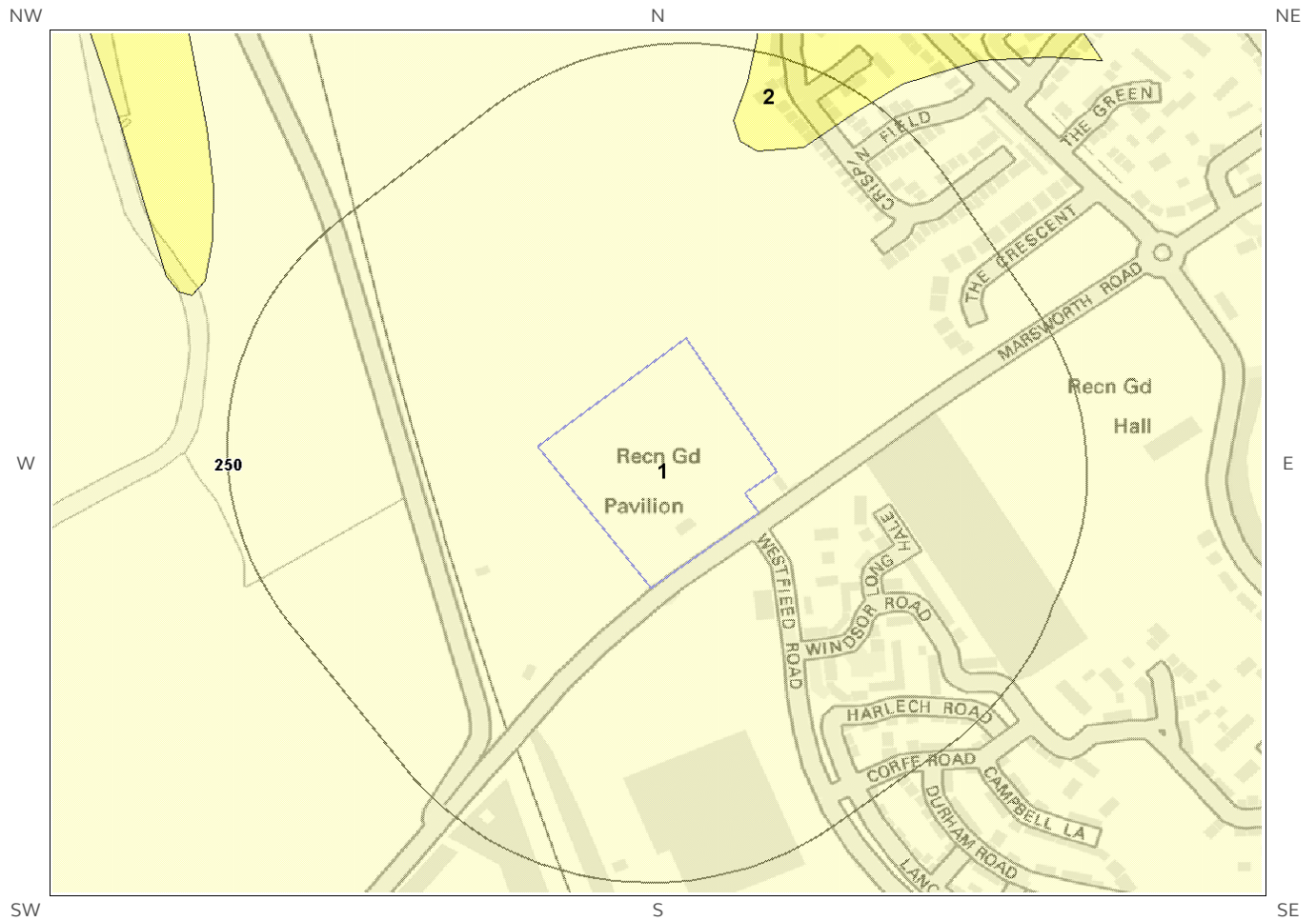


Shrink Swell Clay Legend

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6.2 Landslides map

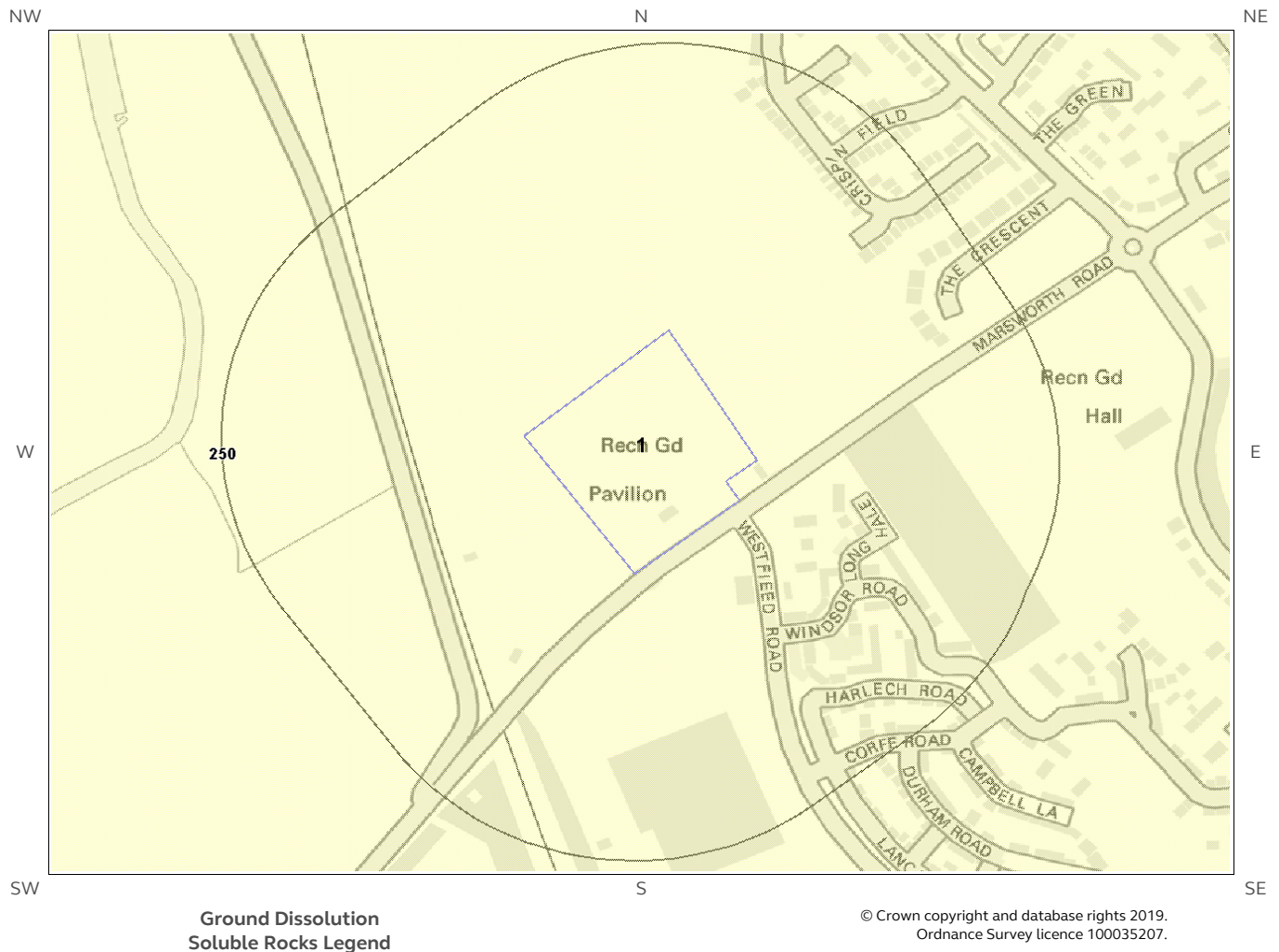


Landslides Legend

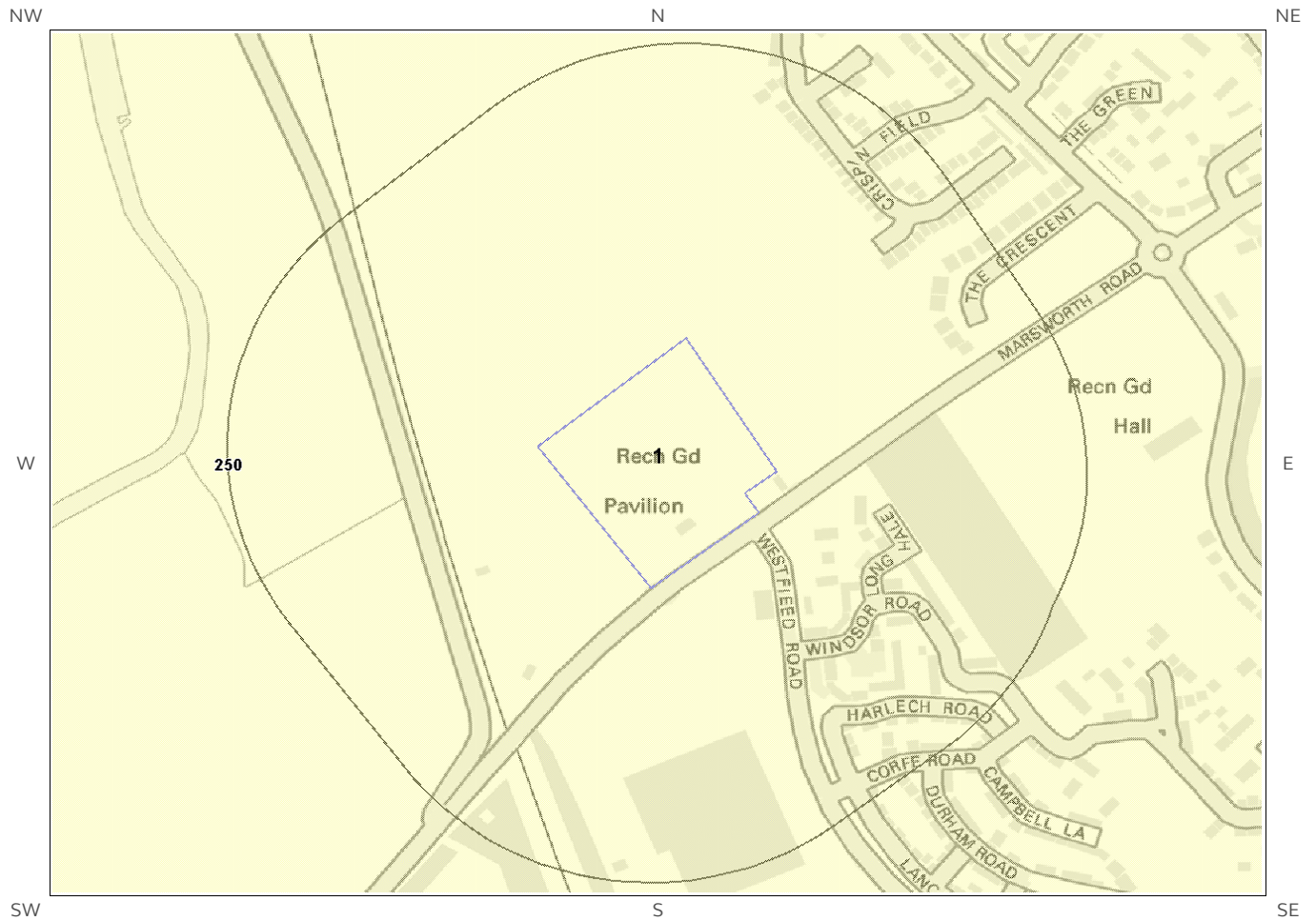
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6.3 Ground Dissolution of Soluble Rocks map



6.4 Compressible Deposits map

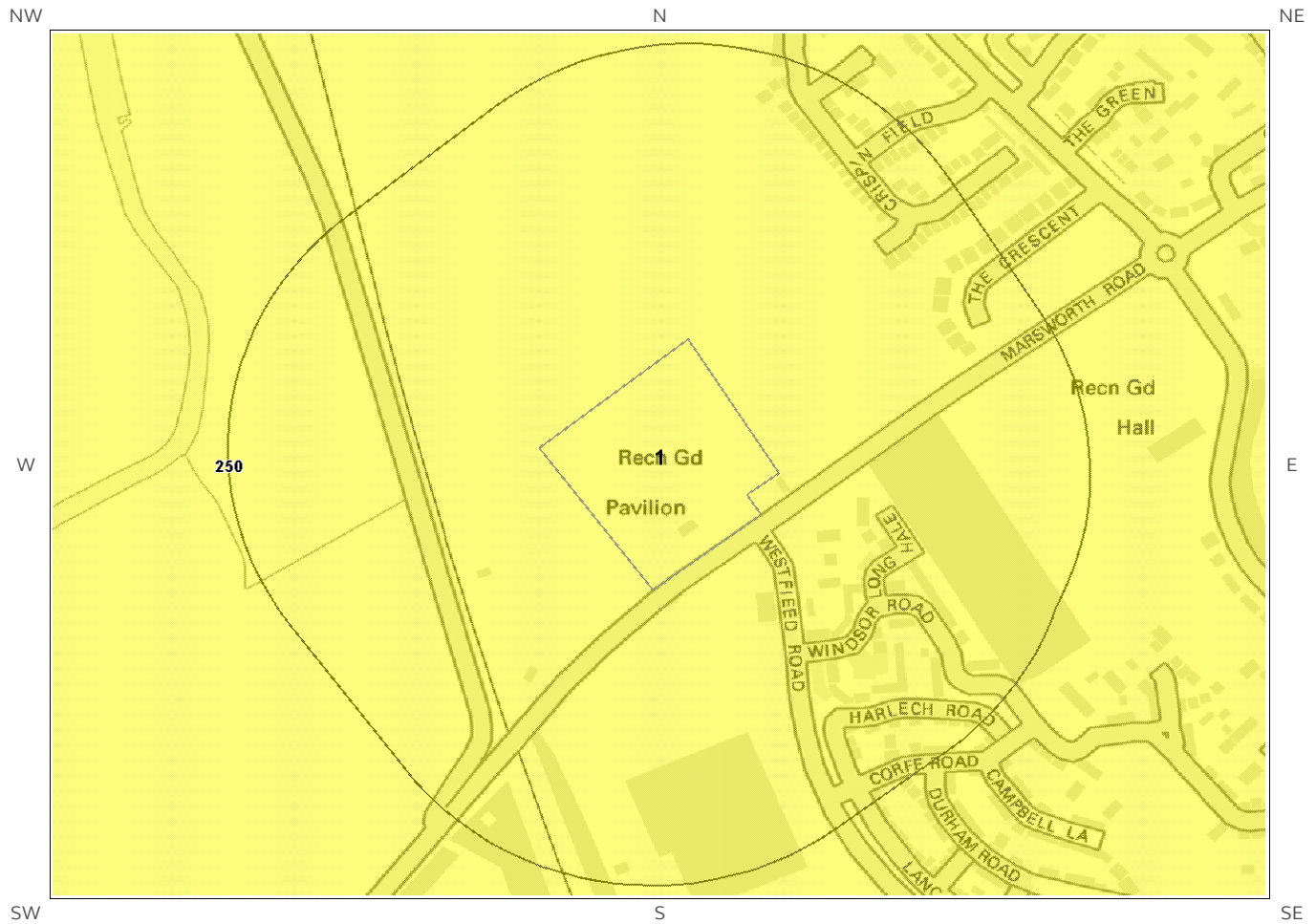


Compressible Deposits Legend

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6.5 Collapsible Deposits map

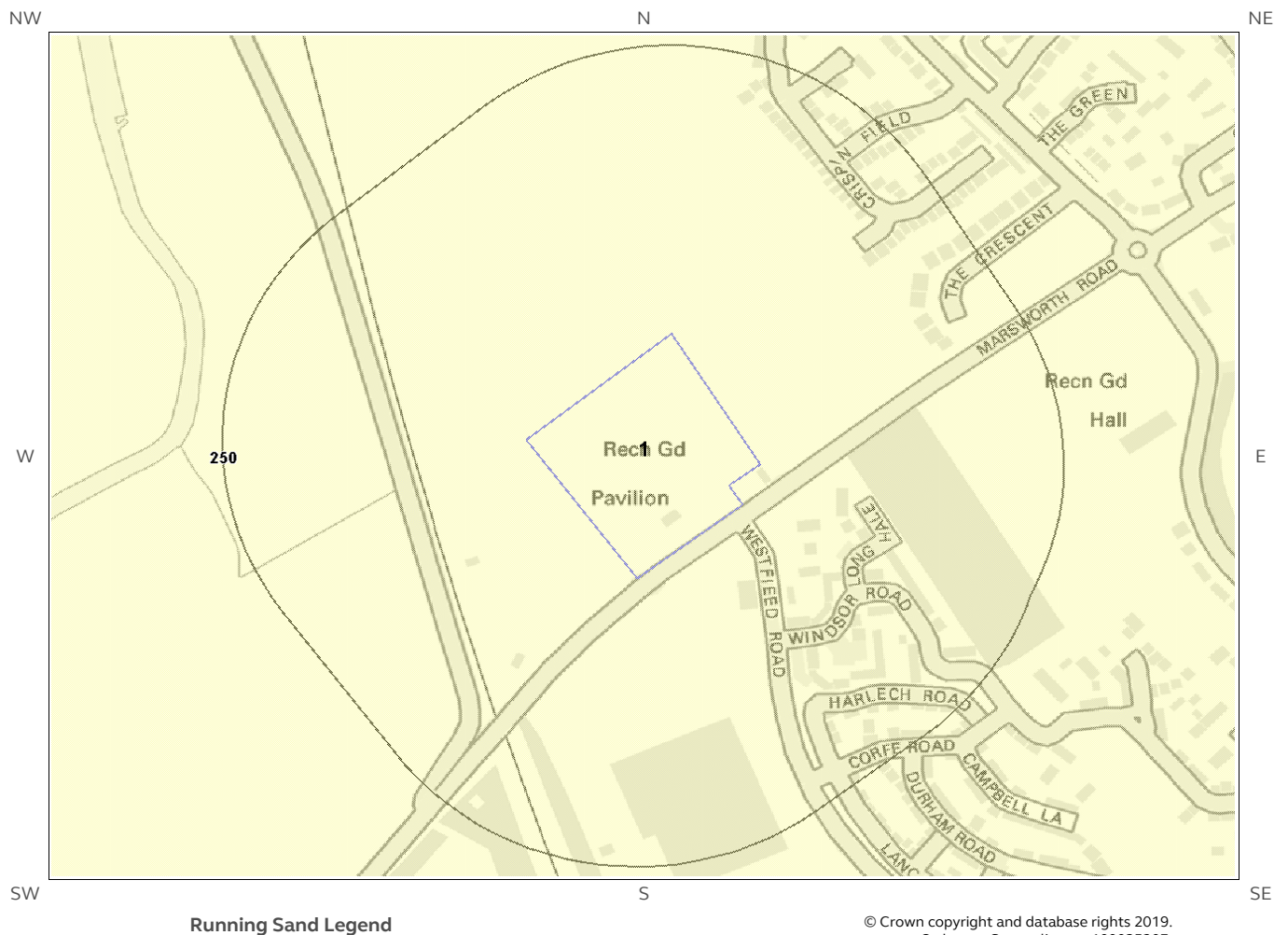


Collapsible Deposits Legend

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6.6 Running Sand map



6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site** boundary? **Very Low**

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for slope instability identified. No special actions required to avoid problems due to landslides. No special ground investigation required and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This includes an automatically generated 50m buffer zone around the site

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

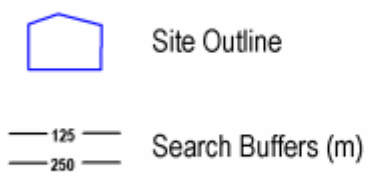
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records map



Borehole Records Legend

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● Borehole Locations

7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary:

3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	73.0	SE	493330 215480	SP91NW11	12.19	PITSTONE LEIGHTON BUZZARD NO.3
2	107.0	SE	493230 215330	SP91NW10	110.03	PITSTONE LEIGHTON BUZZARD NO.3
3	217.0	S	493200 215200	SP91NW21	3.66	WILLIAMSON PITSTONE

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/360178

#2: scans.bgs.ac.uk/sobi_scans/boreholes/360177

#3: scans.bgs.ac.uk/sobi_scans/boreholes/360188

8 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary:

2

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg














*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels map



Railways and Tunnels Legend

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	Site Outline		Underground or Partially Underground Railway / Subway System		Railway Track (OpenStreetMap)
	Search Buffers (m)		Railway Tunnel (OS Mapping)		High Speed 2
	250		Abandoned or Dismantled Railway (OpenStreetMap)		High Speed 2 Revised Proposed Route
	500		Railway Track (OS Mapping)		Crossrail 1
					Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1	57	W	493013 215467	Railway Sidings	1978
2	62	W	492983 215578	Railway Sidings	1960
3	63	W	492976 215599	Railway Sidings	1877
7A	66	W	493147 215283	Railway Sidings	1995
8A	66	W	493147 215283	Railway Sidings	1996
9	72	SW	493093 215250	Railway Sidings	1985

ID	Distance (m)	Direction	NGR	Details	Date
4	76	W	493032 215397	Railway Sidings	1950
5	94	SW	493235 215190	Railway Sidings	1960
6	97	SW	493195 215253	Railway Sidings	1951
10	102	SW	493226 215169	Railway Sidings	1995
11B	114	SW	493039 215361	Railway Sidings	1995
12B	115	SW	493039 215359	Railway Sidings	1985

Any records that have been identified are represented on the Railways and Tunnels map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Status
72	W	Razed
72	W	Abandoned

Multiple sections of the same track may be listed in the detail above

Any records that have been identified are represented on the Railways and Tunnels map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Name	Type
87	W	West Coast Main Line	rail
87	W	West Coast Main Line	rail
90	W	West Coast Main Line	rail
90	W	West Coast Main Line	rail
93	W	West Coast Main Line	rail
93	W	West Coast Main Line	rail
94	W	Not given	Multi Track
94	W	Not given	Multi Track
97	W	West Coast Main Line	rail
97	W	West Coast Main Line	rail

Distance (m)	Direction	Name	Type
174	SW	Not given	Multi Track
174	SW	Not given	Multi Track

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

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BGS Geological Hazards Reports and general geological enquiries



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Standard Terms and Conditions

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<https://www.groundsure.com/terms-and-conditions-feb11-2019>



WDE Consulting Ltd
62a, WESTERN ROAD,
TRING, HP23 4BB

Groundsure Reference: WDE-6482114

Your Reference: 19-555

Report Date 25 Nov 2019

Report Delivery Method: Email - pdf

Enviro Insight

Address: SPORTS PAVILLION, MARSWORTH ROAD, PITSTONE, LU7 9AP

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on (T) 08444 159 000 quoting the above report reference number.

Yours faithfully,

WDE Consulting

Enc.
Groundsure Enviroinsight

Address: SPORTS PAVILLION, MARSWORTH ROAD, PITSTONE, LU7 9AP

Date: 25 Nov 2019

Reference: WDE-6482114

Client: WDE Consulting Ltd

NW

N

NE

W

E



SW

S

SE

Aerial Photograph Capture date: 07-Sep-2015

Grid Reference: 493176,215522

Site Size: 2.1513ha

Report Reference: WDE-6482114

Client Reference: 19-555

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	4	8	38
1.2 Additional Information – Historical Tank Database	0	0	19	57
1.3 Additional Information – Historical Energy Features Database	3	1	4	8
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	0	0	1	26
Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	1	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	1	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	2
2.1.9 Records of Water Industry Referrals	0	0	1	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	0	0
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	2

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	4	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Records of Artificial Ground and Made Ground present beneath the study site	None identified
5.2 Records of Superficial Ground and Drift Geology present beneath the study site	None identified
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m					
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site	Identified					
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site	Identified					
	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	1	3	2	4
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	2	0	0	1	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

0-500m

	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site	No	No	No	No	Yes	Yes
6.10 Ordnance Survey MasterMap Water Network entries within 500m of the site	0	0	2	34	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Environment Agency Zone 2 floodplains within 250m of the study site	None identified					
7.2 Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	None identified					
7.3 Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site	Very Low					
7.4 Flood Defences within 250m of the study site	None identified					
7.5 Areas benefiting from Flood Defences within 250m of the study site	None identified					
7.6 Areas used for Flood Storage within 250m of the study site	None identified					
7.7 Maximum BGS Groundwater Flooding susceptibility within 50m of the study site	Limited potential					
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	High					

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	1	0	2
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	2
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	1
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	2	0	0	3	3	0
8.14 Records of Green Belt land	0	0	0	0	0	2

Section 9: Natural Hazards	
9.1 Maximum risk of natural ground subsidence	Very Low
9.1.1 Maximum Shrink-Swell hazard rating identified on the study site	Negligible
9.1.2 Maximum Landslides hazard rating identified on the study site	Negligible
9.1.3 Maximum Soluble Rocks hazard rating identified on the study site	Negligible
9.1.4 Maximum Compressible Ground hazard rating identified on the study site	Negligible
9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site	Very Low
9.1.6 Maximum Running Sand hazard rating identified on the study site	Negligible
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining	
10.1 Coal mining areas within 75m of the study site	None identified
10.2 Non-Coal Mining areas within 50m of the study site boundary	Identified
10.3 Brine affected areas within 75m of the study site	None identified

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licences, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

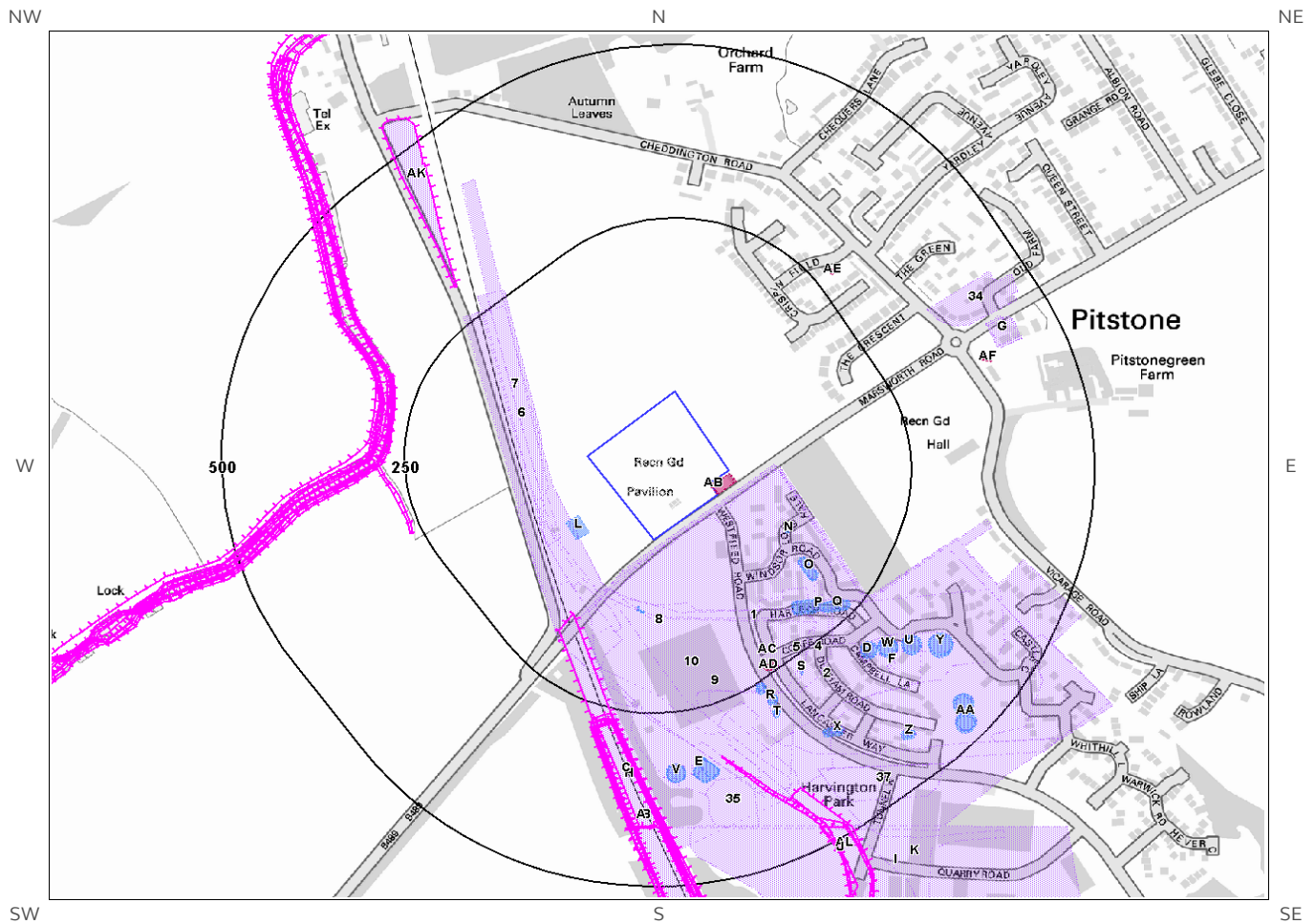
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

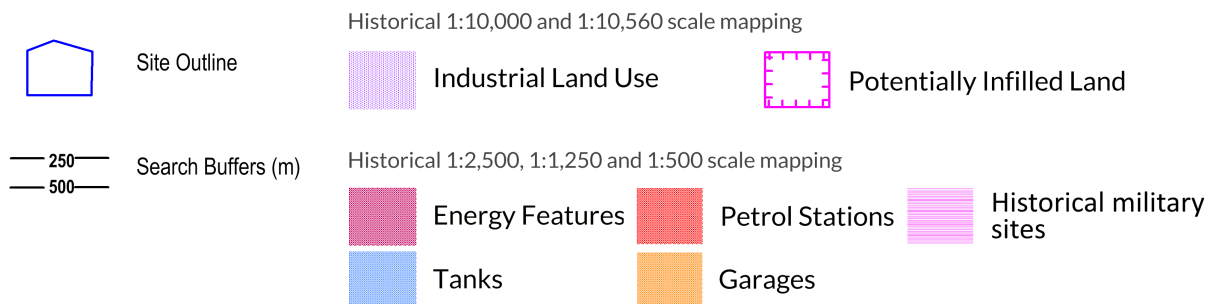
Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



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1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 50

ID	Distance [m]	Direction	Use	Date
1	9	SE	Cement Works	1951
2	14	SE	Unspecified Works	1950
3AC	14	SE	Cement Works	1950
4	17	SE	Unspecified Commercial/Industrial	1978
5	57	W	Railway Sidings	1978
6	62	W	Railway Sidings	1950
7	63	W	Railway Sidings	1877
8	76	W	Railway Sidings	1950
9	94	SW	Railway Sidings	1950
10	97	SW	Railway Sidings	1951
11O	146	SE	Unspecified Tanks	1978
12H	153	SW	Cuttings	1882
13R	252	SE	Unspecified Tanks	1978
14C	257	S	Cuttings	1978
15A	264	S	Cuttings	1951
16A	264	S	Cuttings	1923
17B	264	S	Cuttings	1898
18B	264	S	Cuttings	1950
19B	264	S	Cuttings	1923
20B	266	S	Cuttings	1926
21A	271	S	Cuttings	1897
22C	271	S	Cuttings	1950
23U	293	SE	Unspecified Tanks	1978
24D	296	SE	Unspecified Tank	1950
25D	297	SE	Unspecified Tank	1951
26D	301	SE	Unspecified Tank	1950
27AK	302	NW	Unspecified Heap	1882
28E	318	S	Unspecified Tanks	1950
29E	324	S	Unspecified Tank	1978
30J	325	S	Unspecified Quarry	1951
31F	334	SE	Unspecified Tank	1950
32F	338	SE	Unspecified Tank	1951
33F	342	SE	Chimney	1950

34	354	NE	Abattoir	1978
35	356	S	Gas Valve Compound	1978
36X	360	SE	Unspecified Tanks	1978
37	399	SE	Cement Works	1978
38G	408	NE	Smithy	1898
39AL	410	SE	Unspecified Quarry	1950
40G	410	NE	Smithy	1897
41H	413	S	Cuttings	1959
42H	413	S	Cuttings	1995
43H	413	S	Cuttings	1979
44I	416	S	Cement Works	1995
45I	416	S	Cement Works	1979
46Z	424	SE	Unspecified Tanks	1978
47AA	441	SE	Unspecified Tanks	1978
48J	471	SE	Unspecified Quarry	1959
49K	488	SE	Railway Sidings	1995
50K	488	SE	Railway Sidings	1979

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary:

76

ID	Distance (m)	Direction	Use	Date
51L	62	SW	Tanks	1995
52L	62	SW	Tanks	1996
53M	99	S	Tanks	1978
54M	99	S	Tanks	1985
55N	106	SE	Unspecified Tank	1985
56N	107	SE	Unspecified Tank	1978
57N	107	SE	Unspecified Tank	1995
58N	107	SE	Unspecified Tank	1996
59O	144	SE	Tanks	1985
60O	145	SE	Tanks	1978
61O	145	SE	Tanks	1995
62O	145	SE	Tanks	1996
63P	185	SE	Tanks	1985
64P	186	SE	Tanks	1978
65P	187	SE	Tanks	1996
66P	187	SE	Tanks	1995
67Q	213	SE	Tanks	1978
68Q	214	SE	Tanks	1996

69Q	214	SE	Tanks	1995
70R	251	SE	Unspecified Tank	1985
71R	252	SE	Unspecified Tank	1978
72R	255	SE	Unspecified Tank	1995
73R	255	SE	Unspecified Tank	1996
74S	269	SE	Unspecified Tank	1985
75S	270	SE	Unspecified Tank	1978
76S	273	SE	Unspecified Tank	1995
77S	273	SE	Unspecified Tank	1996
78R	273	SE	Unspecified Tank	1985
79R	275	SE	Unspecified Tank	1978
80R	278	SE	Unspecified Tank	1996
81R	278	SE	Unspecified Tank	1995
82D	292	SE	Unspecified Tank	1985
83D	293	SE	Unspecified Tank	1978
84D	294	SE	Unspecified Tank	1996
85D	294	SE	Unspecified Tank	1995
86R	294	SE	Unspecified Tank	1985
87R	296	SE	Unspecified Tank	1978
88T	299	SE	Unspecified Tank	1996
89T	299	SE	Unspecified Tank	1995
90W	305	SE	Unspecified Tank	1985
91U	307	SE	Unspecified Tank	1978
92F	308	SE	Unspecified Tank	1996
93F	308	SE	Unspecified Tank	1995
94E	320	S	Tanks	1985
95E	320	S	Tanks	1978
96E	323	S	Tanks	1996
97E	323	S	Tanks	1995
98V	324	S	Unspecified Tank	1978
99V	324	S	Unspecified Tank	1985
100W	327	SE	Unspecified Tank	1985
101V	327	S	Unspecified Tank	1996
102V	327	S	Unspecified Tank	1995
103U	329	SE	Unspecified Tank	1978
104U	329	SE	Unspecified Tank	1995
105U	329	SE	Unspecified Tank	1996
106E	334	S	Tanks	1978
107Y	356	SE	Unspecified Tank	1985
108X	357	SE	Tanks	1985
109Y	358	SE	Unspecified Tank	1978
110X	358	SE	Tanks	1978
111Y	358	SE	Unspecified Tank	1996
112Y	358	SE	Unspecified Tank	1995
113X	361	SE	Tanks	1995
114X	361	SE	Tanks	1996

115Z	424	SE	Tanks	1985
116Z	426	SE	Tanks	1978
117Z	428	SE	Tanks	1996
118Z	428	SE	Tanks	1995
119AA	436	SE	Unspecified Tank	1985
120AA	438	SE	Unspecified Tank	1978
121AA	439	SE	Unspecified Tank	1996
122AA	439	SE	Unspecified Tank	1995
123AA	457	SE	Unspecified Tank	1985
124AA	458	SE	Unspecified Tank	1978
125AA	460	SE	Unspecified Tank	1995
126AA	460	SE	Unspecified Tank	1996

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary:

16

ID	Distance (m)	Direction	Use	Date
127AB	0	On Site	Electricity Substation	1995
128AB	0	On Site	Electricity Substation	1996
129AB	0	On Site	Electricity Substation	1985
130AB	1	SE	Electricity Substation	1978
131AC	233	SE	Electricity Substation	1978
132AD	236	SE	Electricity Substation	1995
133AD	236	SE	Electricity Substation	1996
134AC	237	SE	Electricity Substation	1985
135AE	272	NE	Electricity Substation	1985
136AE	272	NE	Electricity Substation	1995
137AE	272	NE	Electricity Substation	1996
138AE	275	NE	Electricity Substation	1978
139AF	381	NE	Electricity Substation	1985
140AF	381	NE	Electricity Substation	1995
141AF	381	NE	Electricity Substation	1996
142AF	383	NE	Electricity Substation	1978

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 0

Database searched and no data found.

1.6 Historical military sites

Certain military installations were not noted on historic mapping for security reasons. Whilst not all military land is necessarily of concern, Groundsure has researched and digitised a number of Ordnance Factories and other military industrial features (e.g. Ordnance Depots, Munitions Testing Grounds) which may be of contaminative concern. This research was drawn from a number of different sources, and should not be regarded as a definitive or exhaustive database of potentially contaminative military installations. The boundaries of sites within this database have been estimated from the best evidence available to Groundsure at the time of compilation.

Records of historical military sites within 500m of the search boundary: 0

Database searched and no data found.

1.7 Potentially Infilled Land

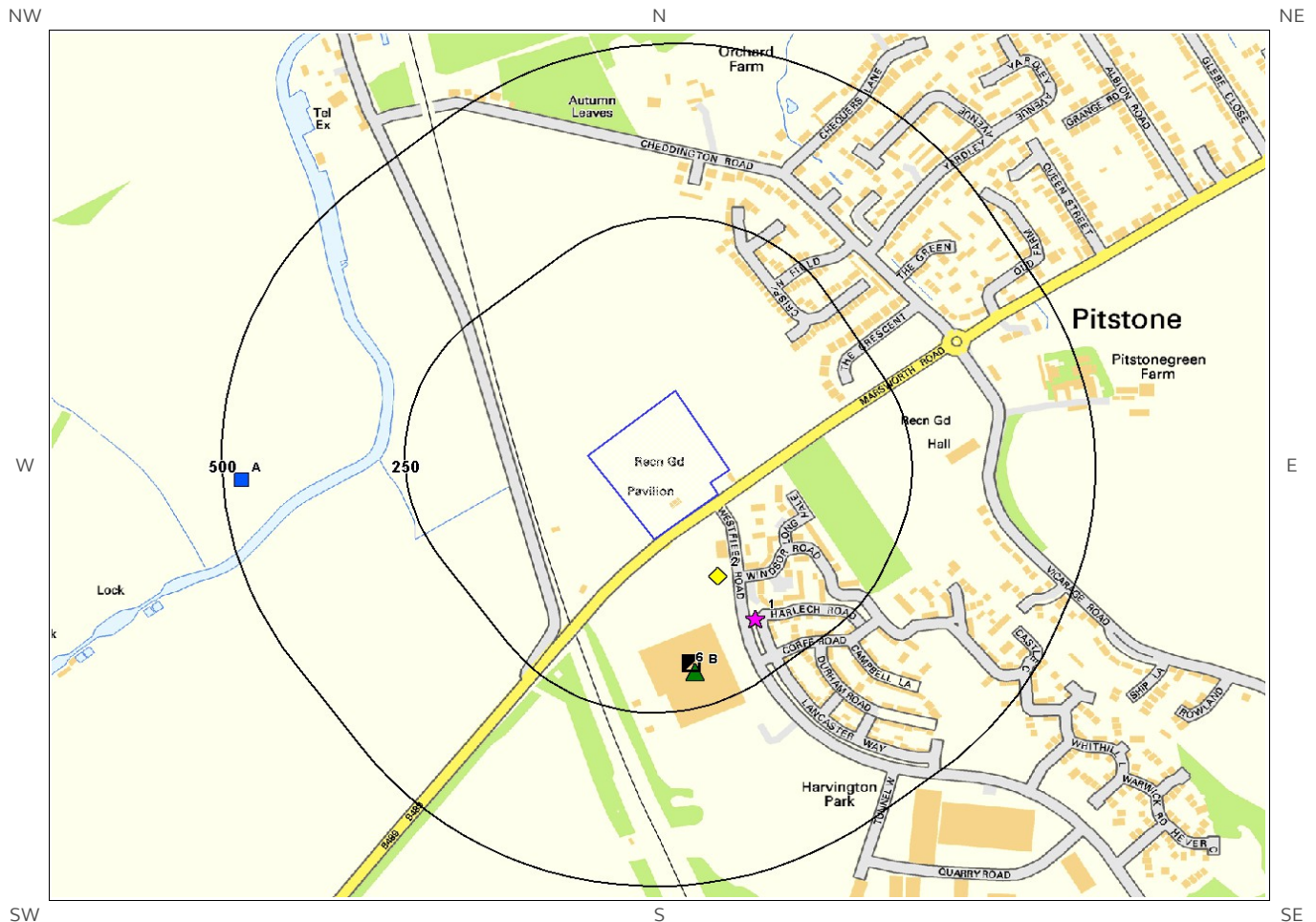
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 27

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
143H	153	SW	Cuttings	1882
144C	257	S	Cuttings	1978
145AG	261	W	Canal	1950
146AG	261	W	Canal	1898
147A	264	S	Cuttings	1951
148A	264	S	Cuttings	1923
149B	264	S	Cuttings	1950
150B	264	S	Cuttings	1898
151B	264	S	Cuttings	1923
152B	266	S	Cuttings	1926
153AH	270	W	Canal	1950
154AH	270	W	Canal	1978
155A	271	S	Cuttings	1897

156C	271	S	Cuttings	1950
157AI	273	W	Canal	1926
158AI	273	W	Canal	1897
159AI	273	W	Canal	1877
160AJ	274	W	Canal	1923
161AJ	275	W	Canal	1926
162	280	W	Canal	1882
163AK	302	NW	Unspecified Heap	1882
164J	325	S	Unspecified Quarry	1951
165AL	410	SE	Unspecified Quarry	1950
166H	413	S	Cuttings	1959
167H	413	S	Cuttings	1979
168H	413	S	Cuttings	1995
169J	471	SE	Unspecified Quarry	1959

2. Environmental Permits, Incidents and Registers Map



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- | | | |
|-------------------------------|---|--|
| Site Outline | Recorded Pollution Incident | RAS 3 & 4 Authorisations |
| Dangerous Substances (List 1) | Dangerous Substances (List 2) | Part A(1) Authorised Processes and Historic IPC Authorisations |
| Water Industry Referrals | Licenced Discharge Consents | Part A(2) and Part B Authorised Processes |
| Red List Discharge Consents | COMAH / NIHHS Sites | Sites Determined as Contaminated Land |
| | Hazardous Substance Consents and Enforcements | |

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

1

The following List 2 Dangerous Substance Inventory Site records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
2	95	SE	493250	Name: Goodrich Control Systems	Authorised Substances: pH

ID	Distance (m)	Direction	NGR	Details
			215360	Limited Status: Not Active Receiving Water: Na

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

1

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
5B	201	S	493219 215221	Address: Goodrich Power Systems, Pitstone Green Business Park, Westfield Rd, Pitstone, LU7 9GT Process: Surface Cleaning Status: Historical Permit Permit Type: Part B Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

2

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
3A	475	W	492600 215500	Address: PITSTONE WORKS, LEIGHTON BUZZARD, BEDS. Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: PR1NF1284 Permit Version: 1 Receiving Water: Grand Union Canal Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 06/01/1981 Effective Date: 06-Jan-1981 Revocation Date: 18/02/1986
4A	475	W	492600 215500	Address: PITSTONE WORKS, LEIGHTON BUZZARD, BEDS. Effluent Type: TRADE DISCHARGES - PROCESS EFFLUENT - NOT WATER COMPANY Permit Number: PR1NF2275 Permit Version: 1 Receiving Water: Into the Grand Union Canal Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 19/02/1986 Effective Date: 19-Feb-1986 Revocation Date: 09/10/2001

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

1

The following Water Industry Referral records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Address	Permission reference	Local Authority	First Date Received	Last Date Received	Status
7B	185	S	Safran Power UK Ltd, PITSTONE GREEN BUSINESS PARK, WESTFIELD ROAD, PITSTONE, BUCKINGHAMSHIRE, LU7 9GT	SCE0104C 2	MILTON KEYNES COUNCIL	16-Jul-2013	01-Jan-2018	EFFECTIVE

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site:

0

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

1

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details
1	173	SE	493300.0 215300.0	<p>Incident Date: 07-Jul-2003 Incident Identification: 171496.0 Pollutant: Inorganic Chemicals/Products Pollutant Description: Other Inorganic Chemical or Product</p> <p>Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)</p>

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

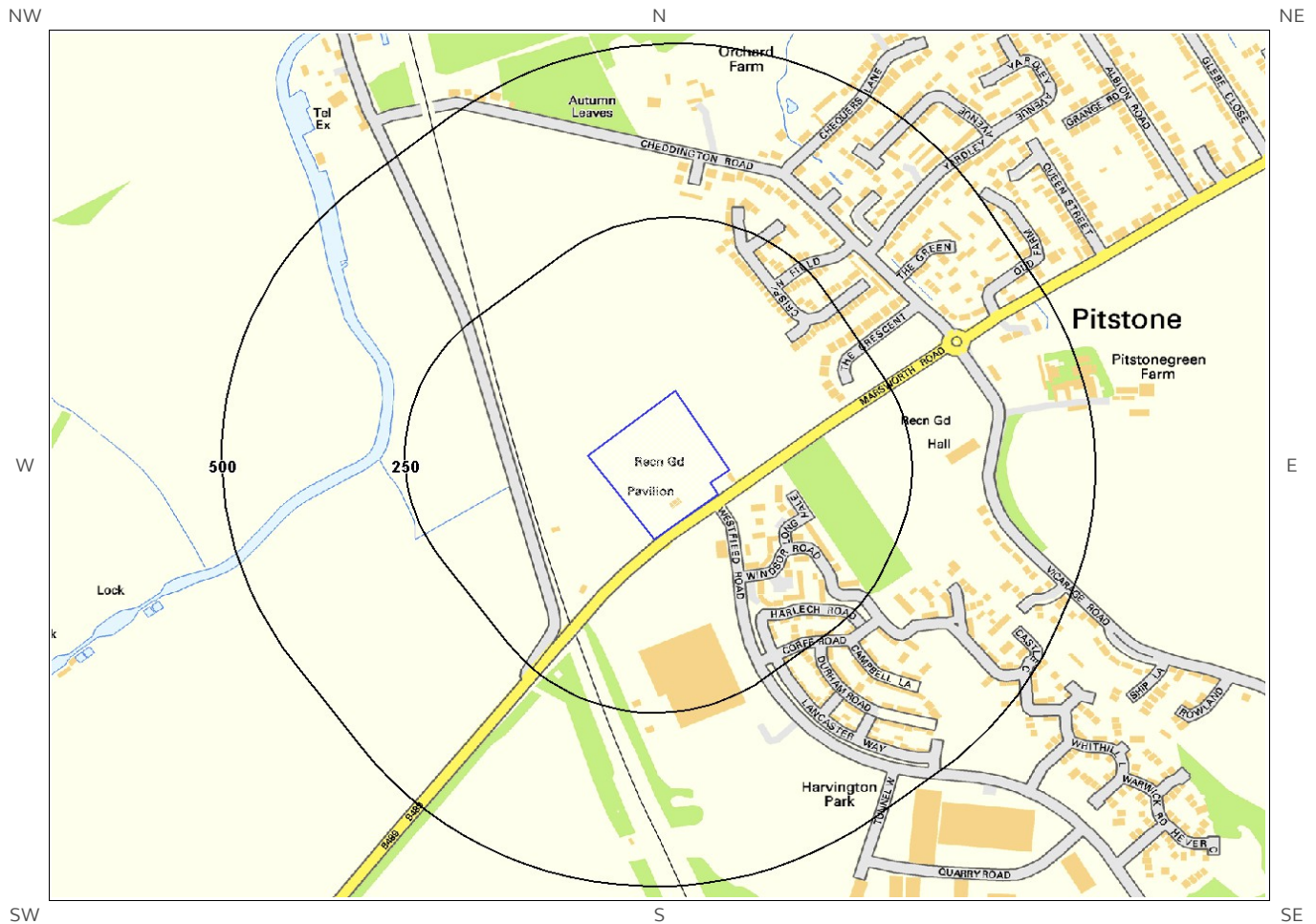
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

Records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site

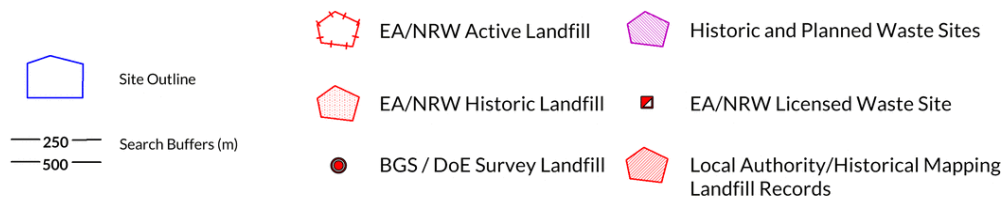
0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



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3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

0

Database searched and no data found.

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

0

Database searched and no data found.

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

2

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details
Not shown	1400	SW	492200 214400	<p>Site Address: Herts CC, Tringford Road, New Mill, Tring, Herts</p> <p>Type: Household, Commercial & Industrial Waste T Stn</p> <p>Size: < 25000 tonnes</p> <p>Environmental Permitting Regulations (Waste) Licence Number: HER001</p> <p>EPR reference: -</p> <p>Operator: Hertfordshire County Council</p> <p>Waste Management licence No: 86051</p> <p>Annual Tonnage: 24999.0</p> <p>Issue Date: 01/04/1996</p> <p>Effective Date: -</p> <p>Modified: 29/03/1997</p> <p>Surrendered Date: -</p> <p>Expiry Date: -</p> <p>Cancelled Date: -</p> <p>Status: Modified</p> <p>Site Name: New Mill Household Waste Site</p> <p>Correspondence Address: Herts CC, County Hall, Pegs Lane, Hertford, Hertfordshire, SG13 8DN</p>
Not shown	1400	SW	492200 214400	<p>Site Address: Herts CC, Tring Household Waste, Tringford Road, New Mill, Tring, Hertfordshire, HP23 4LH</p> <p>Type: Household Waste Amenity Site</p> <p>Size: < 25000 tonnes</p> <p>Environmental Permitting Regulations (Waste) Licence Number: HER001</p> <p>EPR reference: EA/EPR/KP3399EM/V002</p> <p>Operator: Hertfordshire County Council</p> <p>Waste Management licence No: 86051</p> <p>Annual Tonnage: 24999.0</p> <p>Issue Date: 01/04/1996</p> <p>Effective Date: -</p> <p>Modified: 29/03/1997</p> <p>Surrendered Date: -</p> <p>Expiry Date: -</p> <p>Cancelled Date: -</p> <p>Status: Modified</p> <p>Site Name: Tring Household Waste Recycling Centre</p> <p>Correspondence Address: -</p>

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

4

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	64	SE	Behringer Ltd	493254 215401	Victor House Pitstone Green Business Park, Quarry Road, Pitstone, Leighton Buzzard, Buckinghamshire, LU7 9GW	Tools Including Machine Shops	Industrial Products
2	97	SW	Electricity Sub Station	493030 215431	Buckinghamshire, LU7	Electrical Features	Infrastructure and Facilities
3	167	SE	Electricity Sub Station	493294 215303	Buckinghamshire, LU7	Electrical Features	Infrastructure and Facilities
4	203	S	Safran Electrical & Power	493219 215219	Pitstone Green Business Park, Westfield Road, Pitstone, Leighton Buzzard, Buckinghamshire, LU7 9GT	Electronic Equipment	Industrial Products

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

0

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site:

0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.3 Bedrock and Solid Geology

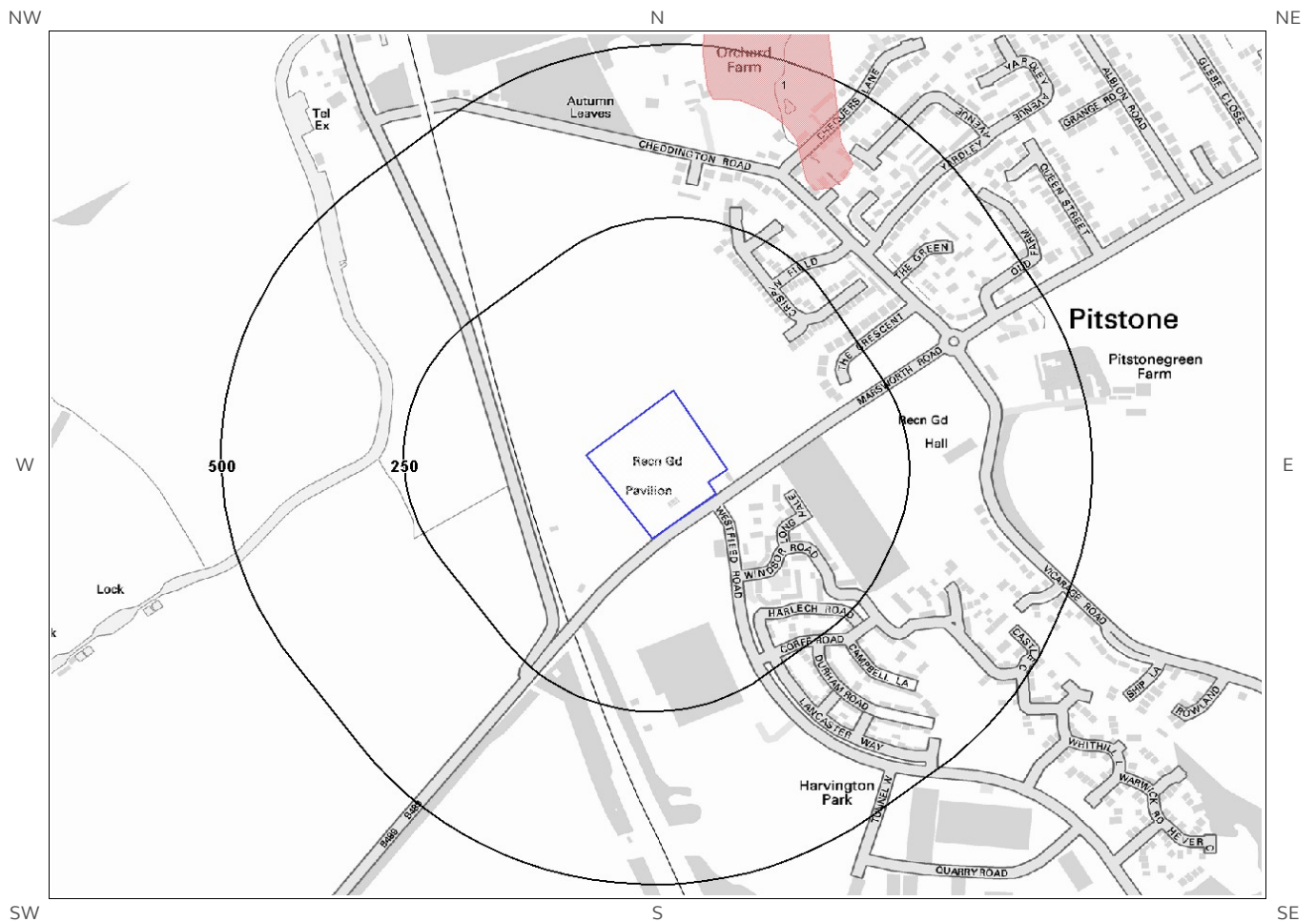
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
WZCK-CHLK	WEST MELBURY MARLY CHALK FORMATION AND ZIG ZAG CHALK FORMATION (UNDIFFERENTIATED)	CHALK

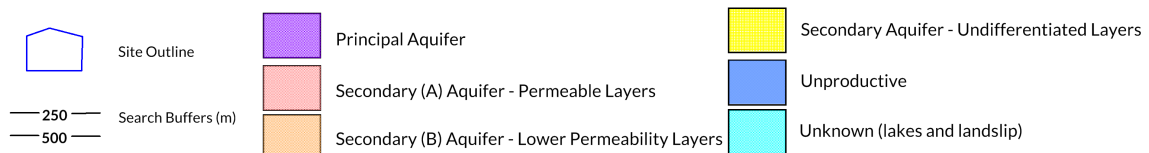
(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



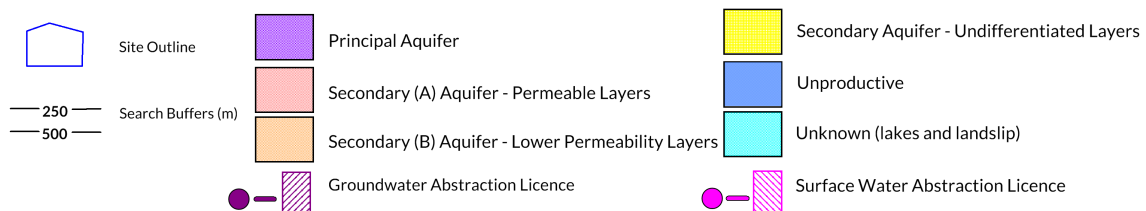
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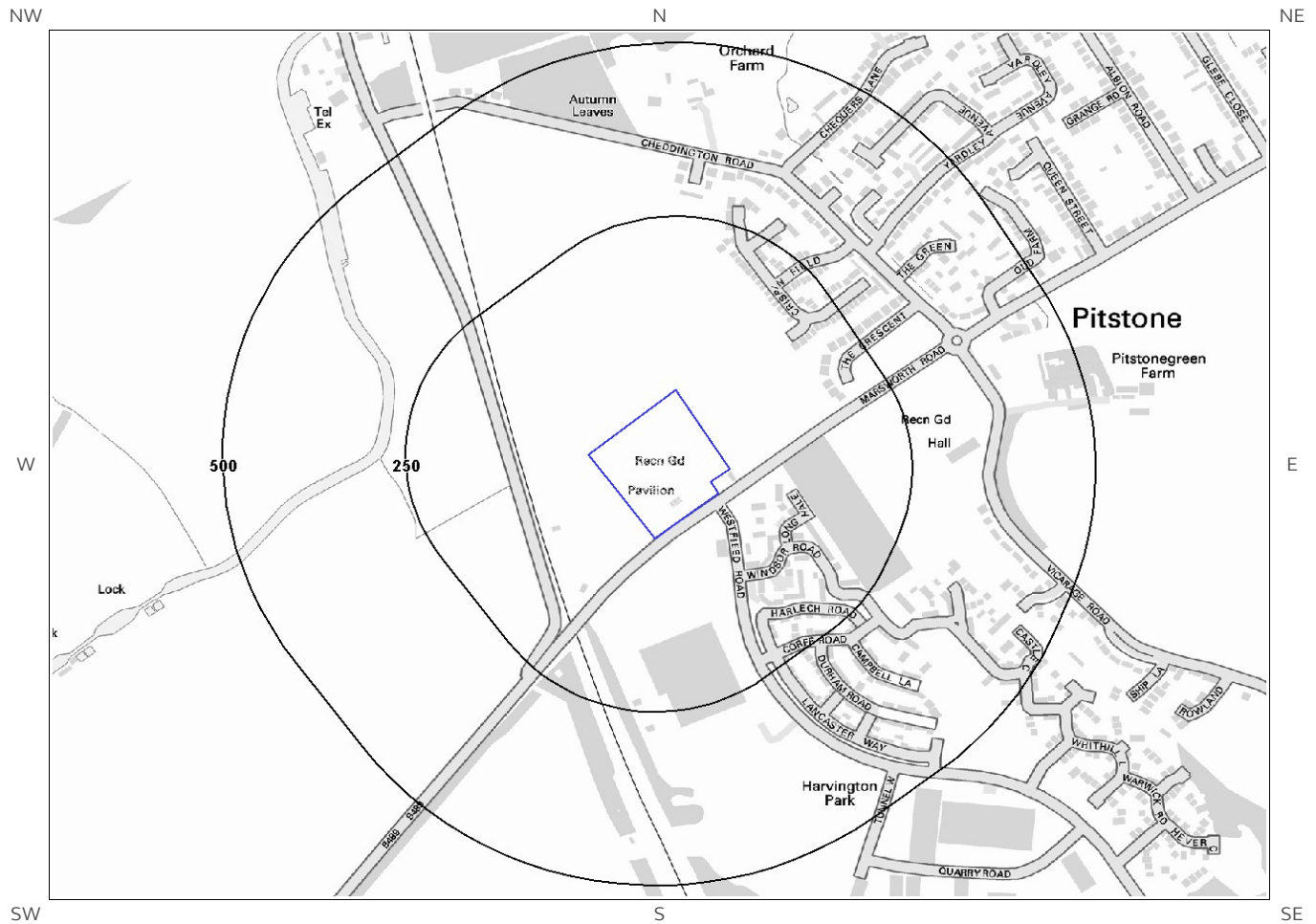
6b. Aquifer Within Bedrock Geology and Abstraction Licences



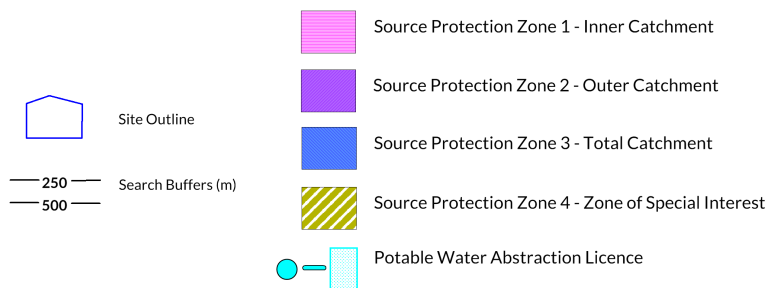
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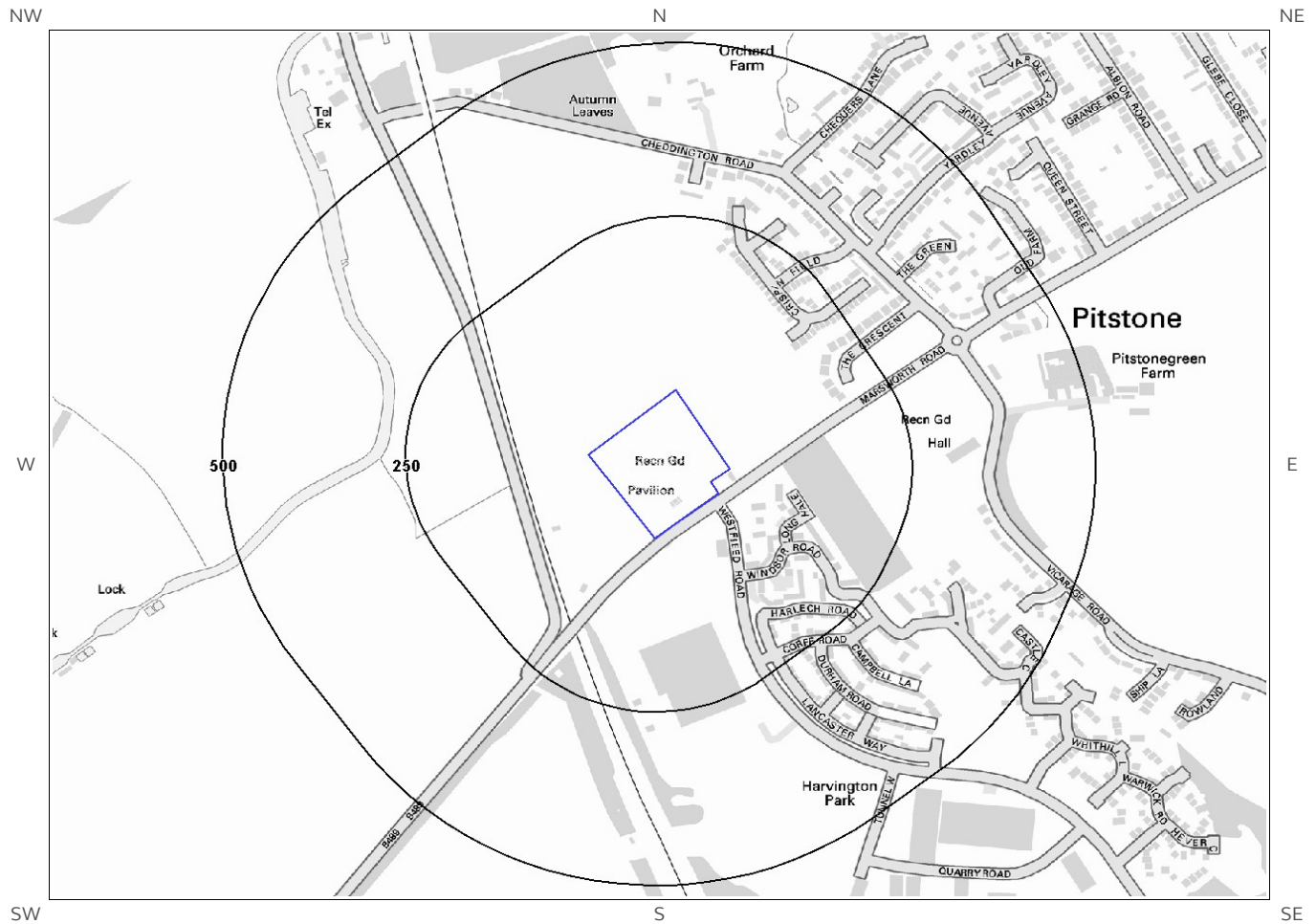
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences



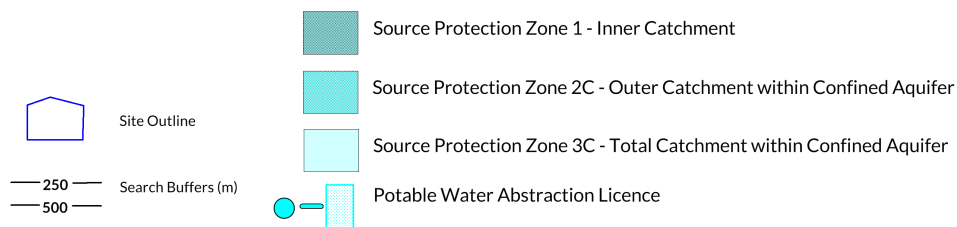
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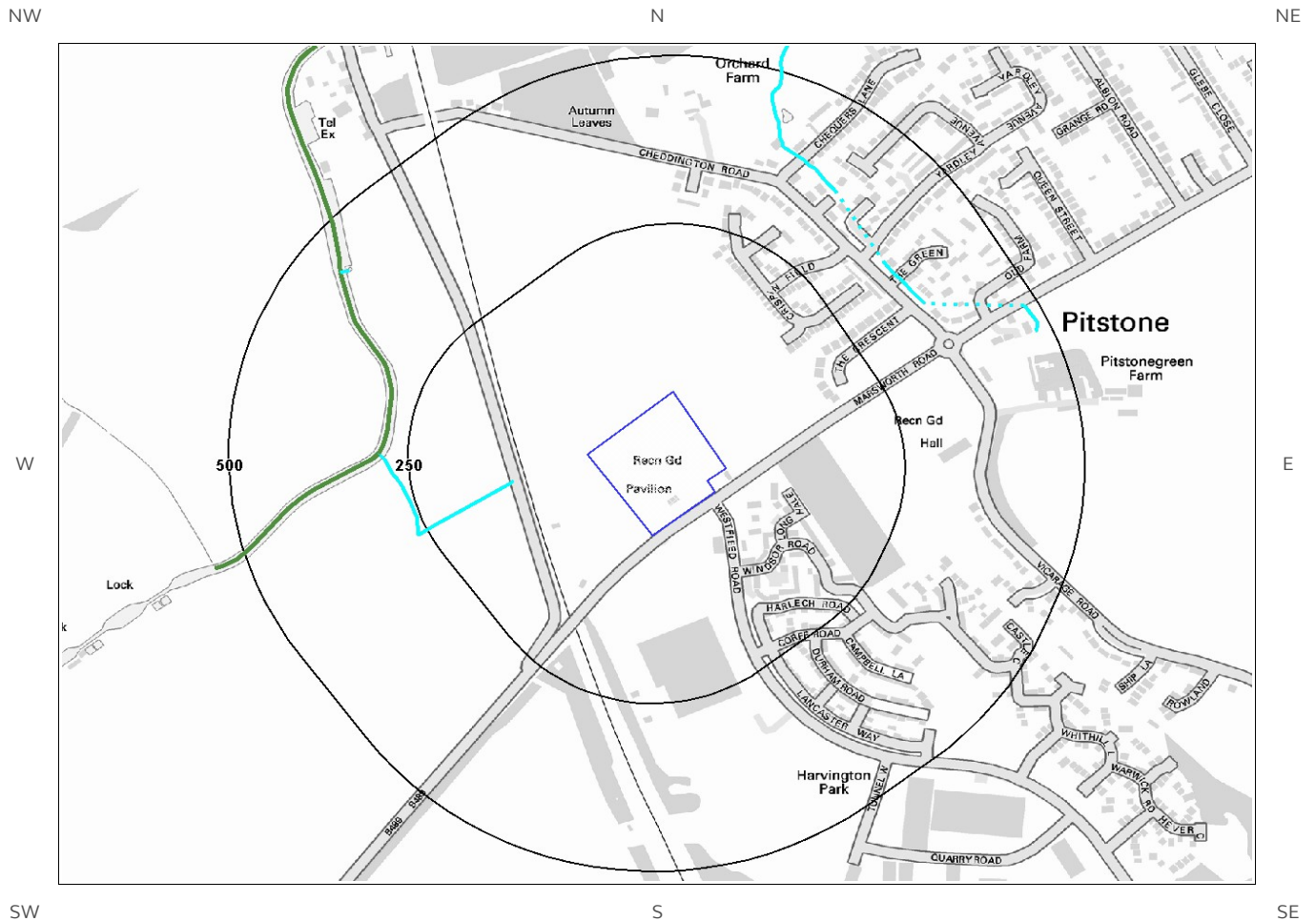
6d. Hydrogeology – Source Protection Zones within confined aquifer



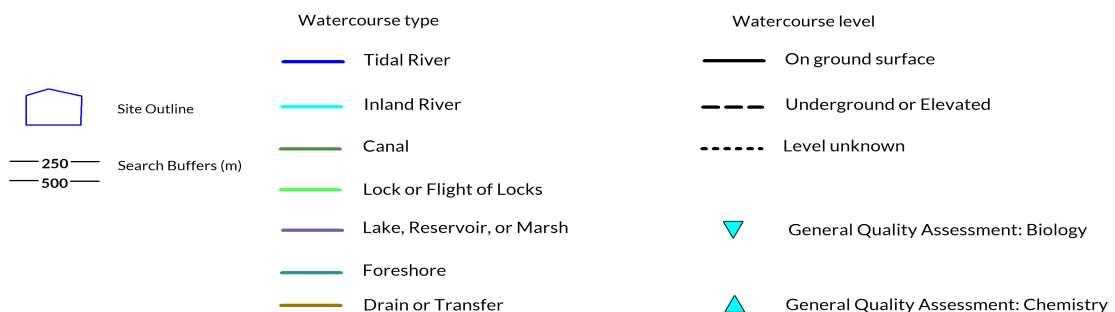
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6e. Hydrology – Watercourse Network and River Quality



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6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Records of strata classification within the superficial geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	349	NE	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

6.2 Aquifer within Bedrock Deposits

Records of strata classification within the bedrock geology at or in proximity to the property Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers
3	169	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	414	S	Principal	Geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply/river base flow on a strategic scale. Generally principal aquifers were previously major aquifers

6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site

Identified

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details
4	70	E	493320 215470	Status: Historical Licence No: 6/33/06/*G/0059 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE 3 PITSTONE Data Type: Point Name: CASTLE CEMENT PITSTONE LTD Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/05/1987 Expiry Date: 31/12/2001 Issue No: 100 Version Start Date: 01/05/1987 Version End Date:
5	340	E	493570 215360	Status: Historical Licence No: 6/33/06/*G/0059 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE 5 PITSTONE Data Type: Point Name: CASTLE CEMENT PITSTONE LTD Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/05/1987 Expiry Date: 31/12/2001 Issue No: 100 Version Start Date: 01/05/1987 Version End Date:
6	376	S	493200 215040	Status: Historical Licence No: 6/33/06/*G/0059 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE 1 PITSTONE Data Type: Point Name: CASTLE CEMENT PITSTONE LTD Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/05/1987 Expiry Date: 31/12/2001 Issue No: 100 Version Start Date: 01/05/1987 Version End Date:
7	401	S	493090 215020	Status: Historical Licence No: 6/33/06/*G/0059 Details: General use relating to Secondary Category (Medium Loss) Direct Source: GROUND WATER SOURCE OF SUPPLY Point: BOREHOLE 4 PITSTONE Data Type: Point Name: CASTLE CEMENT PITSTONE LTD Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/05/1987 Expiry Date: 31/12/2001 Issue No: 100 Version Start Date: 01/05/1987 Version End Date:
8A	555	E	493810 215620	Status: Historical Licence No: 6/33/06/*G/0036 Details: Spray Irrigation - Direct Direct Source: GROUND WATER SOURCE OF SUPPLY Point: THREE WELLS AT PITSTONE Data Type: Point Name: J H HAWKINS & SON Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/08/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/08/1966 Version End Date:
9A	555	E	493810 215620	Status: Historical Licence No: 6/33/06/*G/0036 Details: General Farming & Domestic Direct Source: GROUND WATER SOURCE OF SUPPLY Point: THREE WELLS AT PITSTONE Data Type: Point Name: J H HAWKINS & SON Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 01/08/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/08/1966 Version End Date:

ID	Distance (m)	Direction	NGR	Details	
Not shown	1255	S	493200 214160	Status: Historical Licence No: 28/39/19/0226 Details: General Use Relating To Secondary Category (Low Loss) Direct Source: THAMES GROUNDWATER Point: COLLEGE LAKE NATURE RESERVE, BULBOURNE Data Type: Point Name: BBOWT	Annual Volume (m³): 300000 Max Daily Volume (m³): 1296 Original Application No: - Original Start Date: 21/02/2002 Expiry Date: 31/03/2014 Issue No: 1 Version Start Date: 21/02/2002 Version End Date:
Not shown	1255	S	493200 214160	Status: Historical Licence No: 28/39/19/0224 Details: General use relating to Secondary Category (Low Loss) Direct Source: THAMES GROUNDWATER Point: COLLEGE LAKE NATURE RESERVE, BULBOURNE Data Type: Point Name: BBOWT	Annual Volume (m³): - Max Daily Volume (m³): - Original Application No: - Original Start Date: 19/07/2000 Expiry Date: 31/07/2001 Issue No: 1 Version Start Date: 19/07/2000 Version End Date:
Not shown	1330	S	493232 214086	Status: Historical Licence No: 28/39/19/0232 Details: Transfer Between Sources (Post Water Act 2003) Direct Source: THAMES GROUNDWATER Point: COLLEGE LAKE WILDLIFE CENTRE, BULBOURNE Data Type: Point Name: BERKSHIRE BUCKINGHAMSHIRE & OXFORDSHIRE WILDLIFE TRUST LTD	Annual Volume (m³): 100000 Max Daily Volume (m³): 20000 Original Application No: - Original Start Date: 10/11/2008 Expiry Date: 31/03/2014 Issue No: 1 Version Start Date: 10/11/2008 Version End Date:
Not shown	1330	S	493232 214086	Status: Active Licence No: 28/39/19/0232/R01 Details: Transfer Between Sources (Post Water Act 2003) Direct Source: THAMES GROUNDWATER Point: COLLEGE LAKE WILDLIFE CENTRE, BULBOURNE Data Type: Point Name: BERKSHIRE BUCKINGHAMSHIRE & OXFORDSHIRE WILDLIFE TRUST LTD	Annual Volume (m³): 100000 Max Daily Volume (m³): 20000 Original Application No: - Original Start Date: 01/04/2014 Expiry Date: 31/03/2026 Issue No: 1 Version Start Date: 01/04/2014 Version End Date:

6.4 Surface Water Abstraction Licences

Surface Water Abstraction Licences within 2000m of the study site

Identified

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	843	SW	492300 215200	Status: Historical Licence No: 28/39/19/0138 Details: Process water Direct Source: THAMES SURFACE WATER - NON TIDAL Point: PITSTONE Data Type: Point Name: BRITISH WATERWAYS BOARD	Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 13/02/1967 Expiry Date: - Issue No: 100 Version Start Date: 22/07/1986 Version End Date:

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site

None identified

Database searched and no data found.

6.6 Source Protection Zones

Source Protection Zones within 500m of the study site

None identified

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Source Protection Zones within the Confined Aquifer within 500m of the study site

None identified

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site

Identified

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Major Aquifer/High Leaching Potential	H3	Coarse textured or moderately shallow soils which readily transmit non-adsorbed pollutants and liquid discharges but have some ability to attenuate adsorbed pollutants because of their clay or organic matter content.
0	On Site	Major Aquifer/High Leaching Potential	H1	Soils which readily transmit liquid discharges because they are shallow or susceptible to rapid flow directly to rock, gravel or groundwater.
442	SE	Major Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.

Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site Identified

6.9.1 Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
Not shown	694	NW	492800 216200	River Name: Grand Union Canal (ouzel) Reach: Manor Farm...great Seabrook End/Start of Stretch: End of Stretch NGR	C	D	D	D	C
Not shown	694	NW	492800 216200	River Name: Grand Union Canal (ouzel) Reach: Great Seabrook...linford Wharf End/Start of Stretch: Start of Stretch NGR	B	B	D	D	D
Not shown	940	SW	492300 215000	River Name: Grand Union Canal (ouzel) Reach: Manor Farm...great Seabrook End/Start of Stretch: Start of Stretch NGR	C	D	D	D	C
Not shown	940	SW	492300 215000	River Name: Grand Union Canal (ouzel) Reach: Marsworth...manor Farm End/Start of Stretch: End of Stretch NGR	D	D	D	C	C
Not shown	1011	SW	492170 215080	River Name: Thame Reach: Marsworth - Fleet Marston Brook End/Start of Stretch: Start of Stretch NGR	A	B	A	A	A

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAH). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Chemical Quality Grade				
					2005	2006	2007	2008	2009
Not shown	1011	SW	492170 215080	River Name: Thame Reach: Marsworth - Fleet Marston Brook End/Start of Stretch: Start of Stretch NGR	D	E	D	D	C

6.10 Ordnance Survey MasterMap Water Network

Ordnance Survey MasterMap Water Network entries within 500m of the study site

This watercourse information is provided by Ordnance Survey MasterMap Water Network. The data provides a detailed centre line following the curve of the waterway precisely, so all distances provided in the report should be understood as measurements to the centreline rather than a measurement to the nearest point of the watercourse. Underground watercourses are inferred from entry and exit points so caution is advised in using these to indicate precise locations of underground watercourses when planning site investigation and development.

The following Ordnance Survey MasterMap Water Network records are represented on the Hydrology Map (6e):

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	113 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	113 W	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
2	281 W	Grand Union Canal Alternative Name: -	Canal. A manmade watercourse for inland navigation.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 16.7
15	281 W	Grand Union Canal Alternative Name: -	Canal. A manmade watercourse for inland navigation.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 16.7
3	292 W	Grand Union Canal Alternative Name: -	Canal. A manmade watercourse for inland navigation.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 16.7
16	292 W	Grand Union Canal Alternative Name: -	Canal. A manmade watercourse for inland navigation.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 16.7
4	351 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
5	351 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
17	351 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
18	351 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
6	354 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
19	354 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
7	356 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
20	356 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
8	366 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
21	366 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
9	375 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.3
Not shown	375 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.3
10	379 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	379 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
11	385 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.1
Not shown	385	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	NE			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.1
12	390 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	390 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
13	391 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	391 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	429 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.2
27	429 NW	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 4.2
15	438 NW	Grand Union Canal Alternative Name: -	Canal. A manmade watercourse for inland navigation.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 15.9
28	438 NW	Grand Union Canal Alternative Name: -	Canal. A manmade watercourse for inland navigation.	Catchment Area: Thames Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 15.9
16	454 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	454 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
17	460 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	460 N	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
Average Width in Watercourse Section (m): Not Provided				
18	477 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	477 NE	- Alternative Name: -	Inland river not influenced by normal tidal action.	Catchment Area: Cam Ely Ouse and South Level Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

6.11 Surface Water Features

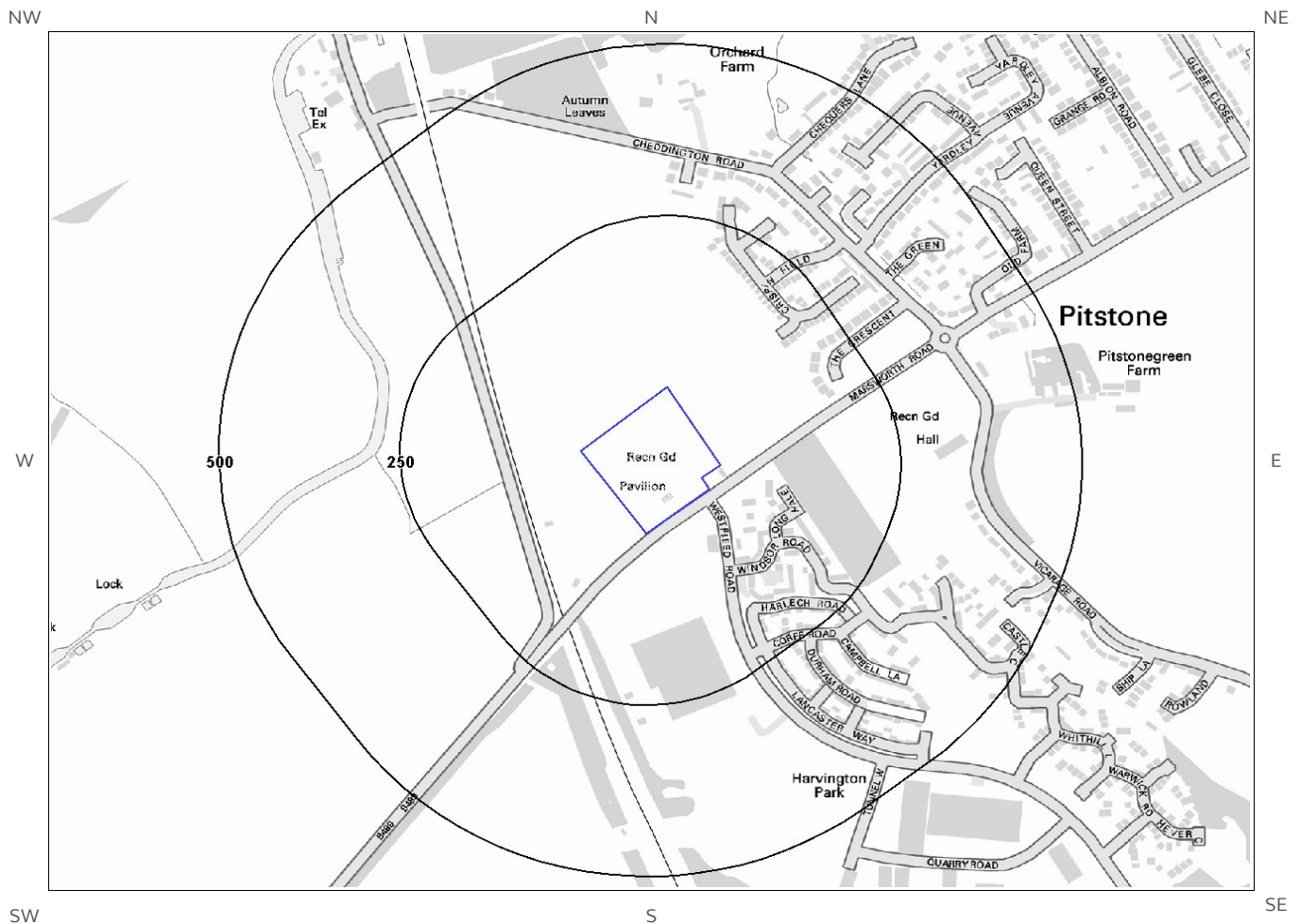
Surface water features within 250m of the study site

Identified

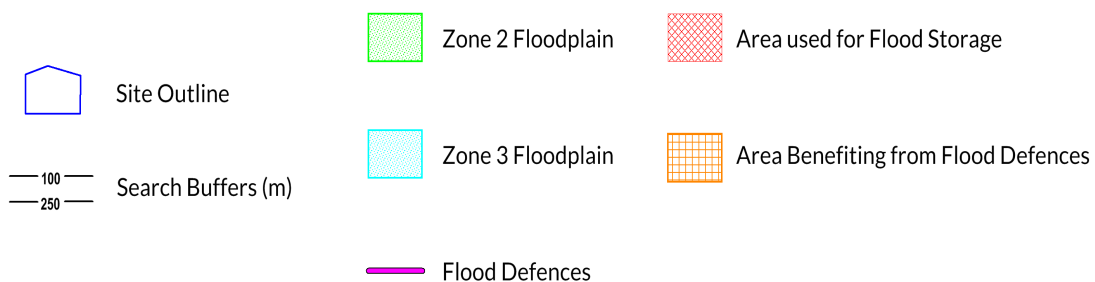
The following surface water records are not represented on mapping:

Distance (m)	Direction
113	W

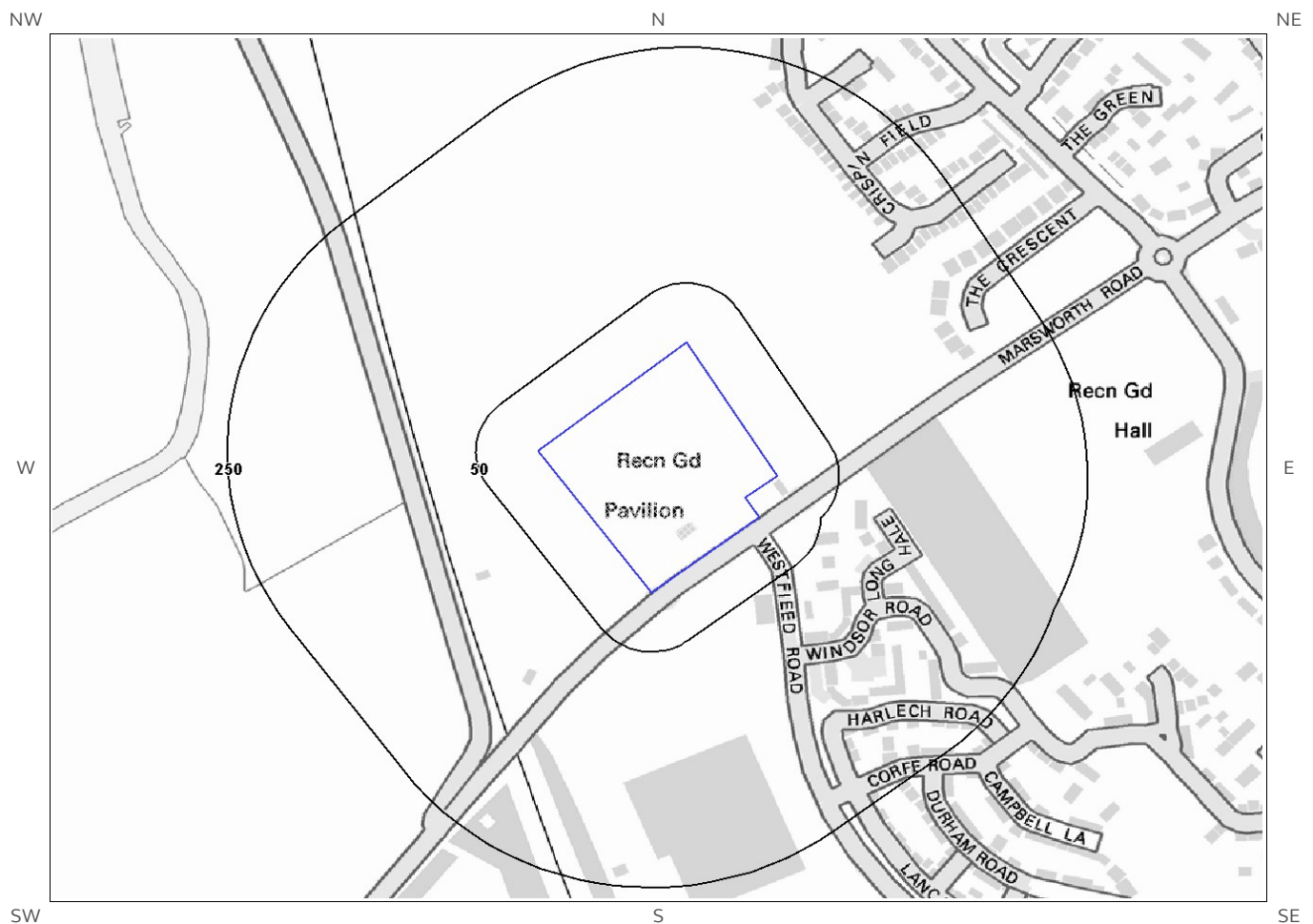
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



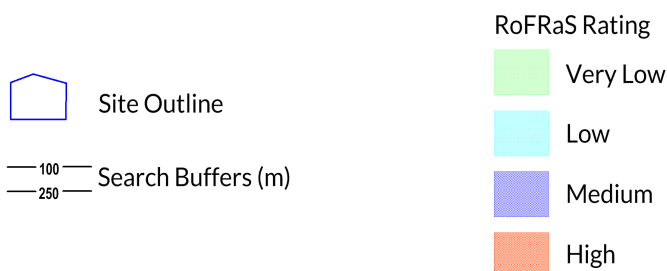
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7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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7 Flooding

7.1 River and Coastal Zone 2 Flooding

Environment Agency/Natural Resources Wales Zone 2 floodplain within 250m

None identified

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Environment Agency/Natural Resources Wales Zone 3 floodplain within 250m

None identified

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

Database searched and no data found.

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

Highest risk of flooding onsite

Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Flood Defences within 250m of the study site

None identified

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Areas benefiting from Flood Defences within 250m of the study site

None identified

7.6 Areas benefiting from Flood Storage

Areas used for Flood Storage within 250m of the study site

None identified

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site

Identified

Clearwater Flooding or Superficial Deposits Flooding

Clearwater Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 Highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

7.8 Groundwater Flooding Confidence Areas

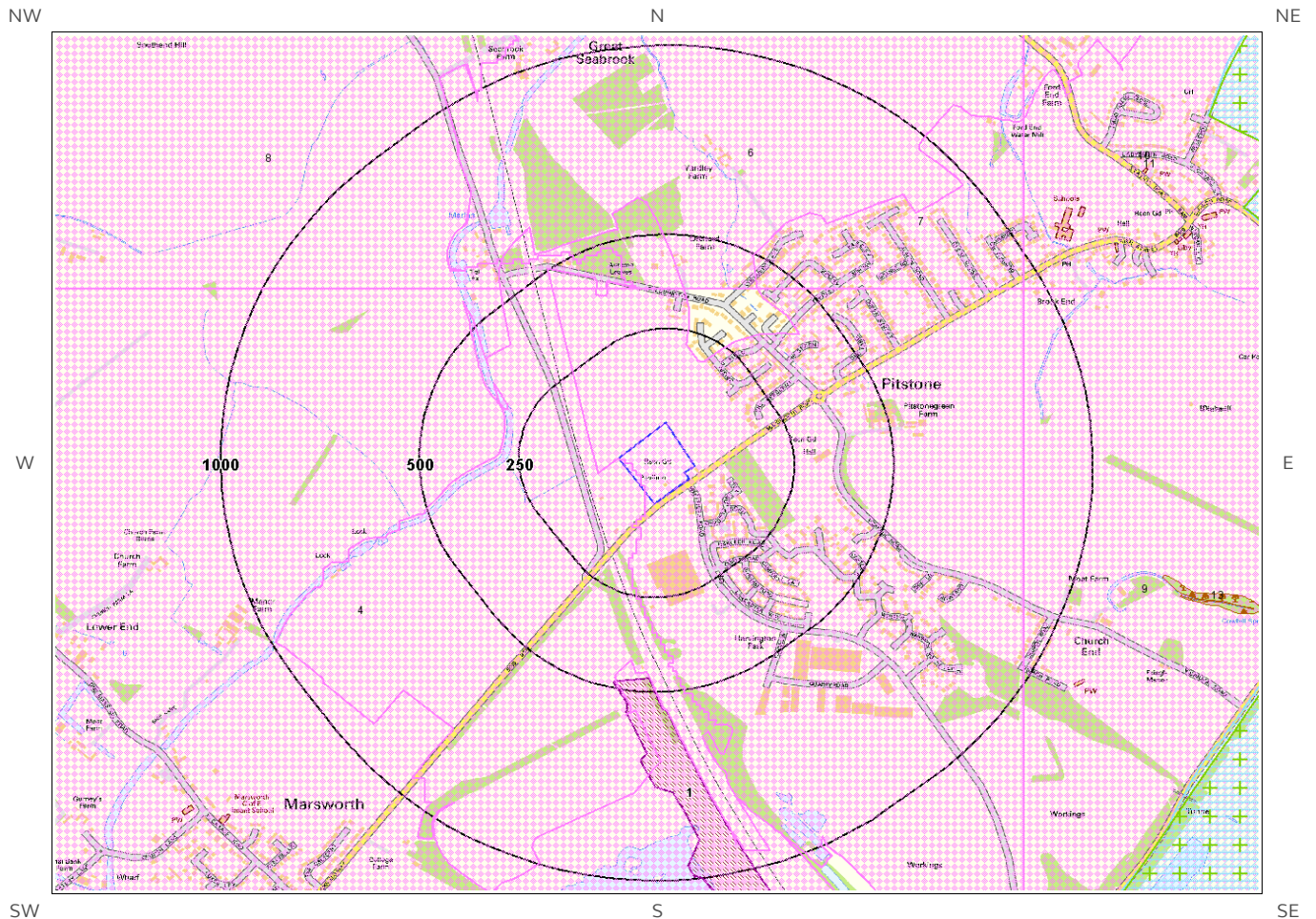
British Geological Survey confidence rating in this result

High

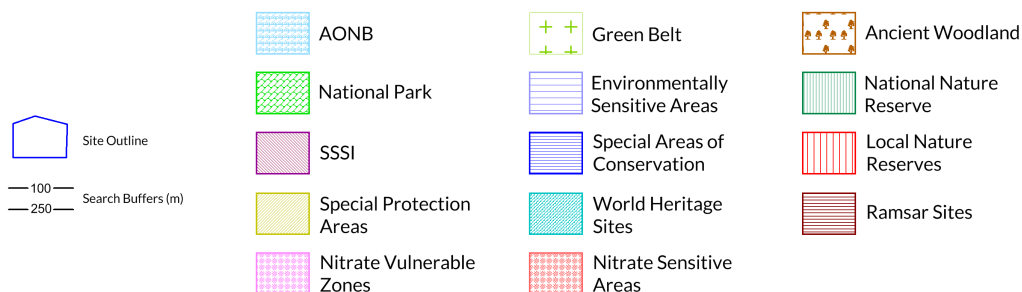
Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site

Identified

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

3

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
1	464	S	Pitstone Quarry	Natural England
Not shown	1645	SW	Tring Reservoirs	Natural England
Not shown	1967	SE	Pitstone Hill	Natural England

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

2

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
13	1211	E	Unknown	Ancient & Semi-Natural Woodland
Not shown	1803	E	Unknown	Ancient & Semi-Natural Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

1

The following Area of Outstanding Natural Beauty (AONB) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	AONB/NSA Name	Data Source
12	1489	E	Chilterns	Natural England

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

8

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
4	0	On Site	Existing	DEFRA
5	0	On Site	Existing	DEFRA
6	355	N	Existing	DEFRA
7	355	N	Existing	DEFRA
8	370	N	Existing	DEFRA
9	826	E	Existing	DEFRA
10	950	NE	Existing	DEFRA
11	950	NE	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

2

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ID	Distance	Direction	Green Belt Name	Local Authority Name
15	1495	E	London Area Greenbelt	Aylesbury Vale District
Not shown	1561	S	London Area Green Belt	Dacorum

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a **Groundsure Geo Insight**, available from our **website**. The following information has been found:

9.1.1 Shrink Swell

Maximum Shrink-Swell** hazard rating identified on the study site Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

9.1.2 Landslides

Maximum Landslide* hazard rating identified on the study site Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for slope instability identified. No special actions required to avoid problems due to landslides. No special ground investigation required and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

Maximum Soluble Rocks* hazard rating identified on the study site Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

Maximum Compressible Ground* hazard rating identified on the study site

Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

9.1.5 Collapsible Rocks

Maximum Collapsible Rocks* hazard rating identified on the study site

Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

Maximum Running Sand** hazard rating identified on the study site

Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site.

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Coal mining areas within 75m of the study site

None identified

Database searched and no data found.

10.2 Non-Coal Mining

Non-Coal Mining areas within 50m of the study site boundary

Identified

The following non-coal mining information is provided by the BGS:

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Chalk	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered

Past underground mine workings are uncommon, localised and of limited area. The rock types present in this area are such that minor mineral veins may be present within them on which it is possible that there have been attempts to work these by underground methods and/or it is possible that small scale underground extraction of other materials may have occurred. All such occurrences are likely to be restricted in size and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Brine affected areas within 75m of the study site

None identified

Guidance: No Guidance Required.

Contact Details

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Telephone: 01442 825 570
general@wdeconsulting.co.uk



British Geological Survey Enquiries

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Keyworth, Nottingham NG12 5GG
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Fax: 0115 936 3276.
Email:

Web: www.bgs.ac.uk

BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

Environment Agency

National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506

Web: www.environment-agency.gov.uk

Email: enquiries@environment-agency.gov.uk



Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe

Email: enquiries@phe.gov.uk
Main switchboard: 020 7654 8000



**Public Health
England**

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk



**The Coal
Authority**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505



Local Authority

Authority: Aylesbury Vale District Council
Phone: 01296 585 858

Web: <http://www.aylesburyvaledc.gov.uk/>

Address: The Gateway, Gatehouse Road, Aylesbury, Buckinghamshire,

Gemapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444



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Grid Ref: 493170, 215521

Map Name: County Series

Map date: 1882-1884

Scale: 1:10,560

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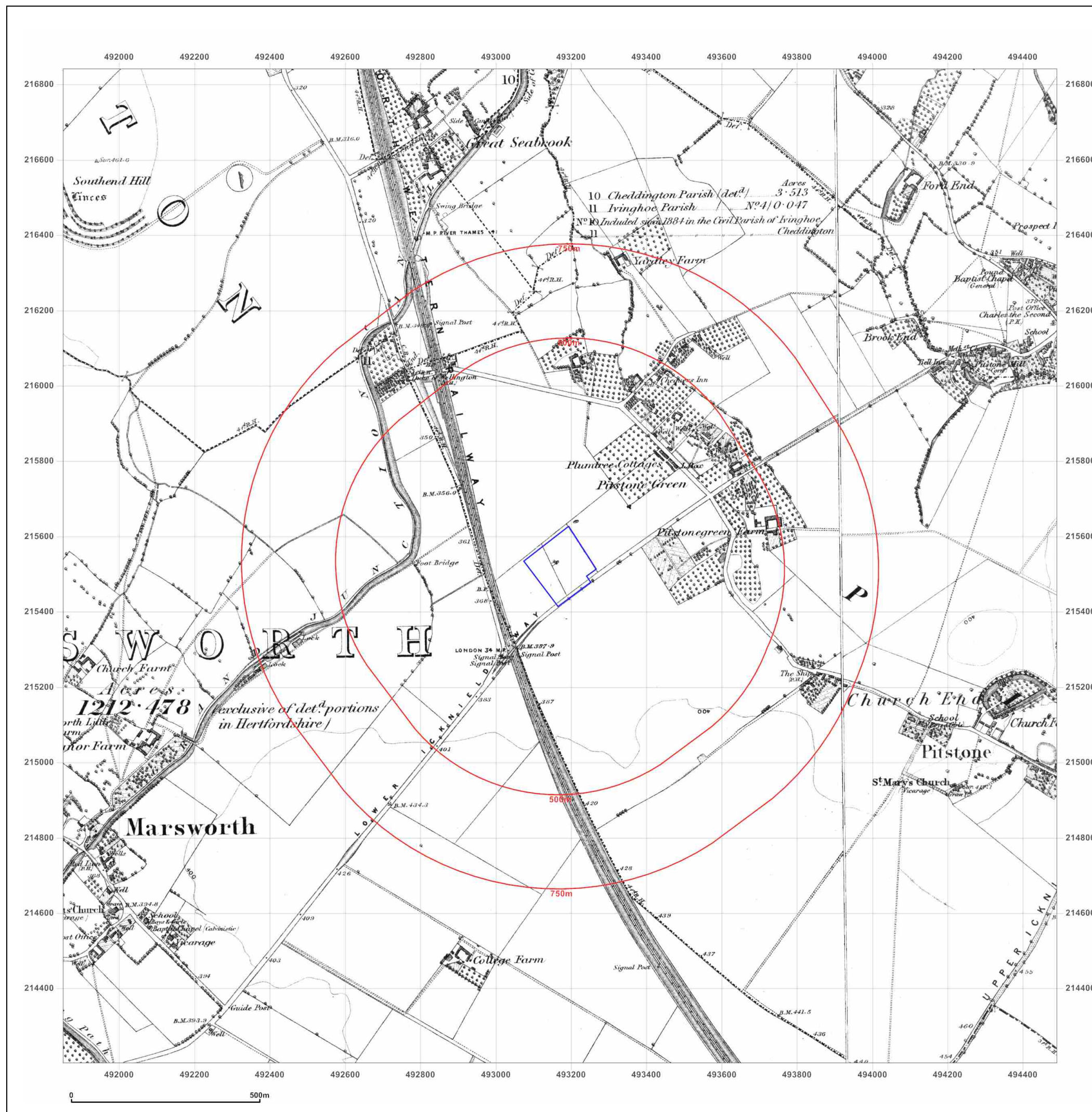


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Grid Ref: 493170, 215521

Map Name: County Series

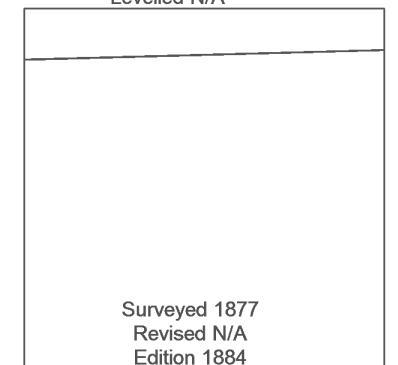
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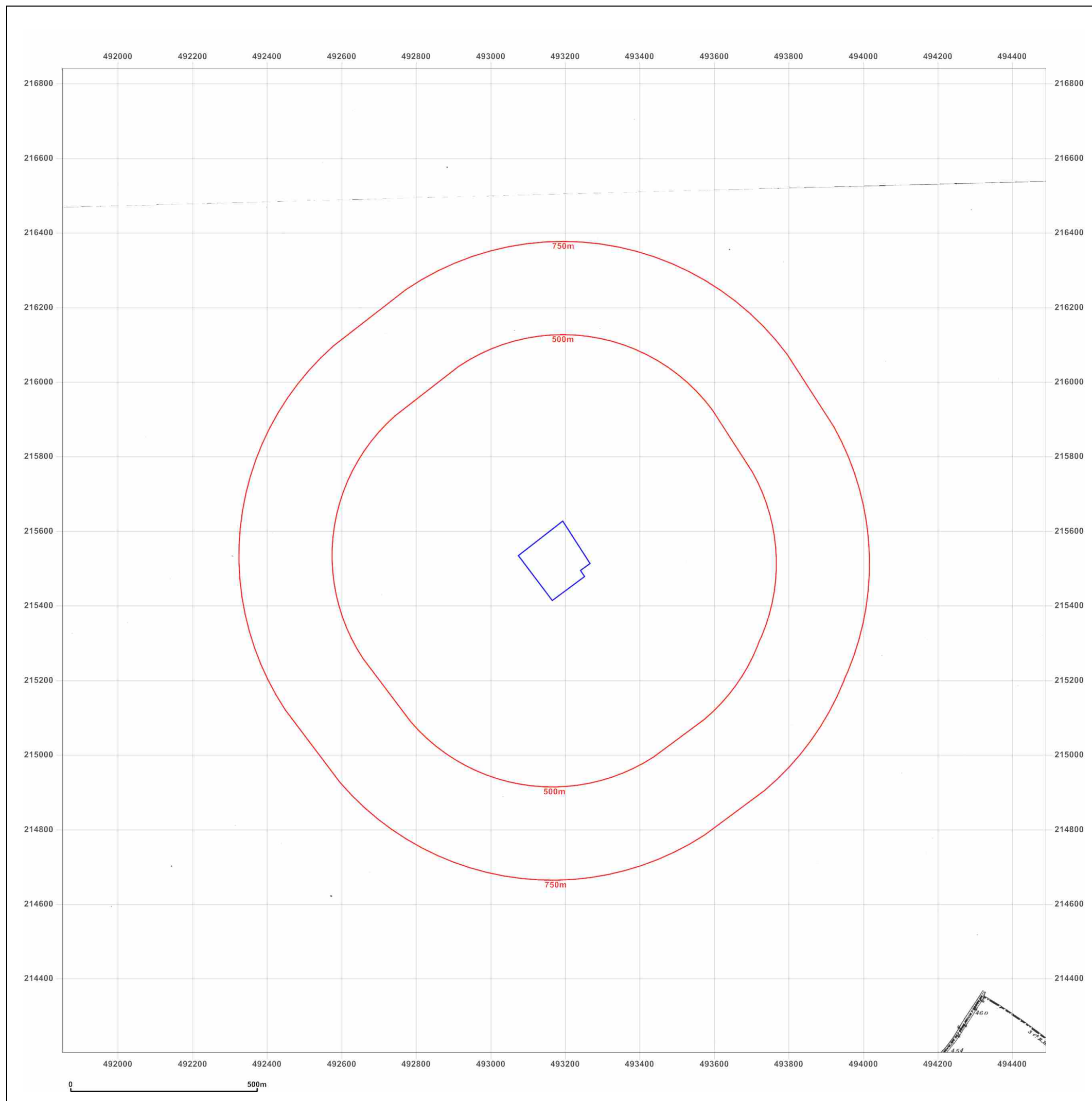
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Grid Ref: 493170, 215521

Map Name: County Series

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Scale: 1:10,560

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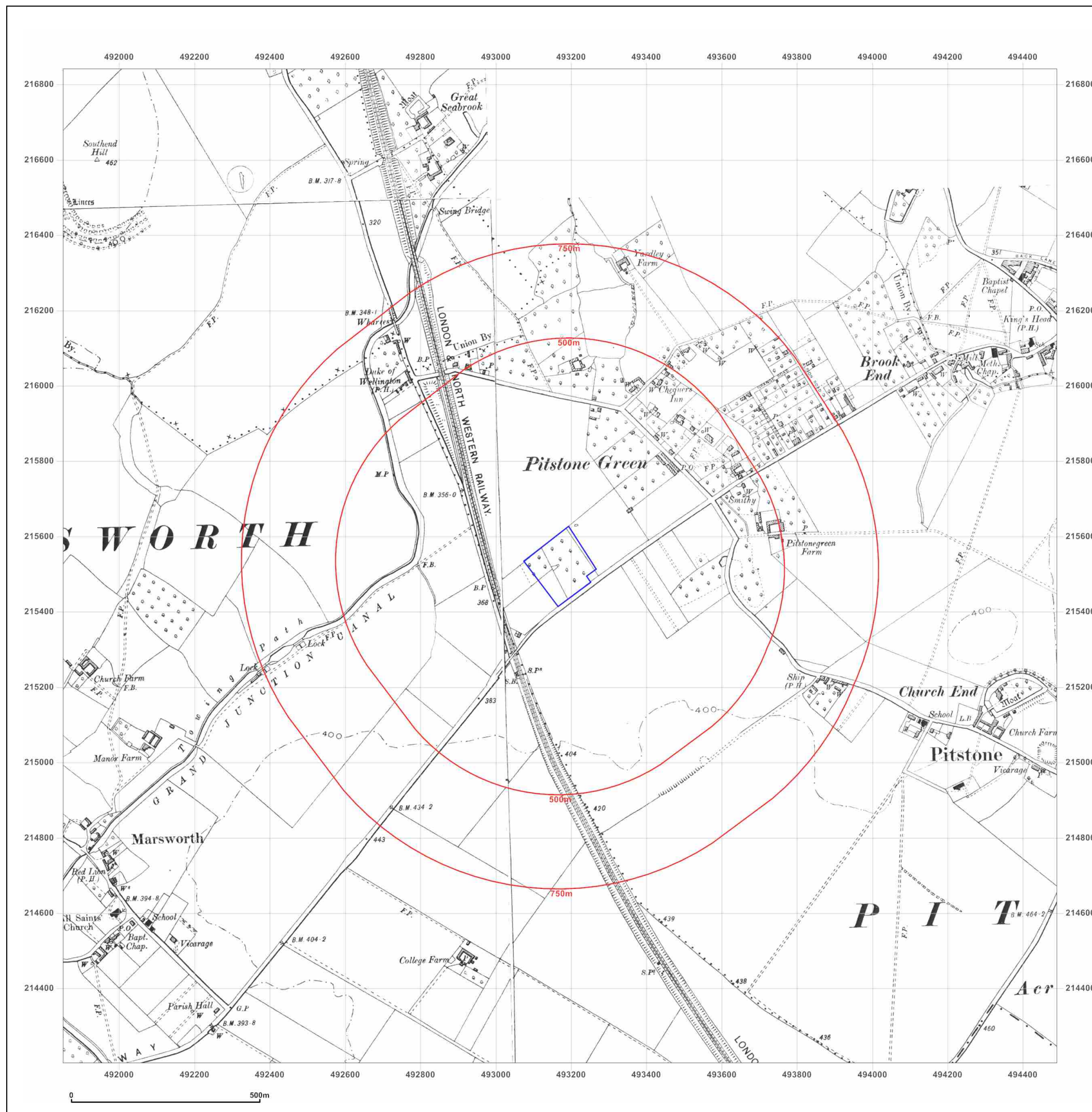


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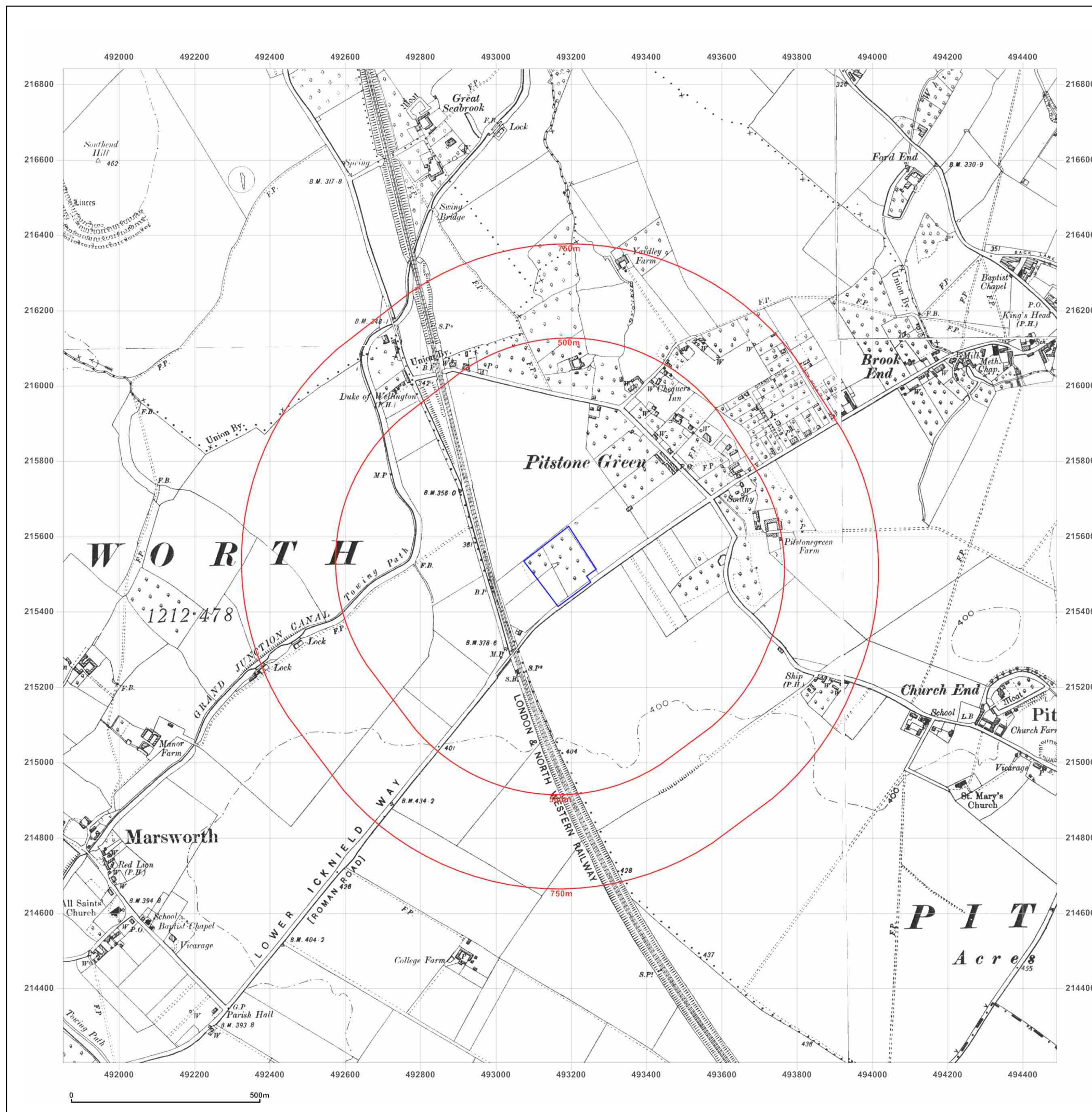


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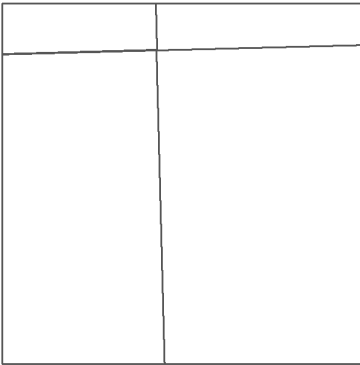
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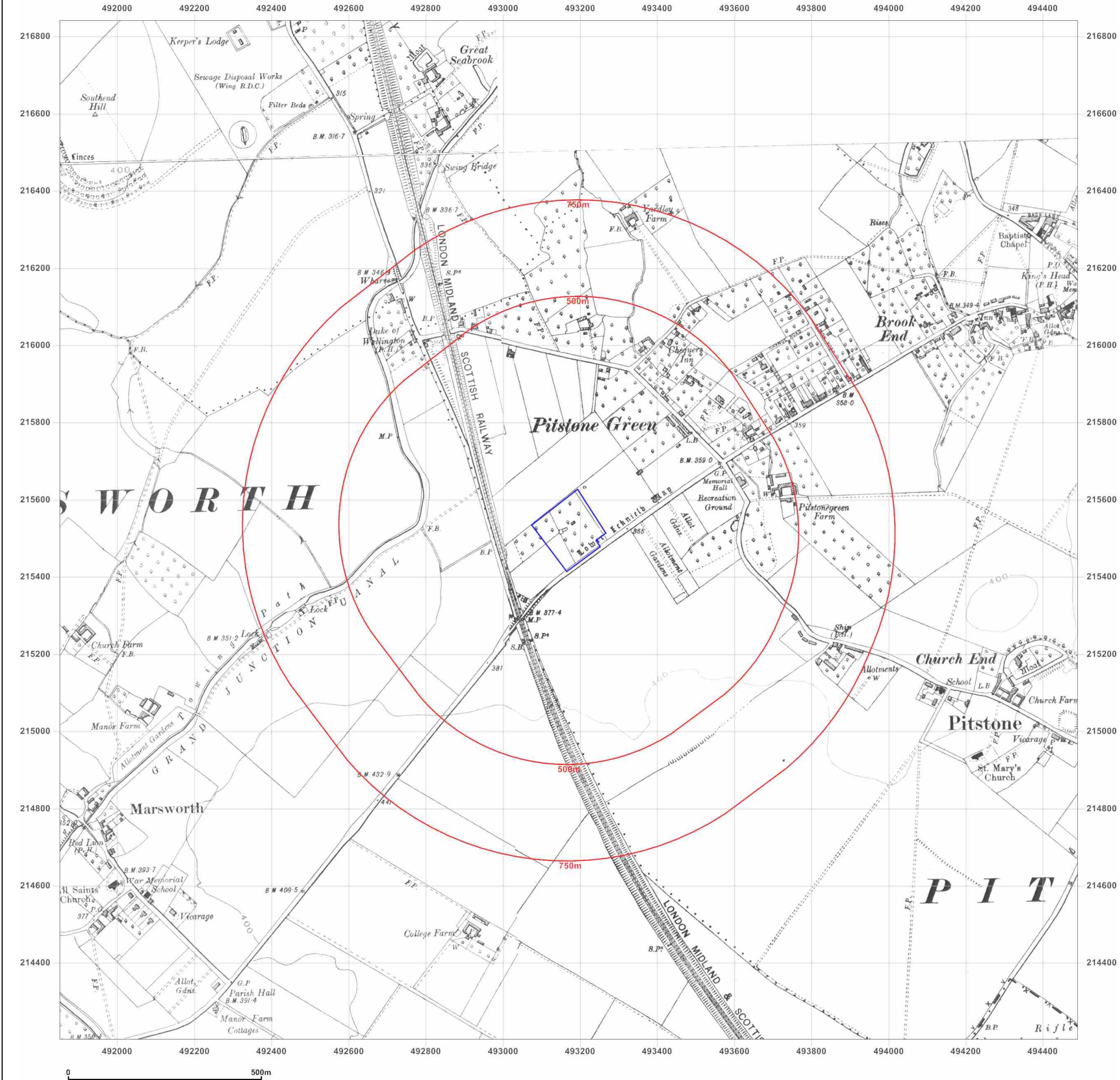


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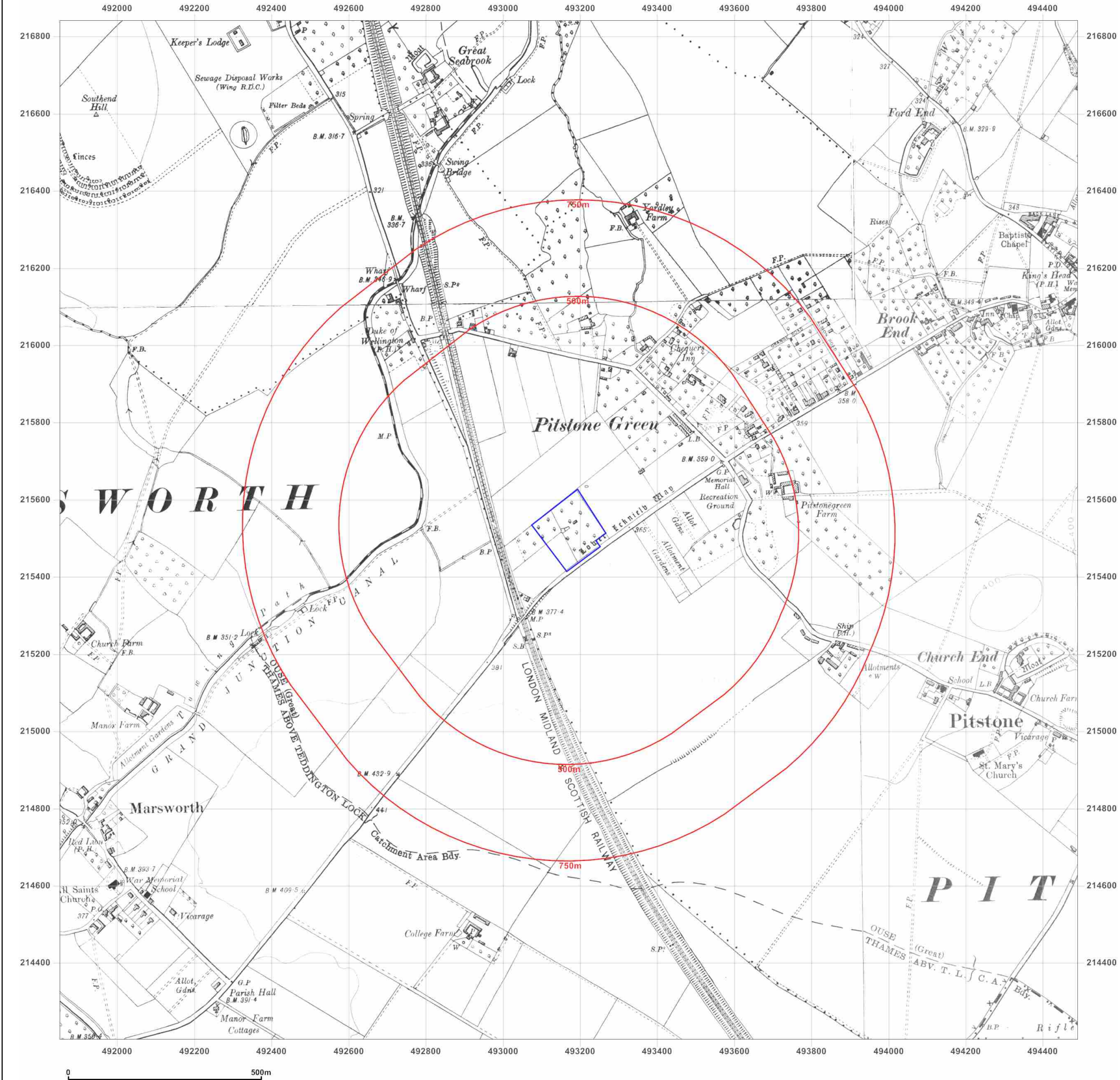


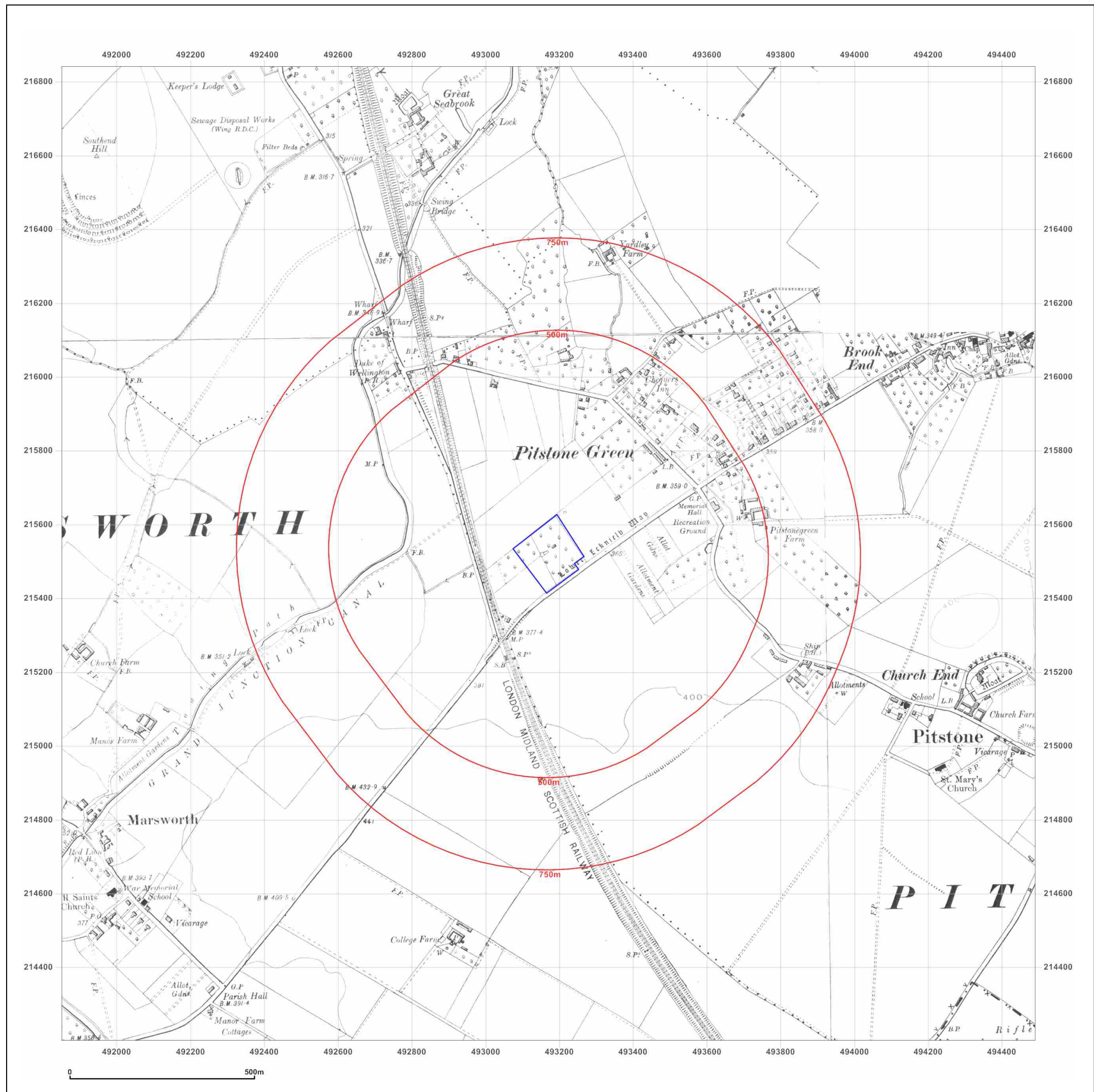
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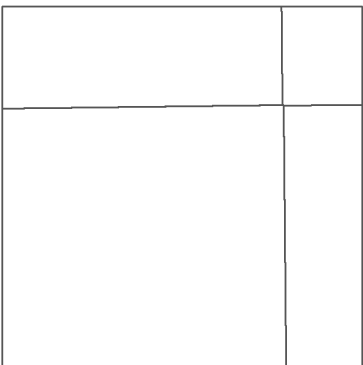
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Map date: 1946-1950

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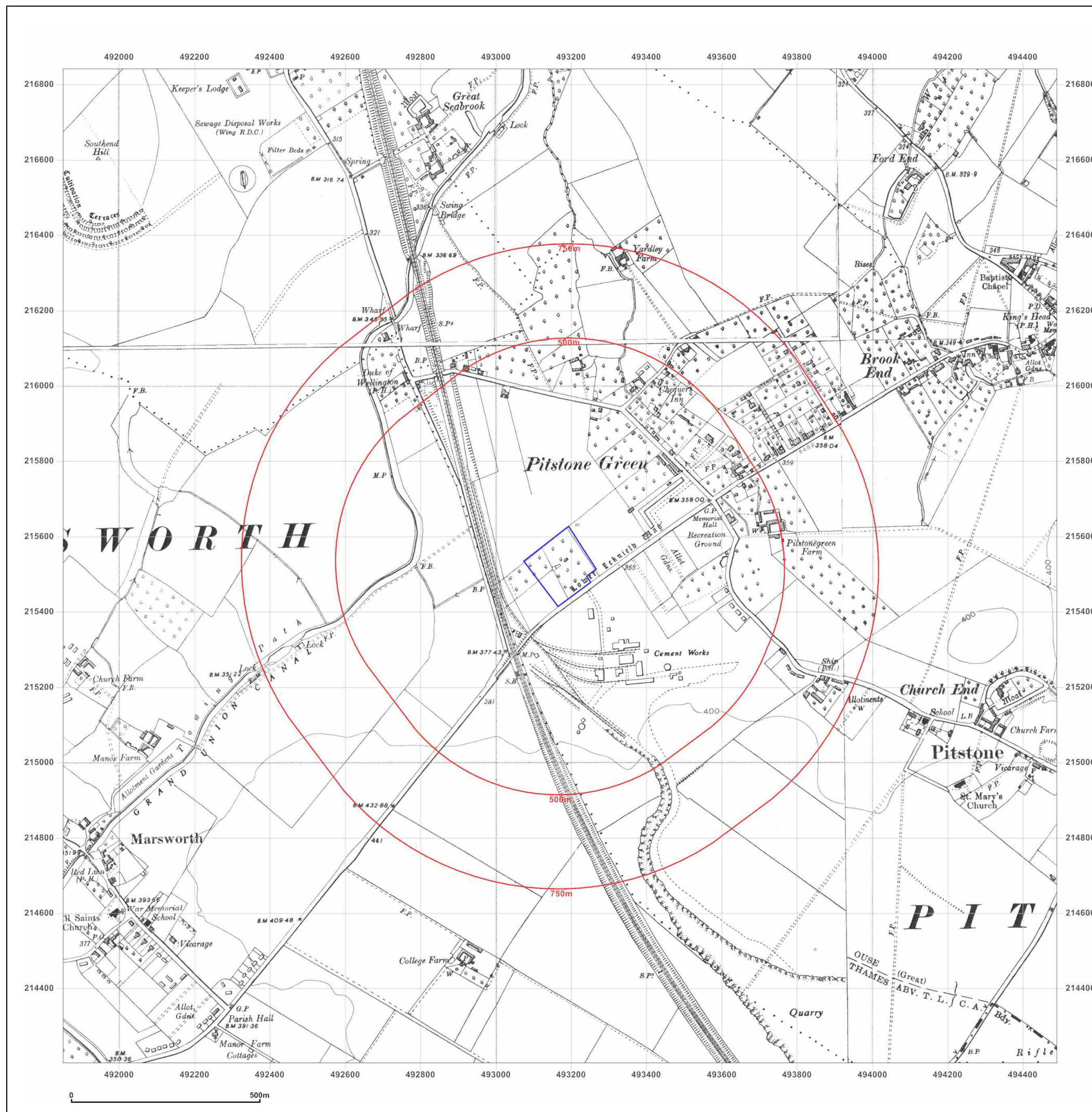


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Map Name: County Series

Map date: 1950-1952

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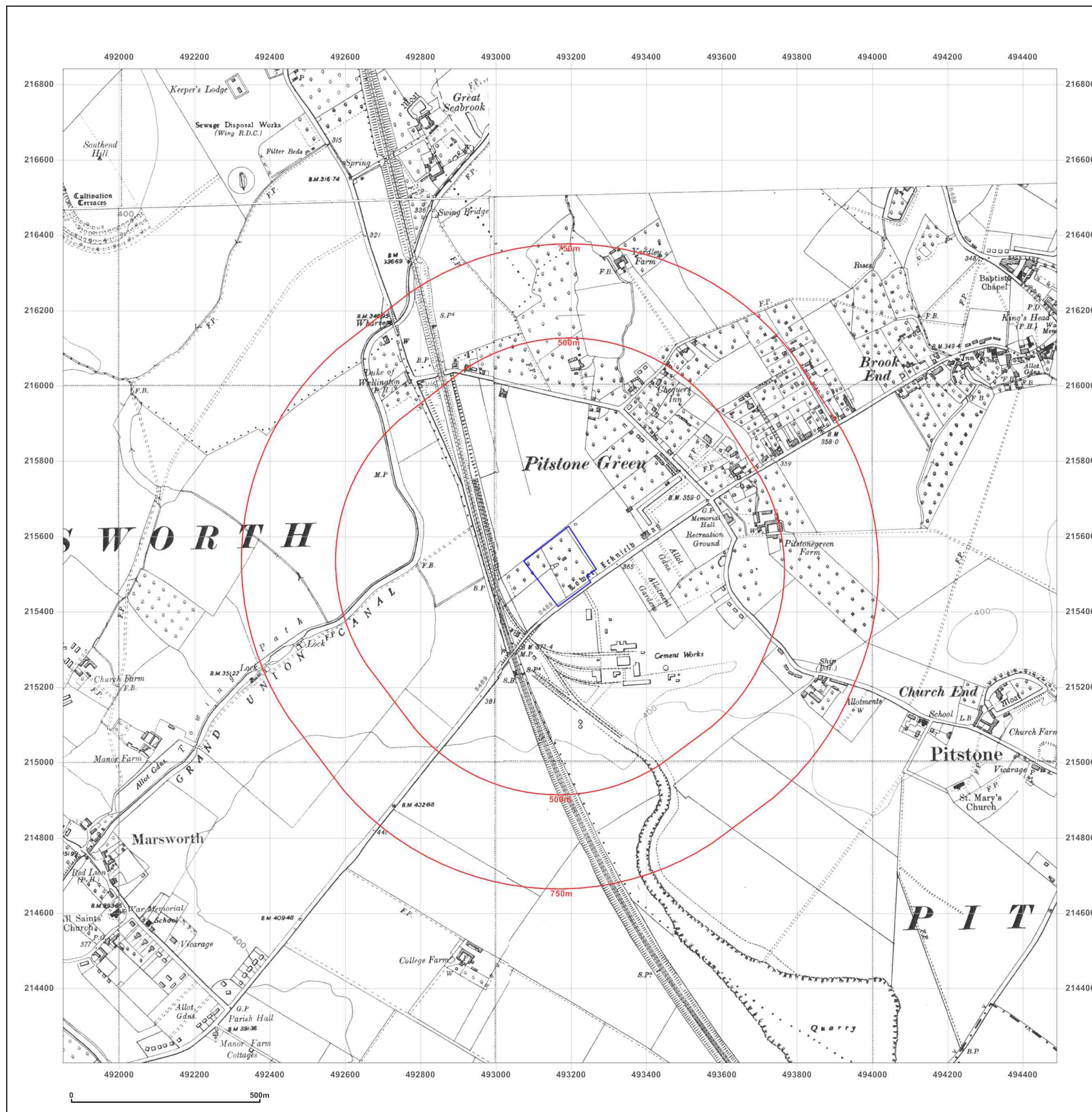


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Map Name: Provisional

Map date: 1959-1960

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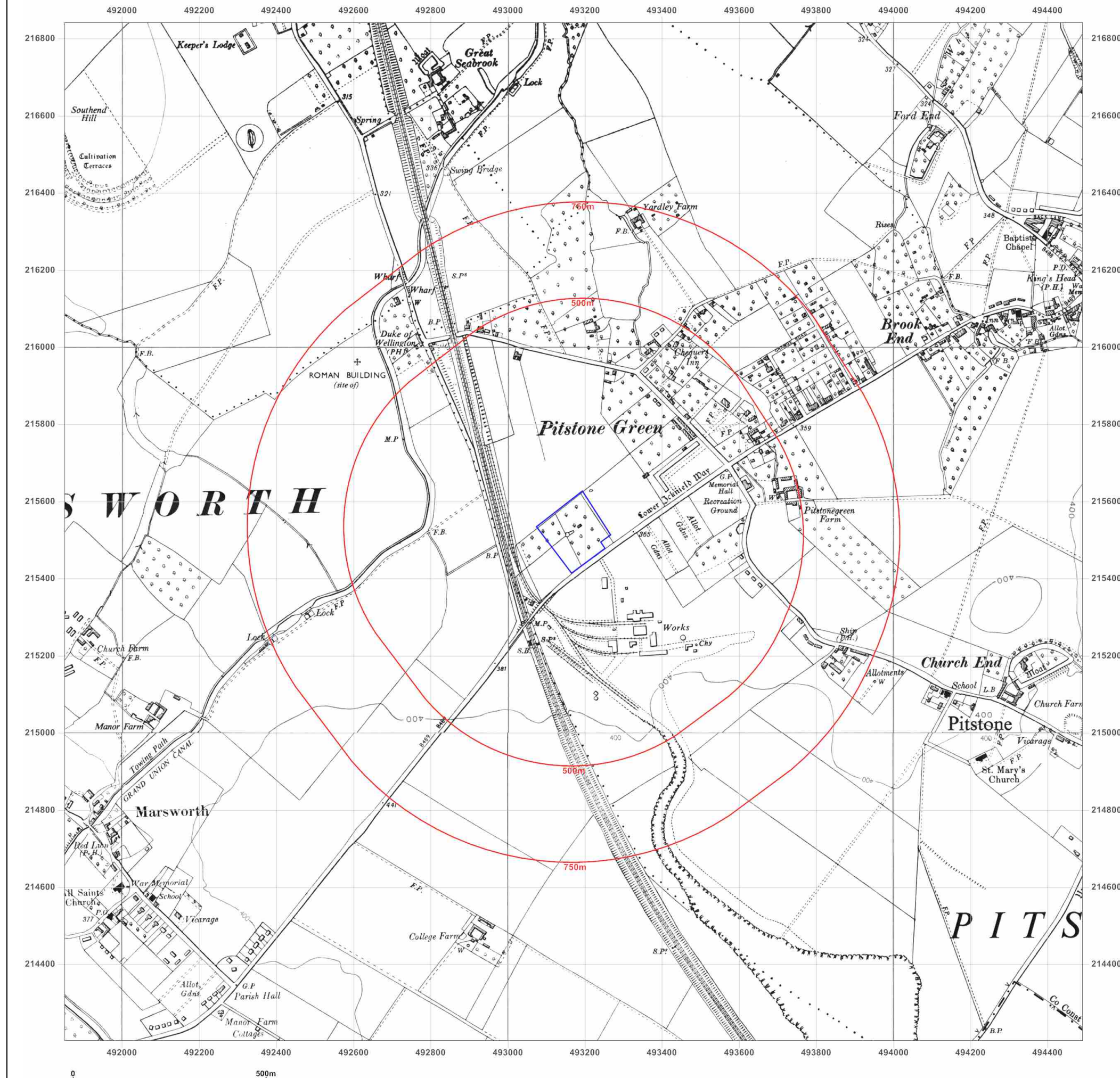


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Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 1980-1981

Scale: 1:10,000

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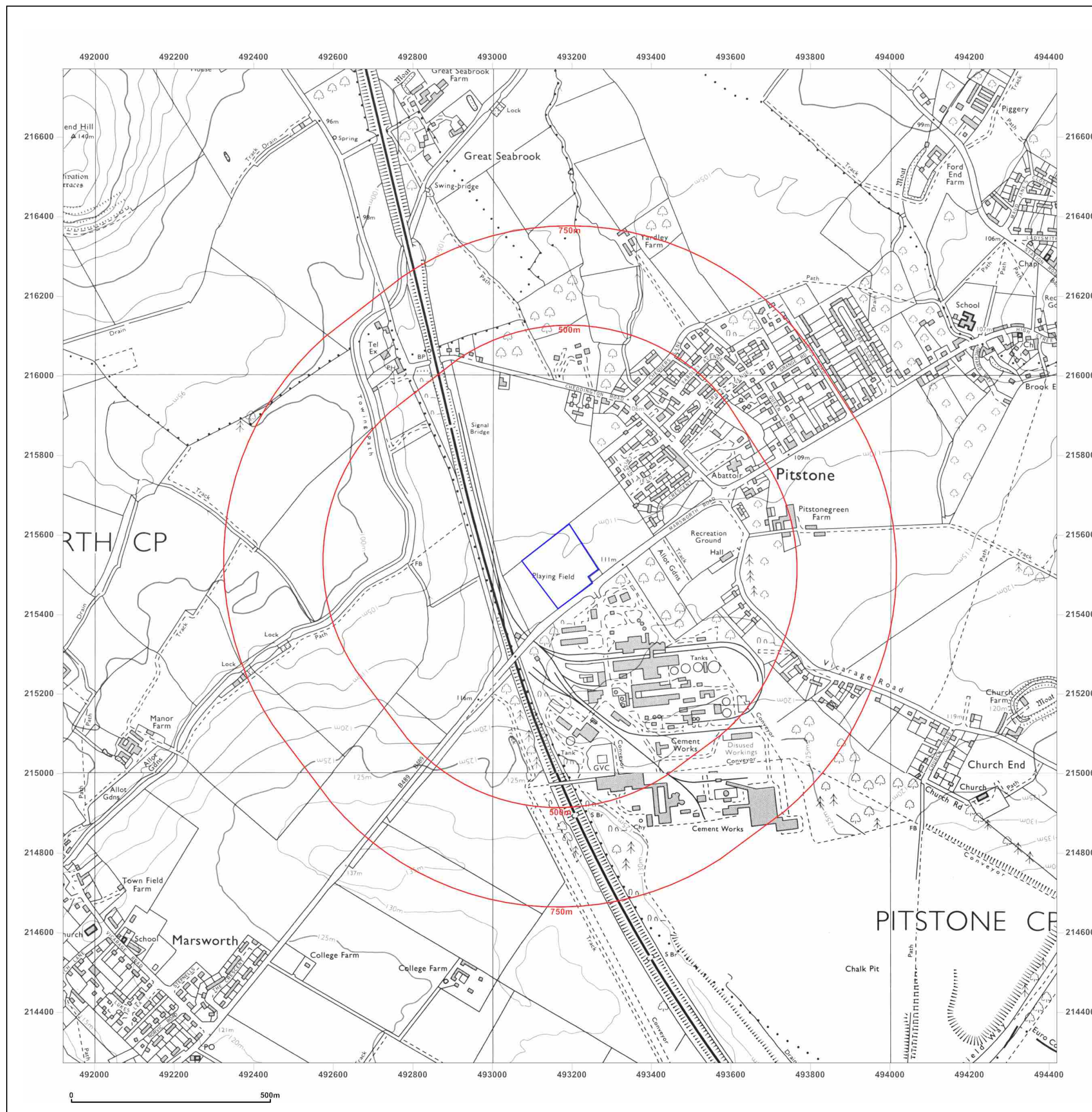
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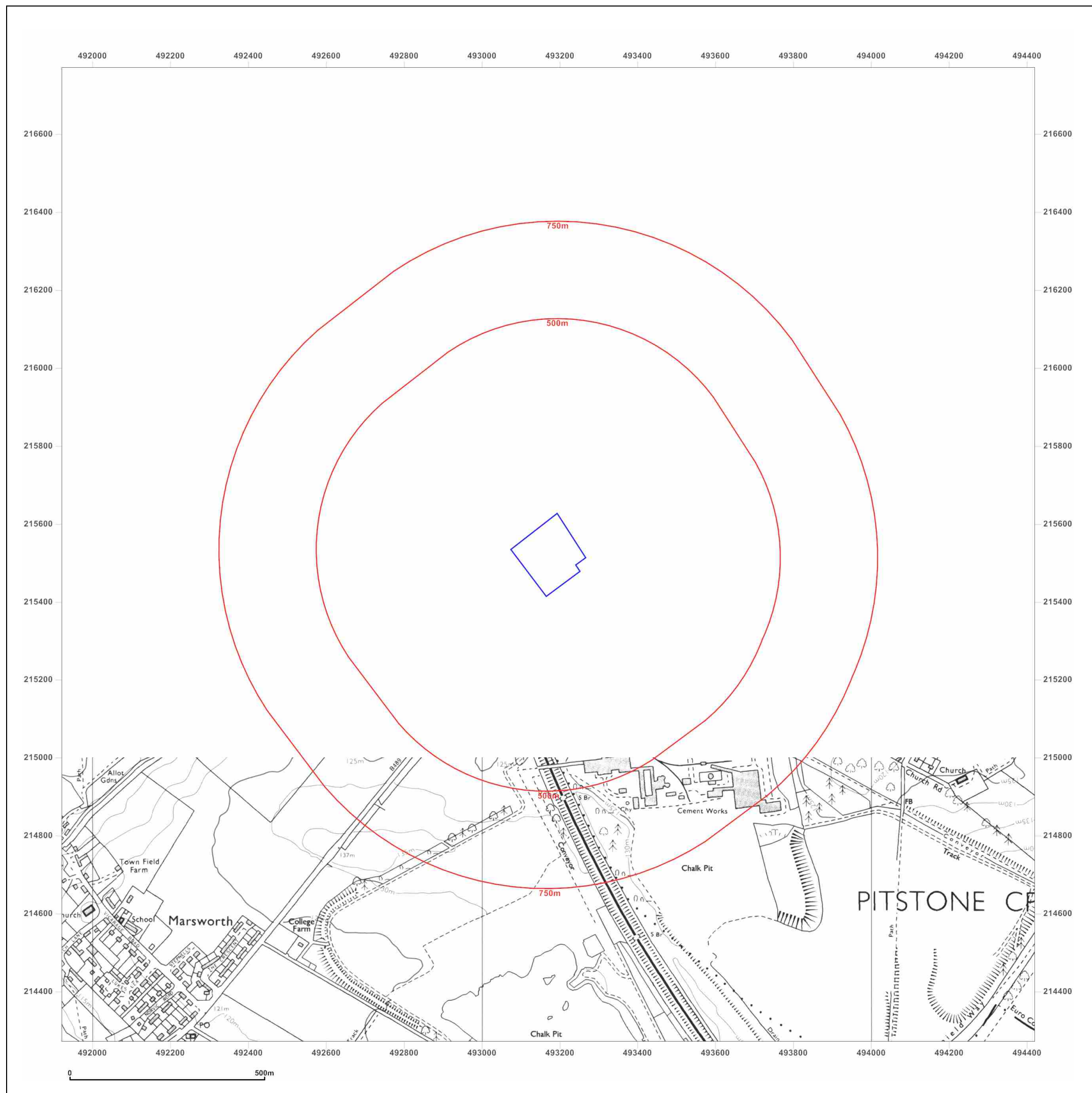
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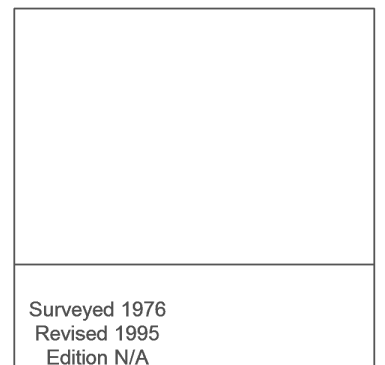
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Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 1995

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Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 2001

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2001



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Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 2010

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2010



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Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 2019

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2019

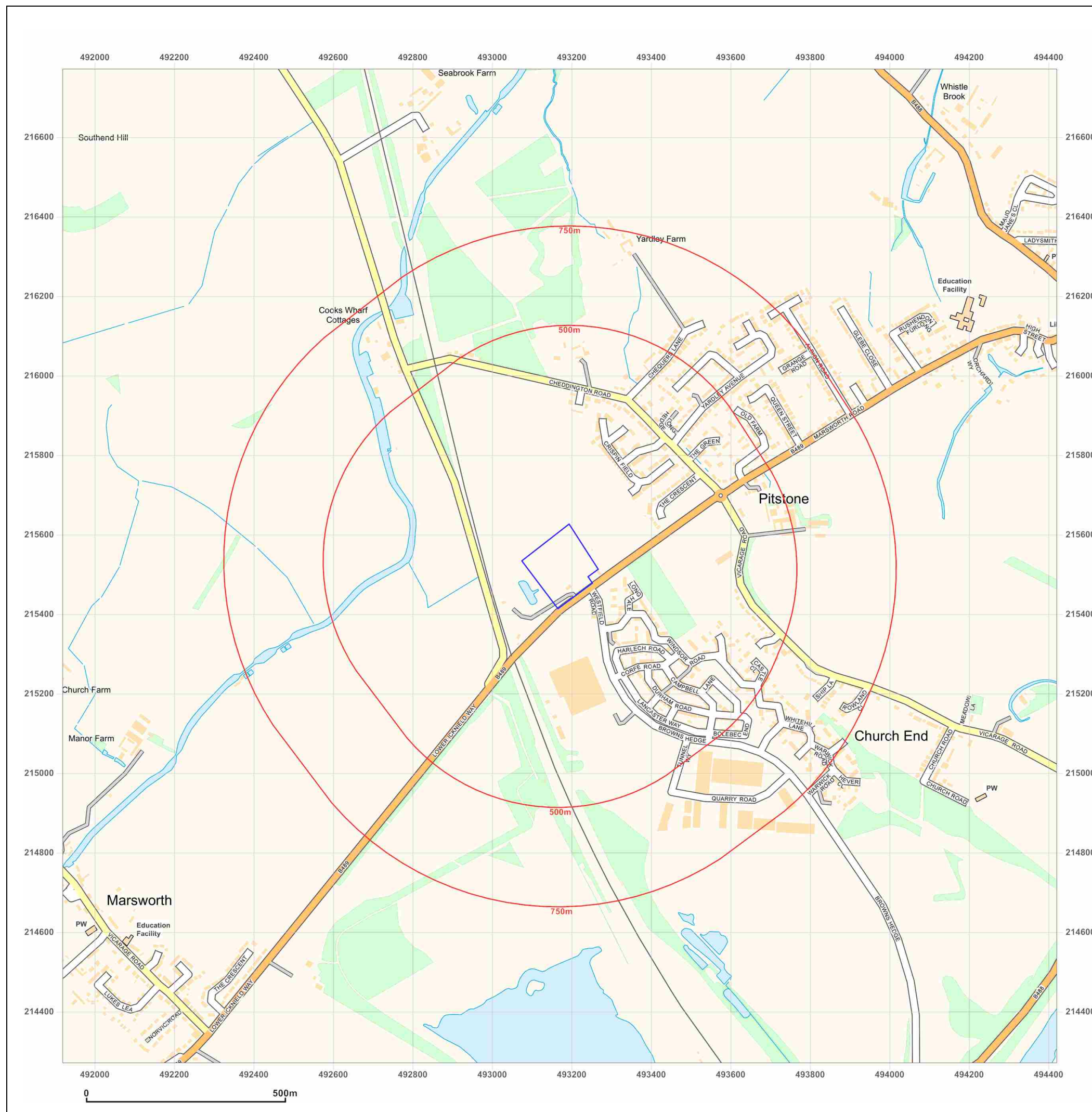


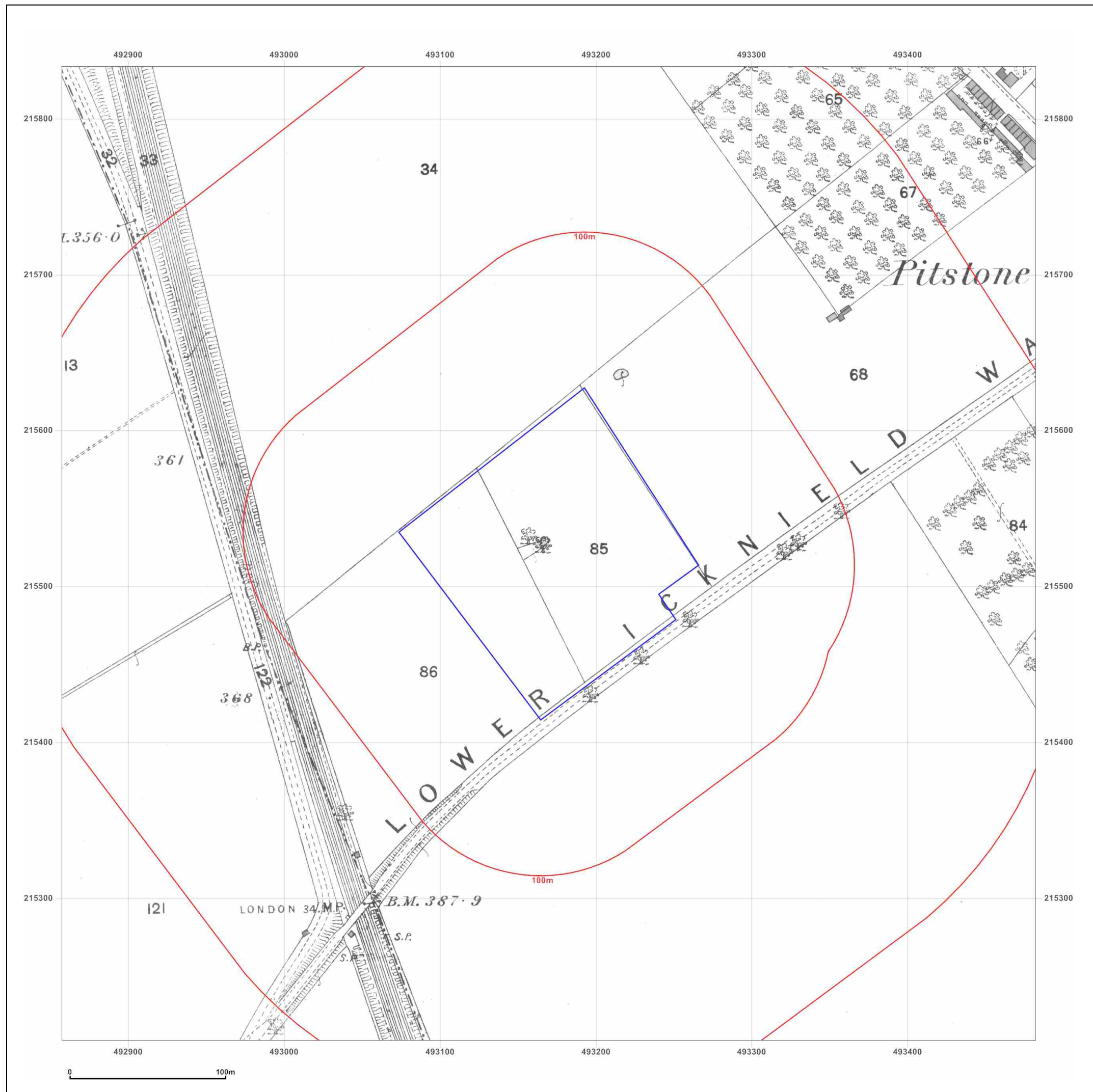
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Map Name: County Series

Map date: 1879

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PITSTONE, LU7 9AP

Client Ref: 19-555
Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: County Series

Map date: 1899

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1899
Revised 1899
Edition N/A
Copyright N/A
Levelled N/A

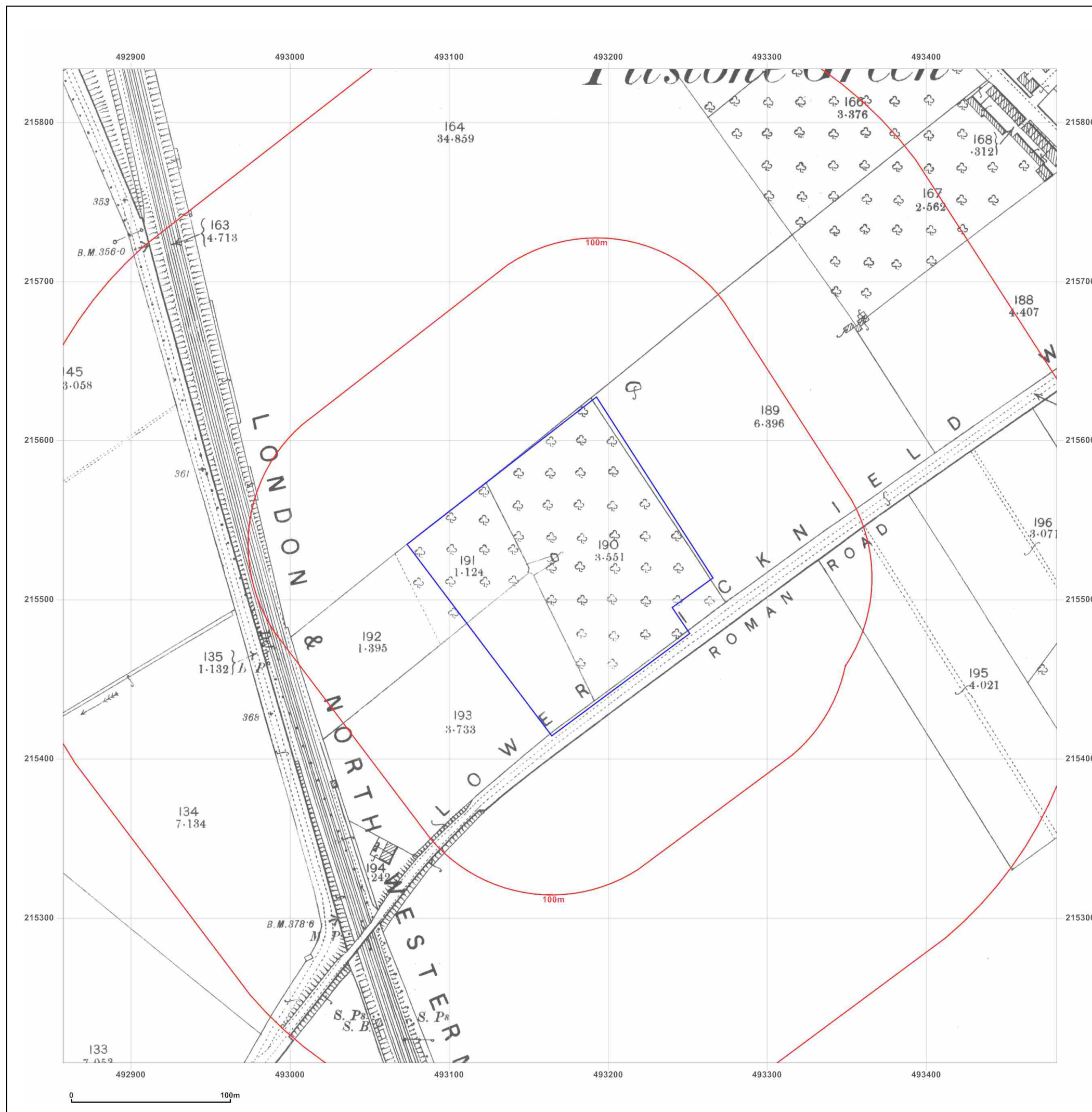


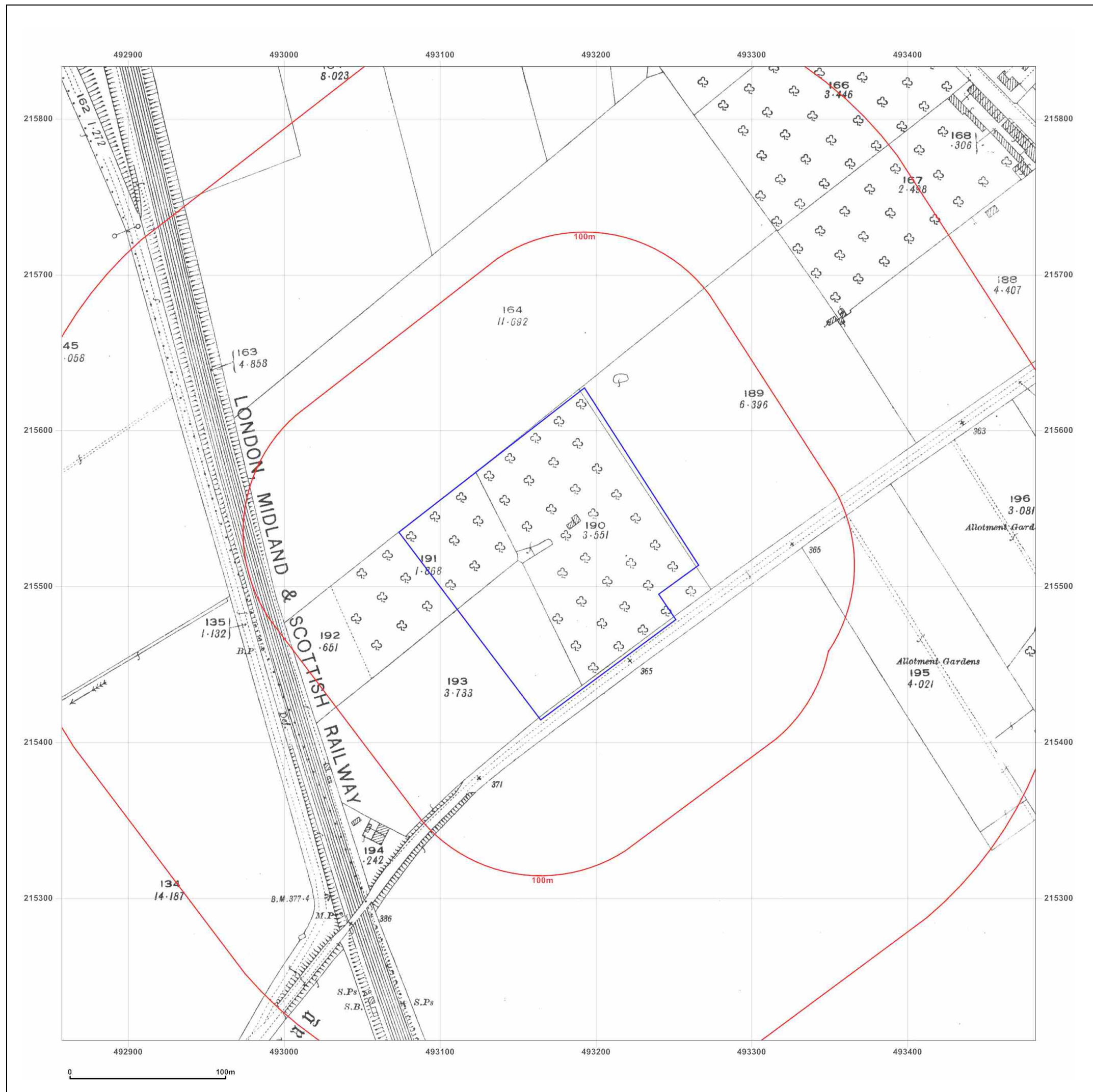
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Site Details:

SPORTS PAVILLION,
MARSWORTH ROAD,
PITSTONE, LU7 9AP

Client Ref: 19-555
Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: County Series

Map date: 1925

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1925
Revised 1925
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Site Details:

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MARSWORTH ROAD,
PITSTONE, LU7 9AP

Client Ref: 19-555
Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 1976-1980

Scale: 1:2,500

Printed at: 1:2,500



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

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1976
Levelled N/A



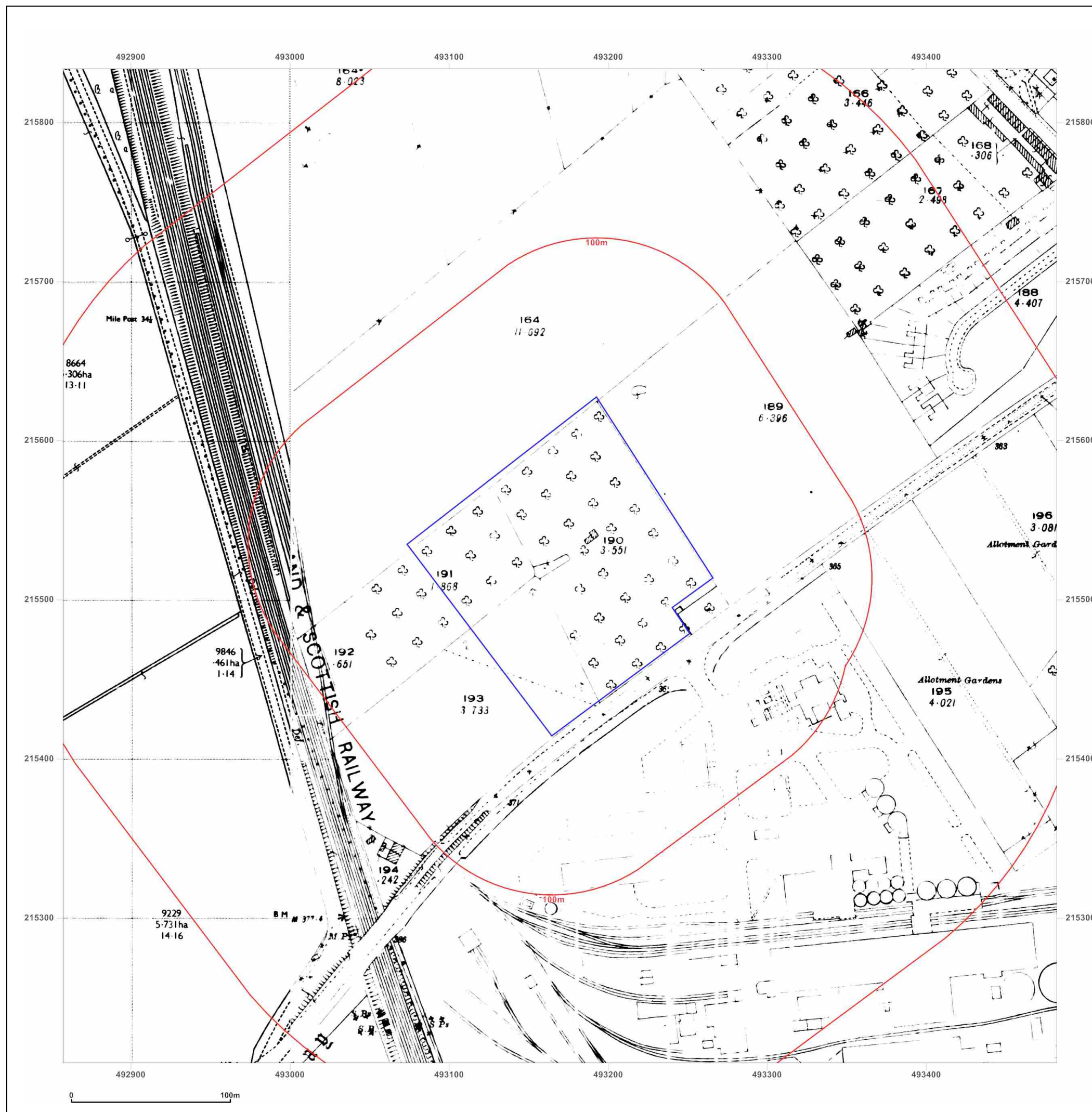
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Site Details:

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PITSTONE, LU7 9AP

Client Ref: 19-555
Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 1980

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised 1979
Edition N/A
Copyright 1980
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Site Details:

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PITSTONE, LU7 9AP

Client Ref: 19-555
Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 1985

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1963
Revised 1985
Edition N/A
Copyright 1985
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Site Details:

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PITSTONE, LU7 9AP

Client Ref: 19-555
Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 1993

Scale: 1:2,500

Printed at: 1:2,500



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

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



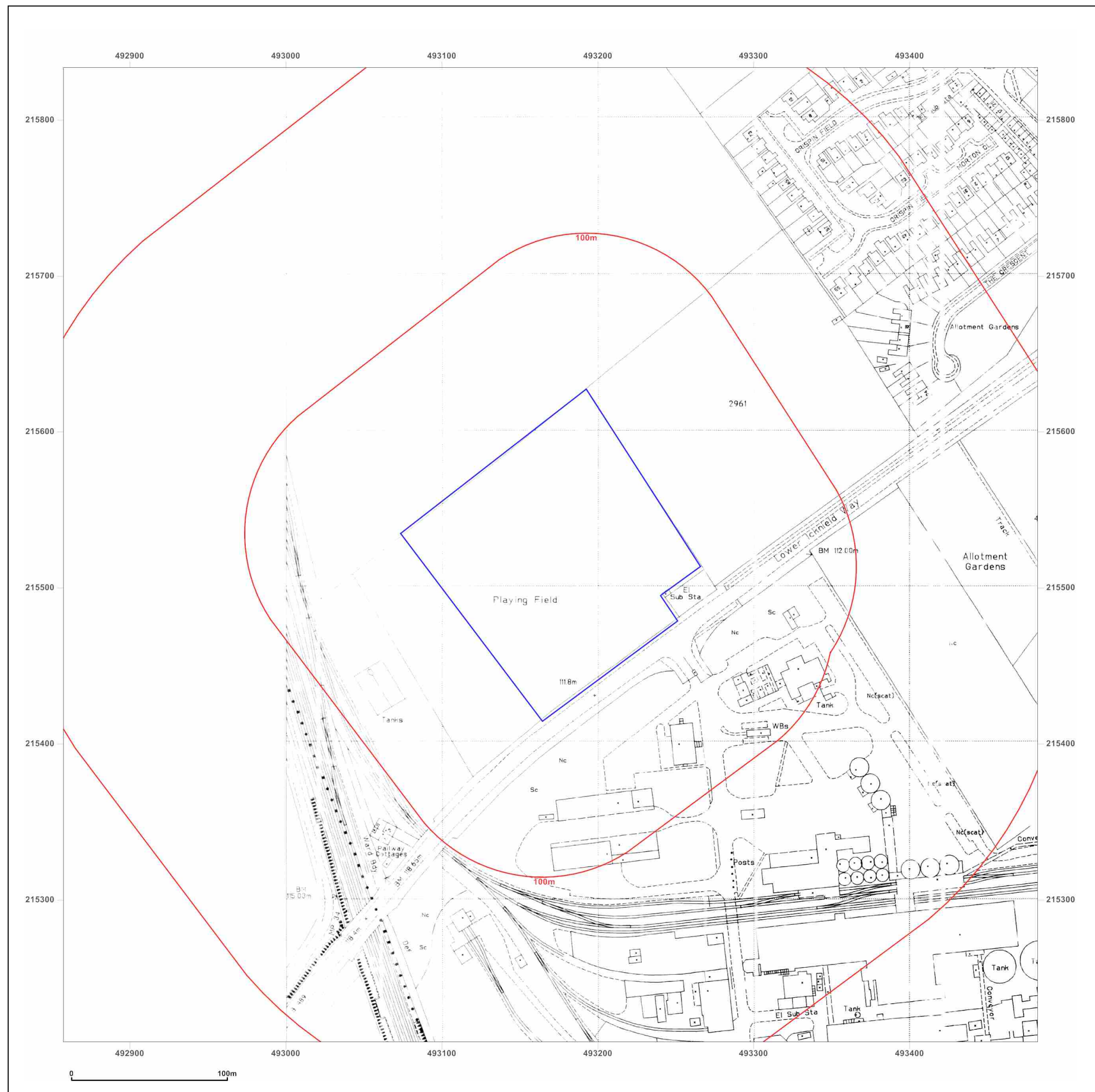
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Site Details:

SPORTS PAVILLION,
MARSWORTH ROAD,
PITSTONE, LU7 9AP

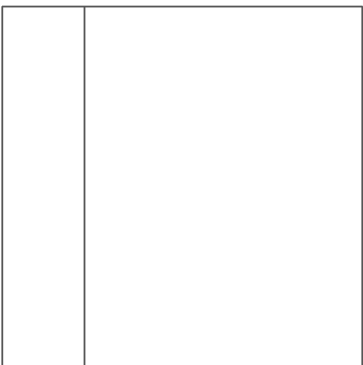
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Grid Ref: 493170, 215521

Map Name: National Grid

Map date: 1995

Scale: 1:2,500

Printed at: 1:2,500



Surveyed N/A
Revised N/A
Edition N/A
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Site Details:

SPORTS PAVILLION,
MARSWORTH ROAD,
PITSTONE, LU7 9AP

Client Ref: 19-555
Report Ref: WDE-6482116
Grid Ref: 493170, 215521

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



2003

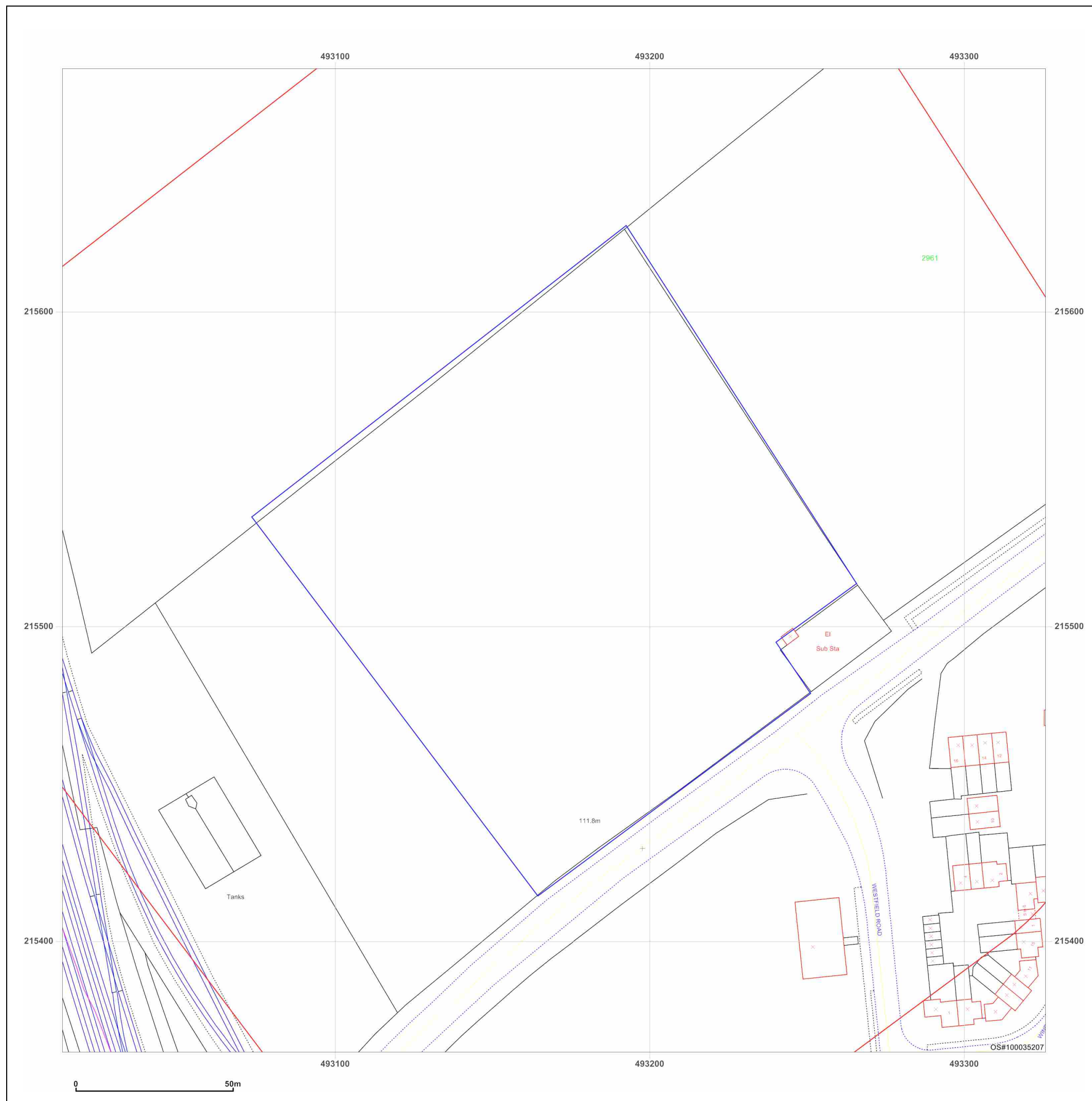


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Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf





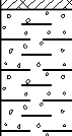

APPENDIX E







Trial Pit Log










Borehole Logs





Dynamic Probe Logs

Foundation Pit Figure

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Pitstone Sports Pavilion, Pitstone		Trial Pit Number SA1	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client Pitstone Parish Council		Job Number 20963	
		Location		Dates 29/11/2019		Engineer Tom Clarke		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
					<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 1px solid black; position: relative;"> <div style="position: absolute; top: 0; left: -5px; width: 10px; height: 100%; border-left: 1px solid black;"></div> </div> <div style="flex: 1; text-align: center;"> <div style="width: 100%; height: 100%; border-left: 1px solid black; border-right: 1px solid black;"></div> </div> </div>	TOPSOIL: Dark brown slightly gravelly clay with rootlets. (0.35) 0.35 Soft to firm brown greyish brown slightly gravelly CLAY. Gravels are fine to medium and subrounded. (0.85) 1.20 Structureless CHALK composed of firm to stiff beige grey SILT (Grade Dm). (1.80) 3.00 Complete at 3.00m	  		
Plan <div style="display: grid; grid-template-columns: repeat(10, 1fr); gap: 5px;"> <div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div> <div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div> <div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div> <div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div> <div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div> <div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div> </div>						Remarks No groundwater encountered.			

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Pitstone Sports Pavilion, Pitstone		Number BH1	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Pitstone Parish Council		Job Number 20963	
		Location		Dates 26/11/2019		Engineer Tom Clarke		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.50	J1		(0.0ppm) (0.1ppm)		(0.25) 0.25	TOPSOIL: Dark brown slightly gravelly clay with rootlets.			
1.00-2.00	C1		(0.0ppm) (0.0ppm) (0.0ppm)		(0.95)	Soft to firm brown greyish gravelly CLAY. Gravels are fine to medium and subrounded.			
2.00-3.00	C2		(0.0ppm)		1.20	Structureless CHALK composed of soft to stiff beige grey SILT (Grade Dm).			
			(0.0ppm)		(3.80)				
			(0.0ppm)		5.00	Complete at 5.00m			
Remarks No groundwater encountered.									
								Scale (approx) 1:50	Logged By TC
								Figure No. 20963.BH1	

			62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410			Site Pitstone Sports Pavilion, Pitstone		Number BH2	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Pitstone Parish Council		Job Number 20963	
		Location		Dates 26/11/2019		Engineer Tom Clarke		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
1.00-2.00	C1		(0.0ppm)		0.20	TOPSOIL: Dark brown slightly gravelly clay with rootlets.			
1.20	J1		(0.0ppm)			Soft to firm brown greyish gravelly CLAY. Gravels are fine to medium and subrounded.			
			(0.0ppm)		(1.20)				
			(0.0ppm)		1.40				
2.00-3.00	C2		(0.0ppm)			Structureless CHALK composed of soft to stiff beige grey SILT (Grade Dm).			
			(0.0ppm)						
					(3.60)				
			(0.0ppm)						
					5.00	Complete at 5.00m			
Remarks No groundwater encountered.								Scale (approx)	
								1:50	
								Logged By TC	
								Figure No. 20963.BH2	

				62a Western Road Tring, Hertfordshire HP23 4BB Tel: 01442 825570 Fax: 01442 891410		Site Pitstone Sports Pavilion, Pitstone		Number BH3	
Excavation Method Drive-in Window Sampler		Dimensions		Ground Level (mOD)		Client Pitstone Parish Council		Job Number 20963	
		Location		Dates 26/11/2019		Engineer Tom Clarke		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.30	J1		(0.1ppm)		(0.40) 0.40	TOPSOIL: Dark brown slightly gravelly clay with rootlets.			
			(0.0ppm)		(0.70)	Soft to firm brown greyish slightly gravelly CLAY. Gravels are fine to medium and subrounded.			
			(0.0ppm)		1.10	Structureless CHALK composed of firm to stiff beige grey SILT (Grade Dm).			
1.50	J2		(0.0ppm)						
1.50-2.00	C1		(0.0ppm)						
2.00-3.00	C2		(0.0ppm)						
			(0.0ppm)						
4.00-5.00	C3		(0.0ppm)		(3.90)				
					5.00	Complete at 5.00m			
Remarks No groundwater encountered.							Scale (approx)	Logged By	
							1:50	TC	
							Figure No. 20963.BH3		

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Pitstone Parish Council	Job Number 20963
	Location	Dates 26/11/2019	Engineer Tom Clarke	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment
0.00-0.10	6			0.00	
0.10-0.20	4				
0.20-0.30	4				
0.30-0.40	2				
0.40-0.50	2			0.50	
0.50-0.60	2				
0.60-0.70	1				
0.70-0.80	2				
0.80-0.90	2				
0.90-1.00	1			1.00	
1.00-1.10	2				
1.10-1.20	2				
1.20-1.30	2				
1.30-1.40	2				
1.40-1.50	2			1.50	
1.50-1.60	2				
1.60-1.70	2				
1.70-1.80	1				
1.80-1.90	1				
1.90-2.00	1			2.00	
2.00-2.10	3				
2.10-2.20	3				
2.20-2.30	4				
2.30-2.40	6				
2.40-2.50	3			2.50	
2.50-2.60	2				
2.60-2.70	2				
2.70-2.80	3				
2.80-2.90	3				
2.90-3.00	2			3.00	
3.00-3.10	3				
3.10-3.20	3				
3.20-3.30	4				
3.30-3.40	4				
3.40-3.50	3			3.50	
3.50-3.60	3				
3.60-3.70	4				
3.70-3.80	4				
3.80-3.90	4				
3.90-4.00	5			4.00	
4.00-4.10	7				
4.10-4.20	9				
4.20-4.30	9				
4.30-4.40	6				
4.40-4.50	7			4.50	
4.50-4.60	7				
4.60-4.70	6				
4.70-4.80	8				
4.80-4.90	8				
4.90-5.00	21			5.00	

Remarks

Scale (approx)	Logged By
1:25	TC
Figure No.	
20963.DP1	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Pitstone Parish Council	Job Number 20963
	Location	Dates 26/11/2019	Engineer Tom Clarke	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment												
					0	3	6	9	12	15	18	21	24	27	30		
0.00-0.10	1			0.00													
0.10-0.20	2																
0.20-0.30	1																
0.30-0.40	1																
0.40-0.50	1																
0.50-0.60	1			0.50													
0.60-0.70	1																
0.70-0.80	2																
0.80-0.90	2																
0.90-1.00	1																
1.00-1.10	1			1.00													
1.10-1.20	1																
1.20-1.30	1																
1.30-1.40	1																
1.40-1.50	1																
1.50-1.60	1			1.50													
1.60-1.70	1																
1.70-1.80	1																
1.80-1.90	1																
1.90-2.00	1																
2.00-2.10	1			2.00													
2.10-2.20	2																
2.20-2.30	2																
2.30-2.40	1																
2.40-2.50	1																
2.50-2.60	2			2.50													
2.60-2.70	2																
2.70-2.80	3																
2.80-2.90	2																
2.90-3.00	2																
3.00-3.10	2			3.00													
3.10-3.20	2																
3.20-3.30	2																
3.30-3.40	2																
3.40-3.50	2																
3.50-3.60	2			3.50													
3.60-3.70	4																
3.70-3.80	4																
3.80-3.90	3																
3.90-4.00	4																
4.00-4.10	3			4.00													
4.10-4.20	5																
4.20-4.30	6																
4.30-4.40	7																
4.40-4.50	7																
4.50-4.60	8			4.50													
4.60-4.70	7																
4.70-4.80	7																
4.80-4.90	10																
4.90-5.00	23			5.00													

Remarks

Scale (approx)	Logged By
1:25	TC
Figure No.	
20963.DP2	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD)	Client Pitstone Parish Council	Job Number 20963
	Location	Dates 26/11/2019	Engineer Tom Clarke	Sheet 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)	Blows for Depth Increment									
0.00-0.10	1			0.00										
0.10-0.20	2													
0.20-0.30	1													
0.30-0.40	1													
0.40-0.50	1													
0.50-0.60	1			0.50										
0.60-0.70	1													
0.70-0.80	1													
0.80-0.90	1													
0.90-1.00	1													
1.00-1.10	1			1.00										
1.10-1.20	1													
1.20-1.30	1													
1.30-1.40	1													
1.40-1.50	1													
1.50-1.60	1			1.50										
1.60-1.70	1													
1.70-1.80	2													
1.80-1.90	2													
1.90-2.00	2													
2.00-2.10	1			2.00										
2.10-2.20	2													
2.20-2.30	2													
2.30-2.40	2													
2.40-2.50	2													
2.50-2.60	2			2.50										
2.60-2.70	3													
2.70-2.80	3													
2.80-2.90	3													
2.90-3.00	3													
3.00-3.10	2			3.00										
3.10-3.20	3													
3.20-3.30	3													
3.30-3.40	3													
3.40-3.50	3													
3.50-3.60	4			3.50										
3.60-3.70	4													
3.70-3.80	4													
3.80-3.90	4													
3.90-4.00	4													
4.00-4.10	4			4.00										
4.10-4.20	5													
4.20-4.30	5													
4.30-4.40	5													
4.40-4.50	7													
4.50-4.60	6			4.50										
4.60-4.70	7													
4.70-4.80	7													
4.80-4.90	7													
4.90-5.00	7			5.00										

Remarks

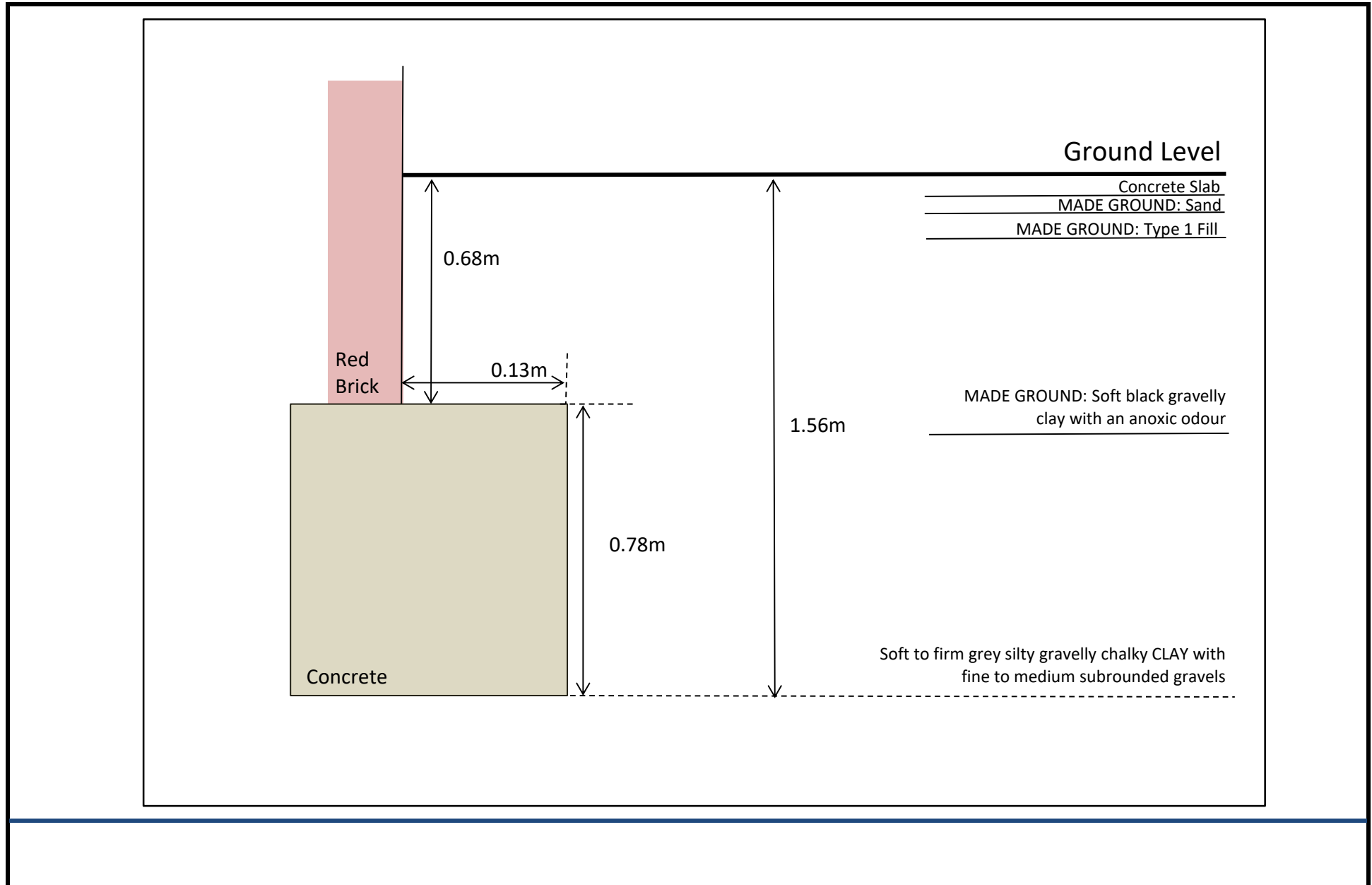
Scale (approx)	Logged By
1:25	TC
Figure No.	
20963.DP3	

Method Dynamic Probe	Cone Dimensions	Ground Level (mOD) Pitstone Parish Council	Client Pitstone Parish Council	Job Number 20963
	Location	Dates 26/11/2019	Engineer Tom Clarke	Sheet 1/1

[illegible]

Remarks	Scale (approx)	Logged By
	1:25	TC
	Figure No. 20963.DP4	

[illegible]



APPENDIX F

Ground Gas Sheet

Permeability Sheets

Visit Date: 26.11.2019

Visit Number: 1

Air Temperature: 2 °C

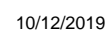
Borehole Number	BH3					
	0 mins	5 mins	10 mins			
Combustible gas (CH4) %LEL	1	1	1			
Combustible gas (CH4) % vol	0.1	0.1	0.1			
Combustible gas (CH4) Peak	0.1	0.1	0.1			
Carbon dioxide % vol	0.2	1.6	1.6			
Oxygen % vol	20.8	18.4	18.4			
Carbon monoxide ppm	0	0	0			
Hydrogen sulfide ppm	0	0	0			
Flow Rate (l/hr)	-0.0					
Barometric Pressure (mB)	1004					
Relative Downhole Pressure (mB)	+0.03					
Depth to Groundwater (m)	3.698					
Depth to Base of Borehole (m)	4.894					
Condition of Standpipe	Good					

Borehole Number						
Combustible gas (CH4) %LEL						
Combustible gas (CH4) % vol						
Combustible gas (CH4) Peak						
Carbon dioxide % vol						
Oxygen % vol						
Carbon monoxide ppm						
Hydrogen sulfide ppm						
Flow Rate (l/hr)						
Barometric Pressure (mB)						
Relative Downhole Pressure (mB)						
Depth to Groundwater (m)						
Depth to Base of Borehole (m)						
Condition of Standpipe						

Comments:

Failed to drain sufficiently within allowed time.

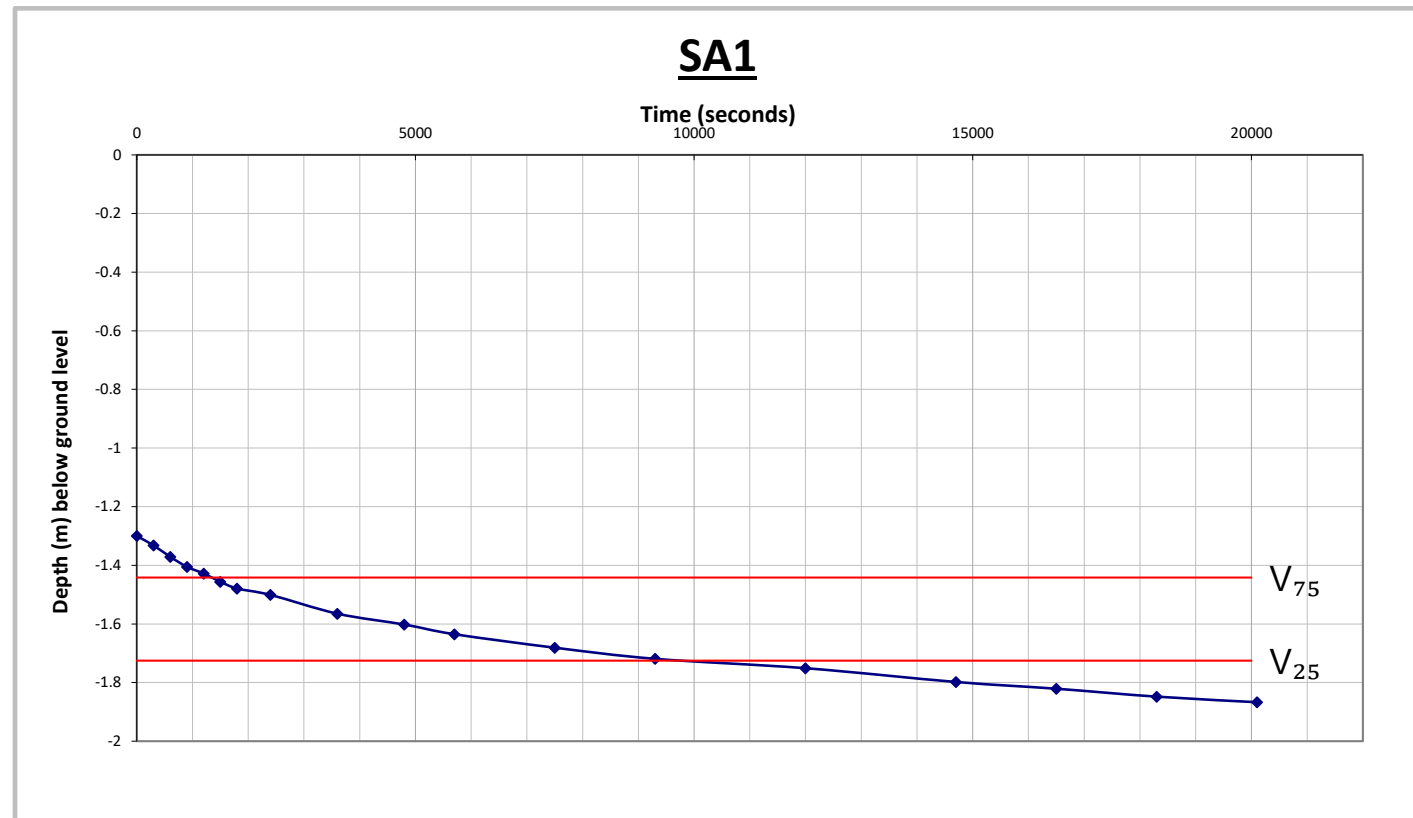
$<10^{-6}$ = Poor Permeability

[illegible]

Location	SA1
Length (m)	1.9
Width (m)	0.55
Depth (m)	3
Surface Area (m ²)	15.745
Depth of Water Lost (m)	0.567
Effective Storage Volume (Vp75-Vp25)	0.2962575

Time (s)	Depth to Water (m)
0	-1.3
300	-1.332
600	-1.371
900	-1.405
1200	-1.428
1500	-1.456
1800	-1.479
2400	-1.501
3600	-1.565
4800	-1.602
5700	-1.635
7500	-1.681
9300	-1.719
12000	-1.751
14700	-1.798
16500	-1.821
18300	-1.848
20100	-1.867

ap50	2.434
V ₇₅	1400
V ₂₅	9300
tp75 - 25	7900



Comments:

Pit failed to drain completely, calculation therefore based on water lost (in line with BRE guidance). However no refills could be conducted due to slow drainage.

Vp	Amount of Water Lost	DTW bgl
75%	0.42525	-1.44175
25%	0.14175	-1.72525

Soil Infiltration Rate (m/sec)

1.54E-05

APPENDIX G


Laboratory Test Results

Waste Checker Sheets



2183

Final Report

Report No.:	19-40052-1		
Initial Date of Issue:	06-Dec-2019		
Client	WDE Consulting Ltd		
Client Address:	62a Western Road Tring Herts HP23 4BB		
Contact(s):	Results Tom Clarke		
Project	20963 Pitstone Sports Pavilion		
Quotation No.:	Q19-16589	Date Received:	29-Nov-2019
Order No.:	19-556	Date Instructed:	29-Nov-2019
No. of Samples:	3		
Turnaround (Wkdays):	5	Results Due:	05-Dec-2019
Date Approved:	06-Dec-2019		
Approved By:			
Details:	Amy Parekh-Pross, Technical Projects Manager		

Project: 20963 Pitstone Sports Pavilion

Client: WDE Consulting Ltd	Chemtest Job No.:				19-40052	19-40052	19-40052
Quotation No.: Q19-16589	Chemtest Sample ID.:				934946	934947	934948
Order No.: 19-556	Client Sample Ref.:				1	1	1
	Sample Location:				BH1	BH2	BH3
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m) (\$):				0.50	1.20	0.30
	Date Sampled (\$):				26-Nov-2019	26-Nov-2019	26-Nov-2019
	Asbestos Lab:				DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
Moisture	N	2030	%	0.020	12	13	22
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Type	U	2192		N/A	-	-	-
ACM Detection Stage	U	2192		N/A	-	-	-
pH	U	2010		4.0	8.8	8.4	9.7
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Sulphate (Total)	U	2430	%	0.010	0.087	0.49	0.17
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.082	0.38	0.025
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	< 0.50	< 0.50	2.1
Total Organic Carbon	U	2625	%	0.20	0.60	2.1	3.4
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.45
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.12
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.20
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.3
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.52
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.8
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.7
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.57
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.56
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	7.3
Arsenic	U	2450	mg/kg	1.0	14	15	14
Beryllium	U	2450	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.53	0.71	1.4
Cadmium	U	2450	mg/kg	0.10	0.16	0.13	0.31
Chromium	U	2450	mg/kg	1.0	11	22	19
Copper	U	2450	mg/kg	0.50	18	48	20
Lead	U	2450	mg/kg	0.50	12	17	38
Mercury	U	2450	mg/kg	0.10	< 0.10	0.10	0.13
Nickel	U	2450	mg/kg	0.50	15	28	24

Project: 20963 Pitstone Sports Pavilion

Client: WDE Consulting Ltd	Chemtest Job No.:				19-40052	19-40052	19-40052
Quotation No.: Q19-16589	Chemtest Sample ID.:				934946	934947	934948
Order No.: 19-556	Client Sample Ref.:				1	1	1
	Sample Location:				BH1	BH2	BH3
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m) (\$):				0.50	1.20	0.30
	Date Sampled (\$):				26-Nov-2019	26-Nov-2019	26-Nov-2019
	Asbestos Lab:				DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD			
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20
Vanadium	U	2450	mg/kg	5.0	8.0	30	26
Zinc	U	2450	mg/kg	0.50	27	37	54
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0

Results - Single Stage WAC

Project: 20963 Pitstone Sports Pavilion

Chemtest Job No: 19-40052					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 934946					Limits		
Sample Ref: 1					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:							
Sample Location: BH1							
Top Depth (m) (\$): 0.50							
Bottom Depth (m) (\$):							
Sampling Date (\$): 26-Nov-2019							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	0.60	3	5	6
Loss On Ignition	2610	U	%	2.3	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.053	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0029	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0044	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0013	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.31	3.1	10	150	500
Sulphate	1220	U	1.4	14	1000	20000	50000
Total Dissolved Solids	1020	N	63	630	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	11	110	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44 Aromatics: >C5–C7, >C7–C8, >C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35–C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"
- \$ This information has been supplied by the client and can affect the integrity of test data.

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Results - Single Stage WAC

Chemtest Job No: 19-40052					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 934946					Limits		
Sample Ref: 1					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:							
Sample Location: BH1							
Top Depth (m) (\$): 0.50							
Bottom Depth (m) (\$):							
Sampling Date (\$): 26-Nov-2019							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	0.60	3	5	6
Loss On Ignition	2610	U	%	2.3	--	--	10
Total BTEX	2760	U	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.053	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0029	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0044	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0013	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.31	3.1	10	150	500
Sulphate	1220	U	1.4	14	1000	20000	50000
Total Dissolved Solids	1020	N	63	630	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	11	110	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2		Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic		Mutagenic	Ecotoxic	
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35	R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14
Naphthalene				0.000045					0.000045					0.000045	0.000045
Acenaphthylene	0.000012			0.000012											
Acenaphthene	0.00002														
Fluorene															
Phenanthrene	0.00013			0.00013					0.00013						
Anthracene	0.000052													0.000052	0.000052
Fluoranthene	0.00018			0.00018					0.00018						
Pyrene	0.00017			0.00017											
Benzo(a)anthracene															
Chrysene				0.000056			0.000056						0.000056		
Benzo(b)fluoranthene							0.00001							0.00001	0.00001
Benzo(k)fluoranthene				0.00001			0.00001								
Benzo(a)pyrene							0.00001				0.00001		0.00001	0.00001	0.00001
Indeno(1,2,3-cd)pyrene															
Dibenz(a,h)anthracene							0.00001							0.00001	0.00001
Benzo(ghi)perylene														0.00001	0.00001
Arsenic			0.0014		0.0014									0.0014	0.0014
Boron	0.00014			0.00014											
Cadmium	0.000031	0.000031	0.000031		0.000031	0.000031	0.000031								
Chromium										0.0022			0.0022		
Copper				0.0048										0.0048	0.0048
Lead				0.0038					0.0038		0.0038	0.0038		0.0038	0.0038
Mercury		0.000013				0.000013								0.000013	0.000013
Nickel							0.0028	0.0028	0.0028						
Selenium			0.00002		0.00002										0.00002
Zinc	0.0054			0.0054											
Benzene	0.0001		0.0001	0.0001			0.0001								
Toluene				0.0001								0.0001			
Ethylbenzene				0.0001	0.0001							0.0001			
p & m-xylene	0.0001			0.0001											
o-xylene	0.0001			0.0001											
MTBE (Methyl Tertiary Butyl Eth)	0.0001														
PRO C6-C10				0.0006			0.0006							0.0006	0.0006
DRO C10-C25				0.0008					0.0008					0.0008	0.0008
Total (or greatest)	0.0065	0.000044	0.0016	0.0166	0.0016	0.000044	0.0028	0.0028	0.0038	0.0022	0.0038	0.0038	0.0022	0.0116	0.0116
Threshold (%)	20.0	0.1	3	25.0	3.0	0.1	0.1	0.1	1.0	1.0	0.5	5.0	0.1	25.00	25.00
Exceeded? (y/n)	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2			Carc. Cat 3	C	Repr. Cat 1 / 2		Muta. Cat 1 / 2	N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Corrosive	Teratogenic	Mutagenic		Ecotoxic		
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40	R35		R60 / R61	R62 / R63	R46	R50	R53
Hazard	H4	H5	H5	H5	H6	H6	H7			H8	H10		H11	H14	H14	
Benzo(a)pyrene							0.00001							0.00001		
BaP Concentration in TPH							1E-10							1E-10		
BaP Exceeded (y/n)							N							N		
TPH (EC5 - EC35)				0.001			0.001				0.001			0.001	0.001	0.001
Threshold (%)				25.0			0.1				5.0			0.1	25.0	25.0
Hazardous Properties				N			N				N			N	N	N

Category or Danger	Xi	T+	T	Xn	T	T+	Car. Cat 1 / 2			Carc. Cat 3	Car. Cat 1a	Repr. Cat 1 / 2			Muta. Cat 1 / 2		N	
Substance	Irritant	Harmful			Toxic		Carcinogenic			Teratogenic			Mutagenic		Ecotoxic			
Risk Phase	R36-38	R26-28, R39	R23-25, R39, R48	R20-22, 48,65,68	R23-25, R39, R48	R26-28, R39	R45	R49	R40		RE1	R60 / R61	R62 / R63	R46	R50	R53		
Hazard	H4	H5	H5	H5	H6	H6	H7				H350	H10		H11	H14	H14		
Asbestos											0							
Threshold (%)											0.1							
Hazardous Properties											N							

APPENDIX H

Geotechnical Laboratory Results

SPT Variation Graphs

CBR Variation Graphs



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: Tom Clarke
Site Name: Pitstone Sports Pavilion, Pitstone
Site Address: Not Given

Client Reference: 20963
Job Number: 19-74438
Date Sampled: 26/11/2019
Date Received: 27/11/2019
Date Tested: 05/12/2019
Sampled By: TC

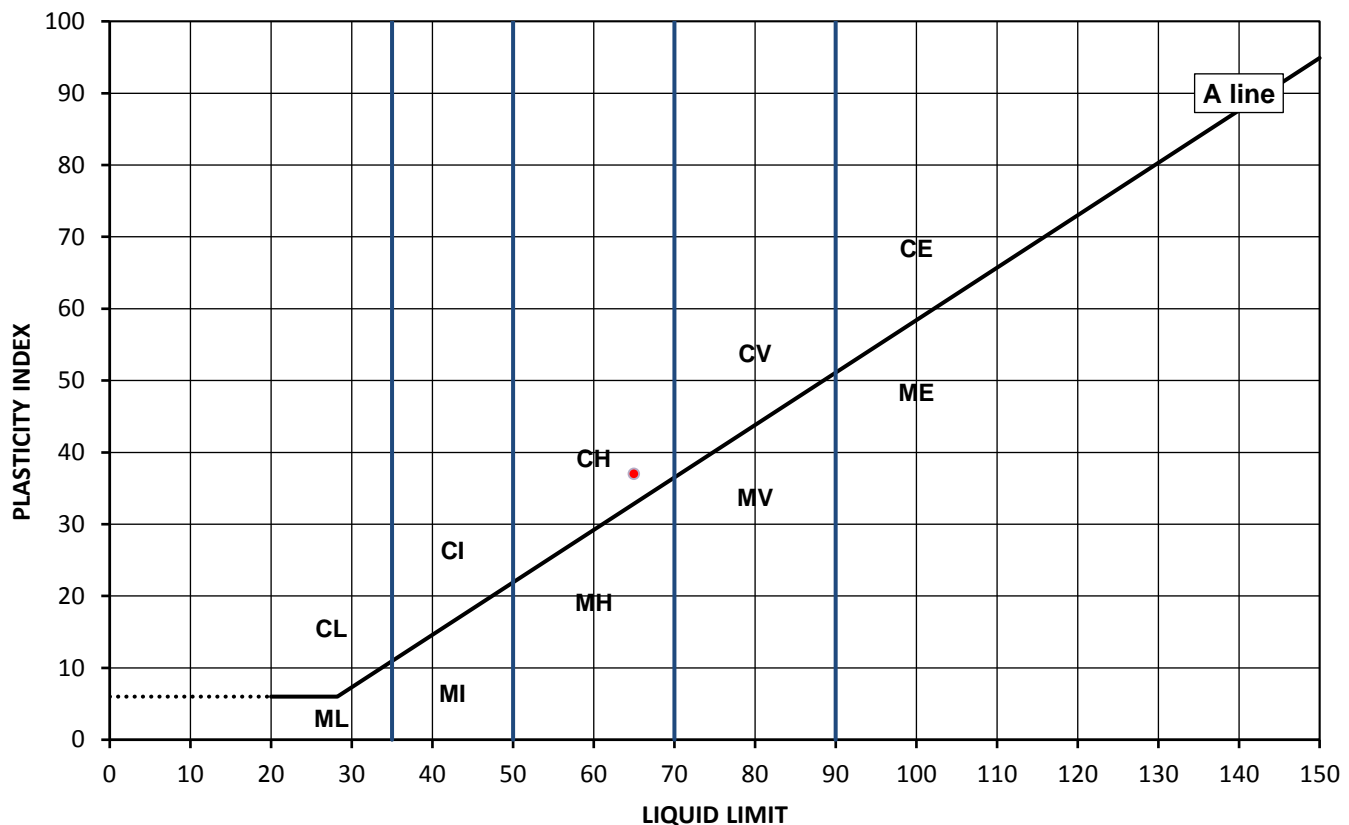
Test Results:

Laboratory Reference: 1375380
Hole No.: BH1
Sample Reference: Not Given
Soil Description: Light brown gravelly sandy CLAY

Depth Top [m]: 1.00
Depth Base [m]: 2.00
Sample Type: C

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
26	65	28	37	77



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	Low
		I	Medium
		H	High
		V	Very high
		E	Extremely high
			below 35
			35 to 50
			50 to 70
			70 to 90
			exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 11/12/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 232.5

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The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*



TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: Tom Clarke
Site Name: Pitstone Sports Pavilion, Pitstone
Site Address: Not Given

Client Reference: 20963
Job Number: 19-74438
Date Sampled: 26/11/2019
Date Received: 27/11/2019
Date Tested: 05/12/2019
Sampled By: TC

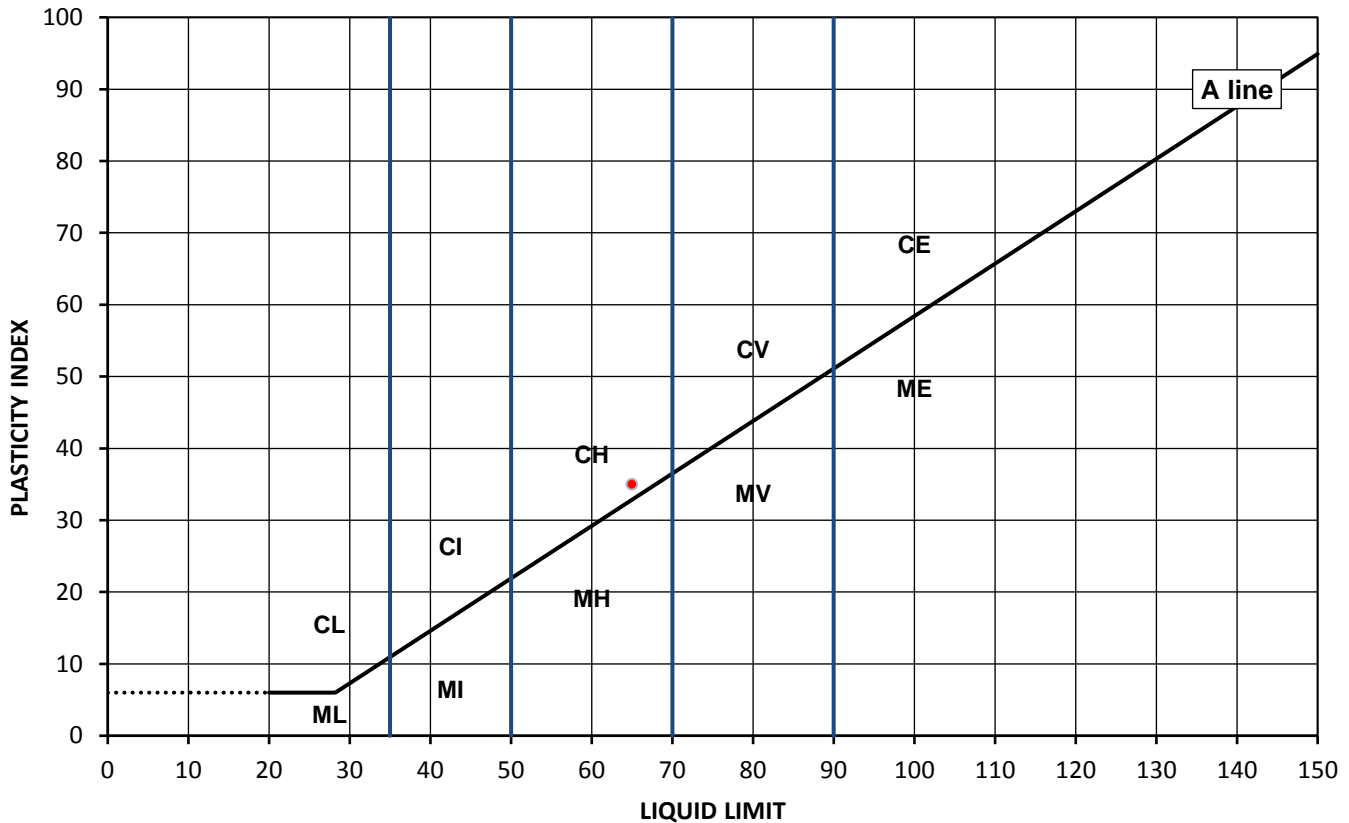
Test Results:

Laboratory Reference: 1375382
Hole No.: BH2
Sample Reference: Not Given
Soil Description: Brownish grey slightly gravelly CLAY

Depth Top [m]: 1.00
Depth Base [m]: 2.00
Sample Type: C

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
29	65	30	35	78



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	Low
		I	Medium
		H	High
		V	Very high
		E	Extremely high
			below 35
			35 to 50
			50 to 70
			70 to 90
			exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 11/12/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 232.5

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TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: Tom Clarke
Site Name: Pitstone Sports Pavilion, Pitstone
Site Address: Not Given

Client Reference: 20963
Job Number: 19-74438
Date Sampled: 26/11/2019
Date Received: 27/11/2019
Date Tested: 05/12/2019
Sampled By: TC

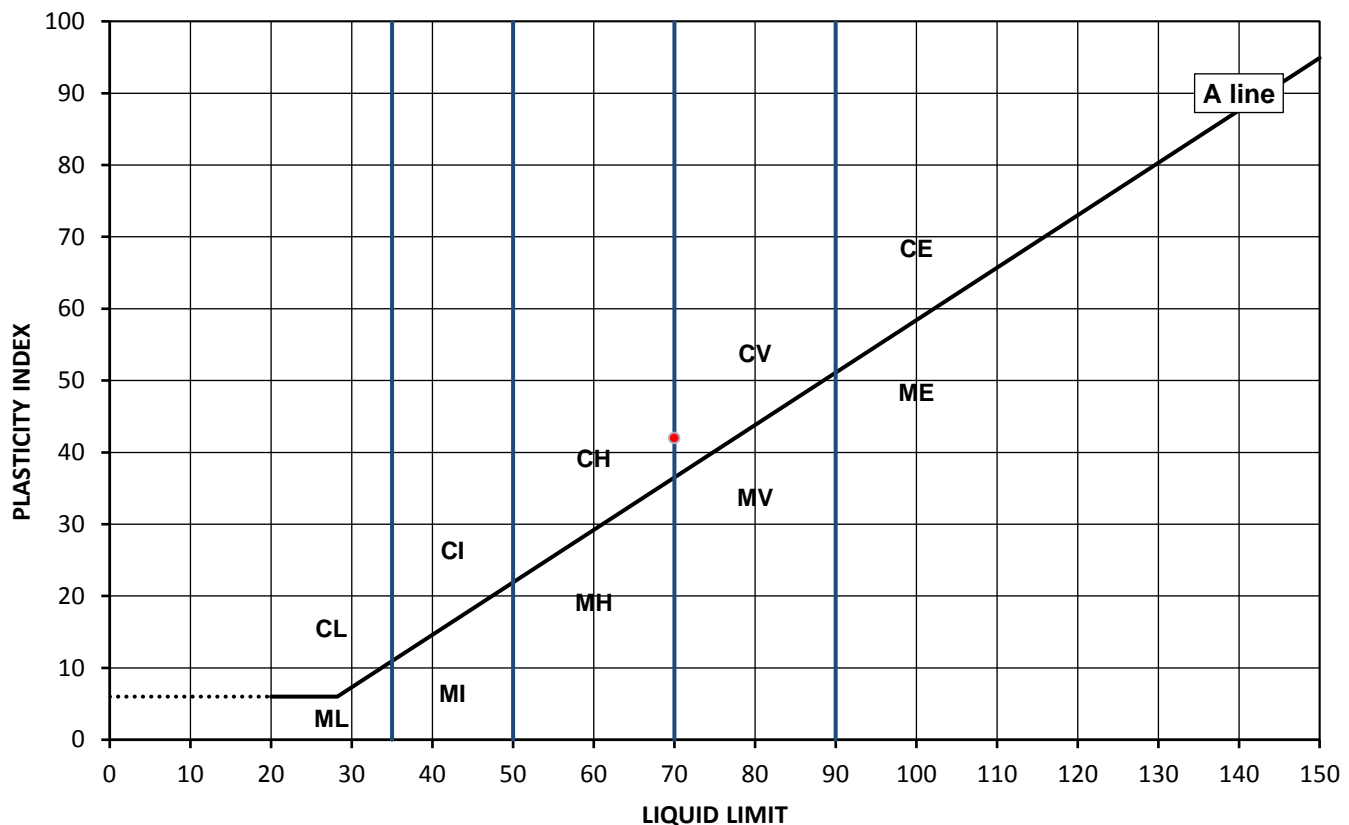
Test Results:

Laboratory Reference: 1375385
Hole No.: BH3
Sample Reference: Not Given
Soil Description: Light grey CLAY

Depth Top [m]: 2.00
Depth Base [m]: 3.00
Sample Type: C

Sample Preparation: Tested in natural condition

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
27	70	28	42	100



Legend, based on BS 5930:2015 Code of practice for site investigations

C	Clay	Plasticity	Liquid Limit
M	Silt	L	Low
		I	Medium
		H	High
		V	Very high
		E	Extremely high
			below 35
			35 to 50
			50 to 70
			70 to 90
			exceeding 90
	Organic	O	append to classification for organic material (eg CHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 11/12/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 232.5

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4041

Client: WDE Consulting Ltd
 Client Address: 62a Western Road, Tring,
 Hertfordshire, HP23 4BB
 Contact: Tom Clarke
 Site Name: Pitstone Sports Pavilion, Pitstone
 Site Address: Not Given

SUMMARY REPORT

Summary of Classification Test Results

Tested in Accordance with:

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg
 by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990:
 Clause 8.2

i2 Analytical Ltd
 7 Woodshots Meadow
 Croxley Green Business Park
 Watford Herts WD18 8YS



Environmental Science

Client Reference: 20963
 Job Number: 19-74438
 Date Sampled: 26/11/2019
 Date Received: 27/11/2019
 Date Tested: 05/12/2019
 Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	MC	WC	Atterberg				Density			Total Porosity#		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	LL	PL	PI	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
1375380	BH1	Not Given	1.00	2.00	C	Light brown gravelly sandy CLAY	Atterberg 1 Point	26		77	65	28	37						
1375382	BH2	Not Given	1.00	2.00	C	Brownish grey slightly gravelly CLAY	Atterberg 1 Point	29		78	65	30	35						
1375385	BH3	Not Given	2.00	3.00	C	Light grey CLAY	Atterberg 1 Point	27		100	70	28	42						

Note: # Non accredited; NP - Non plastic

Comments:

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
 Date Reported: 11/12/2019

Signed: Darren Berrill
 Geotechnical General Manager
 for and on behalf of i2 Analytical Ltd

GF 234.7

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TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



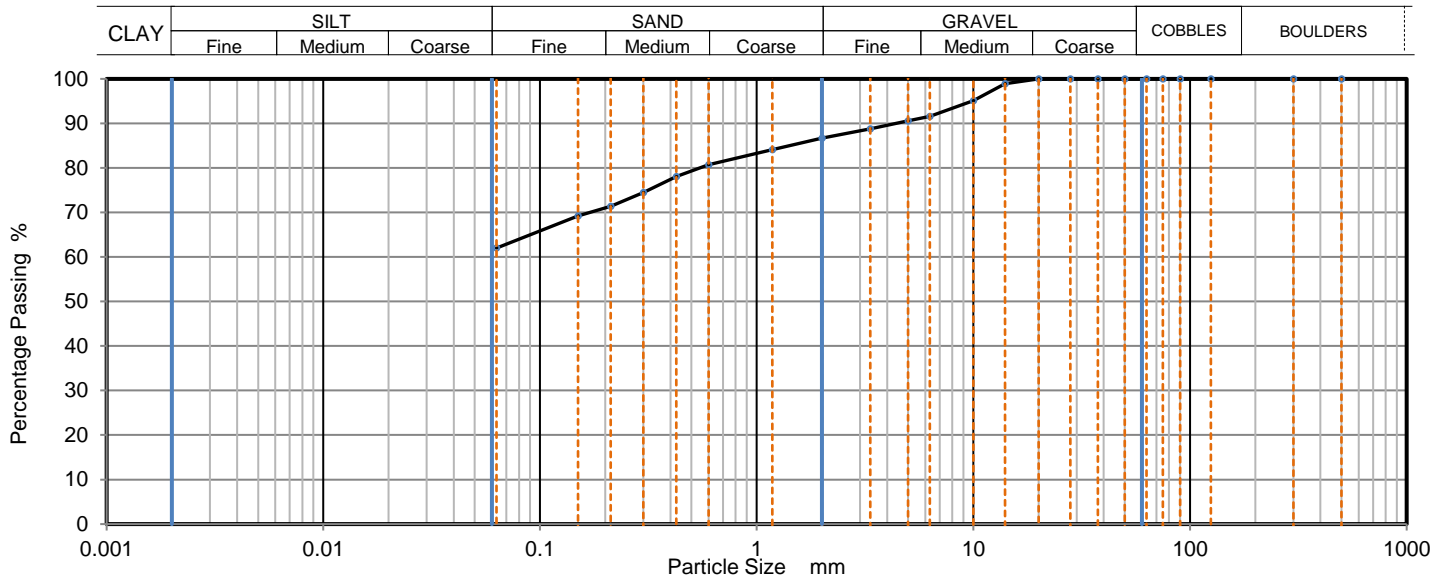
Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: Tom Clarke
Site Name: Pitstone Sports Pavilion, Pitstone
Site Address: Not Given

Client Reference: 20963
Job Number: 19-74438
Date Sampled: 26/11/2019
Date Received: 27/11/2019
Date Tested: 05/12/2019
Sampled By: TC

Test Results:

Laboratory Reference: 1375380
Hole No.: BH1
Sample Reference: Not Given
Sample Description: Light brown gravelly sandy CLAY

Depth Top [m]: 1.00
Depth Base [m]: 2.00
Sample Type: C



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	95		
6.3	92		
5	91		
3.35	89		
2	87		
1.18	84		
0.6	81		
0.425	78		
0.3	75		
0.212	71		
0.15	69		
0.063	63		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	13.30
Sand	24.10
Fines <0.063mm	62.50

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 11/12/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 100.13



TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS



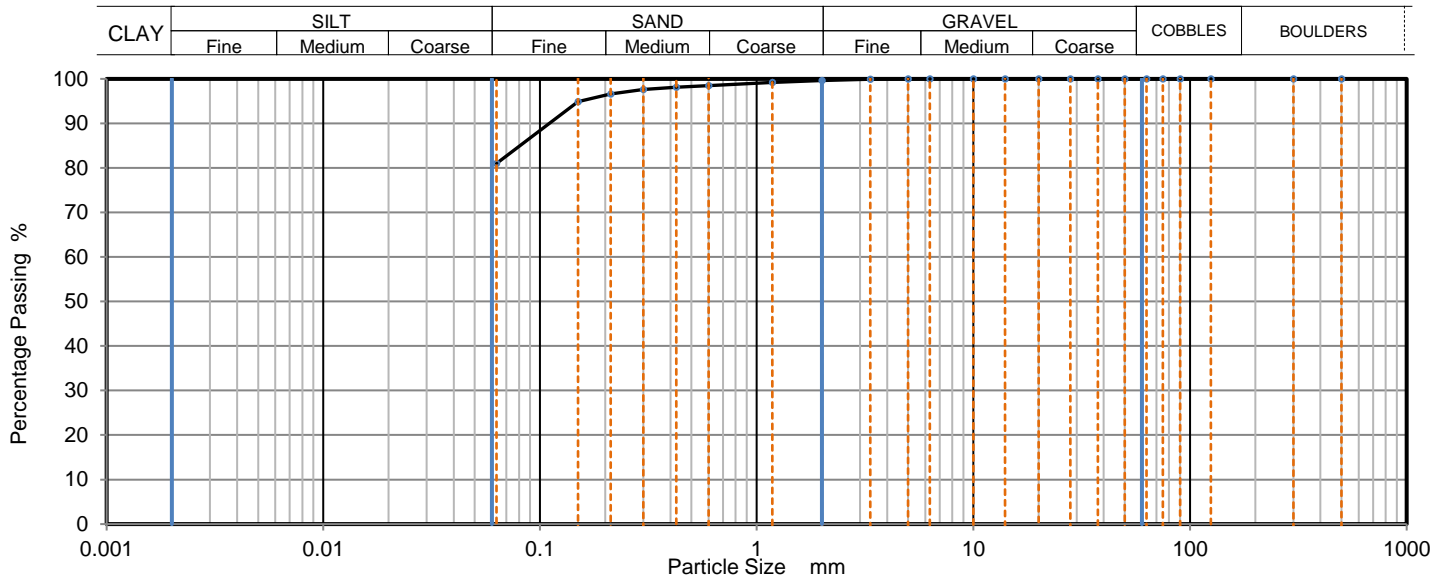
Client: WDE Consulting Ltd
Client Address: 62a Western Road, Tring,
Hertfordshire, HP23 4BB
Contact: Tom Clarke
Site Name: Pitstone Sports Pavilion, Pitstone
Site Address: Not Given

Client Reference: 20963
Job Number: 19-74438
Date Sampled: 26/11/2019
Date Received: 27/11/2019
Date Tested: 05/12/2019
Sampled By: TC

Test Results:

Laboratory Reference: 1375383
Hole No.: BH2
Sample Reference: Not Given
Sample Description: Light brown sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: 3.00
Sample Type: C



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	99		
0.425	98		
0.3	98		
0.212	97		
0.15	95		
0.063	82		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.40
Sand	18.20
Fines <0.063mm	81.50

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Approved: Dariusz Piotrowski
PL Geotechnical Laboratory Manager
Date Reported: 11/12/2019

Signed: Darren Berrill
Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 100.13



4041

Client: WDE Consulting Ltd
 Client Address: 62a Western Road, Tring,
 Hertfordshire, HP23 4BB
 Contact: Tom Clarke
 Site Name: Pitstone Sports Pavilion, Pitstone
 Site Address: Not Given

SUMMARY REPORT

Summary of Saturation Moisture Content Test Results

Tested in Accordance with: BS 1377-2: 1990: Clause 3.3

i2 Analytical Ltd
 7 Woodshots Meadow
 Croxley Green Business Park
 Watford Herts WD18 8YS



Environmental Science

Client Reference: 20963
 Job Number: 19-74438
 Date Sampled: 26/11/2019
 Date Received: 27/11/2019
 Date Tested: 05/12/2019
 Sampled By: TC

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	SMC	Bulk density	Dry density	MC								
		Reference	Depth Top	Depth Base	Type														
			m	m				%	Mg/m3	Mg/m3	%								
1375381	BH1	Not Given	2.00	3.00	C	Brownish grey CLAY		37	1.82	1.34	36								
1375385	BH3	Not Given	2.00	3.00	C	Light grey CLAY	Supplied lump of chalk fails to comply with volume requirements as per BS1377-2 Clause 3.3.5.1	30	1.89	1.49	27								

Note: SMC - Saturation Moisture Content; MC - Moisture Content

Comments:

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
 Date Reported: 11/12/2019

Signed: Darren Berrill
 Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 132.9

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4041

TEST CERTIFICATE**Unconsolidated Undrained****Triaxial Compression**Tested in Accordance with:
BS 1377-7: 1990: Clause 8i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client: WDE Consulting Ltd
 Client Address: 62a Western Road, Tring,
 Hertfordshire, HP23 4BB
 Contact: Tom Clarke
 Site Name: Pitstone Sports Pavilion, Pitstone
 Site Address: Not Given

Client Reference: 20963
 Job Number: 19-74438
 Date Sampled: 26/11/2019
 Date Received: 27/11/2019
 Date Tested: 05/12/2019
 Sampled By: Not Given

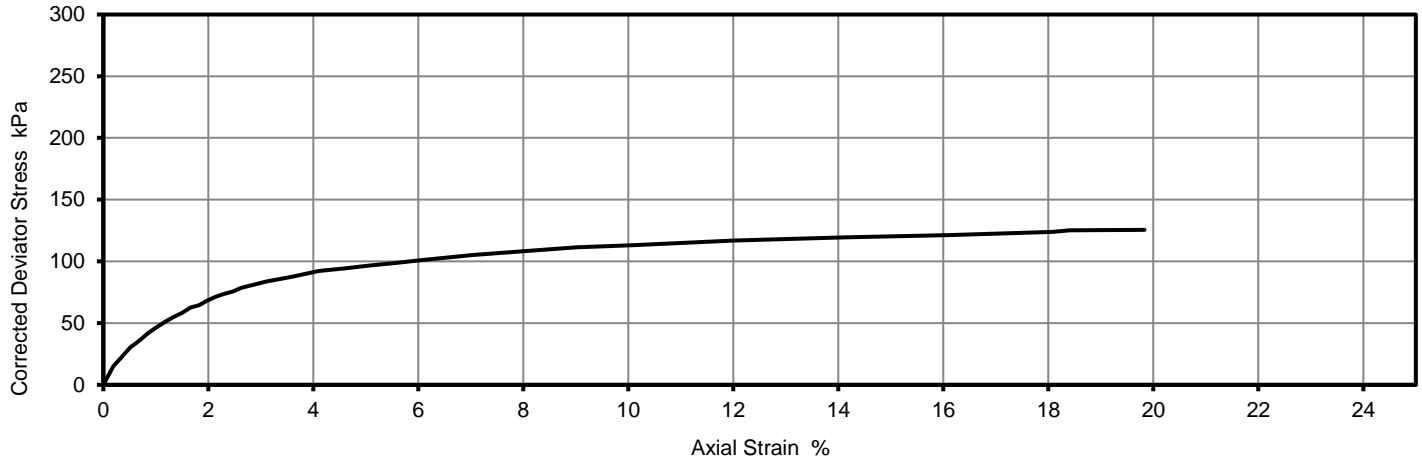
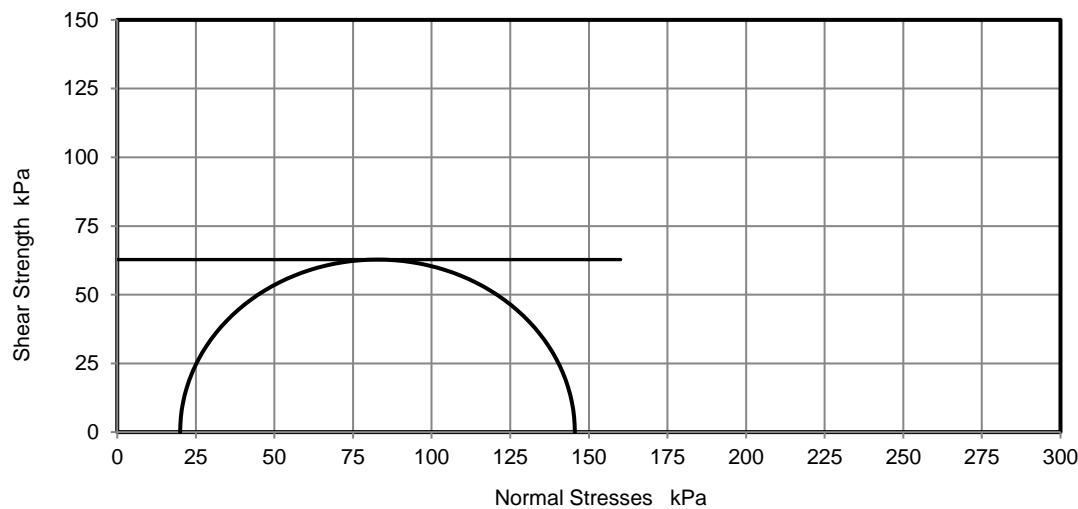
Test Results:

Laboratory Reference: 1375380
 Hole No.: BH1
 Sample Reference: Not Given
 Sample Description: Light brown gravelly sandy CLAY

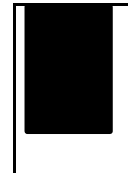
Depth Top [m]: 1.00
 Depth Base [m]: 2.00
 Sample Type: C

Test Number	1
Length	136.20 mm
Diameter	70.00 mm
Bulk Density	1.92 Mg/m ³
Moisture Content	26 %
Dry Density	1.52 Mg/m ³
Membrane Correction	1.53 kPa

Rate of Strain	2.00 %/min
Cell Pressure	20 kPa
Axial Strain at failure	19.8 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	126 kPa
Undrained Shear Strength, c_u	63 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.28 mm

Deviator Stress v Axial Strain**Mohr Circles**

Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
 This is provided for information only.

Remarks:

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
Date Reported: 11/12/2019

Signed: Darren Berrill
 Geotechnical General Manager
for and on behalf of i2 Analytical Ltd GF 184.7

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4041

TEST CERTIFICATE**Unconsolidated Undrained****Triaxial Compression**Tested in Accordance with:
BS 1377-7: 1990: Clause 8i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client: WDE Consulting Ltd
 Client Address: 62a Western Road, Tring,
 Hertfordshire, HP23 4BB
 Contact: Tom Clarke
 Site Name: Pitstone Sports Pavilion, Pitstone
 Site Address: Not Given

Client Reference: 20963
 Job Number: 19-74438
 Date Sampled: 26/11/2019
 Date Received: 27/11/2019
 Date Tested: 05/12/2019
 Sampled By: Not Given

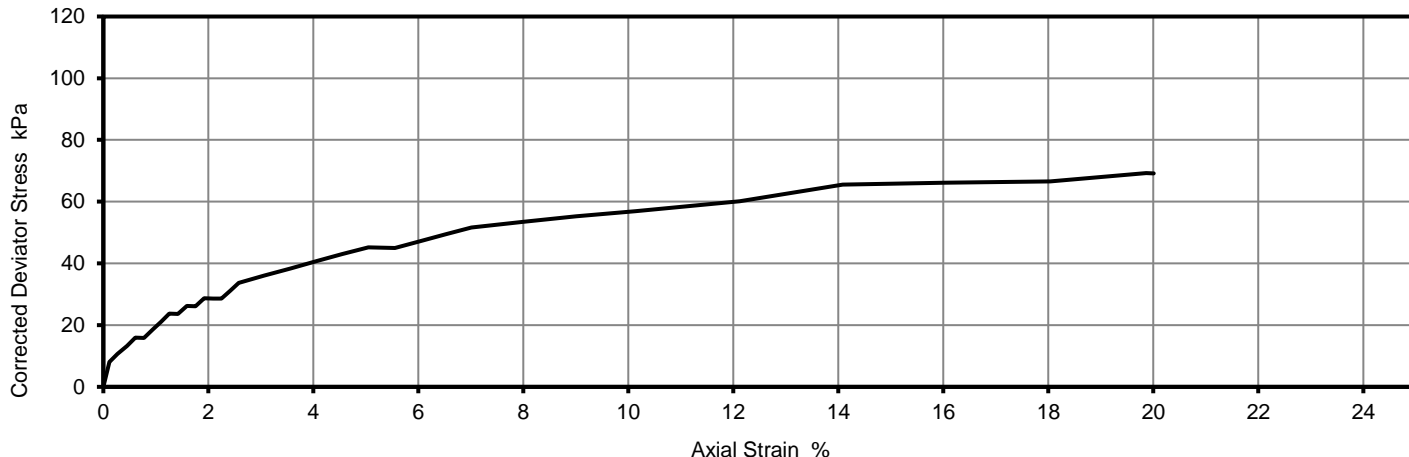
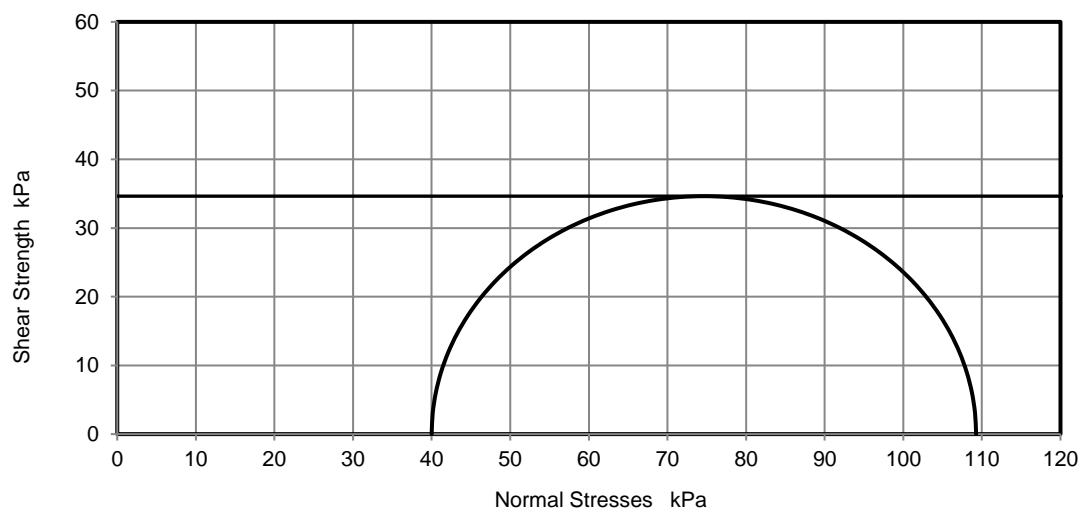
Test Results:

Laboratory Reference: 1375383
 Hole No.: BH2
 Sample Reference: Not Given
 Sample Description: Light brown CLAY

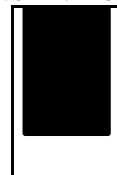
Depth Top [m]: 2.00
 Depth Base [m]: 3.00
 Sample Type: C

Test Number	1
Length	139.60 mm
Diameter	68.90 mm
Bulk Density	1.92 Mg/m ³
Moisture Content	33 %
Dry Density	1.45 Mg/m ³
Membrane Correction	1.66 kPa

Rate of Strain	2.00 %/min
Cell Pressure	40 kPa
Axial Strain at failure	19.9 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	69 kPa
Undrained Shear Strength, c_u	35 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.30 mm

Deviator Stress v Axial Strain**Mohr Circles**

Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
 This is provided for information only.

Remarks:

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
 Date Reported: 11/12/2019

Signed: Darren Berrill
 Geotechnical General Manager
 for and on behalf of i2 Analytical Ltd GF 184.7

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4041

TEST CERTIFICATE
Unconsolidated Undrained**Triaxial Compression**Tested in Accordance with:
BS 1377-7: 1990: Clause 8i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Environmental Science

Client: WDE Consulting Ltd
 Client Address: 62a Western Road, Tring,
 Hertfordshire, HP23 4BB
 Contact: Tom Clarke
 Site Name: Pitstone Sports Pavilion, Pitstone
 Site Address: Not Given

Client Reference: 20963
 Job Number: 19-74438
 Date Sampled: 26/11/2019
 Date Received: 27/11/2019
 Date Tested: 05/12/2019
 Sampled By: Not Given

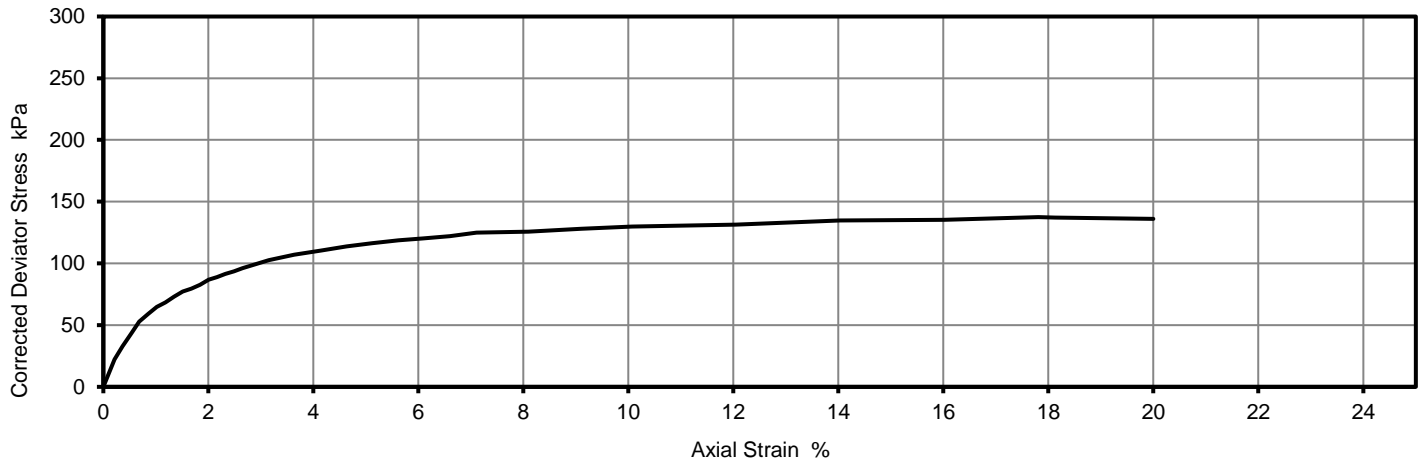
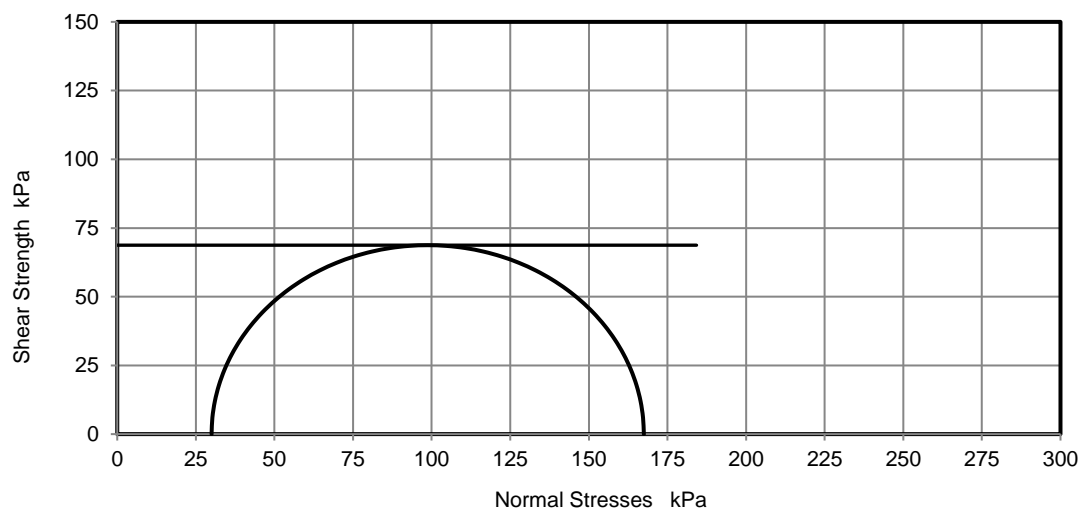
Test Results:

Laboratory Reference: 1375384
 Hole No.: BH3
 Sample Reference: Not Given
 Sample Description: Light grey CLAY

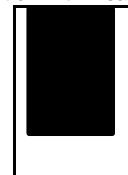
Depth Top [m]: 1.50
 Depth Base [m]: 2.00
 Sample Type: C

Test Number	1
Length	140.20 mm
Diameter	70.10 mm
Bulk Density	1.88 Mg/m ³
Moisture Content	33 %
Dry Density	1.42 Mg/m ³
Membrane Correction	1.15 kPa

Rate of Strain	2.00 %/min
Cell Pressure	30 kPa
Axial Strain at failure	17.8 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	137 kPa
Undrained Shear Strength, c_u	69 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Plastic
Membrane thickness	0.23 mm

Deviator Stress v Axial Strain**Mohr Circles**

Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
 This is provided for information only.

Remarks:

Approved: Dariusz Piotrowski
 PL Geotechnical Laboratory Manager
Date Reported: 11/12/2019

Signed: Darren Berrill
 Geotechnical General Manager

for and on behalf of i2 Analytical Ltd GF 184.7

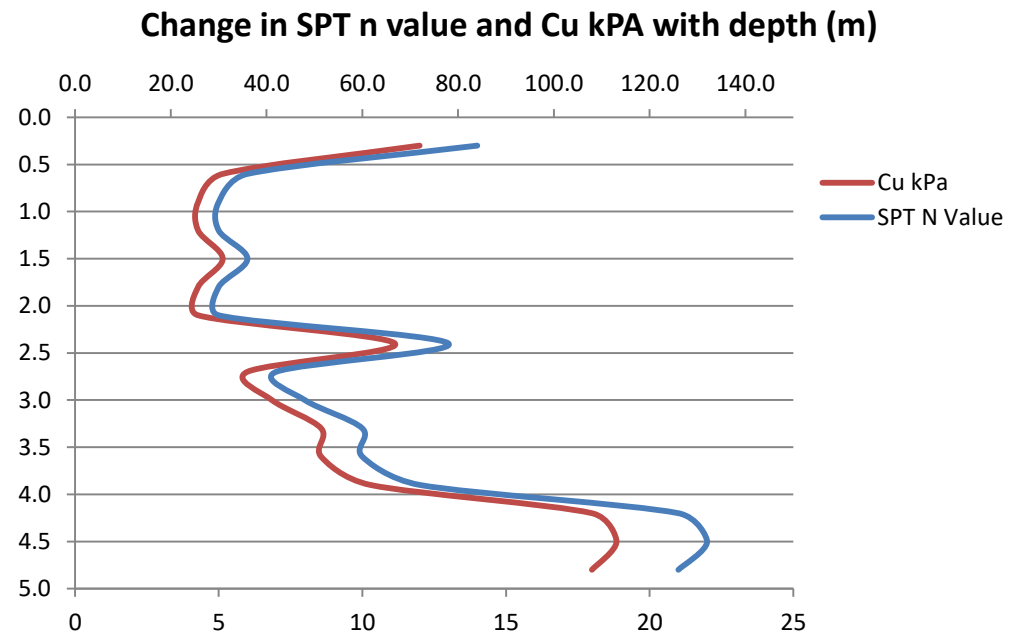
*Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation.
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 The results included within the report are representative of the samples submitted for analysis.
 The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland.*

Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP1

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3	14	72.0	109.7
0.6	6	30.8	46.0
0.9	5	25.7	37.8
1.2	5	25.7	37.8
1.5	6	30.8	46.0
1.8	5	25.7	37.8
2.1	5	25.7	37.8
2.4	13	66.8	101.9
2.7	7	36.0	54.1
3.0	8	41.1	62.2
3.3	10	51.4	78.2
3.6	10	51.4	78.2
3.9	12	61.7	94.1
4.2	21	107.9	163.0
4.5	22	113.1	170.4
4.8	21	107.9	163.0

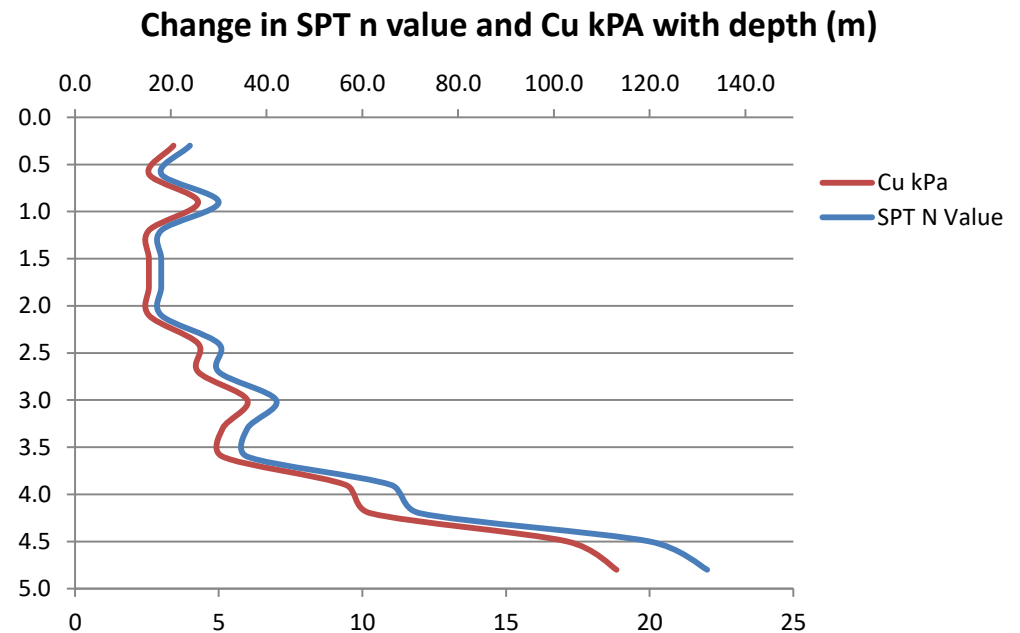


Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP2

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3	4	20.6	29.5
0.6	3	15.4	21.3
0.9	5	25.7	37.8
1.2	3	15.4	21.3
1.5	3	15.4	21.3
1.8	3	15.4	21.3
2.1	3	15.4	21.3
2.4	5	25.7	37.8
2.7	5	25.7	37.8
3.0	7	36.0	54.1
3.3	6	30.8	46.0
3.6	6	30.8	46.0
3.9	11	56.5	86.2
4.2	12	61.7	94.1
4.5	20	102.8	155.5
4.8	22	113.1	170.4

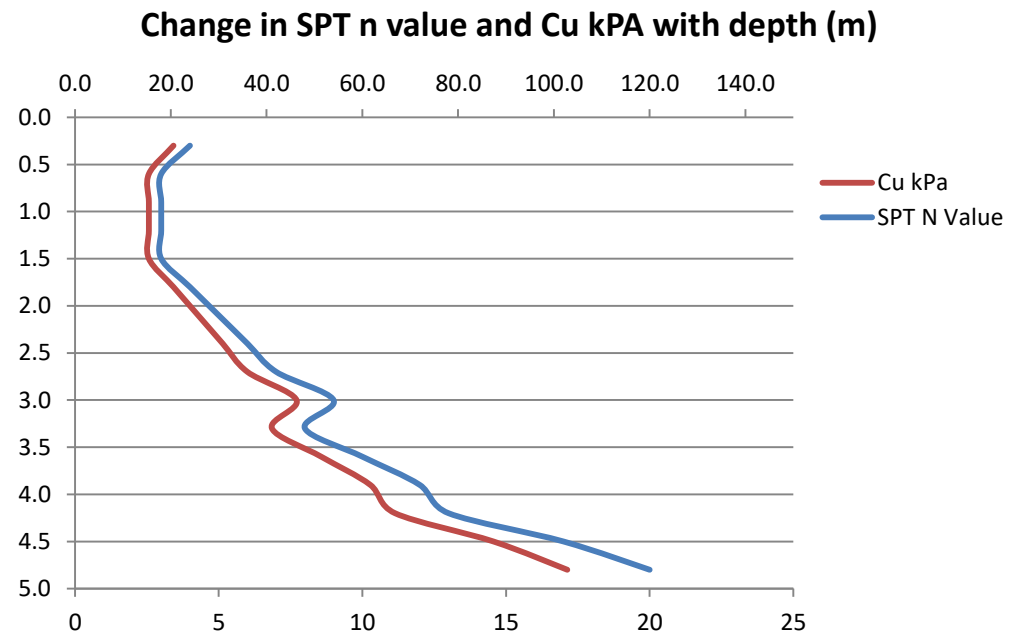


Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP3

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3	4	20.6	29.5
0.6	3	15.4	21.3
0.9	3	15.4	21.3
1.2	3	15.4	21.3
1.5	3	15.4	21.3
1.8	4	20.6	29.5
2.1	5	25.7	37.8
2.4	6	30.8	46.0
2.7	7	36.0	54.1
3.0	9	46.3	70.2
3.3	8	41.1	62.2
3.6	10	51.4	78.2
3.9	12	61.7	94.1
4.2	13	66.8	101.9
4.5	17	87.4	132.8
4.8	20	102.8	155.5

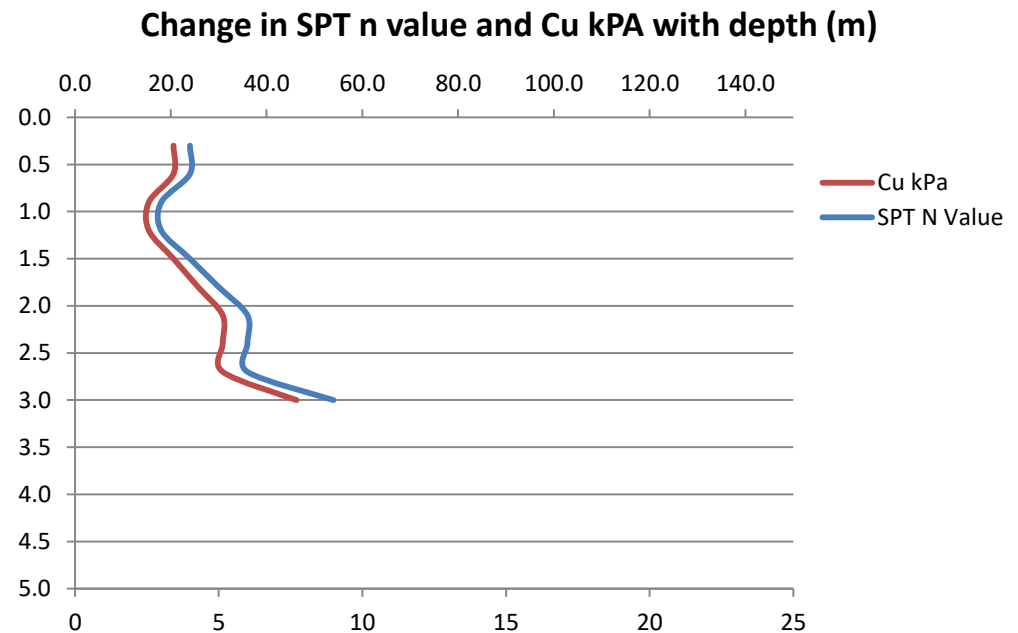


Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP4

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3	4	20.6	29.5
0.6	4	20.6	29.5
0.9	3	15.4	21.3
1.2	3	15.4	21.3
1.5	4	20.6	29.5
1.8	5	25.7	37.8
2.1	6	30.8	46.0
2.4	6	30.8	46.0
2.7	6	30.8	46.0
3.0	9	46.3	70.2

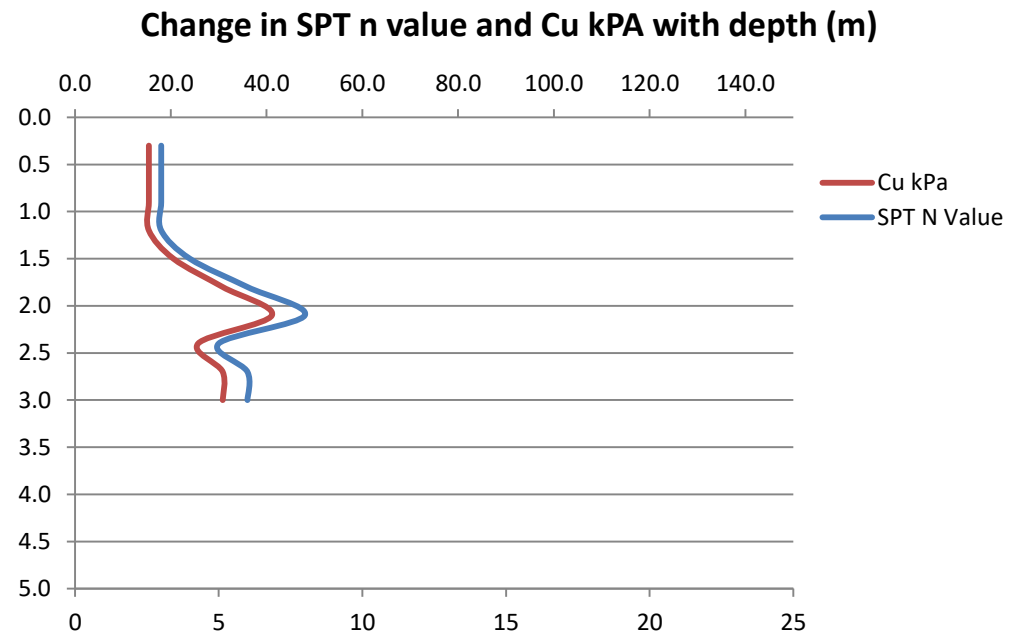


Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP5

Calculation of Cu and Q alt based on Terzaghi and Peck with additional factor of 2 safety

Correlation factor 5.14

Depth (m)	SPT N Value	Cu kPa	Q alt kPA
0.3	3	15.4	21.3
0.6	3	15.4	21.3
0.9	3	15.4	21.3
1.2	3	15.4	21.3
1.5	4	20.6	29.5
1.8	6	30.8	46.0
2.1	8	41.1	62.2
2.4	5	25.7	37.8
2.7	6	30.8	46.0
3.0	6	30.8	46.0

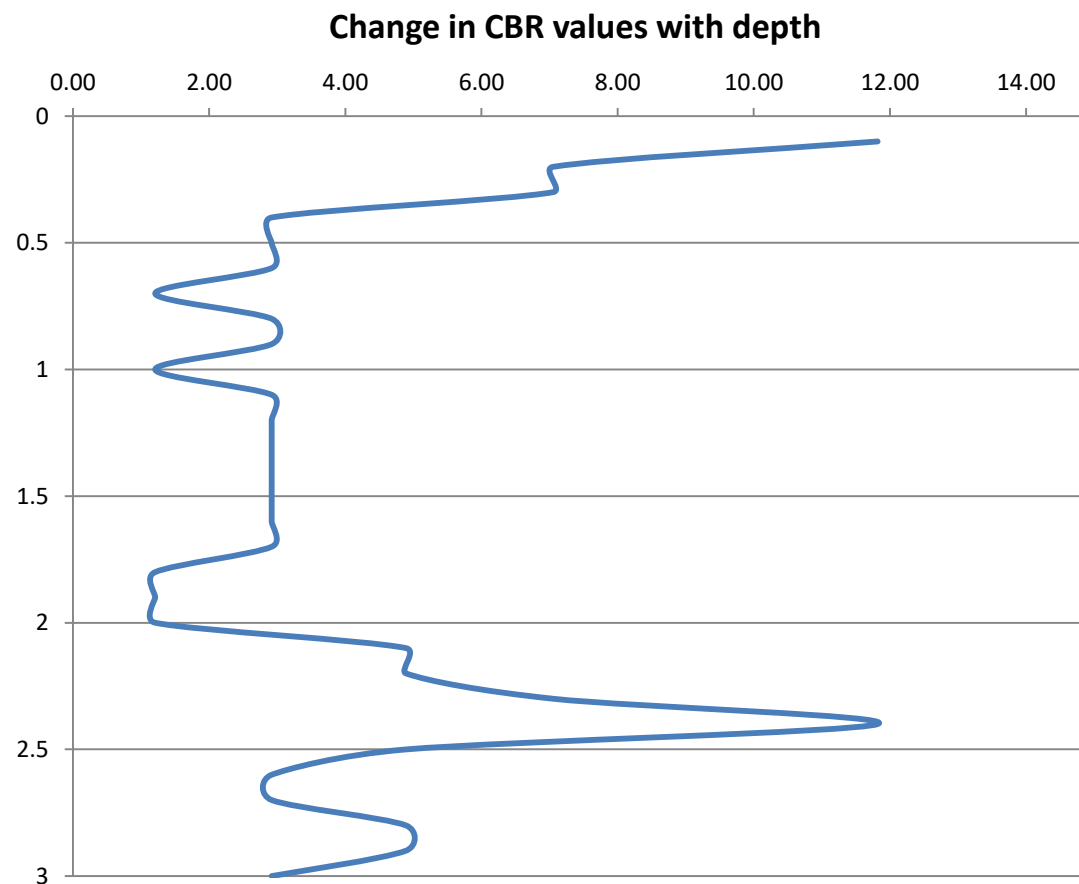


Date of Test 26/11/2019
Completed by TC
Site Name Pitstone Sports Pavilion
Hole number DP1

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	11.82
0.2	7.05
0.3	7.05
0.4	2.92
0.5	2.92
0.6	2.92
0.7	1.21
0.8	2.92
0.9	2.92
1.0	1.21
1.1	2.92
1.2	2.92
1.3	2.92
1.4	2.92
1.5	2.92
1.6	2.92
1.7	2.92
1.8	1.21
1.9	1.21
2.0	1.21
2.1	4.89
2.2	4.89
2.3	7.05
2.4	11.82
2.5	4.89
2.6	2.92
2.7	2.92
2.8	4.89
2.9	4.89
3.0	2.92

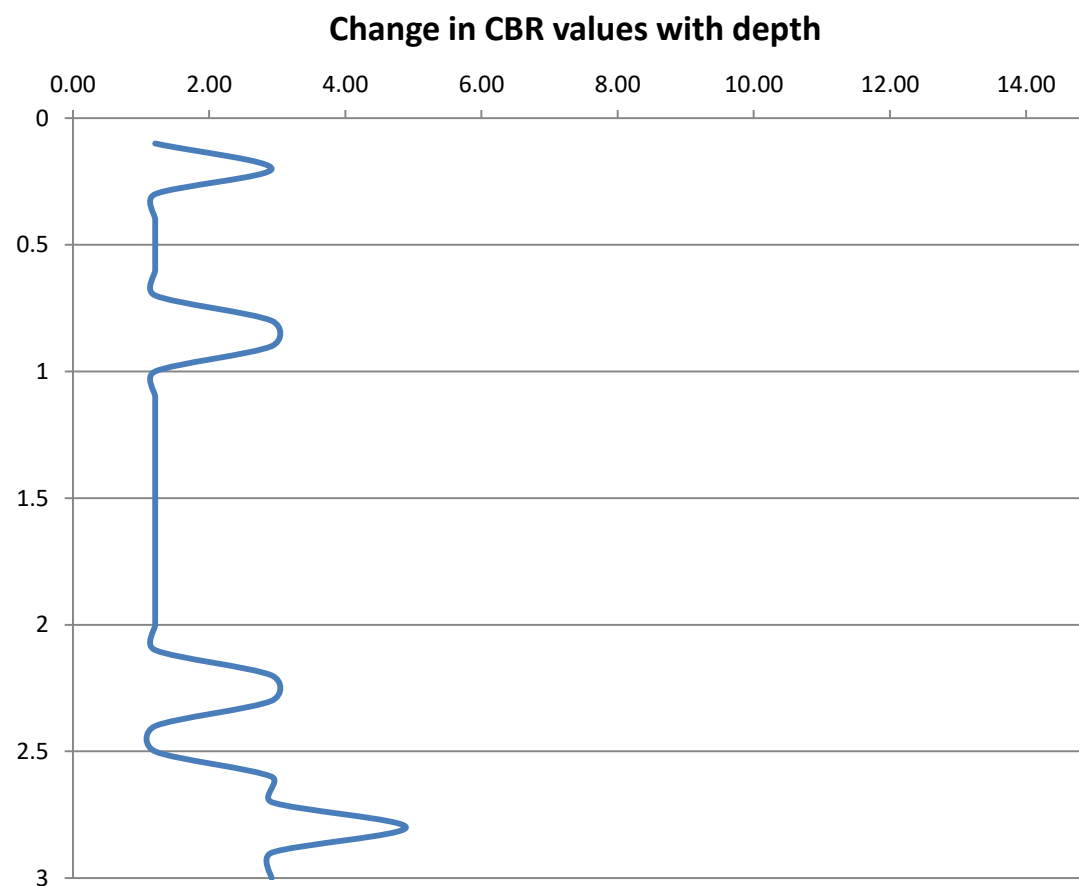


Date of Test 26/11/2019
Completed by TC
Site Name Pitstone Sports Pavilion
Hole number DP2

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	1.21
0.2	2.92
0.3	1.21
0.4	1.21
0.5	1.21
0.6	1.21
0.7	1.21
0.8	2.92
0.9	2.92
1.0	1.21
1.1	1.21
1.2	1.21
1.3	1.21
1.4	1.21
1.5	1.21
1.6	1.21
1.7	1.21
1.8	1.21
1.9	1.21
2.0	1.21
2.1	1.21
2.2	2.92
2.3	2.92
2.4	1.21
2.5	1.21
2.6	2.92
2.7	2.92
2.8	4.89
2.9	2.92
3.0	2.92

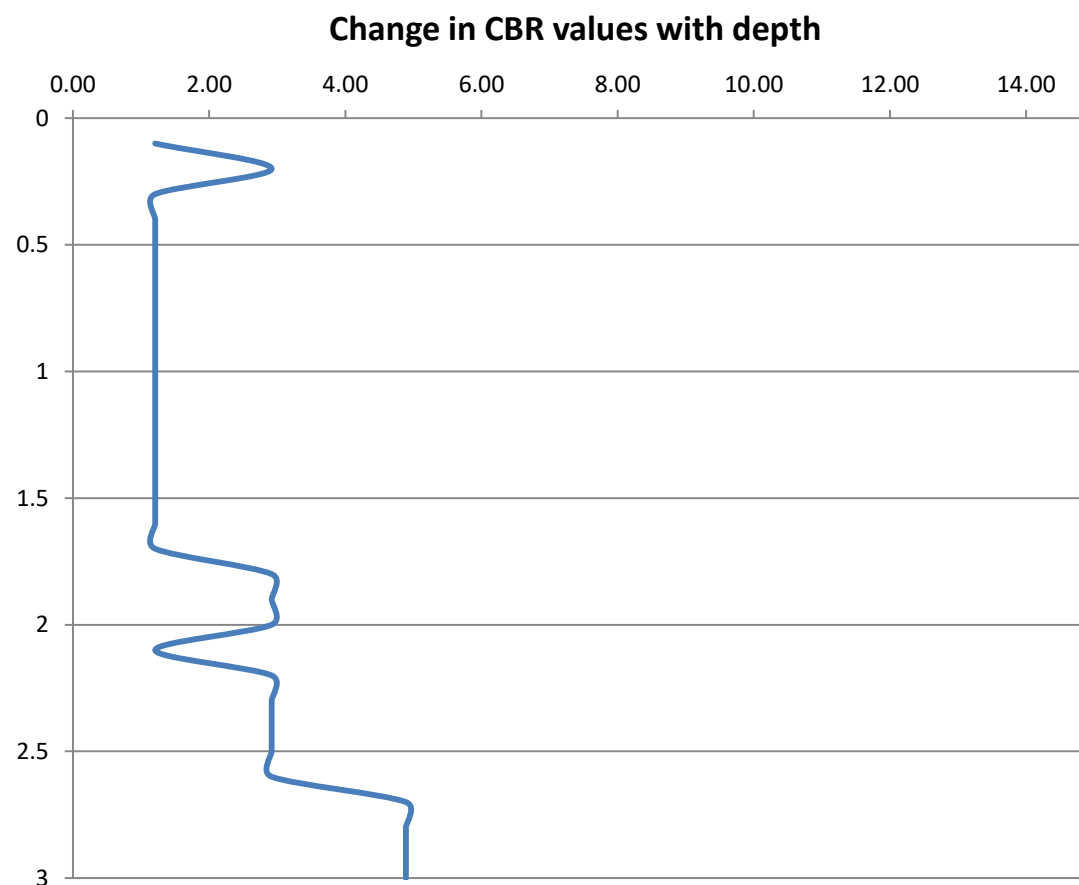


Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP3

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	1.21
0.2	2.92
0.3	1.21
0.4	1.21
0.5	1.21
0.6	1.21
0.7	1.21
0.8	1.21
0.9	1.21
1.0	1.21
1.1	1.21
1.2	1.21
1.3	1.21
1.4	1.21
1.5	1.21
1.6	1.21
1.7	1.21
1.8	2.92
1.9	2.92
2.0	2.92
2.1	1.21
2.2	2.92
2.3	2.92
2.4	2.92
2.5	2.92
2.6	2.92
2.7	4.89
2.8	4.89
2.9	4.89
3.0	4.89

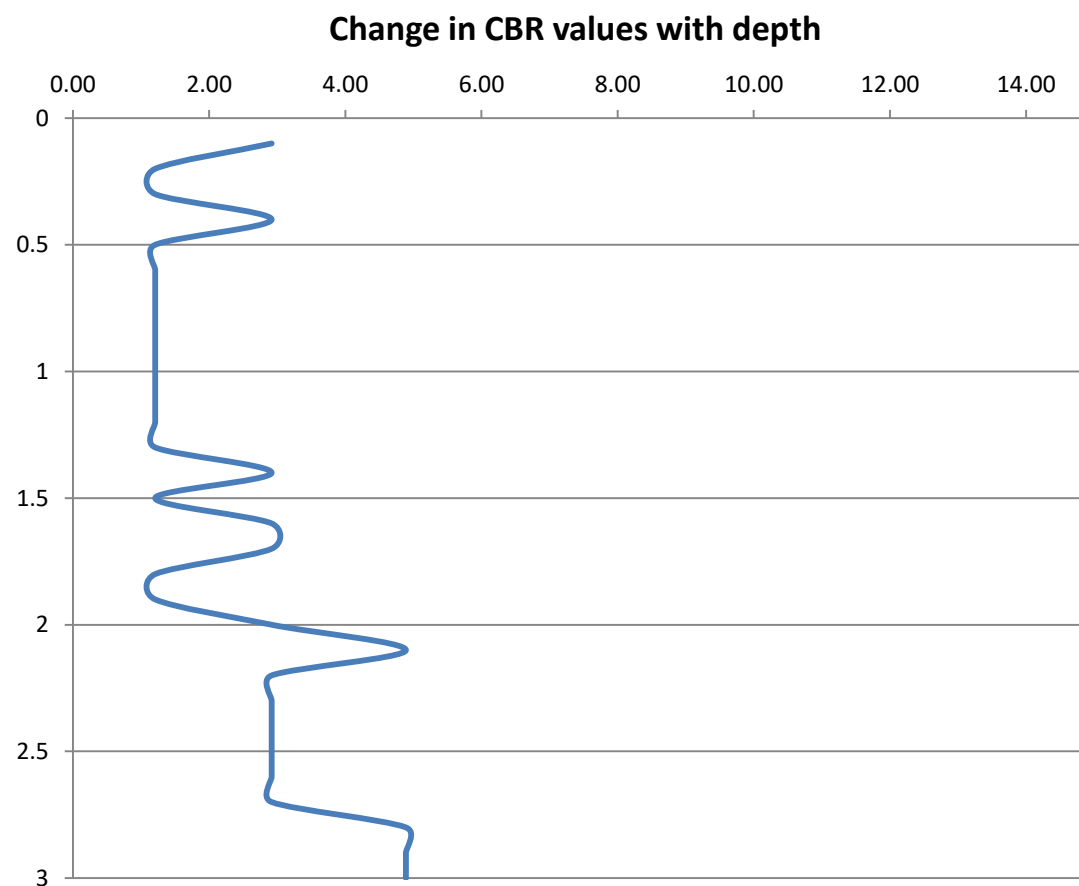


Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP4

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	2.92
0.2	1.21
0.3	1.21
0.4	2.92
0.5	1.21
0.6	1.21
0.7	1.21
0.8	1.21
0.9	1.21
1.0	1.21
1.1	1.21
1.2	1.21
1.3	1.21
1.4	2.92
1.5	1.21
1.6	2.92
1.7	2.92
1.8	1.21
1.9	1.21
2.0	2.92
2.1	4.89
2.2	2.92
2.3	2.92
2.4	2.92
2.5	2.92
2.6	2.92
2.7	2.92
2.8	4.89
2.9	4.89
3.0	4.89



Date of Test	26/11/2019
Completed by	TC
Site Name	Pitstone Sports Pavilion
Hole number	DP5

Values calculated using Kleyn & Van Harden (1983) conversion.

CBR Conversion calculation $\log CBR = 2.628 - 1.273 \log(DCP)$

Depth (m)	CBR (%)
0.1	1.21
0.2	1.21
0.3	1.21
0.4	1.21
0.5	1.21
0.6	1.21
0.7	1.21
0.8	1.21
0.9	1.21
1.0	1.21
1.1	1.21
1.2	1.21
1.3	1.21
1.4	1.21
1.5	2.92
1.6	2.92
1.7	2.92
1.8	2.92
1.9	4.89
2.0	4.89
2.1	2.92
2.2	2.92
2.3	1.21
2.4	2.92
2.5	2.92
2.6	2.92
2.7	2.92
2.8	2.92
2.9	2.92
3.0	2.92

