St Peters Close, Rhosrobin

Proposed Housing

Geoenvironmental Report

SG Estates



GroundSolve Ltd
Consulting Geotechnical, Engineering Geology and Environmental Engineers

CONTENTS

1.0	**INTRODUCTION**	1
2.0	**THE SITE**	2
2.1	Site Location and Description	2
2.2	Geology and Hydrogeology	3
2.3	History	4
2.4	Abandoned Mining	5
3.0	**ENVIRONMENTAL SEARCHES**	6
4.0	**PROPOSED DEVELOPMENT**	8
5.0	**SITE INVESTIGATIONS**	9
5.1	Previous Investigation	9
5.2	This Investigation	9
5.2.1	Fieldwork	9
5.2.2	Laboratory Work	10
6.0	**GROUND CONDITIONS**	12
6.1	General Stratigraphy	12
6.2	Topsoil	13
6.3	Glacial Till	13
6.4	Fluvioglacial Deposits	13
6.5	Groundwater	13
6.6	DCP Testing	14
6.7	Permeability Testing	16
6.8	Services	16
7.0	**RESULTS OF CHEMICAL TESTING**	17
8.0	**CONCEPTUAL GROUND MODEL**	20
8.1	General	20
8.2	Hazard Identification	20
8.3	Summary of Conceptual Ground Model	21
8.4	Pathways	22
8.5	Receptors	22
8.6	Future Site Users Risk Assessment	22
8.7	Controlled Waters Risk Assessment	22
8.8	Construction Workers	23
8.9	Ground Gases	23
8.10	Building Materials	23
8.11	Vegetation	23
9.0	**GEOTECHNICAL RECOMMENDATIONS**	24
9.1	Ground Model	24
9.2	Excavations and Site Preparation	24
9.3	Foundations and Floor Slabs	24
9.4	Drainage	25
9.5	Reuse of Materials	26
9.6	Roads and Hard Standings	26
9.7	Protection of Buried Concrete	26
9.8	Landfill and Radon Gas	27
REFERENCES		28

FIGURES

1. Site Location
2. Site Layout and Exploratory Hole Locations
   2A- Additional Site Investigation Exploratory Hole Location Plan
3. History
4. Proposed Development
5. Cross Sections

APPENDICES

A. General Site Photographs
B. Coal Consultants Report
C. Groundsure Report
D. Trial Pit Logs/Trench photographs
E. Borehole Logs
F. Soakaway Test Results
G. Falling Head Test Results
H. CBR Test Results
I. Physical Test Results
J. Chemical Test Results
K. BGS Radon Report

1.0 INTRODUCTION

SG Estates (SGE) are proposing to purchase and develop a site next to St Peters Close in Rhosrobin, Wrexham. The proposals include some ninety-two residential dwellings, including semi-detached and detached housing, along with apartments.

Consequently, SGE appointed GroundSolve Ltd (GSL) to undertake a Phase II site investigation at the site, with the report issued in October 2021.

Subsequent to the findings of this report, SGE appointed GSL to supplement this report with a Phase I desk study, and undertake further site investigation to inform the drainage strategy, and also investigate the location of a possible backfilled pond.

This report presents the findings of the desk study and site investigations, and gives firm geotechnical recommendations for the development. In addition, conceptual ground models and environmental risk assessments are presented.

2.0 THE SITE

2.1 Site Location and Description

The site is located off Plas Acton and Llay New Road, in Rhosrobin, Wrexham, at National Grid Reference SJ 330, 529, see Figure 1.

It is currently open fields, bounded to the north and west by Plas Acton Road and Cemetery, with the western boundary defined by Llay New Road. The Wrexham Railway Line, in cutting runs along the southeastern boundary of the site. Several small residential estates are present around the site, see Figure 2.

The site comprises three separate open fields, north, south and one to the east of the southern field, divided by hedgerows. A public footpath cuts between the northern and southern/eastern fields. Two overhead power lines cross the site, with one trending west to east, and another southwest-northeast, see Figure 2.

A topographic survey has been provided, which confirms the site to have a gentle fall in elevation in a west to east direction, from around 69mAOD in the west to 65mAOD in the eastern field. A recent aerial photograph is presented below.



Recent aerial photograph

Photographs of the site are presented in Appendix A.

2.2 Geology and Hydrogeology

The geology of the site has been studied on the following sources:

- 1:50,000 scale geology plan, Sheet 121,
- Associated geological memoirs, Reference 1,
- Wrexham applied mapping project at a scale of 1:25,000, Reference 2.

These confirmed the south and western parts of the site to be underlain by glacial till (Boulder Clay), with glaciofluvial deposits (Sand and gravel) recorded in the north and eastern sections of the site.

Reference 2 describes the glacial till as mainly silty, sandy clays, with gravel, cobble and occasional boulder. It contains beds of sand and gravel, which may be water bearing. The clays are generally of low to intermediate compressibility, with small consolidation settlements.

The glacial sand and gravel are described as water bearing, medium dense to dense, well sorted, sand and gravel, with occasional cobbles, and interbedded with medium dense, clean sands, and silty, clayey sands.

Reference 2 records the drift thickness to be around 15m.

Made ground is recorded along the railway line on the southern site boundary.

The underlying bedrock is Carboniferous in age, the strata differing in age across the site. Underlying the majority of the site is the Coed Yr Allt Formation, with the overlying Bettisfield Formation outcropping on the eastern section of the site. The dip of the strata is gentle in an easterly direction, Reference 1.

The Coed Yr Allt Formation, comprises a grey to green, micaceous sandstone, and grey to green mudstone, with thin coals and limestone beds, known as the 'Spirobis' limestone, with local intraformational conglomerate. Whilst the Bettisfield formation is largely mudstone, with minor sandstones.

These strata lie above the Ruabon Formation and the underlying Coal Measures, consequently, any coal seams and associated workings would be anticipated to be at significant depth beneath the site. No mine shafts are record in the vicinity of the site, although Reference 2 confirms past deep mining beneath the site.

The major Wrexham fault is shown to the west of the site trending approximately north to south.

The underlying superficial and bedrock aquifers are classified as a Secondary Aquifer A (Minor), which comprises 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.

Groundwater would be anticipated to be at significant depth beneath the site, although a perched water table on the surface of the low permeability glacial till should be anticipated.

2.3 History

The History of the site has been studied using old Ordnance Survey (OS) plans dating from 1874, at a scale of 1:2,500 unless otherwise stated. In addition, recent aerial photographs have been researched.

The 1874 OS plan shows the site to be within open fields divided by field boundaries. It is bounded to the west and north by unnamed roads, and to the south by a railway line, within a cutting. The westernmost road crosses the railway line on a bridge.

Several buildings were already in existence immediately east of the site, and a Methodist Chapel and housing constructed to the south of the railway line. A Public footpath crosses the northern section of the site trending west to east. 'Wats Dyke' is recorded some 100m east of the site trending north to south, see Figure 3a.

The 1899-1900 OS plan shows a possible pond in the south western section of the site. The section of railway located to the south of the site is now named 'Wheatsheaf Junction', and the farm to the east is now named 'Pandy Farm', see Figure 3b. To the west of the unnamed road, a School, Institute and St Peters Church had been constructed. To the south of the railway line further housing had been constructed, in an area now named Rhosrobin.

No significant changes are recorded on site on the 1912 OS plan, see Figure 3c.

In addition, no changes are recorded on the 1938 OS plan at a scale of 1:10,000, see Figure 3d.

By the 1961 OS plan the road on the western boundary had been named 'New Llay Road', and appears to have been widened and constructed on a low embankment. The pond feature is no longer shown and was presumably backfilled during the widening of New Llay Road. The road to the north had been named 'Plas Acton Road'. A small rectangular building had been constructed on the eastern site boundary associated with Pandy Farm, see Figure 3e.

The 1974 OS plan at as scale of 1:10,000 shows no significant changes to the site, see Figure 3f.

The 1992 OS plan at a scale of 1:10,000 confirms that the building in the eastern to the east of the site is no longer recorded. Further residential development had taken place around the site, see Figure 3g.

The 2010 OS plan at a scale of 1:10,000 shows no significant changes to the site or its surroundings, see Figure 3h.

Aerial photographs dating from 2000 confirm the site to be open fields, with the footpath clearly visible. The cemetery to the north of the site had been constructed and being used by June 2009. The overhead power lines appear to have been installed between 2017 and 2020.

2.4 Abandoned Mining

A Consultant's Coal Mining Report was obtained from the Coal Authority for the site. The report is presented in full in Appendix B, with the findings summarised below:

- The shallowest worked seam is the Powell seam at a depth of 248m to the west of the site.
- The site is underlain by workings in the Quaker seam at a depth of 694m and the Main seam at 708m, last worked in the 1960s.
- There are no probable unrecorded shallow workings.
- There are no mine entries within 100m of the site.

The workings underlying the site at depth are sufficiently deep that they will pose no significant risk to the proposed development.

3.0 ENVIRONMENTAL SEARCHES

A Groundsure report was obtained for the purpose of this investigation. The main findings are summarised below, with the report presented in full in Appendix C.

Agency and Hydrological

- There are no groundwater abstractions within 500m of the site,
- The closest water feature is 185m northeast of the site, and is the River Alyn,
- The closest discharge consent is 91m north east of the site at Pandy Industrial estate, and is a storm overflow,
- The closest licensed pollutant release is 304m south of the site, and is waste oil burner,
- The site is not at risk from flooding from rivers or seas,
- There is a moderate risk of groundwater flooding on site.

Waste

- There are no active landfills within 500m of the site,
- There are no BGS historical landfills within 500m of the site,
- One historical landfill is recorded by the environment agency 434m south west of the site, but was only used between 1990 and February 1991,
- There are no licensed waste sites within 500m,
- The closest waste exemption site is 380m south west of the site, and is an agricultural farm, which spreads waste onto land,
- The closest infilled land is 7m south of the site.

Geology

The BGS has estimated the soil chemistry for the site as follows:

- Arsenic <15mg/kg,
- Cadmium <1.8 mg/kg,
- Chromium 60 – 90 mg/kg,
- Lead <100 mg/kg,
- Nickel 15 – 30 mg/kg.

In addition, the following geological information was provided:

- There are no shrinking or swelling clay hazards on site,
- The potential to encounter running sands is very low,
- There are no compressible ground hazards,
- The potential to encounter collapsible ground is very low,
- The potential to encounter landslides is very low,

- There are no ground dissolution hazards,
- Small scale underground mining for iron ore was located 222m west of the site,
- The site is located within a coal mining area.
- The site is in a high probability radon area where between 10 and 30% of homes are estimated to be at or above the action level,
- Therefore, full radon protective measures are required in the construction of new dwellings or extensions.

Industrial Land Use

- The closest active trade directory is 45m east of the site, and is Pandy Business Park,
- An unspecified tank is recorded 5m south east of the site,
- A petrol filling station was recorded 492m south east of the site,
- There are no current petrol stations within 500m of the site,
- A historical garage was recorded 117m south west of the site,
- There are no sites considered to be contaminated within 500m.

Sensitive Land Use

- There are no Sites of Specific Scientific Interest (SSSI) within 1km of the site,
- There are no Local Nature reserves within 1km of the site,
- An area of ancient woodland is recorded 119m north of the site.

4.0 PROPOSED DEVELOPMENT

SGE are proposing to develop the site with ninety-two residential properties on the southern field. The plans include a series of affordable dwellings comprising apartments and housing, as well as private dwellings comprising detached and semidetached houses. A new road is also proposed for access to the site. The current proposed development layout is presented in Figure 4.

Current plans involve directing the surface drainage from the southern field to a large cellular soakaway and ecology pond on the eastern field, see Figure 4.

Building loads and levels have not been provided, however, foundation loads are anticipated to be between 50 to 75kN/m run, with floor slab loadings not exceeding 5kN/m².

Due to the flattish nature of the site, development levels are anticipated to be at/close to grade.

The recommendations given in this report are based on the above assumptions, therefore, they should be reviewed and if necessary revised during the detailed design.

5.0 SITE INVESTIGATIONS

5.1 Previous Investigation

GSL carried out a full Phase II investigation on a site immediately east of this site on the other side of the railway line.

The ground conditions at this site comprised glacial till (clay) and fluvioglacial deposits (sand and gravel).

The glacial till was generally described as firm to stiff, brown, slightly sandy slightly gravelly clay. It generally had a weathered upper layer, which was orange, brown in colour, and slightly weaker, being firm. Physical testing recorded the clay to be of low plasticity.

The fluvioglacial deposits generally comprised loose becoming medium dense, brown, slightly clayey, gravelly, fine to coarse sand, with a low cobble content. PSD testing confirmed that silt/ clay contents were below 10%.

No contamination was encountered on the site, and chemical attack of buried concrete was not an issue. Permeabilities within the sand and gravel were generally between $1x10^{-4}$ and $7x10^{-6}$ m/sec.

5.2 This Investigation

5.2.1 Fieldwork

The site investigation was divided into three phases.

Phase I was the investigation for the proposed development in the southern field, which was undertaken on the 4th August 2021.

It comprised:

- Eleven machine excavated trial pits, excavated to a maximum depth of 2.90m,
- Hand Shear Vein (HSV) testing within the glacial till to determine the shear strength of the cohesive soils,
- Sixteen CBR tests undertaken using a TRL probe to depths up to 1.00m.

Phase II was the investigation in the eastern field to determine the ground conditions for drainage design. It was carried out between 9th and 10th September, and the 17th to 22nd of September.

It comprised:

- Eleven machine excavated trial pits, excavated to a maximum depth of 3.0m,
- Two trenches to determine the extent of the shallow sand and gravel,
- Four boreholes, to a maximum depth of 10m,
- Standpipes were installed in two boreholes for groundwater monitoring,
- Soakaway testing carried out in two trial pits (three cycles in each pit),
- Falling Head Tests carried out at approx. 1.0m intervals within sand and gravel in the boreholes.

Phase III comprised four machine excavated shallow trenches to determine the extent of the backfilled pond, its depth and the nature of the backfill.

The trial pits, boreholes and CBR testing was supervised and logged by a GSL Engineer in general accordance with BS 5930, Reference 3.

The Soakaway testing was carried out by filling the trial pits quickly with water from a 1,600-gallon water tanker and monitoring the water level in accordance with BRE Digest 365, Reference 4.

The falling head tests in the boreholes were carried out in general accordance with BS EN ISO 22282-1, Reference 5.

The locations of the trial pits, trenches, boreholes and CBR tests from all phases of the investigation are presented in Figures 2 and 2a, with the trial pit logs/trench photograph, borehole logs, soakaway tests and CBR results presented in the following Appendices.

- Trial pit logs/Trench photographs – Appendix D,
- Borehole Logs- Appendix E,
- Soakaway Tests – Appendix F,
- Falling Head Tests- Appendix G,
- CBR Test Results – Appendix H.

5.2.2 Laboratory Work

Samples were taken from the trial pits and boreholes for the following chemical and physical analysis:

Physical Testing

- Natural moisture content,
- Atterberg limits,
- pH & water-soluble sulphate (2:1 extract).

The testing was carried out in accordance with BS1377, Reference 6. The results are discussed in Section 6.0, and presented in full in Appendix I.

Chemical Testing

Samples for chemical testing were taken from the topsoil, placed in appropriate containers and a cool box, and taken immediately to the laboratories of Derwentside Environmental Testing Services (DETS) in County Durham for the following testing:

Metals & Non-metals - Arsenic (As), Boron (B), Cadmium (Cd), Chromium (Trivalent), Chromium (Hexavalent), Copper (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Phenol, Selenium (Se), and Zinc (Zn).

Petroleum Hydrocarbons - Benzene, Toluene, Ethylbenzene, o-xylene, m-xylene, p-xylene, Aliphatics >C5 – C44, Aromatics >EC5 – EC44.

Polyaromatic Hydrocarbons (PAH) – Acenaphthene, Acenaphthylene, Anthracene, Benz (a) anthracene, Benzo (a) pyrene, Benzo (b) fluoranthene, Benzo (g, h, i) perylene, Benzo (k) fluoranthene, Chrysene, Dibenzo (a, h) anthracene, Fluorene, Fluoranthene, Indeno (1,2,3-cd) pyrene, Naphthalene, Phenanthrene, Pyrene.

Other Contaminants – Sulphide (easily liberated), Water soluble Sulphate (2:1 extract), Cyanide, pH, Soil Organic Matter (SOM).

In addition, asbestos screening was carried out on all samples.

The results are summarised in Section 7.0, and the results presented in full in Appendix J.

6.0 GROUND CONDITIONS

6.1 General Stratigraphy

The general stratigraphy encountered in the Phase I and II investigations is summarised below in Table 6.1:

Table 6.1 Summary of Ground Conditions

BH/TP No.	Topsoil (m)	Glacial Till (m)	Fluvioglacial Deposits (m)
TP01	0.00-0.35	0.35-2.10	2.10-2.70
TP02	0.00-0.40	0.40-2.90	
TP03	0.00-0.40	0.40-2.10	2.10-2.60
TP04	0.00-0.45	0.45-2.40	2.40-2.75
TP05	0.00-0.20	0.20-1.60 2.00-2.70	1.60-2.00
TP06	0.00-0.45	0.45-2.70	
TP07	0.00-0.30	0.30-2.70	
TP08	0.00-0.30	0.30-2.30 2.50-2.90	2.30-2.50
TP09	0.00-0.35	0.35-2.60	
TP10	0.00-0.35	0.35-2.70	
TP11	0.00-0.40	0.40-2.75	
TP201	*0.00-0.20*		*0.20-2.00*
TP202	*0.00-0.25*	*0.25-2.00*	
TP203	*0.00-0.20*		*0.20-1.30*
TP204	*0.00-0.20*	*0.20-1.80*	
TP205	*0.00-0.15*	*0.15-1.50*	
TP206	*0.00-0.25*	*0.25-1.50*	
TP207	*0.00-0.25*	*0.25-2.00*	
TP208	*0.00-0.25*	*0.25-2.50*	
TP209	*0.00-0.25*	*0.25-0.40*	*0.40-3.40*
TP210	*0.00-0.30*	*0.60-1.80* *3.10-3.20*	*0.30-0.60* *1.80-3.10*
TP211	*0.00-0.30*	*0.30-3.00*	
BH01	*0.00-0.40*		*0.40-10.00*
BH02	*0.00-0.40*	*2.30-5.00*	*0.40 – 2.30*
BH2A	*0.00-0.50*	*0.50-4.80*	*4.80-7.50*
BH03	*0.00-0.60*	*0.40-4.40*	*4.40-10.00*

Boreholes and trial pits in italics undertaken during Phase II.

Cross sections through the eastern section of the site are presented in Figure 5.

In addition, four trenches were excavated at the location of the backfilled pond identified in the desk study. These comprised 0.00-0.30m of topsoil overlying glacial till to a maximum depth of 1.50m, see Appendix D.

6.2 Topsoil

Topsoil was encountered across the entire site to a maximum depth of 0.60m, although it was generally around 0.30m thick. It was generally described as grass over loose, brown, gravelly, slightly clayey sand.

pH values between 5.7-8.6 were recorded, with sulphate values, when measured as 2:1 water extract between 12 and 95 mg/l (0.012 to 0.095g/l).

6.3 Glacial Till

Glacial Till was encountered in all exploratory holes, apart from BH01, TP201 and TP203 in the eastern field. It was proved to a maximum depth of 5m, and generally comprised firm to stiff, brown, mottled blue, sandy, gravelly clay.

Hand Shear Vein Testing (HSV) recorded shear strengths ranging between 40kPa (Soft) and 100KPa (Stiff).

Atterberg limit testing recorded liquid limits between 27 and 34%, plastic limits between 13 and 14%, and plasticity indices between 14 and 17%, indicating a clay of low plasticity. Natural moisture contents were between 13 and 14%.

pH values were between 6.7 and 7.7, with sulphate values, when recorded as 2:1 water extract between <10 and 62 mg/l (<0.01 and 0.062g/l).

6.4 Fluvioglacial Deposits

Fluvioglacial deposits were generally encountered at depth beneath the glacial till on the south field. Whilst in the eastern field they were encountered both near surface and at depth.

It was generally described as loose to medium dense, brown, slightly clayey, gravelly, fine to coarse sand, with a low cobble content.

The area where sand and gravel was encountered consistently near surface is presented on Figure 2a.

6.5 Groundwater

No groundwater strikes were recorded in any of the boreholes or trial pits.

However, the standpipes installed in BH01 and BH03, were monitored for twelve weeks on the following dates:

Date	Groundwater Level
13/09/2021	Non encountered
20/09/2021	Non encountered
05/10/2021	Non encountered
19/10/2021	Non encountered
16/11/2021	Non encountered
29/11/2021	Non encountered

During this time groundwater was not recorded in either borehole.

6.6 DCP Testing

Dynamic Cone Penetrometer (DCP) testing was carried out across the southern field, to determine CBR values for pavement design. The results are summarised in Table 5.2 below.

Table 5.2: DCP Results

Test No	Depth (m)	CBR %
DCP1	0-280	7.7
	280-400	13.4
	400-800	18.6
DCP2	0-280	5.3
	280-800	8.3
DCP3	0-280	5.8
	280-400	10.1
	400-800	14.2
DCP4	0-280	3.5
	280-400	8.3
DCP5	0-280	5.7
	280-400	10.1
	400-800	6.0
DCP6	0-280	7.5
	280-400	8.3
	400-800	6.3
DCP7	0-280	5.5
	280-400	12.7
	400-800	14.2
DCP8	0-280	4.5
	280-400	14.2
	400-800	8.3
DCP9	0-280	6.1
	280-400	8.3
	400-800	7.5
DCP10	0-350	5.8
	350-700	8.0
	700-900	20.1
DCP11	0-300	12.7
	300-650	16.1
	650-850	38.6
DCP12	0-280	5.5

	280-400	12.7
	400-800	8.0
DCP13	0-400	15.1
	400-800	9.3
	800-900	45.4
DCP14	0-300	6.5
	300-550	23.9
	550-800	14.2
DCP15	0-800	8.9
DCP16	0-250	8.0
	250-400	23.9
	400-900	16.1

6.7 Permeability Testing

Permeability testing was concentrated in the eastern field in the sand and gravel deposits at surface, where the proposed drainage for the housing development is to be directed.

The results are summarised in Table 5.3 below:

Table 5.3 Soakaway Test Results

TP No.	Depth (m)	Test No.	Infiltration Rate (m/s)
201	2.00	1	2.6×10^{-5}
		2	1.6×10^{-5}
		3	2.0×10^{-5}
203	1.10	1	3.7×10^{-5}
	1.10	2	2.5×10^{-5}
	1.10	3	2.6×10^{-5}

As only a very limited area of sand and gravel at surface was identified, Falling Head Testing was undertaken at approximately 1.0m intervals in the boreholes.

The results are summarised in Table 5.4 below:

Table 5.4 Falling Head Permeability Test Results

BH No.	Depth (m)	Infiltration Rate (m/s)
BH01	3.00-4.00	7.79×10^{-4}
	4.50-5.50	1.37×10^{-4}
	5.50-6.50	9.4×10^{-4}
	7.00-8.00	3.35×10^{-3}
BH2a	5.00-6.00	1.00×10^{-3}
BH3	5.00-6.00	1.50×10^{-4}
	6.00-7.00	4.9×10^{-3}
	8.00-9.00	2.25×10^{-3}

6.8 Services

Two overhead power lines cross the site, one trending west to east, with the other trending southwest to northeast, both crossing the south and east fields. A sewage line also crosses the site from the south west, before following the public footpath to the east. A medium pressure gas main also crosses the site, see Figure 2.

7.0 RESULTS OF CHEMICAL TESTING

Samples were taken from the topsoil for chemical testing, with the sample depths presented in Table 6.1 below.

Table 6.1 Sample Depths

TP No	Depth (m)
TP01	0.20
TP04	0.20
TP06	0.20
TP09	0.20
TP11	0.20

The results of the soil analyses are presented below, where they have been compared to suitable generic assessment criteria (GACs), in order to allow a generic quantitative risk assessment (GQRA) to be carried out for the site and the proposed development.

The Category 4 Screening Levels (C4SLs) published by DEFRA (2014) have been adopted in the first instance, which have been published for six substances to date. Where a C4SL is unavailable, the "Suitable 4 Use Levels" (S4ULs) published by LQM/CIEH (2015) have been adopted.

These criteria have been derived using the CLEA model for a range of standard end-use scenarios and a range of soil organic matter (SOM) contents. It should be noted that the C4SL values are derived on the basis of a "low level of toxicological concern", while the S4UL values are based on a "tolerable" or "minimal" level of risk. As such, the S4ULs describe a lower level of risk than the C4SLs, and are equivalent to the former Soil Guideline Values (SGVs, published by the Environment Agency) and the previous editions of the LQM/CIEH GAC values.

A "residential with gardens" end-use has been adopted for this analysis, based on a SOM content of 1.0%.

Note: the S4UL values presented below are Copyright Land Quality Management Limited, reproduced with permission; Publication Number S4UL3668. All rights reserved.

Metals & Non-Metals	TP01 0.20	TP04 0.20	TP06 0.20	TP09 0.20	TP11 0.20	Adopted Guideline (mg/kg)	Source	Exceedances
Arsenic	13	8.10	9.20	10	11	37	C4SL	0
Boron, Water Soluble	0.2	0.30	0.50	0.4	0.4	290	S4UL	0
Cadmium	0.2	0.30	0.40	0.4	0.2	22	C4SL	0
Chromium III	16	15	21	18	19	910	S4UL	0
Chromium, Hexavalent	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	21	C4SL	0
Copper	26	17	29	25	25	2400	S4UL	0
Lead	81	53	87	54	56	200	C4SL	0
Mercury	0.09	0.06	0.11	0.07	0.07	1.2	S4UL	0
Nickel	14	12	13	17	18	130	S4UL	0
Phenol – Monohydric	0.3	< 0.3	0.50	0.4	0.4	120	S4UL	0
Selenium	2.4	1.90	1.60	1.9	1.1	250	S4UL	0
Zinc	220	170	66	72	57	3700	S4UL	0

None of the above values exceed the relevant guidance values for residential land use with gardens.

Petroleum Hydrocarbons	TP01 0.20	TP04 0.20	TP06 0.20	TP09 0.20	TP11 0.20	Adopted Guideline (mg/kg)	Source	Exceedances
Aliphatic C5-C6	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	42	S4UL	0
Aliphatic C6-C8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	100	S4UL	0
Aliphatic C8-C10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	27	S4UL	0
Aliphatic C10-C12	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	130	S4UL	0
Aliphatic C12-C16	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	1100	S4UL	0
Aliphatic C16-C21	< 1.5	< 1.5	< 1.5	<1.5	< 1.5	65000	S4UL	0
Aliphatic C21-C35	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	65000	S4UL	0
Aliphatic C35-C40	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	70	S4UL	0
Aromatic C5-C7	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	130	S4UL	0
Aromatic C7-C8	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	34	S4UL	0
Aromatic C8-C10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	74	S4UL	0
Aromatic C10-C12	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	140	S4UL	0
Aromatic C12-C16	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	260	S4UL	0
Aromatic C16-C21	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	1100	S4UL	0
Aromatic C21-C35	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	1100	S4UL	0

None of the above values exceed the relevant guidance values for residential land use with gardens.

Polyaromatic Hydrocarbons (PAH)	TP01 0.20	TP04 0.20	TP06 0.20	TP09 0.20	TP11 0.20	Adopted Guideline (mg/kg)	Source	Exceedances
Acenaphthene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	210	S4UL	0
Acenaphthylene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	170	S4UL	0
Anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	2400	S4UL	0
Benzo(a)anthracene	0.1	0.03	< 0.03	0.11	0.03	7.2	S4UL	0
Benzo(a)pyrene	0.08	< 0.03	< 0.03	0.1	< 0.03	5	C4SL	0
Benzo(b)fluoranthene	0.19	0.10	0.10	0.22	0.11	2.6	S4UL	0
Benzo(g,h,i)perylene	0.03	< 0.03	< 0.03	0.05	< 0.03	320	S4UL	0
Benzo(k)fluoranthene	0.04	< 0.03	< 0.03	0.05	< 0.03	77	S4UL	0
Chrysene	0.1	< 0.03	< 0.03	0.12	0.04	15	S4UL	0
Dibenzo(a,h)anthracene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.24	S4UL	0
Fluoranthene	0.21	0.05	0.07	0.21	0.06	280	S4UL	0
Fluorene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	170	S4UL	0
Indeno(1,2,3-c,d)pyrene	0.03	< 0.03	< 0.03	0.05	< 0.03	27	S4UL	0
Naphthalene	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	2.3	S4UL	0
Phenanthrene	0.05	< 0.03	< 0.03	0.07	< 0.03	95	S4UL	0
Pyrene	0.19	0.04	0.06	0.18	0.05	620	S4UL	0

None of the above values exceed the relevant guidance values for residential land use with gardens.

Other Contaminants / Testing	TP01 0.20	TP04 0.20	TP06 0.20	TP09 0.20	TP11 0.20	Adopted Guideline (mg/kg)	Source	Exceedances
Organic matter	4	4.20	4.60	4.4	4.3	-	-	-
pH	6.5	-	5.70	8.6	5.7	-	-	-
Sulphide	24	< 10	20.00	< 10	< 10	-	-	-
Cyanide, Total	0.5	0.50	0.70	0.6	0.6	-	-	-
Sulphur (free)	1.3	< 0.75	2.10	1.2	< 0.75	-	-	-
Sulphate Aqueous Extract as SO4	95	16.00	19.00	12	15	-	-	-

None of the above values cause any concern.

In addition, no asbestos was detected in any of the samples.

8.0 CONCEPTUAL GROUND MODEL

8.1 General

According to the Contaminated Land Regulations, to determine whether there is a significant possibility of significant harm, the following should be considered:

"The nature and degree of harm, the susceptibility of the receptors and the timescale within which the harm might occur".

Current good practice therefore requires that the findings from the desk study or site investigation be evaluated for contamination on a site-specific basis using a risk-based approach. Risk assessment involves identification of the hazards and evaluation of the risks associated with these hazards. Risk assessment requires an evaluation of a conceptual "source – pathway – receptor" linkage model and can be qualitative or quantitative.

The basis of an environmental risk assessment involves identifying a 'source' of contamination, a 'pathway' along which the contamination may migrate and a 'receptor' at risk from the contamination.
Current legislation defines the various elements of the pollution linkage as:

- A contaminant 'source' is a substance, which is in, or under the ground, and which has the potential to cause harm or to cause pollution of controlled waters.
- A 'pathway' is one or more routes through which a receptor is being exposed to, or affected by, a contaminant, or could be so affected.
- A 'receptor' is either a living organism, an ecological system, a piece of land or property, or controlled water.

A pollutant linkage indicates that all three elements have been identified. The site can only be defined as 'Contaminated Land' if a pollutant linkage exists and the contamination meets the criteria above.

8.2 Hazard Identification

On Site

The desk study has revealed that the site's only use has been as agricultural open fields. Therefore, the only risk of contamination is from minor fuel spills from farm vehicles using the site, however, as the site has been used for grazing this is considered to be a very low risk.

The trial pits/trenches and boreholes failed to reveal any visual or olfactory evidence of contamination, which was confirmed by the chemical testing.

Whilst a backfilled pond has been identified near the proposed development for Plot 7, the excavation of trenches in the area failed to reveal any visual evidence of a backfilled pond.

The reason for this is considered to be that when New Llay Road was widened, it was placed on a low embankment. The backfilled pond was probably below this works, and would have been excavated and backfilled during the widening of the road.

A structure was also identified on site associated with Pandy Farm, although this is likely to have been an outbuilding it is not in the development footprint and is therefore not an issue.

Off Site

The desk study has revealed that there were several potential contaminative land uses close to the site. The closest being the railway on the eastern site boundary, which is still in use. This could have resulted in contamination, associated with the railway, although as there were no associated sidings, this is considered unlikely. However, the railway line is in cutting past the site and a such any contamination would be at depth beneath the site and unable to migrate beneath the site and affect future site users.

Other sources such as the collieries and iron works are considered to be at sufficient distance from the site as not to be an issue.

8.3 Summary of Conceptual Ground Model

Potential Contamination Sources	**Potential Contaminants of Concern**	**Potential Pathways**	**Receptor Group**
Localised Made Ground/demolition debris Possible hydrocarbon spills	Heavy Metals Asbestos PAH Petroleum Hydrocarbons	Inhalation/ingestion of contaminated dust Dermal contact Ingestion of soil	Construction Workers Site end users
		Leaching of contaminated materials Lateral Migration and Infiltration of gas/water	Surface and groundwater Building materials and buried services

8.4 Pathways

In relation to any on site contamination reaching potential site users, the following pathways are generally considered for this type of development:

- Ingestion and skin contact with soils on site,
- Ingestion of home-grown vegetables,
- Inhalation of ground gas,
- Inhalation of contaminated dust,
- Leaching of contaminated materials that may affect controlled waters,
- Direct contact with contaminated material during construction,
- Infiltration and accumulation of ground gas.

8.5 Receptors

The potential impact of a hazard must be assessed with regard to the following target groups:

- Future site users,
- Construction workers,
- Surface and groundwater, both on and off the site,
- Nearby vegetation,
- Building materials and buried services.

8.6 Future Site Users Risk Assessment

The site is to be developed with a residential housing estate, which is one of the most sensitive end uses, and gardens are planned throughout the development.

The desk study failed to reveal any past contaminated land uses and no visual or olfactory evidence of contamination was encountered in any of the boreholes or trial pits, which was confirmed by the chemical testing.

The site is therefore considered to be uncontaminated and fit for its intended land use.

However, it would be prudent to undertake a watching brief during shallow excavations. Any potentially contaminated material encountered should be excavated, stored safely on site, tested and then disposed of at a suitably licensed landfill facility.

8.7 Controlled Waters Risk Assessment

When considering the risk to controlled waters both surface waters and underlying aquifers have to be considered.

In this case, due to the lack of contamination and the green field nature of the site, the risk to controlled waters is considered to be negligible.

8.8 Construction Workers

The risk to construction workers is considered to be very low; and can be catered for by appropriate PPE and washing facilities in accordance with current good practice.

8.9 Ground Gases

No significant sources of ground gases have been identified during the desk study or site investigation works.

Therefore, there is considered to be a negligible risk to the development from ground gas.

However, the radon report has indicated that full radon protection measures are required, see Section 9.8.

8.10 Building Materials

The investigation has not revealed any contamination that could adversely affect building materials or services, although this should be checked with the statutory suppliers, who should be supplied with the laboratory test results.

8.11 Vegetation

The investigation has confirmed that there is no risk to vegetation on site and the topsoil is suitable to be re used in garden and landscaping areas.

9.0 GEOTECHNICAL RECOMMENDATIONS

9.1 Ground Model

To understand the foundation and drainage recommendations it is useful to understand the depositional history of the soils on site.

Firstly, the glacial till is deposited beneath advancing ice sheets during the last glaciation, with Reference 1 recording an ice thickness in this area of around 400m.

Secondly, as the ice sheets retreat the glacial meltwaters deposit sand and gravel, usually in a fining upwards sequence, as the flow from the meltwaters subsides. Consequently, permeabilities would be anticipated to generally increase with depth, which appears to be the case from the falling head test results in the boreholes.

In addition, the water flow would erode the surface of the glacial till, forming an uneven surface, with some channels cut into the surface of the till. The uneven surface also explaining why the sand and gravel is unevenly spread across the site.

9.2 Excavations and Site Preparation

Firstly, it will be necessary to strip the topsoil, which should be stockpiled on site for later re use. However, there is likely to be a surplus, which could be sold on, or alternatively, it could be used for landscaping bunds in the eastern section of the site.

It will also be necessary to remove the mature hedgerows on the southern field, with the roots grubbed out. Excavations where they are not in building areas can be backfilled with suitable site won material, such as the sand and gravel. Whilst in building areas excavations should be backfilled with suitable imported granular material compacted in accordance with an approved earthworks specification, Reference 7.

Excavations are likely to be unstable in the short term, especially in the sand and gravel horizons. Consequently, excavations deeper than 1.20m will need to be battered back or shored for safety reasons. For any attenuation ponds the side slopes should be cut at a gradient of 1 on 2 (26.5º).

Groundwater seepages are not anticipated, if encountered, they should be slight and easily catered for by pumping from sumps cut within the excavation.

9.3 Foundations and Floor Slabs

The proposed development area is underlain by firm to stiff glacial till, although occasional soft spots were recorded.

Consequently, conventional spread foundations are recommended for the development founded in clay of at least firm consistency, designed assuming an allowable bearing capacity of 100kN/m², which based on the anticipated loadings a 600mm wide excavation bucket width should suffice.

However, there is a slight possibility that the ground conditions may vary across a plot, from sand and gravel to glacial till, especially in the eastern section of the development. Whilst it would be normal practice to locally deepen foundations to ensure a uniform bearing strata, if the sand and gravel proves to be say thicker than 2m, the foundations should be lightly reinforced.

Foundations should be a minimum of 0.90m below final external ground level, and if any trees are within influencing distance of the plots the foundation depths will need to be assessed in accordance with Reference 8, with a low volume change potential assumed.

The historical plans identified a backfilled pond to the rear of Plot 7. This is most likely to have been a "Marling Pit" used by local farmers, experience of which shows they are generally around 2m deep. However, trial trenches were excavated at the rear of Plot 7 in the plotted position of the pond, with no evidence of it being encountered.

Therefore, it is considered to be beneath the low embankment supporting New Llay Road and not beneath the proposed development footprint.

Floor slabs can be designed to be ground bearing, designed assuming a "Poor" formation in the clay, as described in Reference 9.

9.4 Drainage

A drainage strategy for the site was undertaken by Waterco in August 2021 for SGE. This report concluded that soakaways were not feasible in the development area, which is underlain by low permeability glacial till. However, two trial pits in the eastern field confirmed the presence of sand and gravel with permeabilities between 1.137×10^{-5} and 1.45×10^{-5} m/sec.

It also concluded that a 20m standoff from the railway cutting is required between the cutting and any infiltration basin.

Soakaway testing in trial pits at shallow depth during this investigation recorded permeabilities between 1.6 and 3.7×10^{-5} m/sec, which is similar to those recorded above.

However, deeper testing at depths greater than 3m in the boreholes recorded higher permeabilities between 2.25×10^{-3} and 9.4×10^{-4} m/sec as anticipated from the ground model.

Therefore, the investigation has confirmed that soakaway drainage in the sand and gravel in the eastern field is suitable. The proposed location of the drainage is presented in Figure 4.

9.5 Reuse of Materials

As discussed above the topsoil on site can be re used.

As the site is fairly flat, it is not envisaged that any cut/fill will be required. However, both the glacial till and sand and gravel will be suitable for re-use as a general structural fill. The sand and gravel has a low fines content, consequently, it will conform to several of the earthwork's classifications given in Reference 7, as will the glacial till. It will also be a more reliable fill material than the glacial till, as it is not susceptible to the effects of wet weather.

It would therefore be prudent to phase the works so that sand and gravel is excavated from soakaways first and then stockpiled for re-use elsewhere.

Based on the Atterberg limit testing the glacial till will also be a suitable fill material. However, it should be recorded that it would be susceptible to deterioration during wet weather and trafficking. Consequently, if required, it should be excavated and recompacted immediately without stockpiling.

It would also be suitable to form an impermeable liner for any attenuation ponds.

9.6 Roads and Hard Standings

CBR testing using a TRL probe has been carried out across the development area.

The results are summarised in Table 5.2, and at the top of the glacial till CBR values between 6 and 14% were recorded. Therefore, in accordance with the above results and GSL experience of such materials, a CBR value of 6% should be assumed for the design.

As mentioned above it should also be noted that formations in the glacial till will be subject to rapid deterioration on exposure to wet weather and trafficking. Therefore, in these areas it would be prudent to leave the formation slightly high until construction is imminent.

It will also be necessary for the formation to be proof rolled and any soft spots identified, excavated typically an additional 300m and replaced with suitable well compacted granular material.

9.7 Protection of Buried Concrete

The laboratory test results have indicated that chemical attack of buried concrete will not be an issue. Buried concrete can therefore be designed in accordance with the following classes, Reference 10.

- AC – 1,
- DS – 1.

9.8 Landfill and Radon Gas

No significant sources of ground gases have been identified during the desk study or site investigation works.

Whilst a small backfilled pond has been identified adjacent to the site, it would have been a shallow feature and would most likely have been excavated and replaced with suitable engineering material, as it lies beneath the adjacent road construction.

Therefore, there is considered to be a negligible risk to the development from ground gas.

However, the desk study confirmed the site to be in an area where full radon protection measures are required, and was confirmed by obtaining a BGS Radon Report, see Appendix K. Full protective measures should be constructed in accordance with Reference 11. As a minimum this would comprise a suitable membrane beneath internal and external walls and a radon sump beneath the floor slab. It should also include proprietary “Top Hats” where services enter the building below the slab.

REFERENCES

1. The Geology of the Country around Wrexham (Part II), British Geological Survey, 1928.
2. Applied geological mapping in the Wrexham area: geology and land use planning, Technical Report WA/91/4, British Geological Survey, 1991.
3. BS 5930:2015, Code of Practice for Site Investigation.
4. BRE Digest 365, Soakaway Design, 2003.
5. BS EN ISO 22282-2:2012, Variable Head Method.
6. BS 1377:1991, British Standard Methods of Tests for Soils for Civil engineering Purposes.
7. Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works - Series 600, Department of Transport, 2016.
8. NHBC Standards, Part 4 Foundations, 2007.
9. Cement & Concrete Association, Concrete Ground floors: their design, construction and finish, Deacon, R, Publication 48.034, 1986.
10. BRE Special Digest 1, 2005, Concrete in Aggressive Ground.
11. Radon: Guidance on protective measures for New Buildings, BRE 211, 2007.

FIGURES



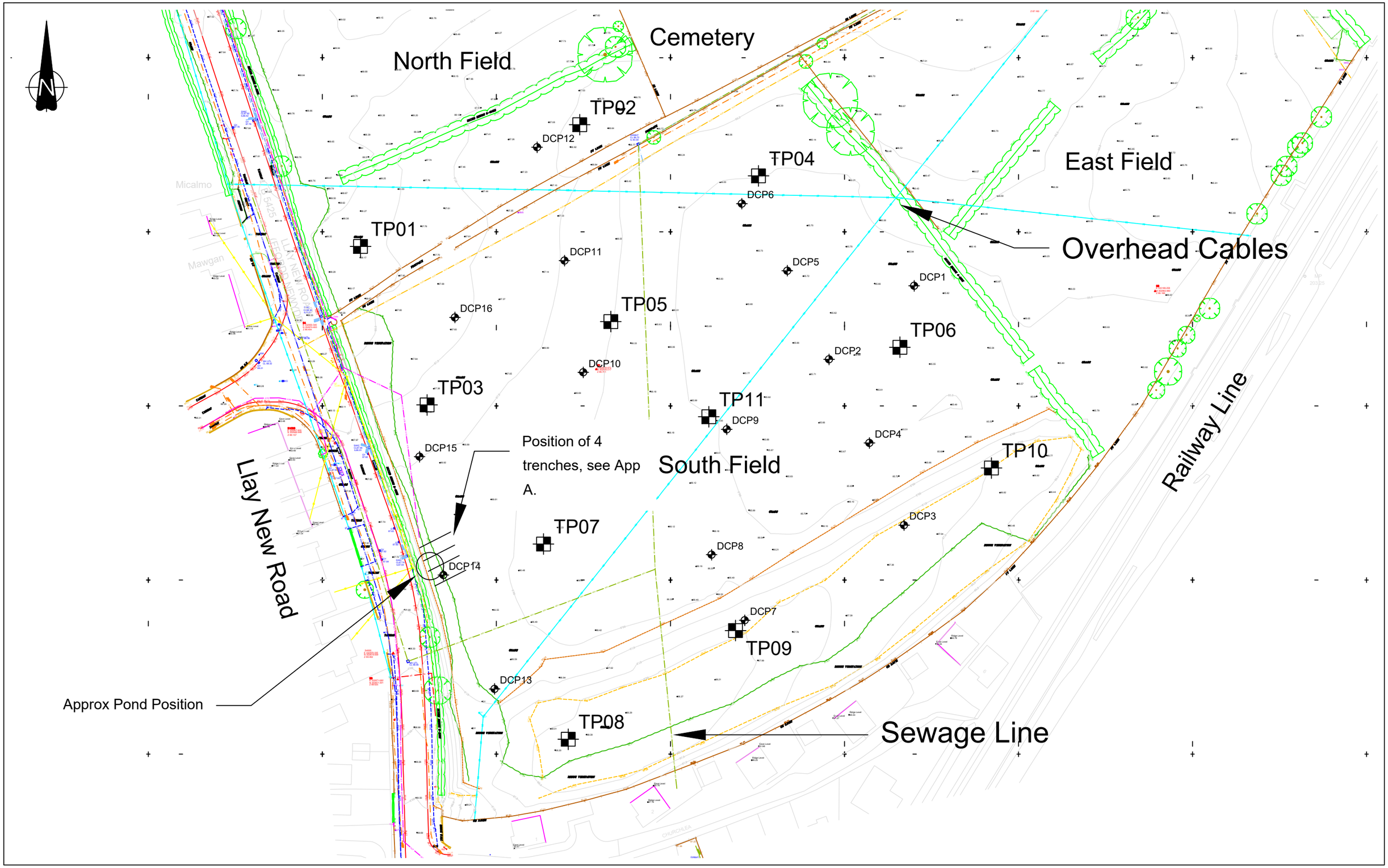
OS LICENSE No. 100030802

SCALE 1:50,000 @ A4

Figure Title

SITE LOCATION

FIGURE 1



SCALE 1: 1000 @ A3

Figure Title

Site Layout & Exploratory Hole Location Plan

FIGURE 2

Approx extent of deep sand and gravels

Approx extent of shallow sand and gravels

Trial Pit Locations

Trial Pit Locations with soakaway Testing

BH locations

TP203- Slip trench identified extent of sand and gravel 18m west of TP3.

TP203- Sand & Gravel identified. Soakaway Test

TP2011- Sand and gravel over deep Clay

TP2010- Sand & Gravel identified- Deep Soakaway.

TP2012 - Clay

TP209 - Clay

BH01

TP201 - Sand & Gravel identified. Soakaway Test completed.

TP201- Slip trench identified extent of sand and gravel 1m west, 8m east and 2m south of TP201.

TP206 - Clay

BH02

TP2013 - Clay

TP205 - Clay. Failed Soakaway- no drop in water level recorded over the day.

TP208 - Clay

TP202 - Sandy Clay Failed soakaway- t25 not acheived within day.

BH03

BH2a

TP207 - Clay

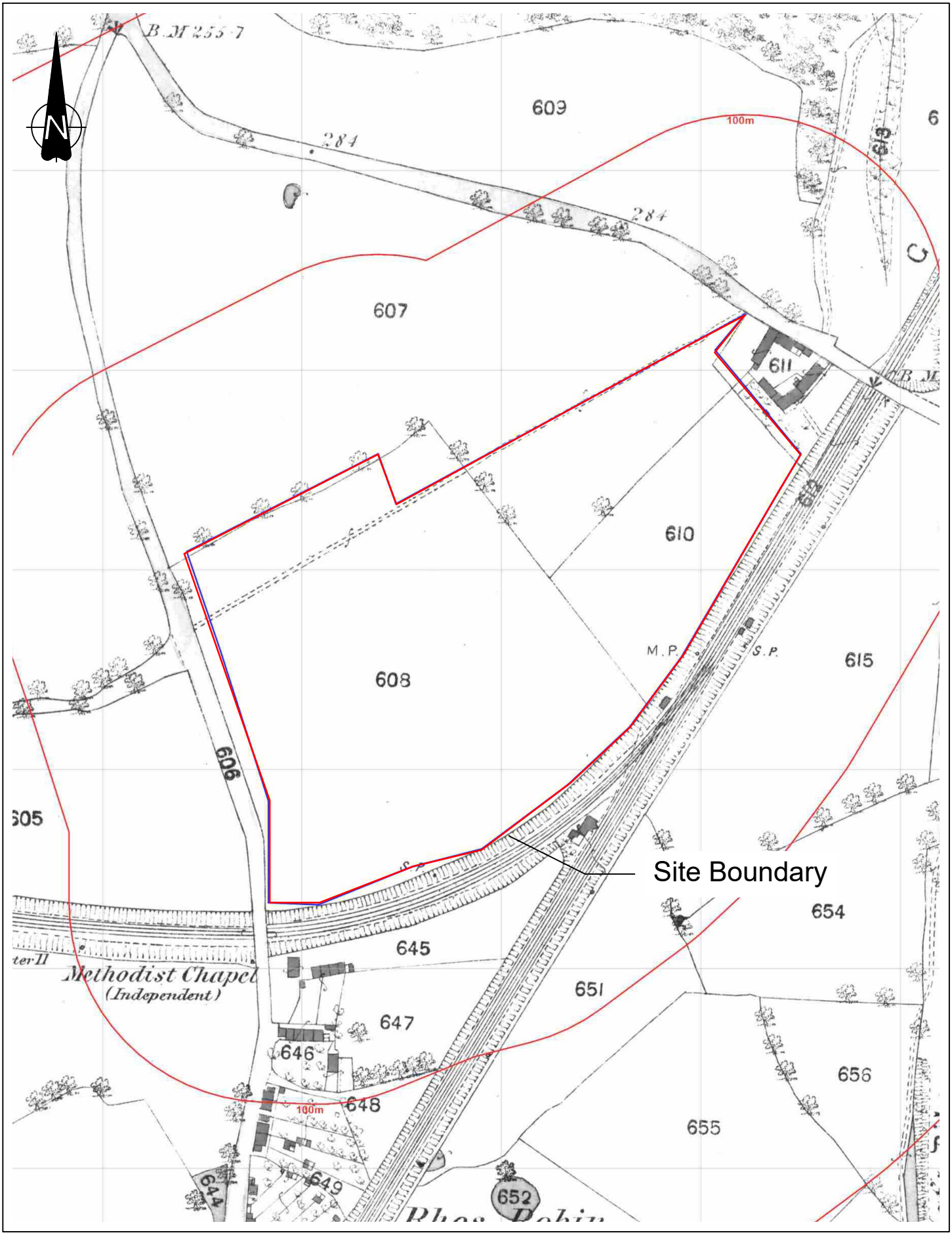
TP204 - Clay

20m line from railway cutting

SCALE 1:500 @ A3

Figure Title

FIGURE 2A

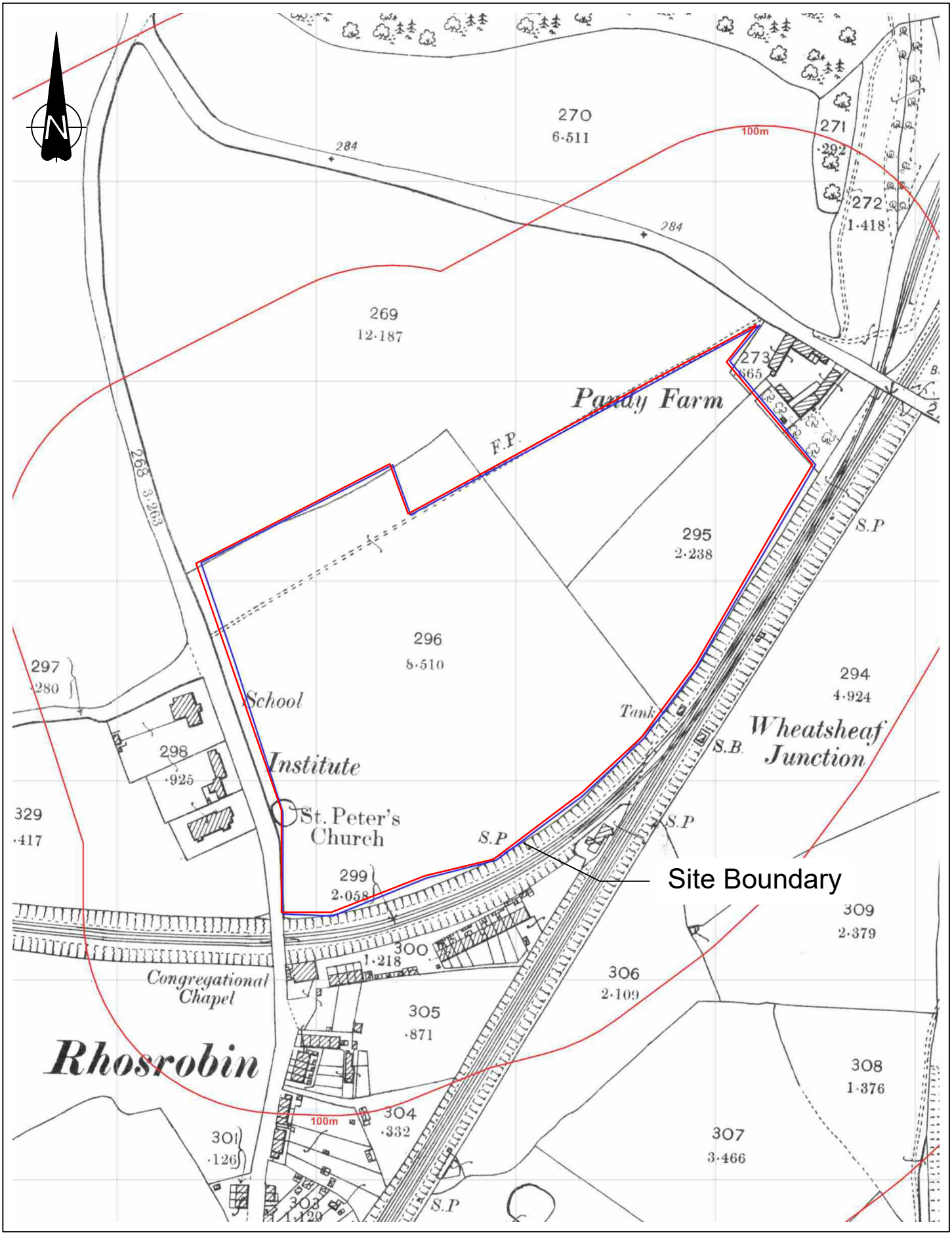


SCALE 1:2500 @ A4

Figure Title

HISTORY
1874 OS PLAN

FIGURE 3a

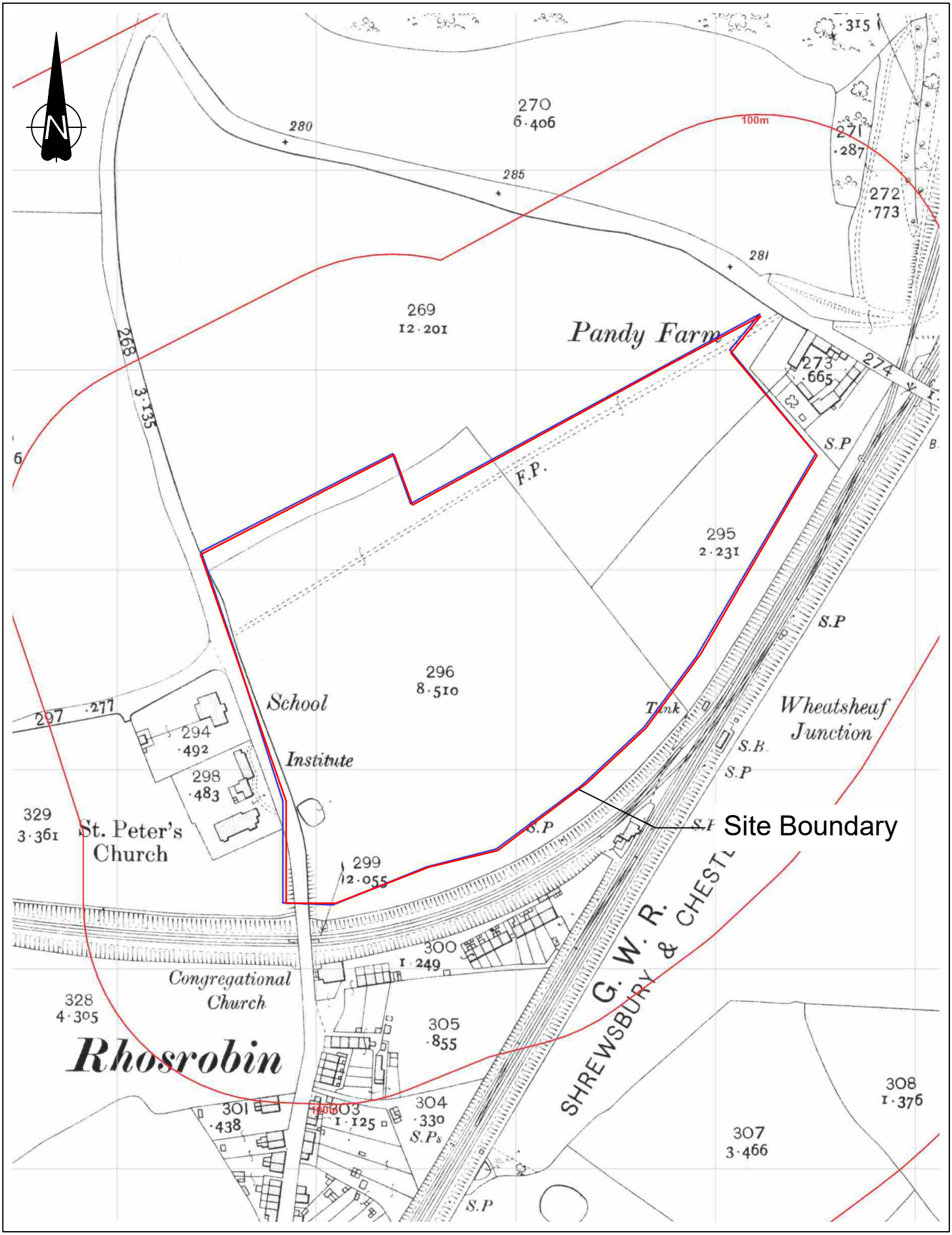


SCALE 1:2500 @ A4

Figure Title

HISTORY
1899-1900 OS PLAN

FIGURE 3b

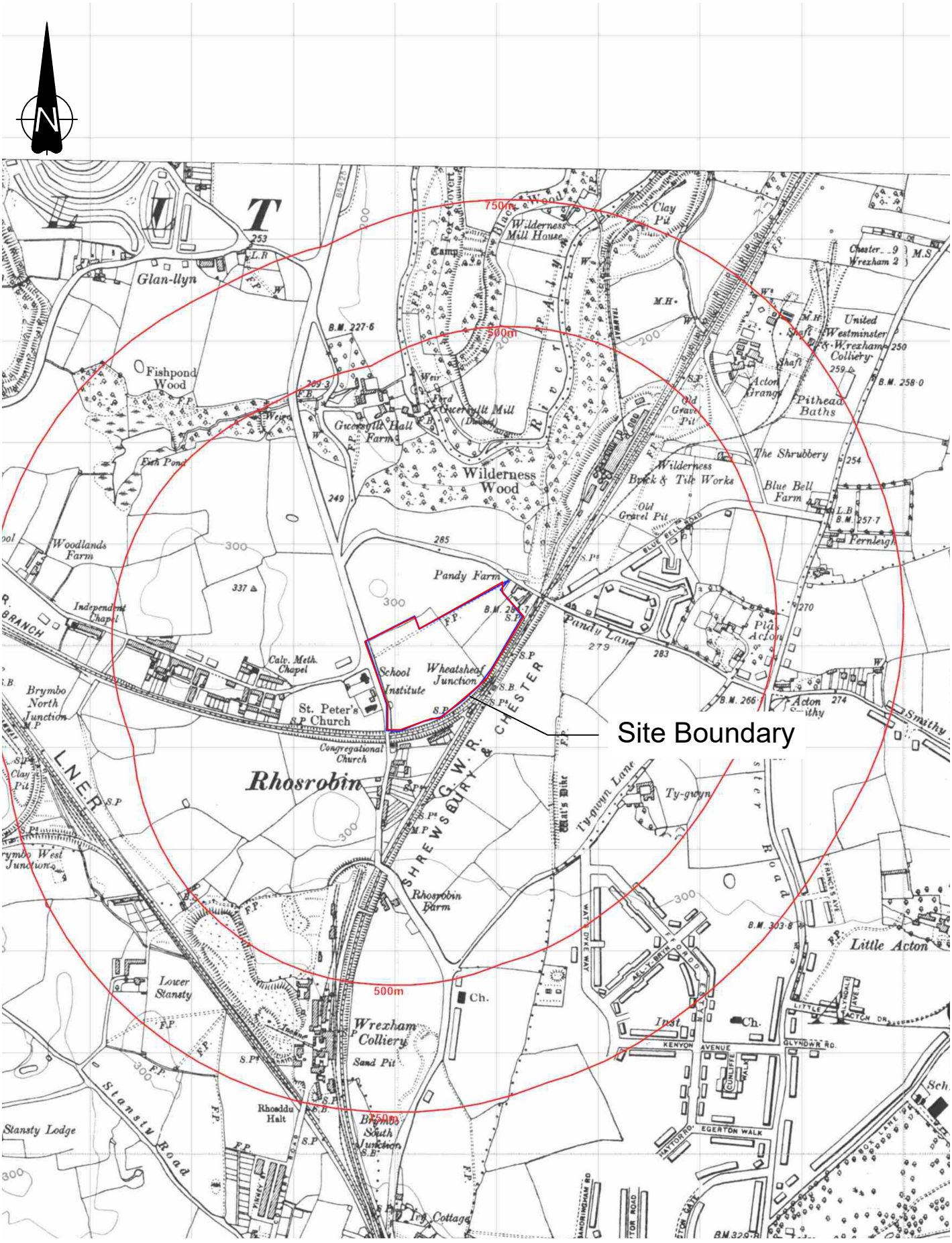


SCALE 1:2500 @ A4

Figure Title

HISTORY
1912 OS PLAN

FIGURE 3c

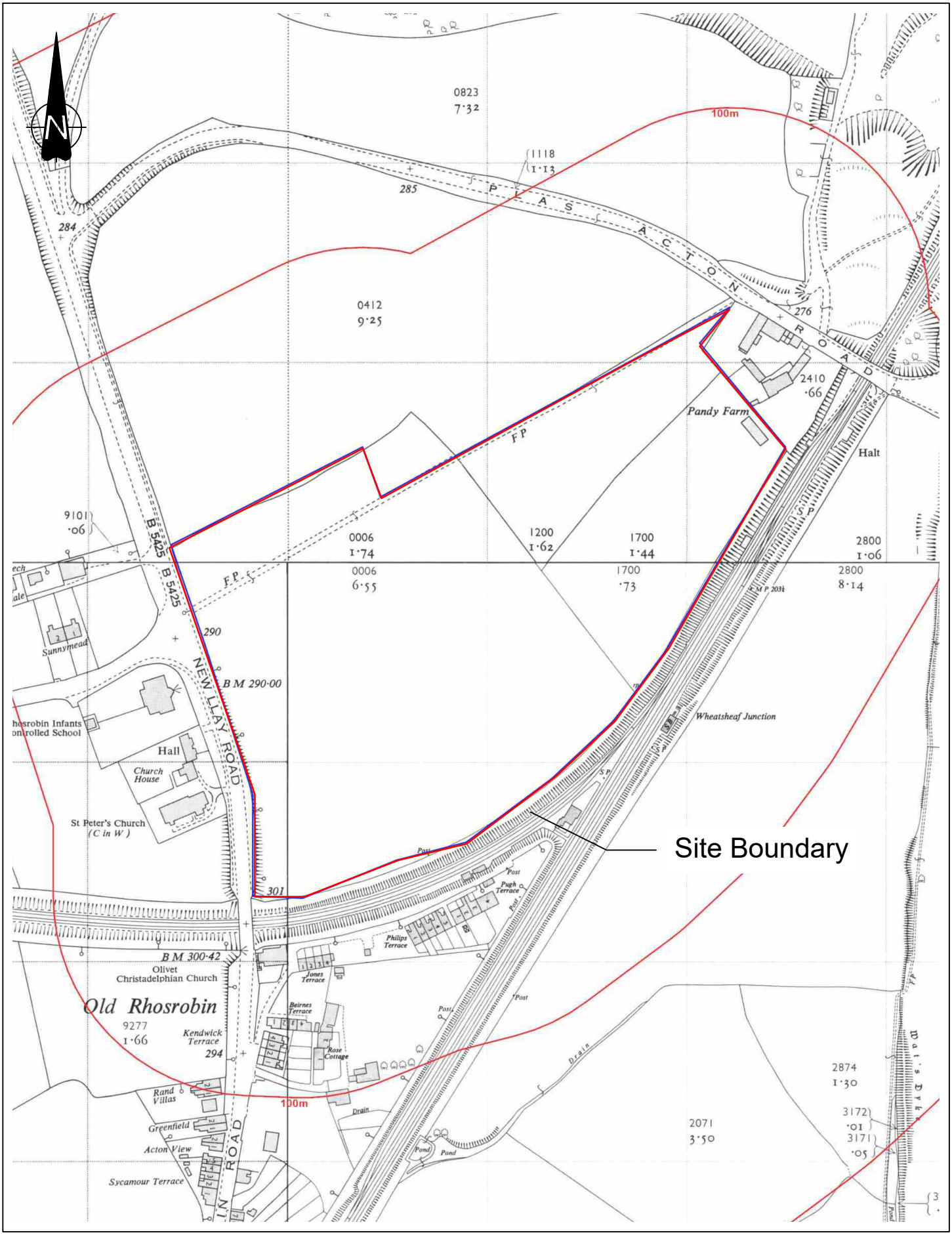


SCALE 1:10000 @ A4

Figure Title

HISTORY
1938 OS PLAN

FIGURE 3d

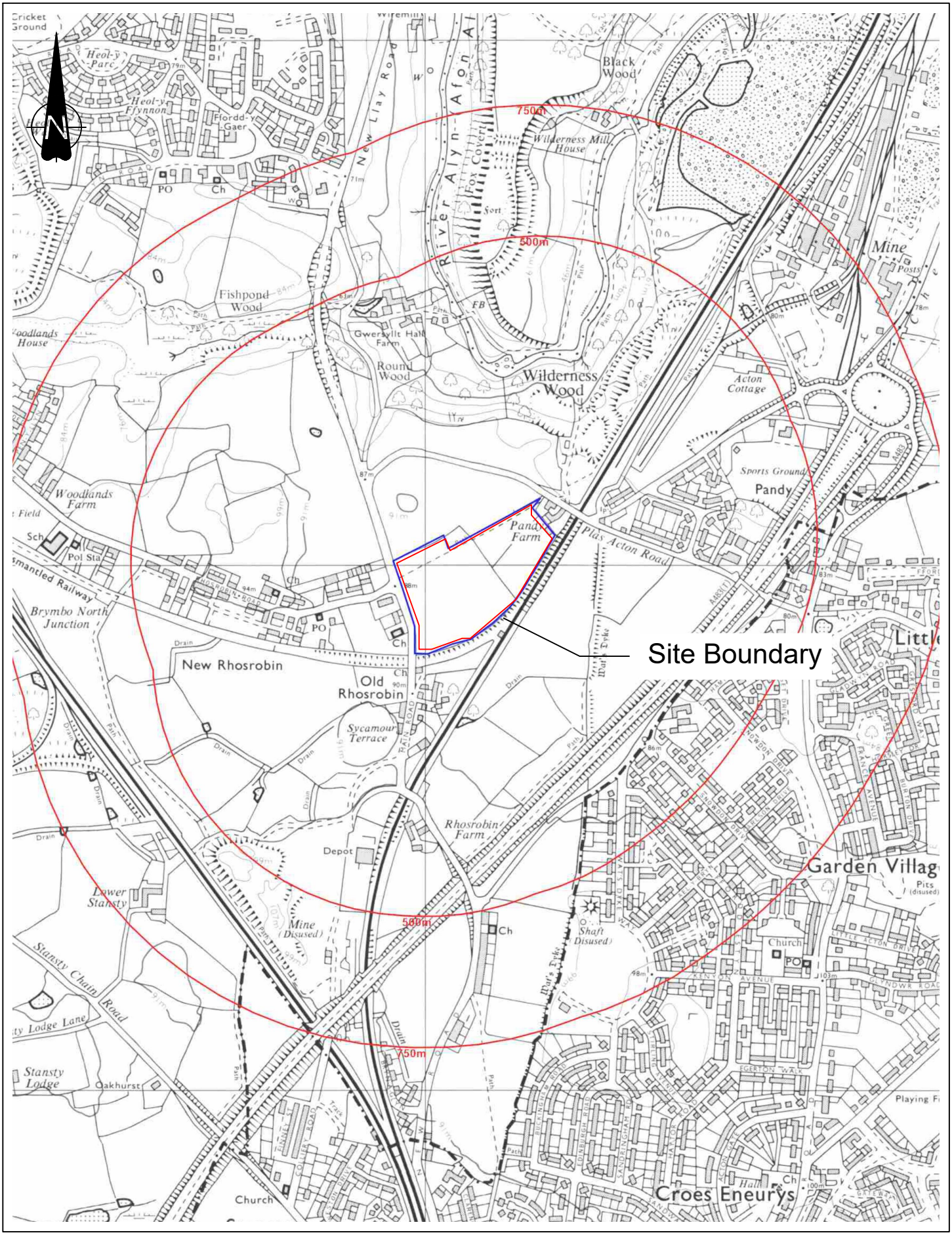


SCALE 1:2500 @ A4

Figure Title

HISTORY
1961 OS PLAN

FIGURE 3e

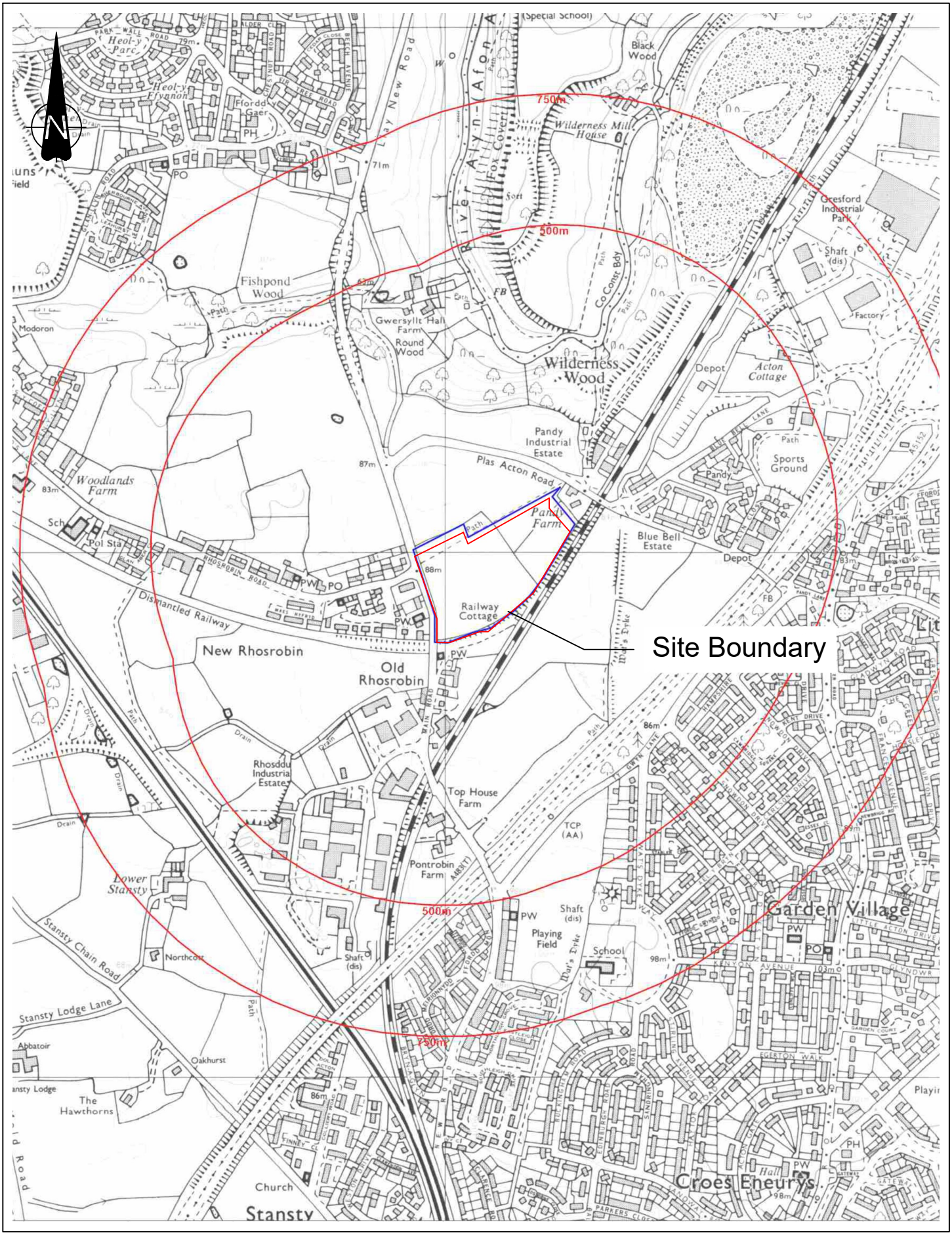


SCALE 1:10000 @ A4

Figure Title

HISTORY
1974 OS PLAN

FIGURE 3f

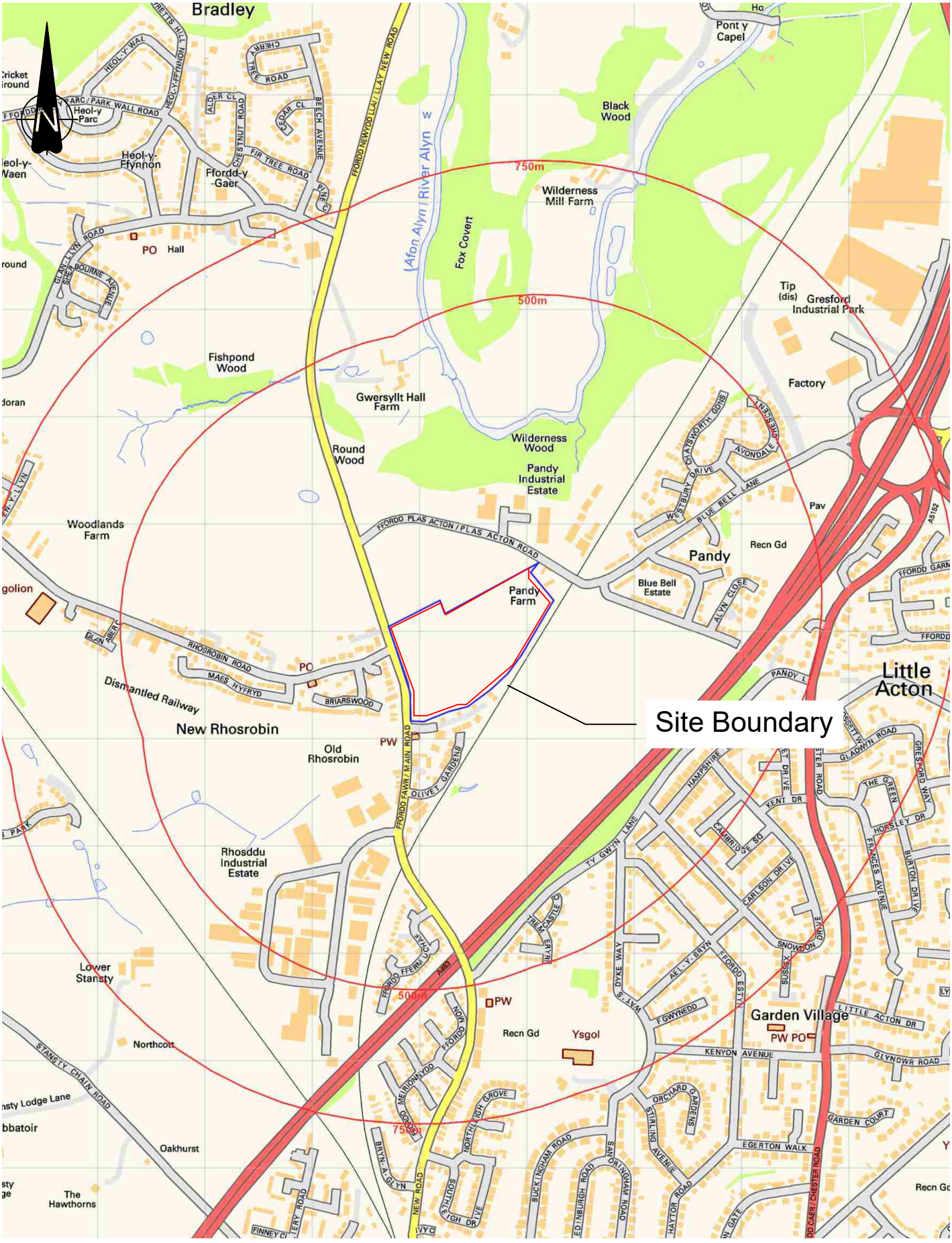


SCALE 1:10000 @ A4

Figure Title

HISTORY
1992 OS PLAN

FIGURE 3g



SCALE 1:10000 @ A4

Figure Title

HISTORY
2010 OS PLAN

FIGURE 3h

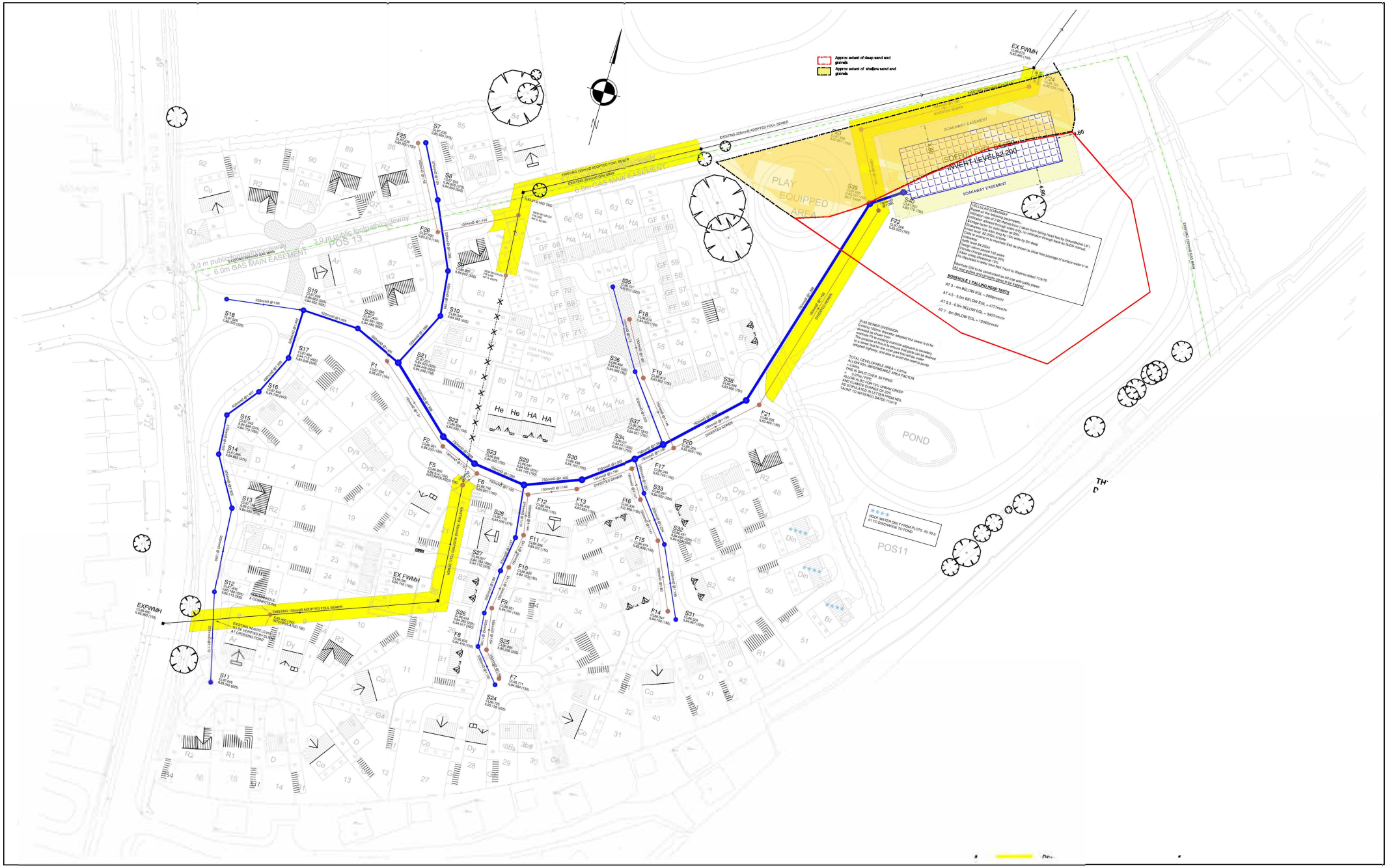
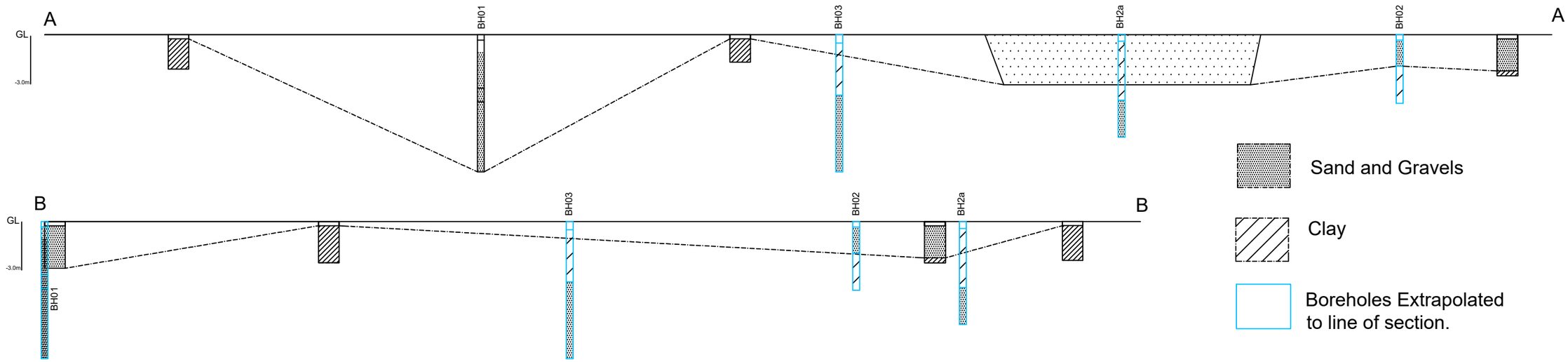


Figure Title
Proposed Development

FIGURE 4



SCALE NTS

Figure Title

CROSS SECTIONS

FIGURE 5

APPENDIX A

General Site Photographs



Photograph 1 Site entrance



Photograph 2 General view from east



Photograph 3 Overhead power lines



Photograph 4 As above



Photograph 5 general view of open fields



Photograph 6 as above



Photographs 7 & 8 General views





Photographs 9 & 10 Footpaths across site





Photographs 11 & 12 Vegetation (Reeds) proving impeded drainage



APPENDIX B

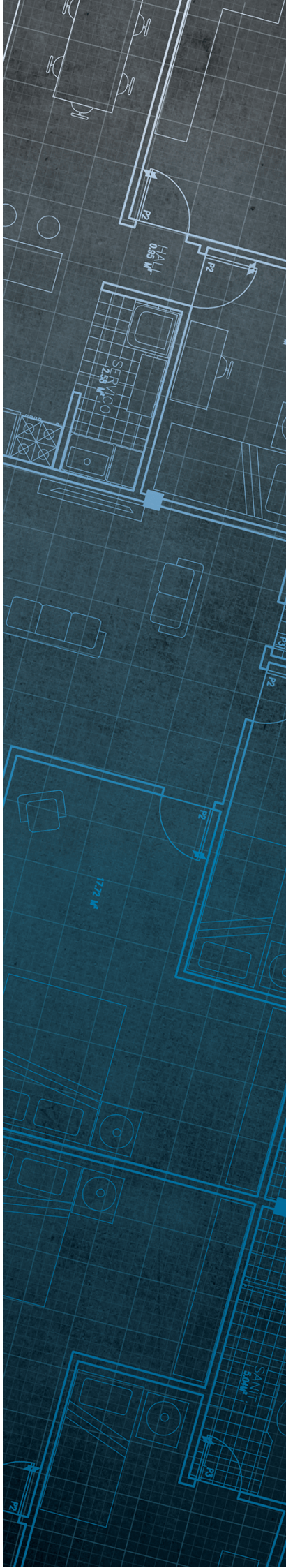
Coal Consultants Report

The Coal Authority

Consultants

Coal Mining Report

Land Off Llay New Road
Wrexham
LL11 4RF



Date of enquiry:	**7 December 2021**
Date enquiry received:	**7 December 2021**
Issue date:	**7 December 2021**
Our reference:	**51002744624001**
Your reference:	**2609-es**

Consultants
Coal Mining Report

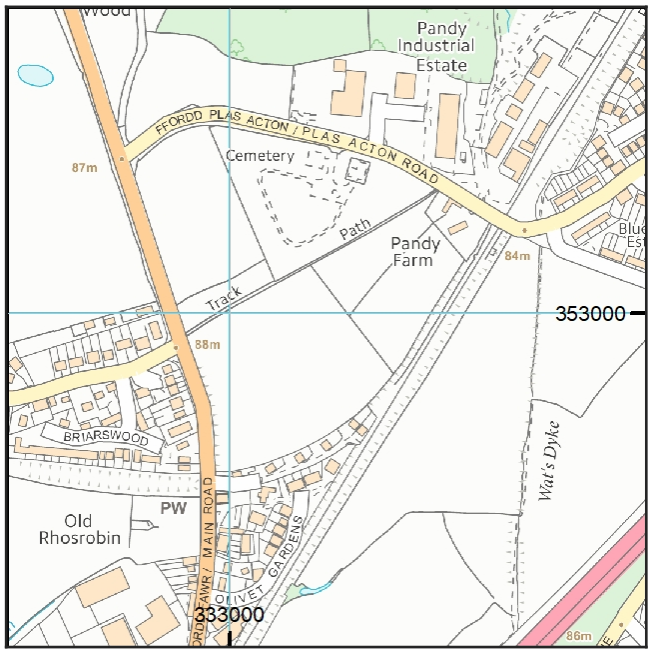
This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

Sam Fishburne

Enquiry address

Land Off Llay New Road
Wrexham
LL11 4RF



Approximate position of property

Map data

Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2018. All rights reserved.

Ordnance Survey Licence number: 100020315

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

@coalauthority
/company/the-coal-authority
/thecoalauthority
/thecoalauthority

Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	POWELL	Coal	3VKN	248	West	7.0	East	130	1924
unnamed	LOWER STINKING	Coal	3VJL	255	West	7.0	East	130	1924
unnamed	CRANK	Coal	3U3W	270	West	7.0	East	90	1924
unnamed	QUAKER	Coal	3U4Y	302	West	7.1	East	140	1921
unnamed	QUAKER	Coal	3U4Z	305	West	7.1	East	140	1921
unnamed	MAIN	Coal	3V3W	325	West	7.1	East	210	1917
unnamed	MAIN	Coal	3V2I	327	West	7.1	East	210	1913
unnamed	QUAKER	Coal	3U50	694	Beneath Property	7.4	East	110	1963
unnamed	MAIN	Coal	3V3V	708	Beneath Property	5.0	East	220	1960

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

7170	NW1478	NW694
NW693		

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Copyright © 2021 The Coal Authority

Outcrops
No outcrops recorded.

Geological faults, fissures and breaklines
No faults, fissures or breaklines recorded.

Opencast mines
None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips
None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations
None recorded within 50 metres of the enquiry boundary.

Remediated sites
None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence
The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas
None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes
None recorded within 500 metres of the enquiry boundary.

Copyright © 2021 The Coal Authority

Section 3 – Licensing and future mining activity

Future underground mining
None recorded.

Coal mining licensing
None recorded within 200 metres of the enquiry boundary.

Court orders
None recorded.

Section 46 notices
No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices
The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

Payments to owners of former copyhold land
The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Copyright © 2021 The Coal Authority

Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk.**

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Copyright © 2021 The Coal Authority

Opencast mines
Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips
Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations
Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites
Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence
Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas
Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Copyright © 2021 The Coal Authority

Mine water treatment schemes
Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining
Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing
Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders
Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices
Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices
Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

Copyright © 2021 The Coal Authority

The Coal Authority

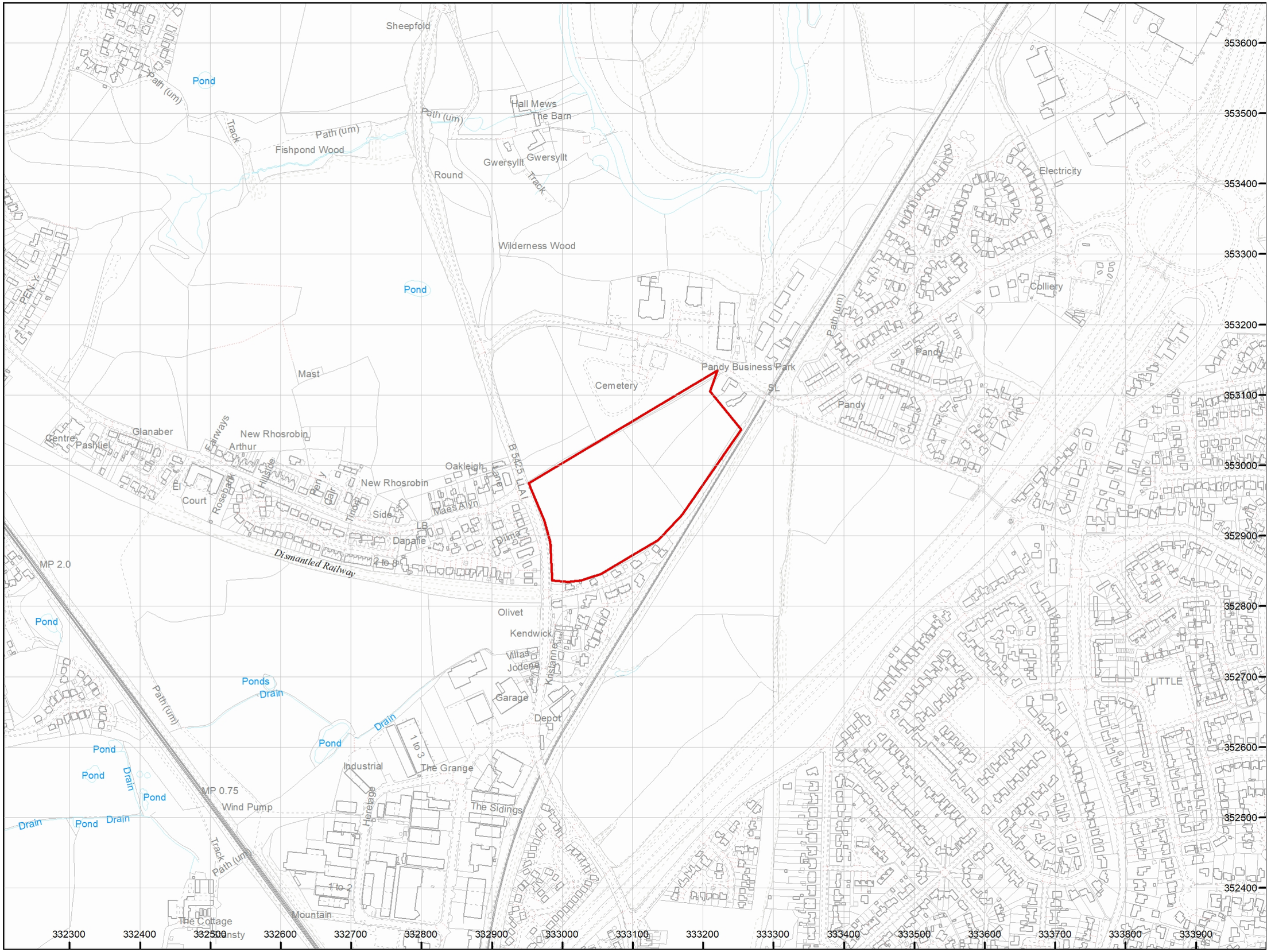
Summary of findings

Reproduced by permission of Ordnance Survey on behalf of HMSO.
© Crown copyright and database right 2018. All rights reserved.
Ordnance Survey Licence number: 100020315
Map data

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown



How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

APPENDIX C

GroundSure Report

Groundsure
LOCATION INTELLIGENCE

Enviro+Geo Insight

Land to the South of Cemetery, New Rhosrobin, Wrexham, LL11 4RF

Order Details

Date: 23/11/2021

Your ref: PO000422

Our Ref: GS-8350082

Client: GroundSolve Ltd

Site Details

Location: 333084 352959

Area: 4.8 ha

Authority: Wrecsam - Wrexham County Borough Council



Summary of findings p. 2

OS MasterMap site plan p.13

Aerial image p. 8

groundsure.com/insightuserguide

Contact us with any questions at:
info@groundsure.com
08444 159 000

Summary of findings

Page	Section	Past land use	On site	0-50m	50-250m	250-500m	500-2000m
14	1.1	Historical industrial land uses	4	17	24	78	-
19	1.2	Historical tanks	0	3	1	7	-
20	1.3	Historical energy features	0	0	0	5	-
20	1.4	Historical petrol stations	0	0	0	1	-
21	1.5	Historical garages	0	0	1	2	-
21	1.6	Historical military land	0	0	0	0	-
Page	Section	Past land use - un-grouped	On site	0-50m	50-250m	250-500m	500-2000m
22	2.1	Historical industrial land uses	9	24	39	115	-
29	2.2	Historical tanks	0	3	5	8	-
30	2.3	Historical energy features	0	0	0	13	-
31	2.4	Historical petrol stations	0	0	0	1	-
31	2.5	Historical garages	0	0	4	3	-
Page	Section	Waste and landfill	On site	0-50m	50-250m	250-500m	500-2000m
33	3.1	Active or recent landfill	0	0	0	0	-
33	3.2	Historical landfill (BGS records)	0	0	0	0	-
34	3.3	Historical landfill (LA/mapping records)	0	0	0	0	-
34	3.4	Historical landfill (EA/NRW records)	0	0	0	1	-
34	3.5	Historical waste sites	0	0	0	0	-
34	3.6	Licensed waste sites	0	0	0	0	-
35	3.7	Waste exemptions	0	0	0	3	-
Page	Section	Current industrial land use	On site	0-50m	50-250m	250-500m	500-2000m
36	4.1	Recent industrial land uses	0	1	8	-	-
37	4.2	Current or recent petrol stations	0	0	0	0	-
37	4.3	Electricity cables	0	0	0	0	-
37	4.4	Gas pipelines	0	0	0	0	-
38	4.5	Sites determined as Contaminated Land	0	0	0	0	-

38	**4.6**	**Control of Major Accident Hazards (COMAH)**	0	0	0	1	-
38	4.7	Regulated explosive sites	0	0	0	0	-
38	**4.8**	**Hazardous substance storage/usage**	0	0	0	1	-
39	4.9	Historical licensed industrial activities (IPC)	0	0	0	0	-
39	4.10	Licensed industrial activities (Part A(1))	0	0	0	0	-
39	**4.11**	**Licensed pollutant release (Part A(2)/B)**	0	0	0	4	-
40	4.12	Radioactive Substance Authorisations	0	0	0	0	-
40	**4.13**	**Licensed Discharges to controlled waters**	0	0	4	3	-
41	4.14	Pollutant release to surface waters (Red List)	0	0	0	0	-
42	4.15	Pollutant release to public sewer	0	0	0	0	-
42	4.16	List 1 Dangerous Substances	0	0	0	0	-
42	4.17	List 2 Dangerous Substances	0	0	0	0	-
42	4.18	Pollution Incidents (EA/NRW)	0	0	0	0	-
42	4.19	Pollution inventory substances	0	0	0	0	-
43	4.20	Pollution inventory waste transfers	0	0	0	0	-
43	4.21	Pollution inventory radioactive waste	0	0	0	0	-

Page	Section	Hydrogeology	On site	0-50m	50-250m	250-500m	500-2000m
44	**5.1**	**Superficial aquifer**	Identified (within 500m)				
46	**5.2**	**Bedrock aquifer**	Identified (within 500m)				
47	**5.3**	**Groundwater vulnerability**	Identified (within 50m)				
49	5.4	Groundwater vulnerability- soluble rock risk	None (within 0m)				
49	5.5	Groundwater vulnerability- local information	None (within 0m)				
50	**5.6**	**Groundwater abstractions**	0	0	0	0	2
51	5.7	Surface water abstractions	0	0	0	0	0
51	5.8	Potable abstractions	0	0	0	0	0
52	5.9	Source Protection Zones	0	0	0	0	-
52	5.10	Source Protection Zones (confined aquifer)	0	0	0	0	-

Page	Section	Hydrology	On site	0-50m	50-250m	250-500m	500-2000m
53	**6.1**	**Water Network (OS MasterMap)**	0	0	3	-	-

54	6.2	Surface water features	0	0	3	-	-
54	6.3	WFD Surface water body catchments	1	-	-	-	-
55	6.4	WFD Surface water bodies	0	0	1	-	-
55	6.5	WFD Groundwater bodies	1	-	-	-	-

Page	Section	River and coastal flooding	On site	0-50m	50-250m	250-500m	500-2000m
56	7.1	Risk of flooding from rivers and the sea	None (within 50m)				
56	7.2	Historical Flood Events	0	0	0	-	-
56	7.3	Flood Defences	0	0	0	-	-
57	7.4	Areas Benefiting from Flood Defences	0	0	0	-	-
57	7.5	Flood Storage Areas	0	0	0	-	-
58	7.6	Flood Zone 2	None (within 50m)				
58	7.7	Flood Zone 3	None (within 50m)				

Page	Section	Surface water flooding	
59	8.1	Surface water flooding	1 in 30 year, 0.3m - 1.0m (within 50m)

Page	Section	Groundwater flooding	
61	9.1	Groundwater flooding	Moderate (within 50m)

Page	Section	Environmental designations	On site	0-50m	50-250m	250-500m	500-2000m
62	10.1	Sites of Special Scientific Interest (SSSI)	0	0	0	0	1
63	10.2	Conserved wetland sites (Ramsar sites)	0	0	0	0	0
63	10.3	Special Areas of Conservation (SAC)	0	0	0	0	0
63	10.4	Special Protection Areas (SPA)	0	0	0	0	0
63	10.5	National Nature Reserves (NNR)	0	0	0	0	0
64	10.6	Local Nature Reserves (LNR)	0	0	0	0	1
64	10.7	Designated Ancient Woodland	0	0	2	5	34
66	10.8	Biosphere Reserves	0	0	0	0	0
66	10.9	Forest Parks	0	0	0	0	0
66	10.10	Marine Conservation Zones	0	0	0	0	0
66	10.11	Green Belt	0	0	0	0	0
67	10.12	Proposed Ramsar sites	0	0	0	0	0

67	10.13	Possible Special Areas of Conservation (pSAC)	0	0	0	0	0
67	10.14	Potential Special Protection Areas (pSPA)	0	0	0	0	0
67	10.15	Nitrate Sensitive Areas	0	0	0	0	0
68	10.16	Nitrate Vulnerable Zones	0	0	0	0	0
69	**10.17**	**SSSI Impact Risk Zones**	1	-	-	-	-
70	10.18	SSSI Units	0	0	0	0	0
Page	Section	Visual and cultural designations	On site	0-50m	50-250m	250-500m	500-2000m
71	11.1	World Heritage Sites	0	0	0	-	-
72	11.2	Area of Outstanding Natural Beauty	0	0	0	-	-
72	11.3	National Parks	0	0	0	-	-
72	11.4	Listed Buildings	0	0	0	-	-
72	11.5	Conservation Areas	0	0	0	-	-
73	**11.6**	**Scheduled Ancient Monuments**	0	0	1	-	-
73	11.7	Registered Parks and Gardens	0	0	0	-	-
Page	Section	Agricultural designations	On site	0-50m	50-250m	250-500m	500-2000m
74	**12.1**	**Agricultural Land Classification**	Grade 2 (within 250m)				
75	12.2	Open Access Land	0	0	0	-	-
75	12.3	Tree Felling Licences	0	0	0	-	-
76	12.4	Environmental Stewardship Schemes	0	0	0	-	-
76	12.5	Countryside Stewardship Schemes	0	0	0	-	-
Page	Section	Habitat designations	On site	0-50m	50-250m	250-500m	500-2000m
77	13.1	Priority Habitat Inventory	0	0	0	-	-
77	13.2	Habitat Networks	0	0	0	-	-
77	13.3	Open Mosaic Habitat	0	0	0	-	-
77	13.4	Limestone Pavement Orders	0	0	0	-	-
Page	Section	Geology 1:10,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
78	**14.1**	**10k Availability**	Identified (within 500m)				
79	**14.2**	**Artificial and made ground (10k)**	0	1	2	4	-
81	**14.3**	**Superficial geology (10k)**	2	1	3	4	-

82	14.4	Landslip (10k)	0	0	0	0	-
83	14.5	Bedrock geology (10k)	2	0	2	1	-
84	14.6	Bedrock faults and other linear features (10k)	0	0	3	2	-
Page	Section	Geology 1:50,000 scale	On site	0-50m	50-250m	250-500m	500-2000m
85	15.1	50k Availability	Identified (within 500m)				
86	15.2	Artificial and made ground (50k)	0	1	2	2	-
87	15.3	Artificial ground permeability (50k)	0	1	-	-	-
88	15.4	Superficial geology (50k)	2	1	2	4	-
89	15.5	Superficial permeability (50k)	Identified (within 50m)				
89	15.6	Landslip (50k)	0	0	0	0	-
90	15.7	Landslip permeability (50k)	None (within 50m)				
91	15.8	Bedrock geology (50k)	2	0	2	1	-
92	15.9	Bedrock permeability (50k)	Identified (within 50m)				
92	15.10	Bedrock faults and other linear features (50k)	0	0	3	2	-
Page	Section	Boreholes	On site	0-50m	50-250m	250-500m	500-2000m
94	16.1	BGS Boreholes	0	0	7	-	-
Page	Section	Natural ground subsidence					
96	17.1	Shrink swell clays	Very low (within 50m)				
98	17.2	Running sands	Very low (within 50m)				
99	17.3	Compressible deposits	Very low (within 50m)				
101	17.4	Collapsible deposits	Very low (within 50m)				
102	17.5	Landslides	Very low (within 50m)				
103	17.6	Ground dissolution of soluble rocks	Negligible (within 50m)				
Page	Section	Mining, ground workings and natural cavities	On site	0-50m	50-250m	250-500m	500-2000m
105	18.1	Natural cavities	0	0	0	0	-
106	18.2	BritPits	0	0	0	2	-
106	18.3	Surface ground workings	8	15	34	-	-
109	18.4	Underground workings	0	0	0	3	20
110	18.5	Historical Mineral Planning Areas	0	0	0	0	-

110	**18.6**	**Non-coal mining**	0	0	1	0	1
110	18.7	Mining cavities	0	0	0	0	0
111	18.8	JPB mining areas	None (within 0m)				
111	**18.9**	**Coal mining**	Identified (within 0m)				
111	18.10	Brine areas	None (within 0m)				
111	18.11	Gypsum areas	None (within 0m)				
111	18.12	Tin mining	None (within 0m)				
112	18.13	Clay mining	None (within 0m)				
Page	Section	Radon					
113	**19.1**	**Radon**	Between 10% and 30% (within 0m)				
Page	Section	Soil chemistry	On site	0-50m	50-250m	250-500m	500-2000m
115	**20.1**	**BGS Estimated Background Soil Chemistry**	13	5	-	-	-
116	20.2	BGS Estimated Urban Soil Chemistry	0	0	-	-	-
116	20.3	BGS Measured Urban Soil Chemistry	0	0	-	-	-
Page	Section	Railway infrastructure and projects	On site	0-50m	50-250m	250-500m	500-2000m
117	21.1	Underground railways (London)	0	0	0	-	-
117	21.2	Underground railways (Non-London)	0	0	0	-	-
118	21.3	Railway tunnels	0	0	0	-	-
118	**21.4**	**Historical railway and tunnel features**	1	10	9	-	-
119	21.5	Royal Mail tunnels	0	0	0	-	-
119	**21.6**	**Historical railways**	0	1	0	-	-
119	**21.7**	**Railways**	0	2	2	-	-
120	21.8	Crossrail 1	0	0	0	0	-
120	21.9	Crossrail 2	0	0	0	0	-
120	21.10	HS2	0	0	0	0	-

Recent aerial photograph



Capture Date: 10/04/2020

Site Area: 4.8ha

Recent site history - 2017 aerial photograph



Capture Date: 07/05/2017

Site Area: 4.8ha

Recent site history - 2009 aerial photograph



Capture Date: 01/06/2009

Site Area: 4.8ha

Recent site history - 2003 aerial photograph



Capture Date: 04/08/2003

Site Area: 4.8ha

Recent site history - 2000 aerial photograph



Capture Date: 04/09/2000

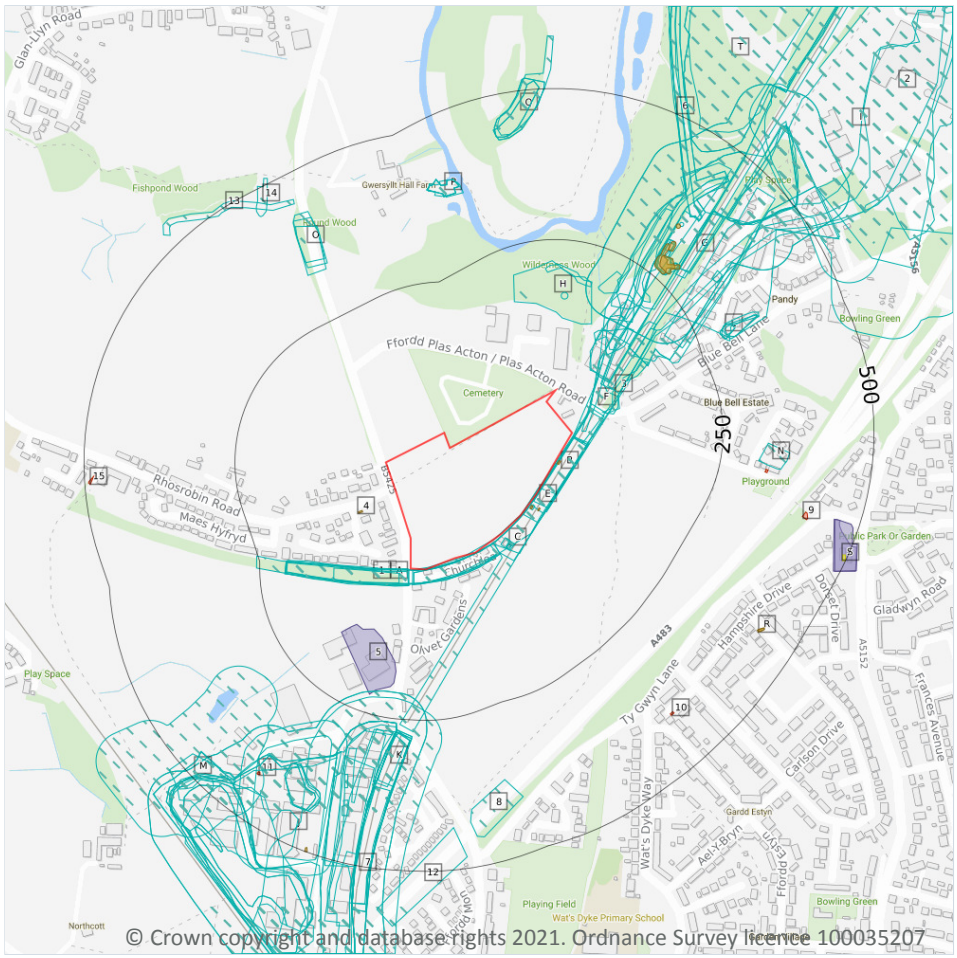
Site Area: 4.8ha

OS MasterMap site plan



Site Area: 4.8ha

1 Past land use



© Crown copyright and database rights 2021. Ordnance Survey licence 100035207

1.1 Historical industrial land uses

Records within 500m	123

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

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

ID	Location	Land use	Dates present	Group ID
1	**On site**	**Railway Sidings**	**1964**	**915020**

ID	Location	Land use	Dates present	Group ID
A	**On site**	**Cuttings**	**1938**	**958373**
B	**On site**	**Cuttings**	**1964 - 1992**	**915643**
C	**On site**	**Cuttings**	**1909**	**960119**
D	0m S	Cuttings	1872	928092
E	0m SE	Cuttings	1949	953359
C	1m SE	Cuttings	1938	923191
C	1m SE	Cuttings	1949	986010
B	2m SE	Cuttings	1938	961927
F	3m SE	Railway Sidings	1898	845941
A	4m SW	Cuttings	1938	864174
A	4m SW	Cuttings	1949	896355
2	4m SE	Railway Sidings	1938	860099
G	6m SE	Railway Sidings	1938	907441
E	6m SE	Railway Building	1872	819220
A	8m SW	Cuttings	1872	978658
D	9m SE	Railway Building	1985	876885
F	17m E	Tramway Sidings	1909	879276
D	18m SE	Railway Building	1980	911019
A	21m W	Cuttings	1964 - 1992	965693
D	21m SE	Railway Building	1872 - 1898	848954
F	54m NE	Brick and Tile Works	1938	986797
3	61m NE	Unspecified Ground Workings	1949	799088
F	67m NE	Industrial Estate	1985 - 1989	849933
F	69m NE	Industrial Estate	1992	974041
F	87m E	Cuttings	1872	795362
F	104m NE	Refuse Heap	1949	828328
F	106m NE	Unspecified Ground Workings	1964 - 1980	989815
H	118m N	Sewage Works	1949	811767

ID	Location	Land use	Dates present	Group ID
G	141m NE	Railway Sidings	1974 - 1980	991531
I	141m NE	Railway Sidings	1964	865717
I	142m NE	Railway Sidings	1949	861618
F	146m NE	Unspecified Heap	1964 - 1980	862082
G	147m NE	Brick and Tile Works	1898	884798
G	147m NE	Brick and Tile Works	1938	895106
H	152m N	Unspecified Tank	1949	823847
F	165m NE	Unspecified Heap	1949	868936
F	168m NE	Brick and Tile Works	1909	876350
F	180m NE	Unspecified Pit	1964 - 1989	989415
H	181m N	Unspecified Ground Workings	1985 - 1992	933893
F	203m NE	Unspecified Depot	1985	844754
J	207m S	Colliery	1938	879187
J	207m S	Colliery	1898	968605
F	208m NE	Unspecified Ground Workings	1964 - 1980	909306
J	216m S	Colliery	1872	888230
J	257m S	Colliery	1949	885376
J	257m S	Railway Sidings	1949	904054
J	257m S	Railway Sidings	1898	966138
J	257m S	Railway Sidings	1938	967219
F	262m NE	Unspecified Tanks	1909	879554
F	262m NE	Unspecified Tanks	1938	850297
J	263m S	Colliery	1909	868954
F	265m NE	Unspecified Tanks	1898	872328
F	265m NE	Unspecified Tanks	1938	906257
J	268m S	Cuttings	1909	914969
J	269m S	Cuttings	1938	980525
J	271m S	Railway Sidings	1909	936538

ID	Location	Land use	Dates present	Group ID
J	272m S	Railway Sidings	1872	971220
K	272m S	Cuttings	1872	874643
J	272m S	Cuttings	1938 - 1949	857514
J	272m S	Cuttings	1898	959476
K	273m S	Cuttings	1964 - 1992	848236
J	277m S	Railway Sidings	1938	880538
F	277m NE	Cuttings	1872	941479
J	285m SW	Industrial Estate	1985	853953
F	288m NE	Cuttings	1938	980654
L	289m E	Old Gravel Pit	1898	846959
L	289m E	Old Gravel Pit	1938 - 1949	894916
F	290m NE	Cuttings	1909	877413
L	291m E	Sand Pit	1872	797324
L	294m E	Unspecified Ground Workings	1964 - 1980	870979
F	296m NE	Unspecified Tanks	1909	859720
L	298m E	Old Gravel Pit	1909	927871
M	299m SW	Disused Iron Works	1898	818925
J	310m SW	Industrial Estate	1989 - 1992	974515
N	313m E	Unspecified Depot	1992	818109
F	319m NE	Unspecified Depot	1989 - 1992	984078
J	325m S	Colliery	1938	933881
J	329m S	Unspecified Depot	1974 - 1980	961641
O	331m NW	Cuttings	1964	871234
J	336m S	Unspecified Disused Mine	1964 - 1974	929971
O	339m NW	Cuttings	1949	978455
F	342m NE	Unspecified Tank	1898	823846
O	347m NW	Cuttings	1974 - 1992	906355
J	356m S	Railway Building	1938	819226

ID	Location	Land use	Dates present	Group ID
P	361m NW	Unspecified Disused Mill	1909 - 1938	876690
6	364m NE	Tramway Sidings	1938	844903
7	366m S	Cuttings	1872	979626
P	366m NW	Unspecified Mill	1898	810171
P	366m NW	Corn Mill	1872	823097
P	366m NW	Unspecified Disused Mill	1938 - 1949	953409
J	371m SW	Refuse Heap	1938	951365
8	372m S	Cuttings	1974 - 1980	938352
J	372m SW	Unspecified Ground Workings	1909	799090
J	374m SW	Unspecified Heap	1938 - 1949	983415
J	375m SW	Shale Tip	1909	821771
J	397m S	Railway Building	1938	819227
G	401m NE	Old Gravel Pit	1909 - 1938	852398
G	402m NE	Unspecified Pit	1872	838987
G	402m NE	Old Gravel Pit	1898	925211
G	404m NE	Old Gravel Pit	1938	920920
Q	425m N	Unspecified Ground Workings	1985 - 1989	856065
Q	425m N	Unspecified Heaps	1964 - 1980	907505
Q	428m N	Unspecified Heap	1872 - 1898	925583
Q	428m N	Unspecified Heap	1938 - 1949	984419
12	430m S	Cuttings	1974 - 1980	887907
Q	431m N	Unspecified Ground Workings	1992	889249
J	447m SW	Unspecified Heap	1949	914628
J	449m SW	Unspecified Heap	1964	941695
13	451m NW	Unspecified Ground Workings	1974 - 1992	976882
M	456m SW	Brick Field	1872	817814
14	457m NW	Unspecified Ground Workings	1909	884421
M	458m SW	Unspecified Ground Workings	1872	959502

ID	Location	Land use	Dates present	Group ID
J	460m SW	Unspecified Ground Workings	1909	946117
J	462m SW	Unspecified Heap	1938	860414
T	464m NE	Refuse Heap	1985	904520
T	464m NE	Refuse Heap	1989	929549
J	469m SW	Unspecified Heap	1898	961558
J	478m SW	Shale Tip	1909	821772
M	479m SW	Unspecified Heap	1980	860174
U	479m NE	Colliery	1949	844687
U	487m NE	Colliery	1938	979075
T	495m NE	Refuse Heap	1992	899301

This data is sourced from Ordnance Survey / Groundsure.

1.2 Historical tanks

Records within 500m	**11**

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

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

ID	Location	Land use	Dates present	Group ID
B	5m SE	Unspecified Tank	1937	109508
E	5m SE	Unspecified Tank	1899	109511
E	17m SE	Unspecified Tank	1912	109510
4	63m W	Unspecified Tank	1976 - 1990	134260
F	262m NE	Tanks	1899	128842
F	268m NE	Tanks	1912	129815
F	299m NE	Tanks	1912	139242
F	336m NE	Unspecified Tank	1899	109509

ID	Location	Land use	Dates present	Group ID
R	430m SE	Unspecified Tank	1937 - 1959	131449
R	431m SE	Unspecified Tank	1961	138831
J	493m S	Unspecified Tank	1988	109512

This data is sourced from Ordnance Survey / Groundsure.

1.3 Historical energy features

Records within 500m	**5**

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

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

ID	Location	Land use	Dates present	Group ID
N	326m E	Electricity Substation	1969 - 1990	81411
9	406m E	Electricity Substation	1990	82087
10	409m SE	Electricity Substation	1972 - 1974	75176
11	419m SW	Electricity Substation	1988 - 1990	80948
15	484m W	Electricity Substation	1990	65854

This data is sourced from Ordnance Survey / Groundsure.

1.4 Historical petrol stations

Records within 500m	**1**

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

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

ID	Location	Land use	Dates present	Group ID
S	492m SE	Filling Station	1969	1465

This data is sourced from Ordnance Survey / Groundsure.

1.5 Historical garages

Records within 500m	**3**

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

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

ID	Location	Land use	Dates present	Group ID
5	117m SW	Garage	1985 - 1990	24240
S	457m E	Garage	1990	25288
S	458m E	Garage	1974	21618

This data is sourced from Ordnance Survey / Groundsure.

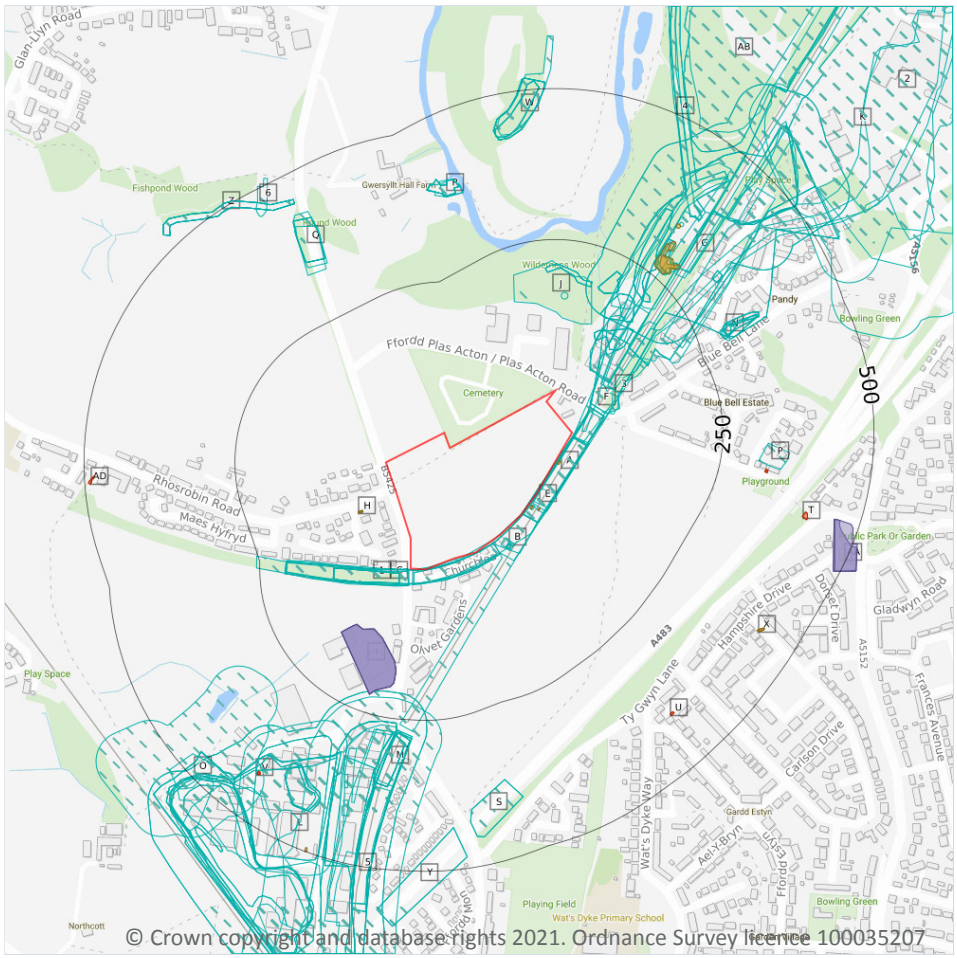
1.6 Historical military land

Records within 500m	**0**

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

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

2 Past land use - un-grouped



2.1 Historical industrial land uses

Records within 500m	187

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
1	**On site**	**Railway Sidings**	**1964**	**915020**
A	**On site**	**Cuttings**	**1989**	**915643**
A	**On site**	**Cuttings**	**1992**	**915643**

ID	Location	Land Use	Date	Group ID
A	**On site**	**Cuttings**	**1980**	**915643**
A	**On site**	**Cuttings**	**1974**	**915643**
A	**On site**	**Cuttings**	**1985**	**915643**
A	**On site**	**Cuttings**	**1964**	**915643**
B	**On site**	**Cuttings**	**1909**	**960119**
C	**On site**	**Cuttings**	**1938**	**958373**
D	0m S	Cuttings	1872	928092
E	0m SE	Cuttings	1949	953359
B	1m SE	Cuttings	1938	923191
B	1m SE	Cuttings	1949	986010
A	2m SE	Cuttings	1938	961927
A	3m SE	Cuttings	1938	961927
F	3m SE	Railway Sidings	1898	845941
C	4m SW	Cuttings	1938	864174
C	4m SW	Cuttings	1949	896355
2	4m SE	Railway Sidings	1938	860099
G	6m SE	Railway Sidings	1938	907441
E	6m SE	Railway Building	1872	819220
C	8m SW	Cuttings	1872	978658
D	9m SE	Railway Building	1985	876885
F	17m E	Tramway Sidings	1909	879276
D	18m SE	Railway Building	1980	911019
C	21m W	Cuttings	1989	965693
C	21m W	Cuttings	1992	965693
C	21m W	Cuttings	1980	965693
C	21m W	Cuttings	1974	965693
C	21m W	Cuttings	1985	965693
C	21m W	Cuttings	1964	965693

ID	Location	Land Use	Date	Group ID
D	21m SE	Railway Building	1898	848954
D	21m SE	Railway Building	1872	848954
F	54m NE	Brick and Tile Works	1938	986797
F	54m NE	Brick and Tile Works	1938	986797
3	61m NE	Unspecified Ground Workings	1949	799088
F	67m NE	Industrial Estate	1989	849933
F	67m NE	Industrial Estate	1985	849933
F	69m NE	Industrial Estate	1992	974041
F	87m E	Cuttings	1872	795362
F	104m NE	Refuse Heap	1949	828328
F	106m NE	Unspecified Ground Workings	1980	989815
F	106m NE	Unspecified Ground Workings	1974	989815
F	106m NE	Unspecified Ground Workings	1964	989815
J	118m N	Sewage Works	1949	811767
G	141m NE	Railway Sidings	1980	991531
G	141m NE	Railway Sidings	1974	991531
K	141m NE	Railway Sidings	1964	865717
K	142m NE	Railway Sidings	1949	861618
F	146m NE	Unspecified Heap	1980	862082
F	146m NE	Unspecified Heap	1974	862082
F	146m NE	Unspecified Heap	1964	862082
G	147m NE	Brick and Tile Works	1938	895106
G	147m NE	Brick and Tile Works	1898	884798
J	152m N	Unspecified Tank	1949	823847
F	165m NE	Unspecified Heap	1949	868936
F	168m NE	Brick and Tile Works	1909	876350
F	180m NE	Unspecified Pit	1989	989415
F	180m NE	Unspecified Pit	1980	989415

ID	Location	Land Use	Date	Group ID
F	180m NE	Unspecified Pit	1974	989415
F	180m NE	Unspecified Pit	1985	989415
F	180m NE	Unspecified Pit	1964	989415
J	181m N	Unspecified Ground Workings	1989	933893
J	181m N	Unspecified Ground Workings	1992	933893
J	181m N	Unspecified Ground Workings	1985	933893
F	203m NE	Unspecified Depot	1985	844754
L	207m S	Colliery	1938	879187
L	207m S	Colliery	1898	968605
F	208m NE	Unspecified Ground Workings	1980	909306
F	208m NE	Unspecified Ground Workings	1974	909306
F	208m NE	Unspecified Ground Workings	1964	909306
L	216m S	Colliery	1872	888230
L	257m S	Colliery	1949	885376
L	257m S	Railway Sidings	1938	967219
L	257m S	Railway Sidings	1949	904054
L	257m S	Railway Sidings	1898	966138
F	262m NE	Unspecified Tanks	1909	879554
F	262m NE	Unspecified Tanks	1938	850297
L	263m S	Colliery	1909	868954
F	265m NE	Unspecified Tanks	1938	906257
F	265m NE	Unspecified Tanks	1898	872328
L	268m S	Cuttings	1909	914969
L	269m S	Cuttings	1938	980525
L	271m S	Railway Sidings	1909	936538
L	272m S	Railway Sidings	1872	971220
M	272m S	Cuttings	1872	874643
L	272m S	Cuttings	1938	857514

ID	Location	Land Use	Date	Group ID
L	272m S	Cuttings	1949	857514
L	272m S	Cuttings	1898	959476
M	273m S	Cuttings	1989	848236
M	273m S	Cuttings	1992	848236
M	273m S	Cuttings	1980	848236
M	273m S	Cuttings	1974	848236
M	273m S	Cuttings	1985	848236
M	273m S	Cuttings	1964	848236
L	277m S	Railway Sidings	1938	880538
F	277m NE	Cuttings	1872	941479
L	285m SW	Industrial Estate	1985	853953
F	288m NE	Cuttings	1938	980654
N	289m E	Old Gravel Pit	1938	894916
N	289m E	Old Gravel Pit	1949	894916
N	289m E	Old Gravel Pit	1898	846959
F	290m NE	Cuttings	1909	877413
N	291m E	Sand Pit	1872	797324
N	294m E	Unspecified Ground Workings	1980	870979
N	294m E	Unspecified Ground Workings	1974	870979
N	294m E	Unspecified Ground Workings	1964	870979
F	296m NE	Unspecified Tanks	1909	859720
N	296m E	Old Gravel Pit	1938	894916
N	298m E	Old Gravel Pit	1909	927871
O	299m SW	Disused Iron Works	1898	818925
L	310m SW	Industrial Estate	1989	974515
L	310m SW	Industrial Estate	1992	974515
P	313m E	Unspecified Depot	1992	818109
F	319m NE	Unspecified Depot	1989	984078

ID	Location	Land Use	Date	Group ID
F	319m NE	Unspecified Depot	1992	984078
L	325m S	Colliery	1938	933881
L	325m S	Colliery	1938	933881
L	329m S	Unspecified Depot	1980	961641
L	329m S	Unspecified Depot	1974	961641
Q	331m NW	Cuttings	1964	871234
L	336m S	Unspecified Disused Mine	1974	929971
L	336m S	Unspecified Disused Mine	1964	929971
Q	339m NW	Cuttings	1949	978455
F	342m NE	Unspecified Tank	1898	823846
Q	347m NW	Cuttings	1989	906355
Q	347m NW	Cuttings	1992	906355
Q	347m NW	Cuttings	1980	906355
Q	347m NW	Cuttings	1974	906355
Q	347m NW	Cuttings	1985	906355
L	356m S	Railway Building	1938	819226
R	361m NW	Unspecified Disused Mill	1909	876690
R	362m NW	Unspecified Disused Mill	1938	876690
4	364m NE	Tramway Sidings	1938	844903
5	366m S	Cuttings	1872	979626
R	366m NW	Unspecified Disused Mill	1938	953409
R	366m NW	Unspecified Disused Mill	1949	953409
R	366m NW	Unspecified Mill	1898	810171
R	366m NW	Corn Mill	1872	823097
L	371m SW	Refuse Heap	1938	951365
L	371m SW	Refuse Heap	1938	951365
S	372m S	Cuttings	1980	938352
S	372m S	Cuttings	1974	938352

ID	Location	Land Use	Date	Group ID
L	372m SW	Unspecified Ground Workings	1909	799090
L	374m SW	Unspecified Heap	1938	983415
L	374m SW	Unspecified Heap	1949	983415
L	375m SW	Shale Tip	1909	821771
L	397m S	Railway Building	1938	819227
G	401m NE	Old Gravel Pit	1909	852398
G	402m NE	Unspecified Pit	1872	838987
G	402m NE	Old Gravel Pit	1898	925211
G	404m NE	Old Gravel Pit	1938	920920
G	416m NE	Old Gravel Pit	1938	852398
W	425m N	Unspecified Ground Workings	1989	856065
W	425m N	Unspecified Heaps	1980	907505
W	425m N	Unspecified Heaps	1974	907505
W	425m N	Unspecified Ground Workings	1985	856065
W	425m N	Unspecified Heaps	1964	907505
W	428m N	Unspecified Heap	1938	984419
W	428m N	Unspecified Heap	1949	984419
W	428m N	Unspecified Heap	1898	925583
W	428m N	Unspecified Heap	1872	925583
Y	430m S	Cuttings	1980	887907
Y	430m S	Cuttings	1974	887907
W	431m N	Unspecified Ground Workings	1992	889249
L	447m SW	Unspecified Heap	1949	914628
L	449m SW	Unspecified Heap	1964	941695
Z	451m NW	Unspecified Ground Workings	1989	976882
Z	451m NW	Unspecified Ground Workings	1992	976882
Z	451m NW	Unspecified Ground Workings	1980	976882
Z	451m NW	Unspecified Ground Workings	1974	976882

ID	Location	Land Use	Date	Group ID
Z	451m NW	Unspecified Ground Workings	1985	976882
O	456m SW	Brick Field	1872	817814
6	457m NW	Unspecified Ground Workings	1909	884421
O	458m SW	Unspecified Ground Workings	1872	959502
L	460m SW	Unspecified Ground Workings	1909	946117
L	462m SW	Unspecified Heap	1938	860414
L	462m SW	Unspecified Heap	1938	860414
AB	464m NE	Refuse Heap	1989	929549
AB	464m NE	Refuse Heap	1985	904520
L	467m SW	Unspecified Heap	1938	860414
L	469m SW	Unspecified Heap	1898	961558
L	478m SW	Shale Tip	1909	821772
O	479m SW	Unspecified Heap	1980	860174
AC	479m NE	Colliery	1949	844687
AC	487m NE	Colliery	1938	979075
AB	495m NE	Refuse Heap	1992	899301

This data is sourced from Ordnance Survey / Groundsure.

2.2 Historical tanks

Records within 500m	**16**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
A	5m SE	Unspecified Tank	1937	109508
E	5m SE	Unspecified Tank	1899	109511
E	17m SE	Unspecified Tank	1912	109510
H	63m W	Unspecified Tank	1985	134260

ID	Location	Land Use	Date	Group ID
H	63m W	Unspecified Tank	1988	134260
H	63m W	Unspecified Tank	1990	134260
H	63m W	Unspecified Tank	1990	134260
H	63m W	Unspecified Tank	1976	134260
F	262m NE	Tanks	1899	128842
F	268m NE	Tanks	1912	129815
F	299m NE	Tanks	1912	139242
F	336m NE	Unspecified Tank	1899	109509
X	430m SE	Unspecified Tank	1937	131449
X	431m SE	Unspecified Tank	1961	138831
X	431m SE	Unspecified Tank	1959	131449
L	493m S	Unspecified Tank	1988	109512

This data is sourced from Ordnance Survey / Groundsure.

2.3 Historical energy features

Records within 500m **13**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
P	326m E	Electricity Substation	1990	81411
P	326m E	Electricity Substation	1990	81411
P	326m E	Electricity Substation	1969	81411
P	326m E	Electricity Substation	1974	81411
T	406m E	Electricity Substation	1990	82087
T	406m E	Electricity Substation	1990	82087
U	409m SE	Electricity Substation	1974	75176
U	409m SE	Electricity Substation	1972	75176

ID	Location	Land Use	Date	Group ID
V	419m SW	Electricity Substation	1988	80948
V	419m SW	Electricity Substation	1990	80948
V	419m SW	Electricity Substation	1990	80948
AD	484m W	Electricity Substation	1990	65854
AD	484m W	Electricity Substation	1990	65854

This data is sourced from Ordnance Survey / Groundsure.

2.4 Historical petrol stations

Records within 500m	**1**

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

Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
AA	492m SE	Filling Station	1969	1465

This data is sourced from Ordnance Survey / Groundsure.

2.5 Historical garages

Records within 500m	**7**

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

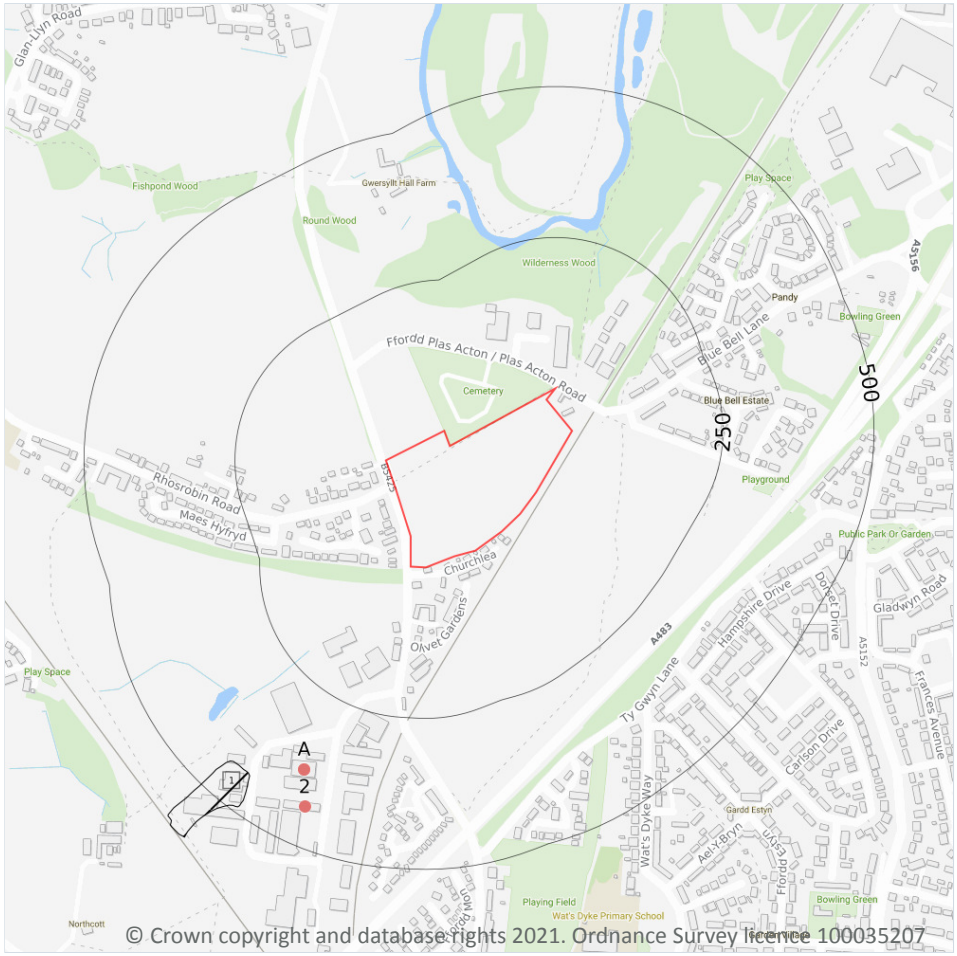
Features are displayed on the Past land use - un-grouped map on **page 22**

ID	Location	Land Use	Date	Group ID
I	117m SW	Garage	1985	24240
I	117m SW	Garage	1988	24240
I	117m SW	Garage	1990	24240
I	117m SW	Garage	1990	24240
AA	457m E	Garage	1990	25288

ID	Location	Land Use	Date	Group ID
AA	457m E	Garage	1990	25288
AA	458m E	Garage	1974	21618

This data is sourced from Ordnance Survey / Groundsure.

3 Waste and landfill



3.1 Active or recent landfill

Records within 500m	0

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

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

3.2 Historical landfill (BGS records)

Records within 500m	0

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

This data is sourced from the British Geological Survey.

3.3 Historical landfill (LA/mapping records)

Records within 500m	0

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

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

3.4 Historical landfill (EA/NRW records)

Records within 500m	1

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

Features are displayed on the Waste and landfill map on **page 33**

ID	Location	Details		
1	434m SW	Site Address: Holmes Plant Hire Licence Holder Address: -	Waste Licence: Yes Site Reference: - Waste Type: Industrial Environmental Permitting Regulations (Waste) Reference: - Licence Issue: - Licence Surrender: -	Operator: - Licence Holder: D S Holmes Builders Limited First Recorded 01/01/1990 Last Recorded: 18/02/1991

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

3.5 Historical waste sites

Records within 500m	0

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

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

3.6 Licensed waste sites

Records within 500m	0

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

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

3.7 Waste exemptions

Records within 500m	3

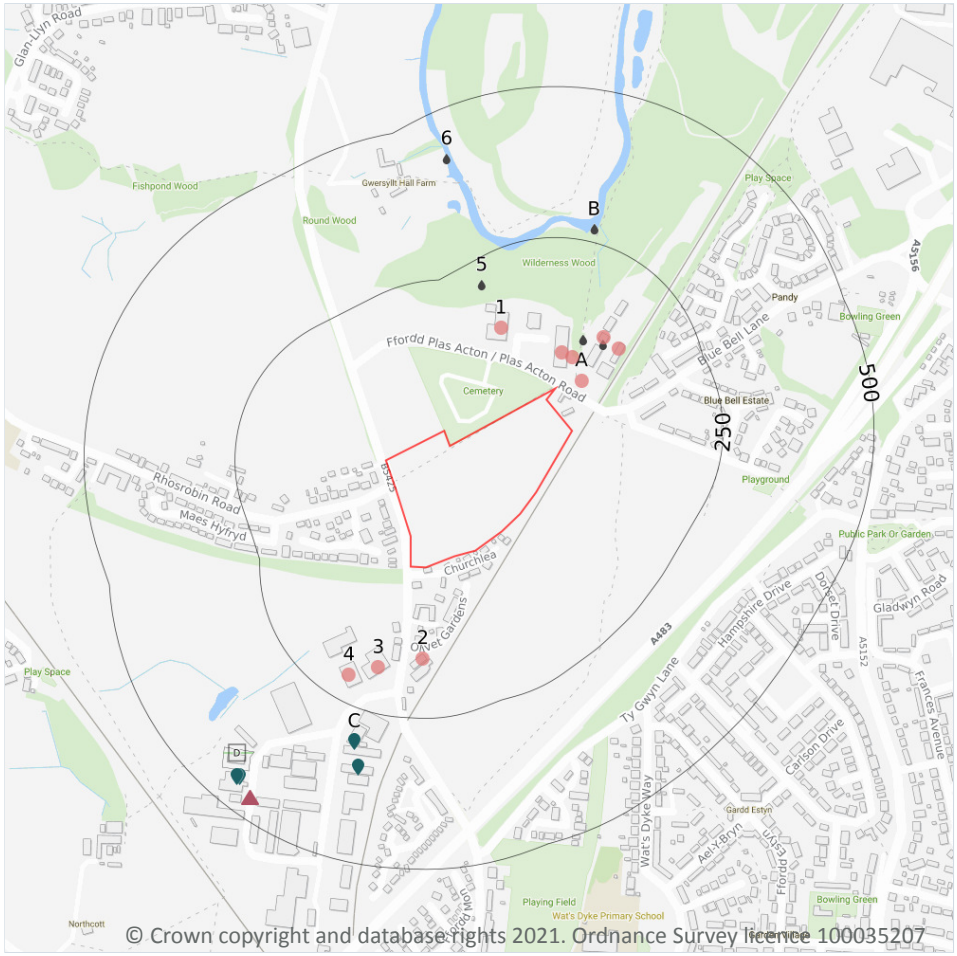
Activities involving the storage, treatment, use or disposal of waste that are exempt from needing a permit. Exemptions have specific limits and conditions that must be adhered to.

Features are displayed on the Waste and landfill map on **page 33**

ID	Location	Site	Reference	Category	Sub-Category	Description
A	380m SW	Land to rear of Rhosddu industrial estate Rhosddu industrial estate Wrexhann LL114YL	NRW-WME029679	Using waste exemption	On a farm	Spreading waste on agricultural land to confer benefit
A	380m SW	Owen Automotive, Owen Automotive Ltd, Unit 3, Rhosddu Industrial Estate, Old Rhosrobin, Rhosrobin, Wrexham, Wrecsam, LL114YL	NRW-WME037041	Using waste exemption	Not on a farm	Burning of waste as a fuel in a small appliance
2	435m SW	Wps Logistics Ltd., Rhosddu Industrial Estate, Rhosrobin, Wrexham, Wrecsam, LL11 4YZ	NRW-WME045725	Treating waste exemption	Not on a farm	Manual treatment of waste

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

4 Current industrial land use



4.1 Recent industrial land uses

Records within 250m	9

Current potentially contaminative industrial sites.

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Company	Address	Activity	Category
A	45m E	Pandy Business Park	Clwyd, LL11	Business Parks and Industrial Estates	Industrial Features
A	60m NE	Electricity Sub Station	Clwyd, LL11	Electrical Features	Infrastructure and Facilities

ID	Location	Company	Address	Activity	Category
A	61m N	Wrexham Tool Hire Ltd	Unit 5 Plas Acton Industrial Estate, Plas Acton Road, Wrexham, Clwyd, LL11 2UB	Construction and Tool Hire	Hire Services
A	117m NE	Uplec Industries	Unit 4 Pandy Business Park, Plas Acton Road, Wrexham, Clwyd, LL11 2UD	Radar and Telecommunications Equipment	Industrial Products
A	124m NE	Jolly Goods Van Hire	Unit 5 Pandy Business Park, Plas Acton Road, Wrexham, Clwyd, LL11 2UD	Vehicle Hire and Rental	Hire Services
1	131m NW	Stoneacre Wrexham	Unit 4 Plas Acton Industrial Estate, Plas Acton Road, Wrexham, Clwyd, LL11 2UB	New Vehicles	Motoring
2	150m S	Tyrewise Ltd	Main Road, Rhosrobin, Wrexham, Clwyd, LL11 4RL	Vehicle Parts and Accessories	Motoring
3	175m S	Wrexham Volkswagen	Rhosddu Industrial Estate, Rhosrobin, Wrexham, Clwyd, LL11 4YL	New Vehicles	Motoring
4	206m SW	W M Rollings Ltd	Rhosddu Industrial Estate, Rhosrobin, Wrexham, Clwyd, LL11 4YL	Vehicle Parts and Accessories	Motoring

This data is sourced from Ordnance Survey.

4.2 Current or recent petrol stations

Records within 500m	**0**

Open, closed, under development and obsolete petrol stations.

This data is sourced from Experian.

4.3 Electricity cables

Records within 500m	**0**

High voltage underground electricity transmission cables.

This data is sourced from National Grid.

4.4 Gas pipelines

Records within 500m	**0**

High pressure underground gas transmission pipelines.

This data is sourced from National Grid.

4.5 Sites determined as Contaminated Land

Records within 500m	0

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

This data is sourced from Local Authority records.

4.6 Control of Major Accident Hazards (COMAH)

Records within 500m	1

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

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Company	Address	Operational status	Tier
D	402m SW	A A Butler & Co (wrexham) Ltd	A A Butler And Co (wrexham) Ltd, Rhosddu Industrial Estate, Rhosrobin, Wrexham, LL11 4YL	Historical NIHHS Site	-

This data is sourced from the Health and Safety Executive.

4.7 Regulated explosive sites

Records within 500m	0

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

This data is sourced from the Health and Safety Executive.

4.8 Hazardous substance storage/usage

Records within 500m	1

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

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Details	
D	466m SW	Application reference number: 6/0002/0881 Application status: Approved Application date: 16/11/1992 Address: A A Butler & Co (Wrexham) Ltd, Rhosddu Industrial Estate, Rhosddu, Wrexham, Clwyd, Wales, LL11 4YL	Details: Deemed Hazardous Substance Consent Enforcement: No Enforcement Notified Date of enforcement: No Enforcement Notified Comment: No Enforcement Notified

This data is sourced from Local Authority records.

4.9 Historical licensed industrial activities (IPC)

Records within 500m	**0**

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

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

4.10 Licensed industrial activities (Part A(1))

Records within 500m	**0**

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

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

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

Records within 500m	**4**

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

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Address	Details	
C	304m S	Owen Automotive, Unit 3 Rhosddu Industrial Estate, Wrexham, LL11 4YL	Process: Waste Oil Burner 0.4 MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcement Notified. Date of enforcement: No Enforcement Notified. Comment: No Enforcement Notified.
C	343m S	CEMEX, Rhosddu Industrial Estate, Rhosddu, Wrexham, LL11 4YL	Process: Other Mineral Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified. Date of enforcement: No Enforcement Notified. Comment: No Enforcement Notified.

ID	Location	Address	Details	
D	448m SW	Tudor Griffiths Group, Rhosddu Industrial Estate, Wrexham, LL11 4YL	Process: Other Mineral Processes Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified. Date of enforcement: No Enforcement Notified. Comment: No Enforcement Notified.
D	452m SW	Matclad Ltd, Unit 51, Rhosddu Industrial Estate, Old Rhosrobin, Wrexham, LL11 4YL	Process: Manufacture of Clay Status: Current Permit Permit Type: Part B	Enforcement: No Enforcement Notified. Date of enforcement: No Enforcement Notified. Comment: No Enforcement Notified.

This data is sourced from Local Authority records.

4.12 Radioactive Substance Authorisations

Records within 500m	**0**

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

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

4.13 Licensed Discharges to controlled waters

Records within 500m	**7**

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

Features are displayed on the Current industrial land use map on **page 36**

ID	Location	Address	Details	
A	91m NE	Pandy SPS Wrexham, Pandy Ind Est Plas Acton road, Pandy, Wrexham, LL11 2UD	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: CM0176801 Permit Version: 3 Receiving Water: RIVER ALYN	Status: Effective Issue date: 06/02/2020 Effective Date: 06/02/2020 Revocation Date: -
A	91m NE	Pandy SPS Wrexham, Pandy Ind Est Plas Acton road, Pandy, Wrexham, LL11 2UD	Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: CM0176801 Permit Version: 3 Receiving Water: RIVER ALYN	Status: Effective Issue date: 06/02/2020 Effective Date: 06/02/2020 Revocation Date: -

ID	Location	Address	Details	
A	105m NE	PANDY PUMPING STATION, PANDY INDUSTRIAL ESTATE, PANDY, WREXHAM, LL11 2UD	Effluent Type: UNSPECIFIED Permit Number: CM0176801 Permit Version: 1 Receiving Water: ALYN	Status: NEW CONSENT, BY APPLICATION (WRA 91, SECTION 88) Issue date: 19/10/1989 Effective Date: 19/10/1989 Revocation Date: 30/03/2005
5	209m NW	WILDERNESS STW, WILDERNESS STW, UNKNOWN, UNKNOWN, UNKNOWN, UNKNOWN	Effluent Type: UNSPECIFIED Permit Number: CM0005801 Permit Version: 1 Receiving Water: ALYN	Status: CONSENT EXPIRED - TIME LIMIT Issue date: 14/02/1958 Effective Date: 14/02/1958 Revocation Date: 28/03/1995
B	271m N	PANDY PUMPING STATION, PANDY INDUSTRIAL ESTATE, PANDY, Wrexham, LL11 2UD	Effluent Type: MISCELLANEOUS DISCHARGES - EMERGENCY DISCHARGES Permit Number: CM0176801 Permit Version: 2 Receiving Water: RIVER ALYN	Status: Effective Issue date: 25/11/2004 Effective Date: 31/03/2005 Revocation Date: -
B	271m N	PANDY PUMPING STATION, PANDY INDUSTRIAL ESTATE, PANDY, Wrexham, LL11 2UD	Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: CM0176801 Permit Version: 2 Receiving Water: RIVER ALYN	Status: Effective Issue date: 25/11/2004 Effective Date: 31/03/2005 Revocation Date: -
6	421m NW	GWERSYLLT HALL LODGE, LLAY NEW ROAD, Bradley, Wrexham, Clwyd, LL11 4BG	Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: WQD003972 Permit Version: 1 Receiving Water: UN-NAMED TRIB OF RIVER ALYN	Status: Effective Issue date: 10/10/2008 Effective Date: 10/10/2008 Revocation Date: -

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

4.14 Pollutant release to surface waters (Red List)

Records within 500m	**0**

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

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

4.15 Pollutant release to public sewer

Records within 500m	0

Discharges of Special Category Effluents to the public sewer.

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

4.16 List 1 Dangerous Substances

Records within 500m	0

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

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

4.17 List 2 Dangerous Substances

Records within 500m	0

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

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

4.18 Pollution Incidents (EA/NRW)

Records within 500m	0

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

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

4.19 Pollution inventory substances

Records within 500m	0

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

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

4.20 Pollution inventory waste transfers

Records within 500m	0

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

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

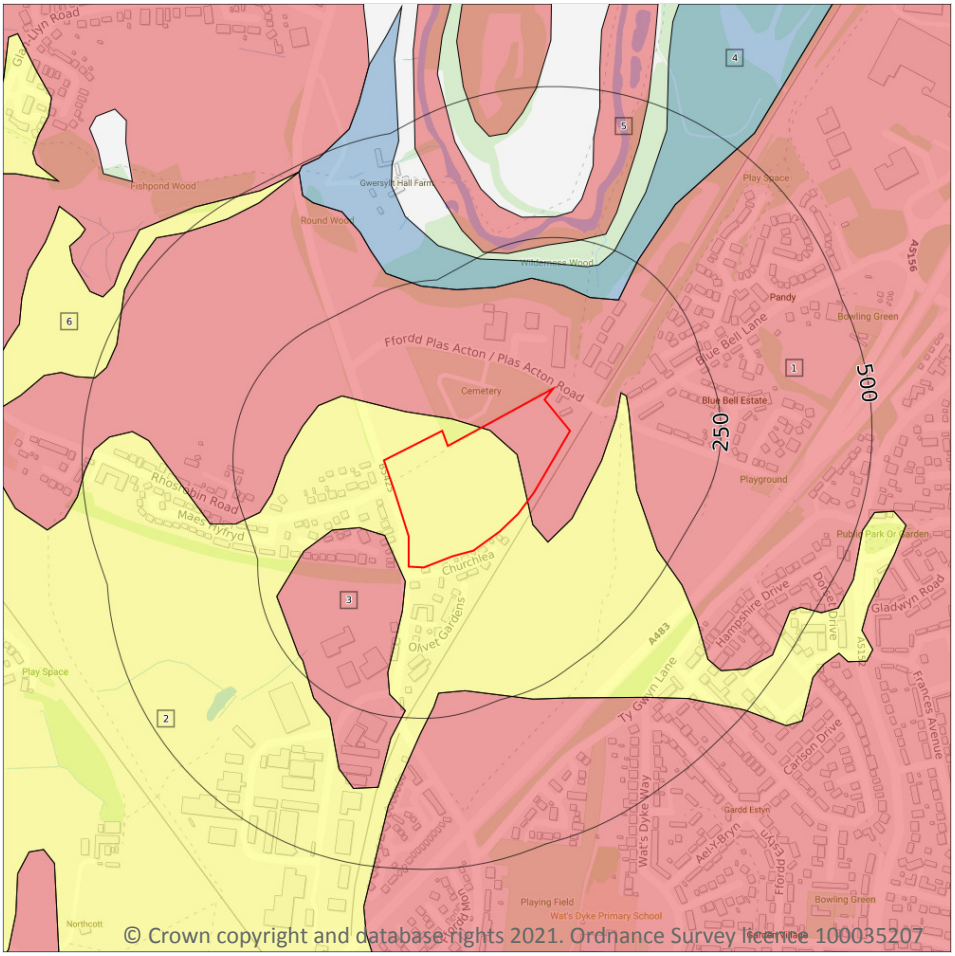
4.21 Pollution inventory radioactive waste

Records within 500m	0

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

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

5 Hydrogeology - Superficial aquifer



© Crown copyright and database rights 2021. Ordnance Survey licence 100035207

5.1 Superficial aquifer

Records within 500m	6

Aquifer status of groundwater held within superficial geology.

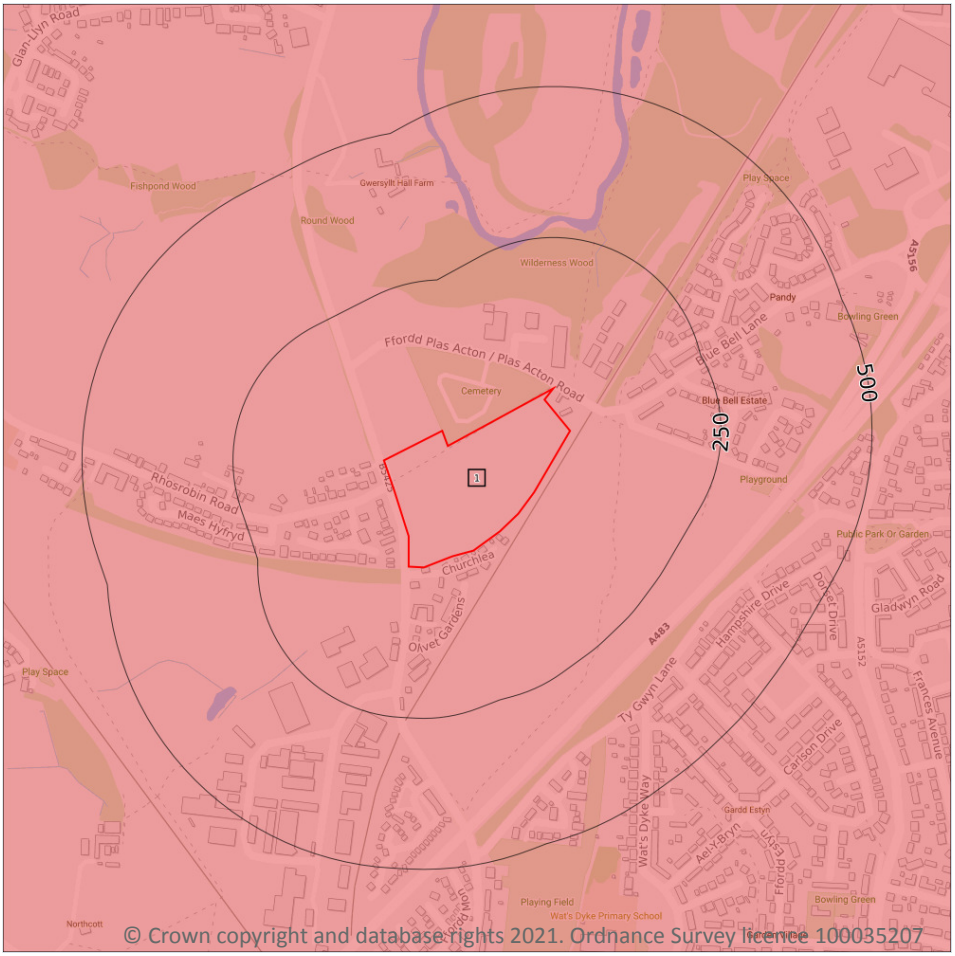
Features are displayed on the Hydrogeology map on **page 44**

ID	Location	Designation	Description
1	On site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	On site	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

ID	Location	Designation	Description
3	15m SW	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
4	163m N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
5	234m N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
6	474m NW	Secondary Undifferentiated	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

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

Bedrock aquifer



© Crown copyright and database rights 2021. Ordnance Survey licence 100035207

5.2 Bedrock aquifer

Records within 500m	1

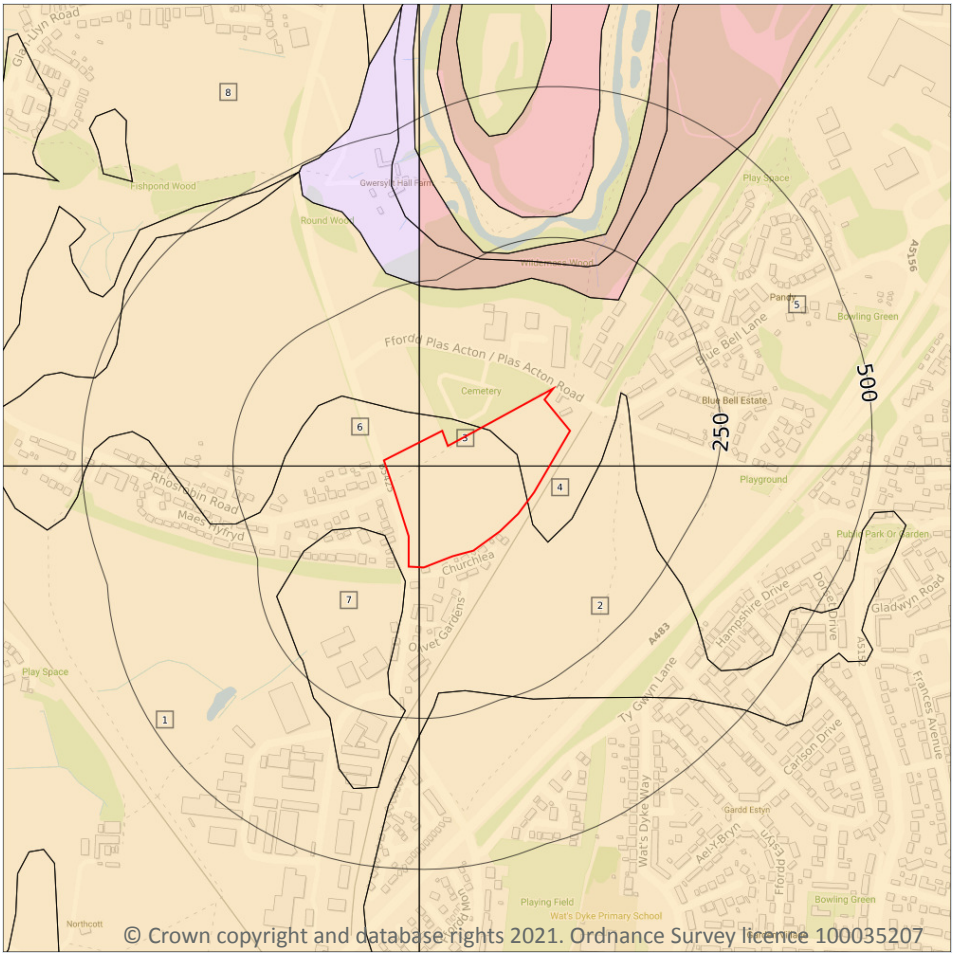
Aquifer status of groundwater held within bedrock geology.

Features are displayed on the Bedrock aquifer map on **page 46**

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

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

Groundwater vulnerability



© Crown copyright and database rights 2021. Ordnance Survey licence 100035207

5.3 Groundwater vulnerability

Records within 50m	8

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

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

Features are displayed on the Groundwater vulnerability map on **page 47**

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

ID	Location	Summary	Soil / surface	Superficial geology	Bedrock geology
7	15m SW	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300-550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: >10m Patchiness value: >90% Recharge potential: High	Vulnerability: Low Aquifer type: Secondary Flow mechanism: Well connected fractures
8	42m NW	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: 300-550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: 3-10m Patchiness value: >90% Recharge potential: High	Vulnerability: Medium Aquifer type: Secondary Flow mechanism: Well connected fractures

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

5.4 Groundwater vulnerability- soluble rock risk

Records on site	**0**

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

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

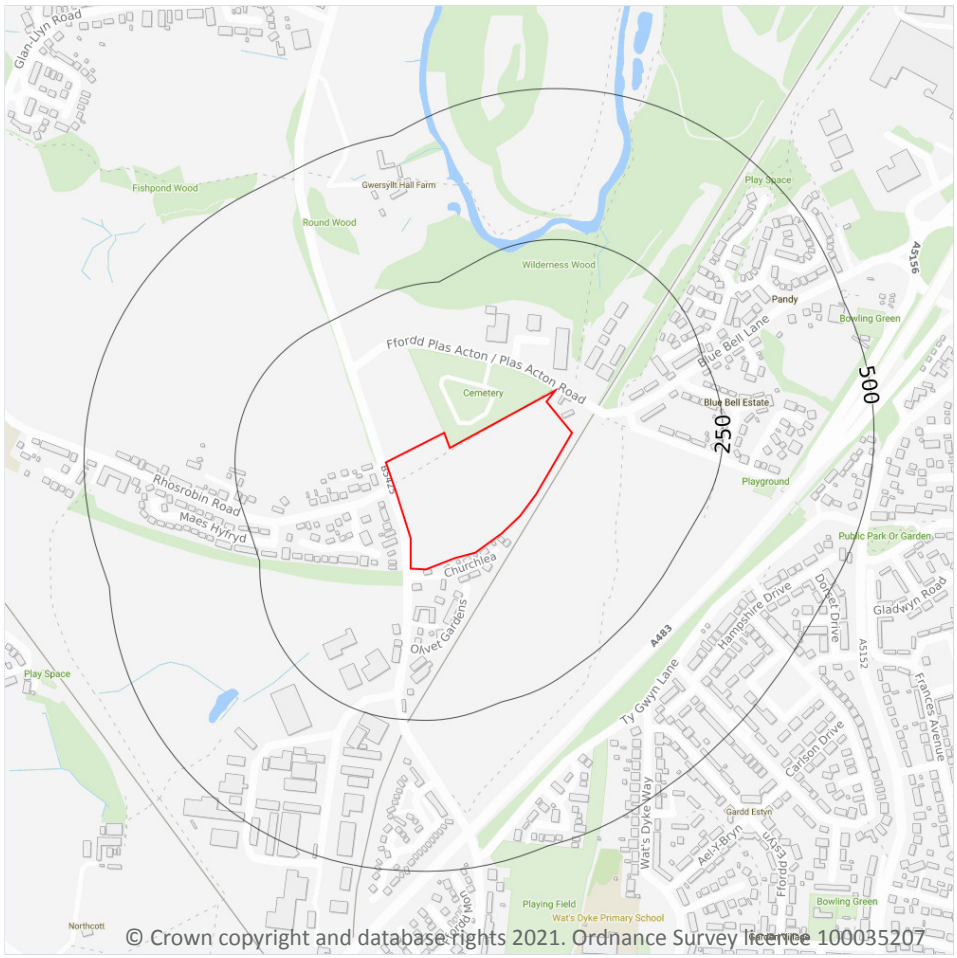
5.5 Groundwater vulnerability- local information

Records on site	**0**

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

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

Abstractions and Source Protection Zones



Site Outline

Search buffers in metres (m)

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

5.6 Groundwater abstractions

Records within 2000m	2

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

Features are displayed on the Abstractions and Source Protection Zones map on **page 50**

ID	Location	Details	
-	1412m E	Status: Historical Licence No: 24/67/8/0017 Details: General Farming & Domestic Direct Source: EAW Groundwater Point: WELL 2 Data Type: Point Name: Jones Easting: 334640 Northing: 353310	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 09/08/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/04/1995 Version End Date: -
-	1417m E	Status: Historical Licence No: 24/67/8/0017 Details: General Farming & Domestic Direct Source: EAW Groundwater Point: WELL 1 Data Type: Point Name: Jones Easting: 334620 Northing: 353421	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 09/08/1966 Expiry Date: - Issue No: 100 Version Start Date: 01/04/1995 Version End Date: -

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

5.7 Surface water abstractions

Records within 2000m	0

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

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

5.8 Potable abstractions

Records within 2000m	0

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

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

5.9 Source Protection Zones

Records within 500m	0

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

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

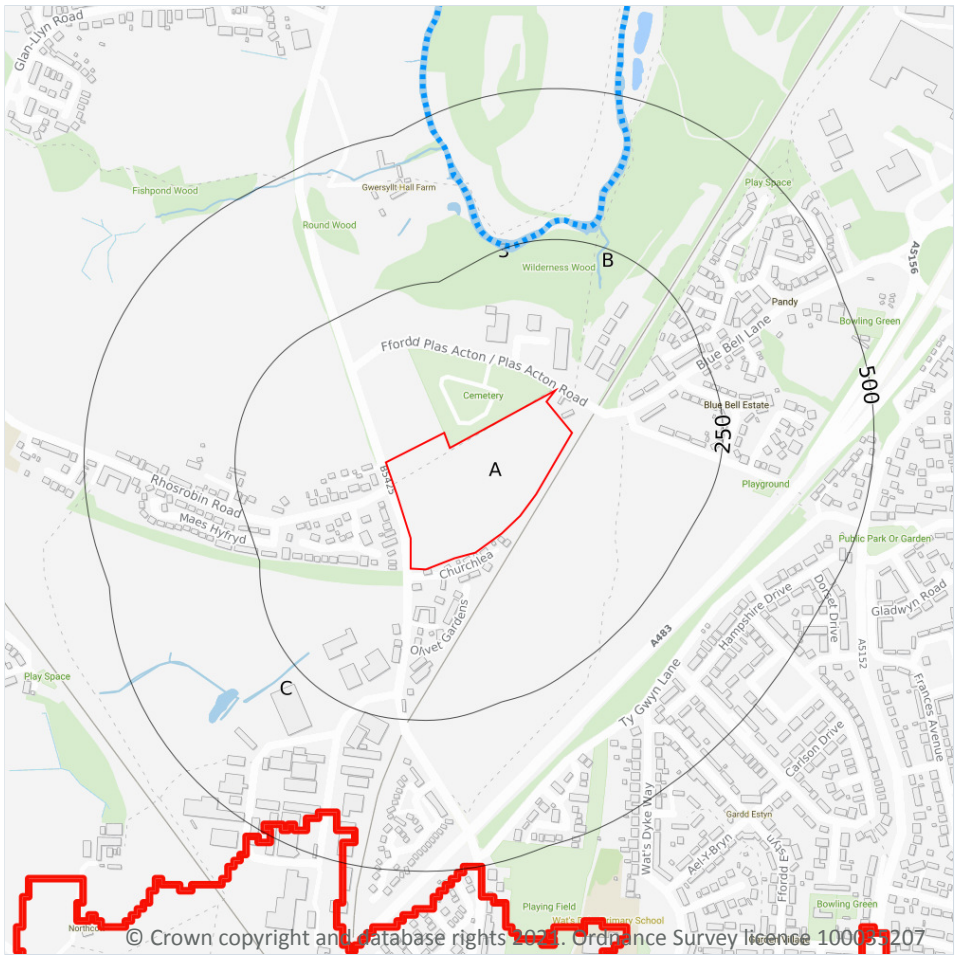
5.10 Source Protection Zones (confined aquifer)

Records within 500m	0

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

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

6 Hydrology



Site Outline

Search buffers in metres (m)

Water Network (OS MasterMap)

Surface water features (wider than 5m)

Surface water features (narrower than 5m)

WFD River, canal and surface water transfer water bodies

WFD Lake water bodies

WFD Transitional and coastal water bodies

WFD Surface water body catchments boundaries

WFD Groundwater body boundaries

6.1 Water Network (OS MasterMap)

Records within 250m	3

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

Features are displayed on the Hydrology map on **page 53**

ID	Location	Type of water feature	Ground level	Permanence	Name
B	185m NE	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-

ID	Location	Type of water feature	Ground level	Permanence	Name
C	218m SW	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	-
3	249m N	Inland river not influenced by normal tidal action.	On ground surface	Watercourse contains water year round (in normal circumstances)	Afon Alun

This data is sourced from the Ordnance Survey.

6.2 Surface water features

Records within 250m	**3**

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

Features are displayed on the Hydrology map on **page 53**

This data is sourced from the Ordnance Survey.

6.3 WFD Surface water body catchments

Records on site	**1**

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

Features are displayed on the Hydrology map on **page 53**

ID	Location	Type	Water body catchment	Water body ID	Operational catchment	Management catchment
A	**On site**	**River WB catchment**	**Alyn - Hope to Dee**	**GB111067052173**	**Alyn**	**Dee**

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

6.4 WFD Surface water bodies

Records identified	1

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

Features are displayed on the Hydrology map on **page 53**

ID	Location	Type	Name	Water body ID	Overall rating	Chemical rating	Ecological rating	Year
2	250m N	River	Alyn - Hope to Dee	GB111067052173	Moderate	Good	Moderate	2016

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

6.5 WFD Groundwater bodies

Records on site	1

Groundwater bodies are also covered by the Directive and the same regime of objectives and reporting detailed in the previous section is in place.

Features are displayed on the Hydrology map on **page 53**

ID	Location	Name	Water body ID	Overall rating	Chemical rating	Quantitative	Year
A	**On site**	**Dee Carboniferous Coal Measures**	**GB41102G204800**	**Poor**	**Poor**	**Good**	**2017**

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

7 River and coastal flooding

7.1 Risk of flooding from rivers and the sea

Records within 50m	0

The chance of flooding from rivers and/or the sea in any given year, based on cells of 50m within the Risk of Flooding from Rivers and Sea (RoFRaS)/Flood Risk Assessment Wales (FRAW) models. Each cell is allocated one of four flood risk categories, taking into account flood defences and their condition. The risk categories for RoFRaS for rivers and the sea and FRAW for rivers are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 100 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 100 chance) or High (greater than or equal to 1 in 30 chance). The risk categories for FRAW for the sea are; Very low (less than 1 in 1000 chance in any given year), Low (less than 1 in 200 but greater than or equal to 1 in 1000 chance), Medium (less than 1 in 30 but greater than or equal to 1 in 200 chance) or High (greater than or equal to 1 in 30 chance).

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

7.2 Historical Flood Events

Records within 250m	0

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

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

7.3 Flood Defences

Records within 250m	0

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

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

7.4 Areas Benefiting from Flood Defences

Records within 250m	0

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

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

7.5 Flood Storage Areas

Records within 250m	0

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

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

River and coastal flooding - Flood Zones

7.6 Flood Zone 2

Records within 50m	0

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

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

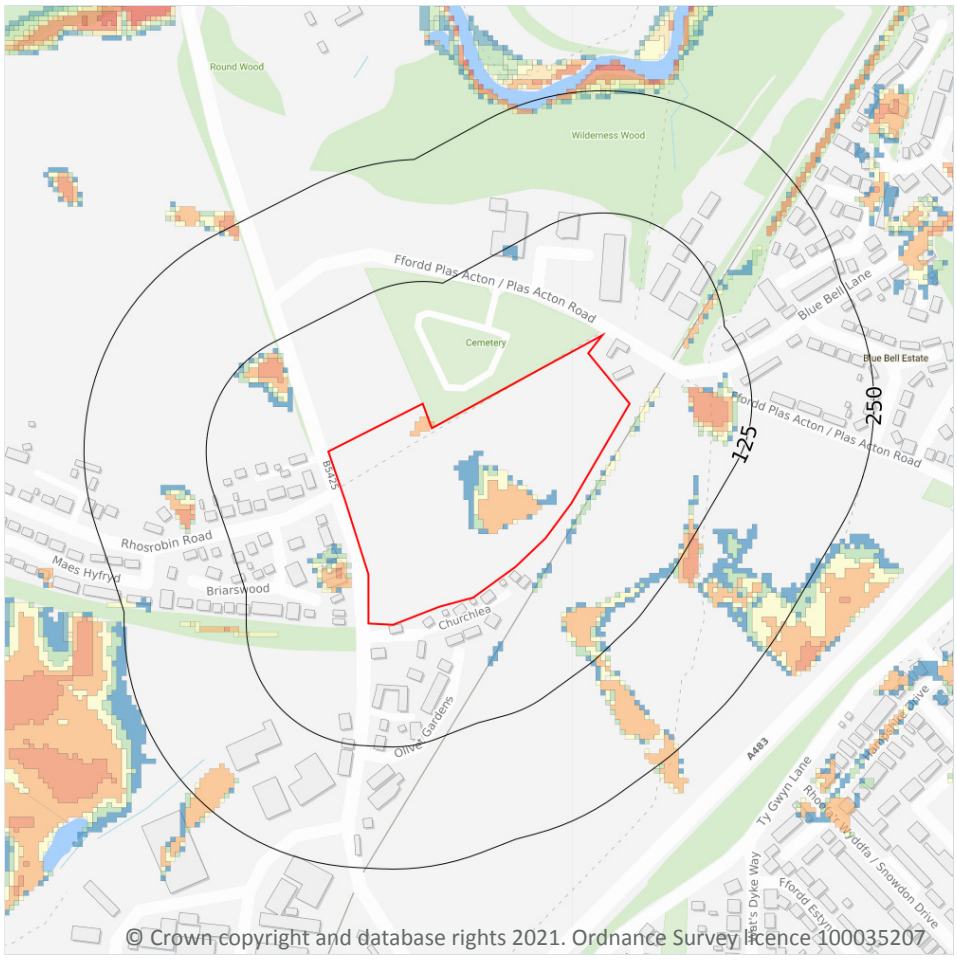
7.7 Flood Zone 3

Records within 50m	0

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

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

8 Surface water flooding



Site Outline

Search buffers in metres (m)

1 in 1000 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 250 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 100 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

1 in 30 return period
- Depth between 0.1m - 0.3m
- Depth between 0.3m - 1.0m
- Depth greater than 1.0m

8.1 Surface water flooding

Highest risk on site	**1 in 30 year, 0.1m - 0.3m**
Highest risk within 50m	**1 in 30 year, 0.3m - 1.0m**

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

Features are displayed on the Surface water flooding map on **page 59**

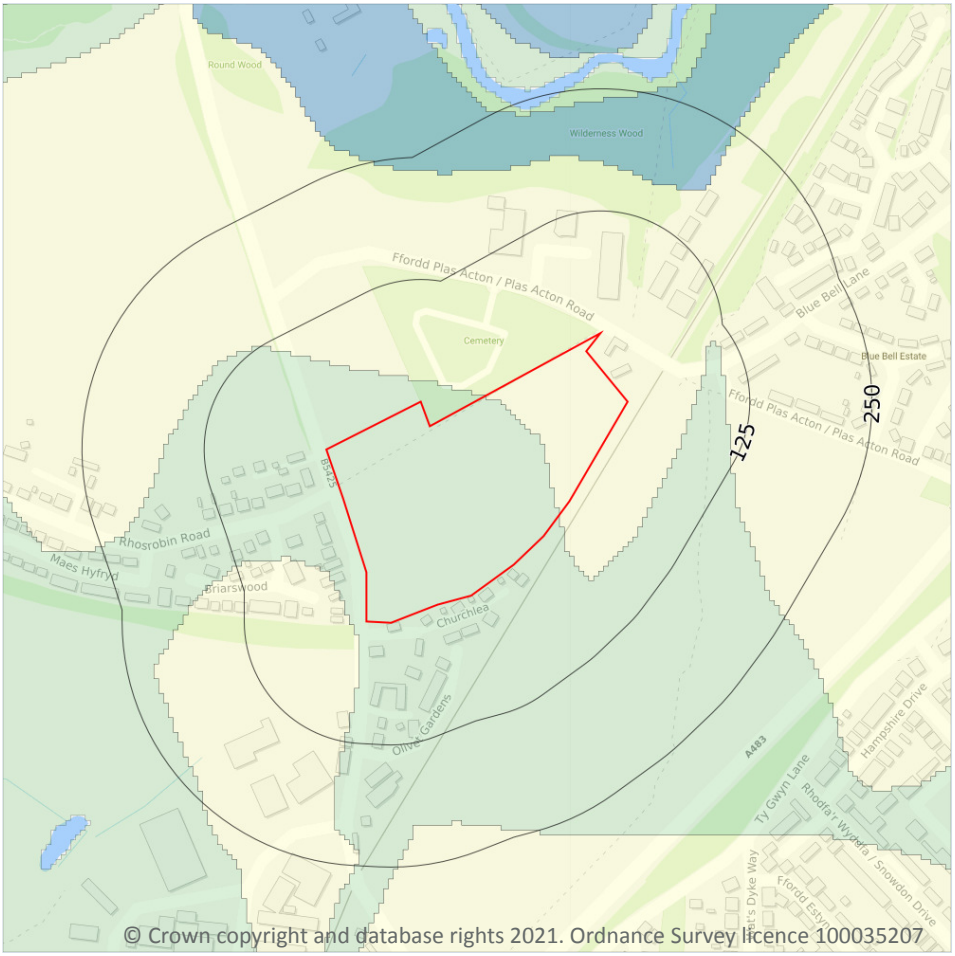
The data shown on the map and in the table above shows the highest likelihood of flood events happening at the site. Lower likelihood events may have greater flood depths and hence a greater potential impact on a site.

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

Return period	Maximum modelled depth
1 in 1000 year	Between 0.3m and 1.0m
1 in 250 year	Between 0.3m and 1.0m
1 in 100 year	Between 0.3m and 1.0m
1 in 30 year	Between 0.1m and 0.3m

This data is sourced from Ambiental Risk Analytics.

9 Groundwater flooding



9.1 Groundwater flooding

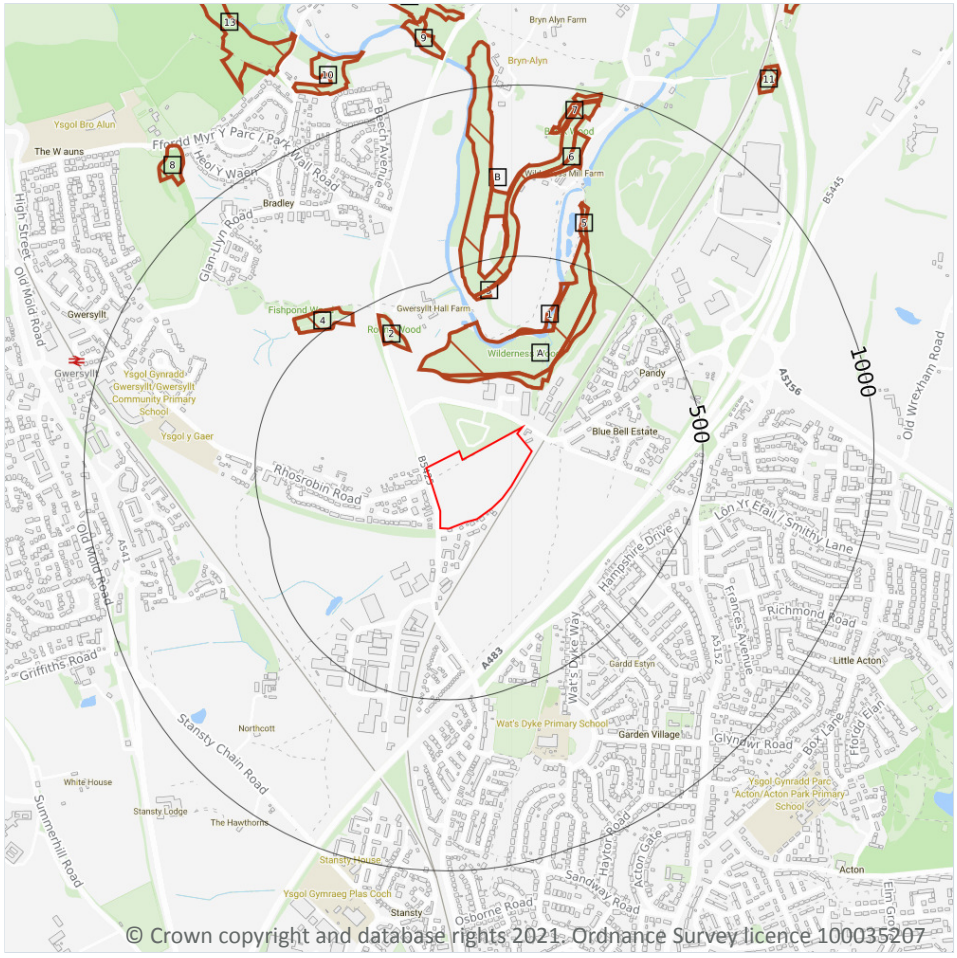
Highest risk on site	**Moderate**
Highest risk within 50m	**Moderate**

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

Features are displayed on the Groundwater flooding map on **page 61**

This data is sourced from Ambiental Risk Analytics.

10 Environmental designations



Site Outline

Search buffers in metres (m)

Sites of Special Scientific Interest (SSSI)

Local Nature Reserves (LNR)

Designated Ancient Woodland

10.1 Sites of Special Scientific Interest (SSSI)

Records within 2000m	1

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

Features are displayed on the Environmental designations map on **page 62**

ID	Location	Name	Data source
-	1772m SW	Gatewen Marsh	Natural Resources Wales

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

10.2 Conserved wetland sites (Ramsar sites)

Records within 2000m	0

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

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

10.3 Special Areas of Conservation (SAC)

Records within 2000m	0

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

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

10.4 Special Protection Areas (SPA)

Records within 2000m	0

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

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

10.5 National Nature Reserves (NNR)

Records within 2000m	0

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

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

10.6 Local Nature Reserves (LNR)

Records within 2000m	1

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

Features are displayed on the Environmental designations map on **page 62**

ID	Location	Name	Data source
-	1550m N	ALYN WATERS	Natural Resources Wales

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

10.7 Designated Ancient Woodland

Records within 2000m	41

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

Features are displayed on the Environmental designations map on **page 62**

ID	Location	Name	Woodland Type
A	119m N	Unknown	Ancient Semi Natural Woodland
A	149m N	Unknown	Ancient Semi Natural Woodland
1	264m N	Unknown	Ancient Semi Natural Woodland
2	330m NW	Unknown	Ancient Semi Natural Woodland
3	395m N	Unknown	Ancient Semi Natural Woodland
B	407m N	Unknown	Ancient Semi Natural Woodland
4	470m NW	Unknown	Ancient Semi Natural Woodland
B	522m N	Unknown	Ancient Semi Natural Woodland
5	566m N	Unknown	Ancient Semi Natural Woodland
6	732m N	Unknown	Ancient Semi Natural Woodland
7	864m N	Unknown	Ancient Semi Natural Woodland
8	1100m NW	Unknown	Ancient Semi Natural Woodland

ID	Location	Name	Woodland Type
9	1104m N	Unknown	Ancient Semi Natural Woodland
10	1109m N	Unknown	Ancient Semi Natural Woodland
11	1198m NE	Unknown	Restored Ancient Woodland Site
12	1206m N	Unknown	Ancient Semi Natural Woodland
13	1226m NW	Unknown	Ancient Semi Natural Woodland
-	1314m N	Unknown	Restored Ancient Woodland Site
-	1322m E	Unknown	Restored Ancient Woodland Site
-	1326m N	Unknown	Restored Ancient Woodland Site
-	1389m N	Unknown	Ancient Semi Natural Woodland
-	1426m E	Unknown	Restored Ancient Woodland Site
17	1440m NE	Unknown	Restored Ancient Woodland Site
-	1574m NE	Unknown	Ancient Semi Natural Woodland
-	1594m E	Unknown	Restored Ancient Woodland Site
-	1653m NE	Unknown	Ancient Semi Natural Woodland
-	1711m W	Unknown	Restored Ancient Woodland Site
-	1780m NE	Unknown	Restored Ancient Woodland Site
-	1796m W	Unknown	Restored Ancient Woodland Site
-	1801m N	Unknown	Ancient Semi Natural Woodland
-	1802m W	Unknown	Restored Ancient Woodland Site
-	1814m N	Unknown	Restored Ancient Woodland Site
-	1830m W	Unknown	Restored Ancient Woodland Site
-	1836m N	Unknown	Restored Ancient Woodland Site
-	1837m W	Unknown	Plantation on Ancient Woodland Site
-	1885m E	Unknown	Ancient Semi Natural Woodland
-	1899m W	Unknown	Restored Ancient Woodland Site
-	1914m W	Unknown	Restored Ancient Woodland Site
-	1957m W	Unknown	Ancient Semi Natural Woodland
-	1961m NE	Unknown	Ancient Semi Natural Woodland

ID	Location	Name	Woodland Type
-	1962m NE	Unknown	Ancient Semi Natural Woodland

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

10.8 Biosphere Reserves

Records within 2000m	0

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

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

10.9 Forest Parks

Records within 2000m	0

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

This data is sourced from the Forestry Commission.

10.10 Marine Conservation Zones

Records within 2000m	0

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

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

10.11 Green Belt

Records within 2000m	0

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

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

10.12 Proposed Ramsar sites

Records within 2000m	0

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

This data is sourced from Natural England.

10.13 Possible Special Areas of Conservation (pSAC)

Records within 2000m	0

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

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

10.14 Potential Special Protection Areas (pSPA)

Records within 2000m	0

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

This data is sourced from Natural England.

10.15 Nitrate Sensitive Areas

Records within 2000m	0

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

This data is sourced from Natural England.

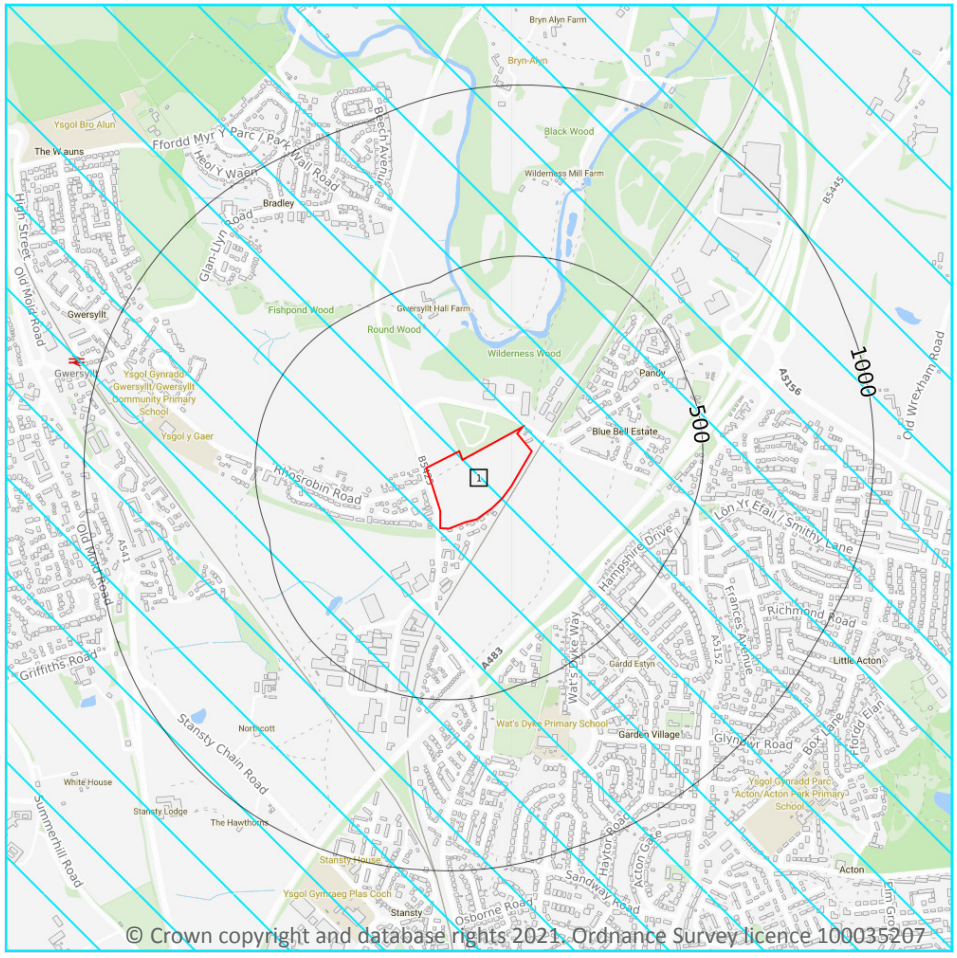
10.16 Nitrate Vulnerable Zones

Records within 2000m	0

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

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

SSSI Impact Zones and Units



Site Outline

Search buffers in metres (m)

SSSI Impact Risk Zones

SSSI Units

- Not recorded
- Favourable
- Unfavourable - Recovering
- Unfavourable - No change
- Unfavourable - Declining
- Partially destroyed
- Destroyed

10.17 SSSI Impact Risk Zones

Records on site	1

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

Features are displayed on the SSSI Impact Zones and Units map on **page 69**

ID	Location	Type of developments requiring consultation
1	On site	**Air pollution - Livestock & poultry units with floorspace > 500m², slurry lagoons > 4000m². Combustion - General combustion processes >50MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion**

This data is sourced from Natural England.

10.18 SSSI Units

Records within 2000m	0

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

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

11 Visual and cultural designations



Site Outline

Search buffers in metres (m)

- Listed buildings
- Conservation areas
- Conservation areas - no data
- National Parks
- Areas of Outstanding Natural Beauty
- Registered parks and gardens
- Scheduled Monuments
- World Heritage Sites

11.1 World Heritage Sites

Records within 250m	0

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

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

11.2 Area of Outstanding Natural Beauty

Records within 250m	0

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

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

11.3 National Parks

Records within 250m	0

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

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

11.4 Listed Buildings

Records within 250m	0

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

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

11.5 Conservation Areas

Records within 250m	0

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

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

11.6 Scheduled Ancient Monuments

Records within 250m	**1**

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

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

ID	Location	Ancient monument name	Reference number
1	71m E	Wat's Dyke: Section W of Ty-Gwyn	376

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

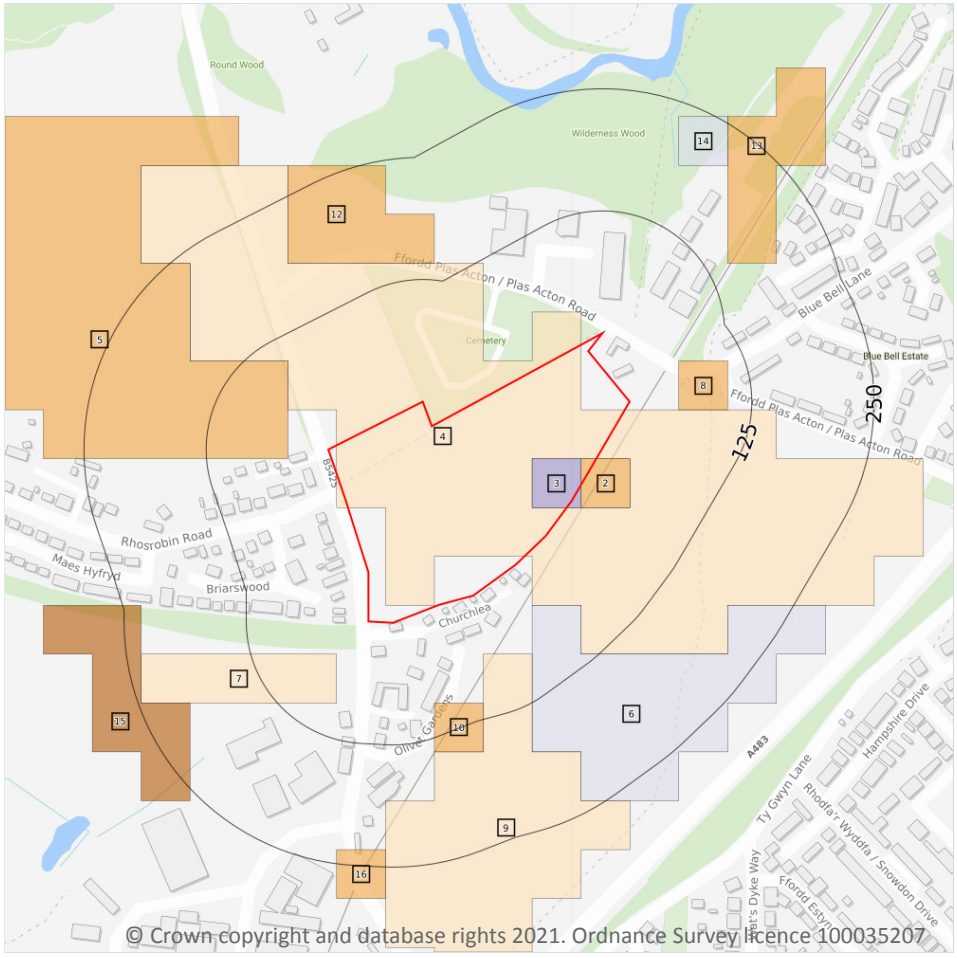
11.7 Registered Parks and Gardens

Records within 250m	**0**

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

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

12 Agricultural designations



Site Outline

Search buffers in metres (m)

- Grade 1 - excellent quality
- Grade 2 - very good quality
- Grade 3a - good quality
- Grade 3b - moderate quality
- Grade 4 - poor quality
- Grade 5 - very poor quality
- Timber felling licences
- Open Access land

12.1 Agricultural Land Classification

Records within 250m	14

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

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

ID	Location	Classification	Description
2	**On site**	**Grade 2**	**Good quality agricultural land**
3	**On site**	**Grade 4**	**Poor quality agricultural land**
4	**On site**	**Grade 3a**	**Good to moderate quality agricultural land**

ID	Location	Classification	Description
5	42m W	Grade 2	Good quality agricultural land
6	44m SE	Grade 3b	Moderate quality agricultural land
7	47m SW	Grade 3a	Good to moderate quality agricultural land
8	50m E	Grade 2	Good quality agricultural land
9	61m S	Grade 3a	Good to moderate quality agricultural land
10	92m S	Grade 2	Good quality agricultural land
12	142m N	Grade 2	Good quality agricultural land
13	147m NE	Grade 2	Good quality agricultural land
14	189m NE	Grade 3b	Moderate quality agricultural land
15	201m SW	Grade 1	Excellent quality agricultural land
16	232m S	Grade 2	Good quality agricultural land

This data is sourced from Natural Resources Wales.

12.2 Open Access Land

Records within 250m	0

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

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

12.3 Tree Felling Licences

Records within 250m	0

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

This data is sourced from the Forestry Commission.

12.4 Environmental Stewardship Schemes

Records within 250m	0

Environmental Stewardship covers a range of schemes that provide financial incentives to farmers, foresters and land managers to look after and improve the environment. The schemes identified may be historical schemes that have now expired, or may still be active.

This data is sourced from Natural England.

12.5 Countryside Stewardship Schemes

Records within 250m	0

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

This data is sourced from Natural England.

13 Habitat designations

13.1 Priority Habitat Inventory

Records within 250m	0

Habitats of principal importance as named under Natural Environment and Rural Communities Act (2006) Section 41.

This data is sourced from Natural England.

13.2 Habitat Networks

Records within 250m	0

Habitat networks for 18 priority habitat networks (based primarily, but not exclusively, on the priority habitat inventory) and areas suitable for the expansion of networks through restoration and habitat creation.

This data is sourced from Natural England.

13.3 Open Mosaic Habitat

Records within 250m	0

Sites verified as Open Mosaic Habitat. Mosaic habitats are brownfield sites that are identified under the UK Biodiversity Action Plan as a priority habitat due to the habitat variation within a single site, supporting an array of invertebrates.

This data is sourced from Natural England.

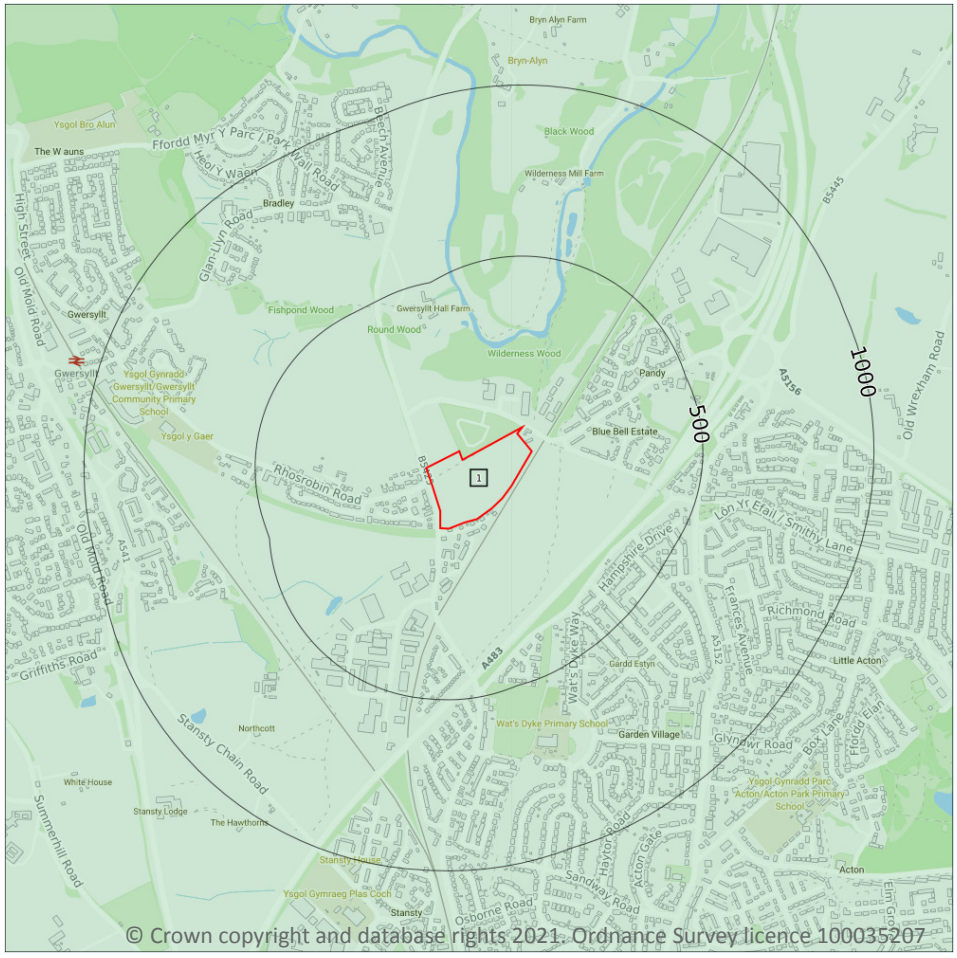
13.4 Limestone Pavement Orders

Records within 250m	0

Limestone pavements are outcrops of limestone where the surface has been worn away by natural means over millennia. These rocks have the appearance of paving blocks, hence their name. Not only do they have geological interest, they also provide valuable habitats for wildlife. These habitats are threatened due to their removal for use in gardens and water features. Many limestone pavements have been designated as SSSIs which affords them some protection. In addition, Section 34 of the Wildlife and Countryside Act 1981 gave them additional protection via the creation of Limestone Pavement Orders, which made it a criminal offence to remove any part of the outcrop. The associated Limestone Pavement Priority Habitat is part of the UK Biodiversity Action Plan priority habitat in England.

This data is sourced from Natural England.

14 Geology 1:10,000 scale - Availability



Site Outline

Search buffers in metres (m)

- Full coverage
- Partial coverage
- No coverage

14.1 10k Availability

Records within 500m	1

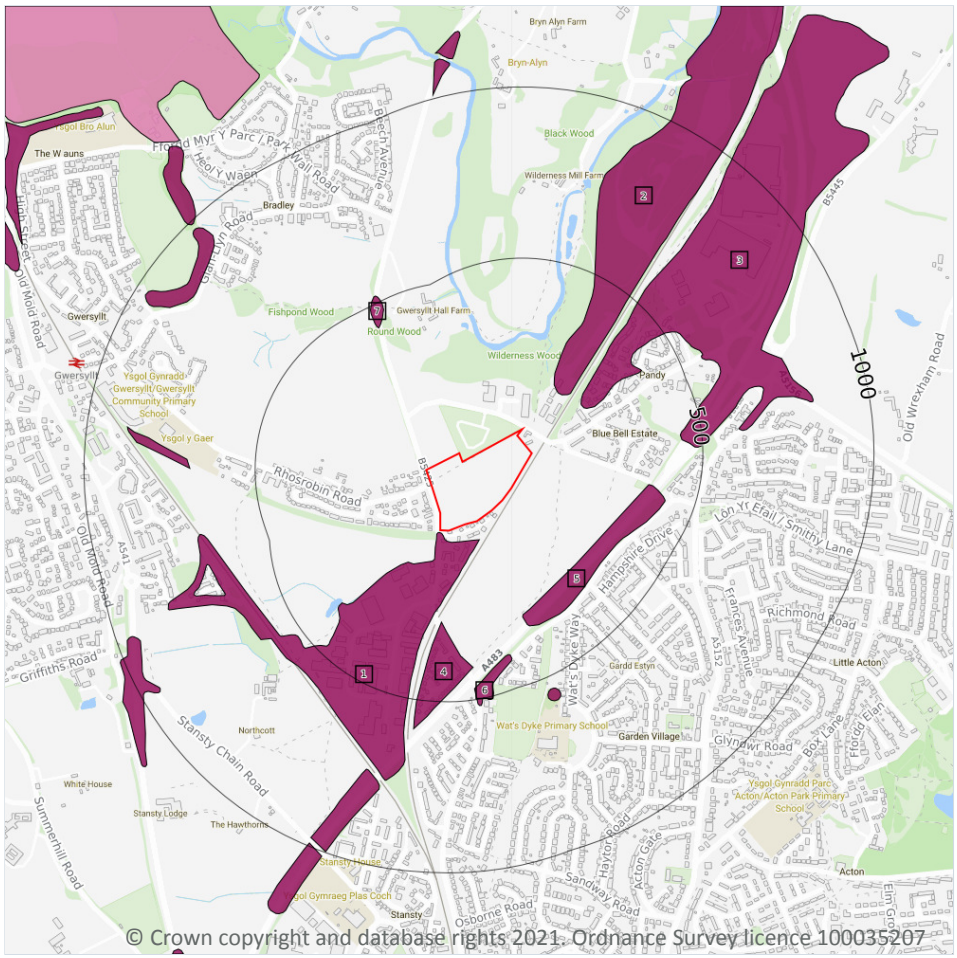
An indication on the coverage of 1:10,000 scale geology data for the site, the most detailed dataset provided by the British Geological Survey. Either 'Full', 'Partial' or 'No coverage' for each geological theme.

Features are displayed on the Geology 1:10,000 scale - Availability map on **page 78**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**Full**	**SJ35SW**

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Artificial and made ground



14.2 Artificial and made ground (10k)

Records within 500m **7**

Details of made, worked, infilled, disturbed and landscaped ground at 1:10,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

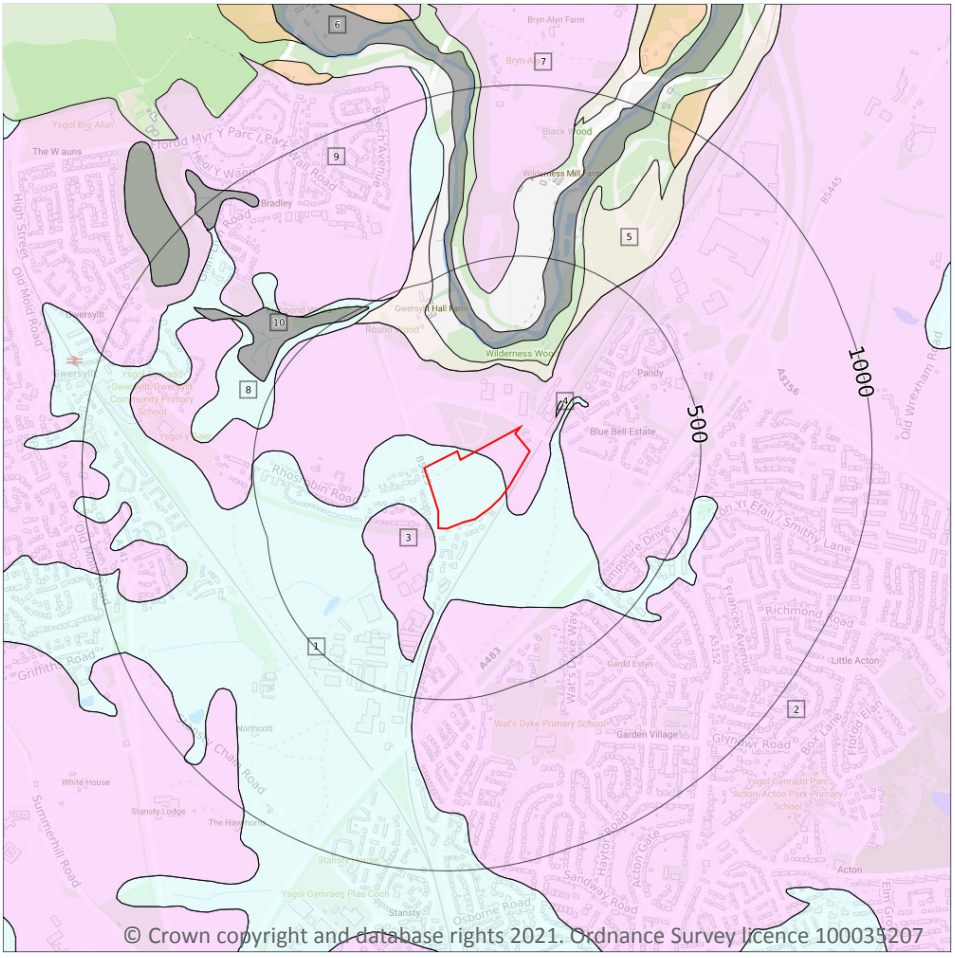
Features are displayed on the Geology 1:10,000 scale - Artificial and made ground map on **page 79**

ID	Location	LEX Code	Description	Rock description
1	7m S	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	149m NE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	187m NE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
4	268m S	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit

ID	Location	LEX Code	Description	Rock description
5	284m SE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
6	400m S	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
7	433m NW	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (10k)

Superficial geology (10k)
Please see table for more details.

14.3 Superficial geology (10k)

Records within 500m **10**

Superficial geological deposits at 1:10,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:10,000 scale - Superficial map on **page 81**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**TILL-DMTN**	**Till - Diamicton**	**Diamicton**
2	**On site**	**GFDU-XSV**	**Glaciofluvial Deposits - Sand And Gravel**	**Sand And Gravel**
3	18m SW	GFDU-XSV	Glaciofluvial Deposits - Sand And Gravel	Sand And Gravel
4	109m E	TILL-DMTN	Till - Diamicton	Diamicton

ID	Location	LEX Code	Description	Rock description
5	150m NE	GLLD-C	Glaciolacustrine Deposits - Clay	Clay
6	239m N	ALV-C	Alluvium - Clay (unlithified Deposits Coding Scheme)	Clay
7	401m N	GFDU-XSV	Glaciofluvial Deposits - Sand And Gravel	Sand And Gravel
8	468m NW	TILL-DMTN	Till - Diamicton	Diamicton
9	487m N	GFDU-XSV	Glaciofluvial Deposits - Sand And Gravel	Sand And Gravel
10	487m NW	ALV-C	Alluvium - Clay (unlithified Deposits Coding Scheme)	Clay

This data is sourced from the British Geological Survey.

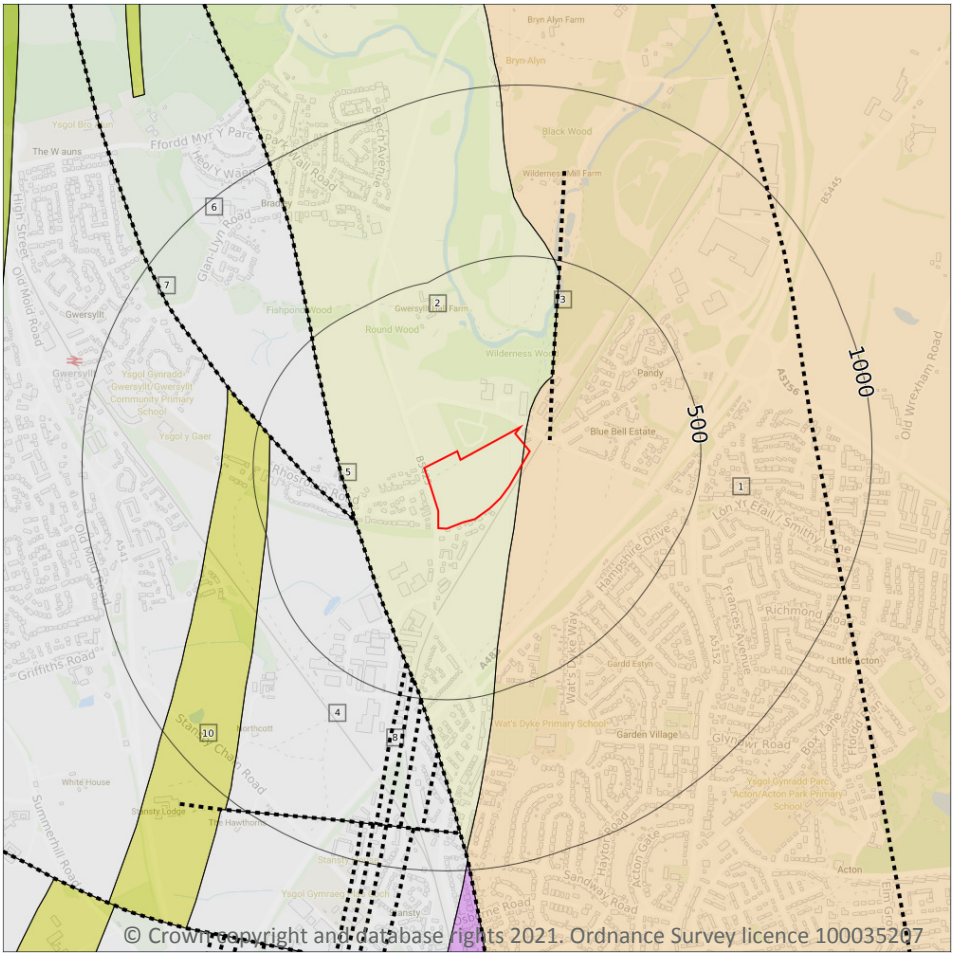
14.4 Landslip (10k)

Records within 500m	**0**

Mass movement deposits on BGS geological maps at 1:10,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

Geology 1:10,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (10k)

Bedrock geology (10k)
Please see table for more details.

14.5 Bedrock geology (10k)

Records within 500m	5

Bedrock geology at 1:10,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 83**

ID	Location	LEX Code	Description	Rock age
1	**On site**	**SAL-MDSC**	**Salop Formation - Mudstone, Sandstone And Conglomerate**	**Cisuralian Epoch - Westphalian D Sub-age**
2	**On site**	**HA-MDSS**	**Halesowen Formation - Mudstone, Siltstone And Sandstone**	**Westphalian D Sub-age**

ID	Location	LEX Code	Description	Rock age
4	224m W	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Langsettian Sub-age
6	238m W	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Langsettian Sub-age
10	453m W	PLMC-SDST	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Sandstone	Bolsovian Sub-age - Langsettian Sub-age

This data is sourced from the British Geological Survey.

14.6 Bedrock faults and other linear features (10k)

Records within 500m	**5**

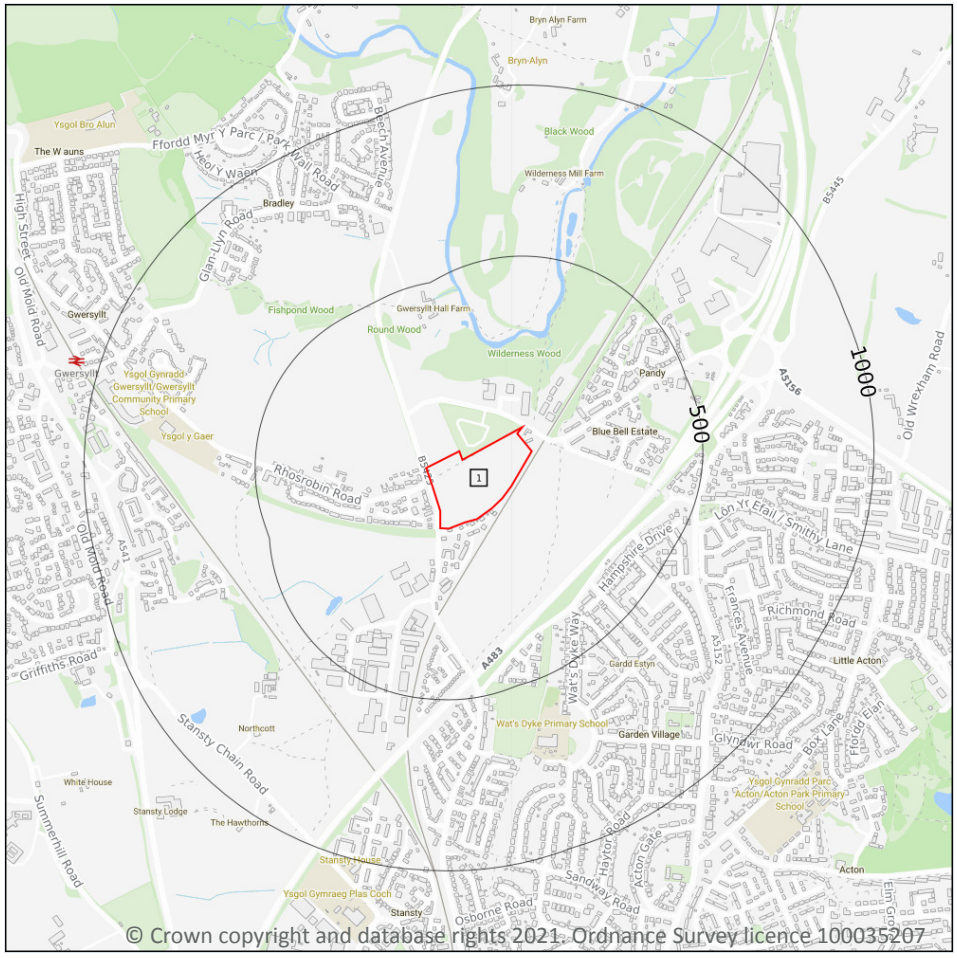
Linear features at the ground or bedrock surface at 1:10,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:10,000 scale - Bedrock map on **page 83**

ID	Location	Category	Description
3	67m NE	FAULT	Normal fault, inferred
5	224m W	FAULT	Normal fault, inferred
7	240m W	FAULT	Normal fault, inferred
8	407m S	ROCK	Coal seam, inferred
9	444m S	ROCK	Coal seam, inferred

This data is sourced from the British Geological Survey.

15 Geology 1:50,000 scale - Availability



Site Outline

Search buffers in metres (m)

Geological map tile

15.1 50k Availability

Records within 500m	1

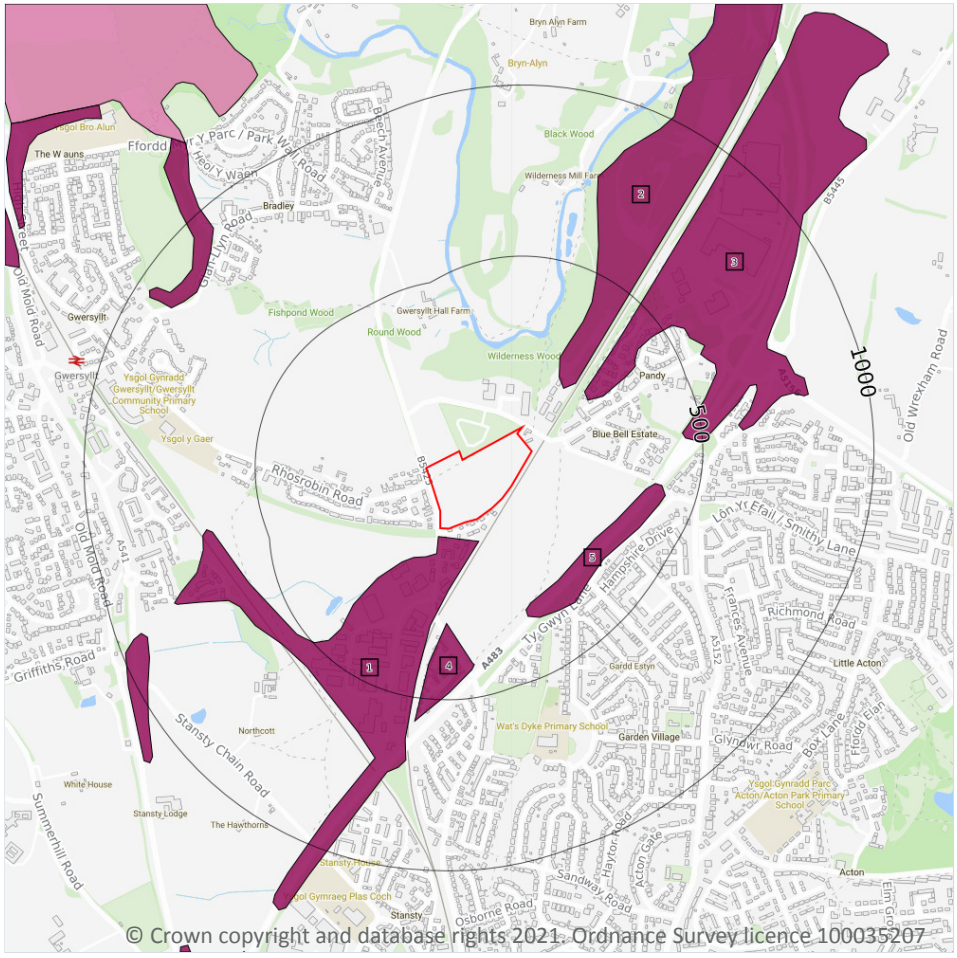
An indication on the coverage of 1:50,000 scale geology data for the site. Either 'Full' or 'No coverage' for each geological theme. Where 50k data is not available, this area has been filled in with 625k scale data.

Features are displayed on the Geology 1:50,000 scale - Availability map on **page 85**

ID	Location	Artificial	Superficial	Bedrock	Mass movement	Sheet No.
1	**On site**	**Full**	**Full**	**Full**	**Full**	**EW121_wrexham_v4**

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Artificial and made ground



15.2 Artificial and made ground (50k)

Records within 500m	5

Details of made, worked, infilled, disturbed and landscaped ground at 1:50,000 scale. Artificial ground can be associated with potentially contaminated material, unpredictable engineering conditions and instability.

Features are displayed on the Geology 1:50,000 scale - Artificial and made ground map on **page 86**

ID	Location	LEX Code	Description	Rock description
1	25m S	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	166m NE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	208m NE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
4	277m S	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

ID	Location	LEX Code	Description	Rock description
5	281m SE	MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

This data is sourced from the British Geological Survey.

15.3 Artificial ground permeability (50k)

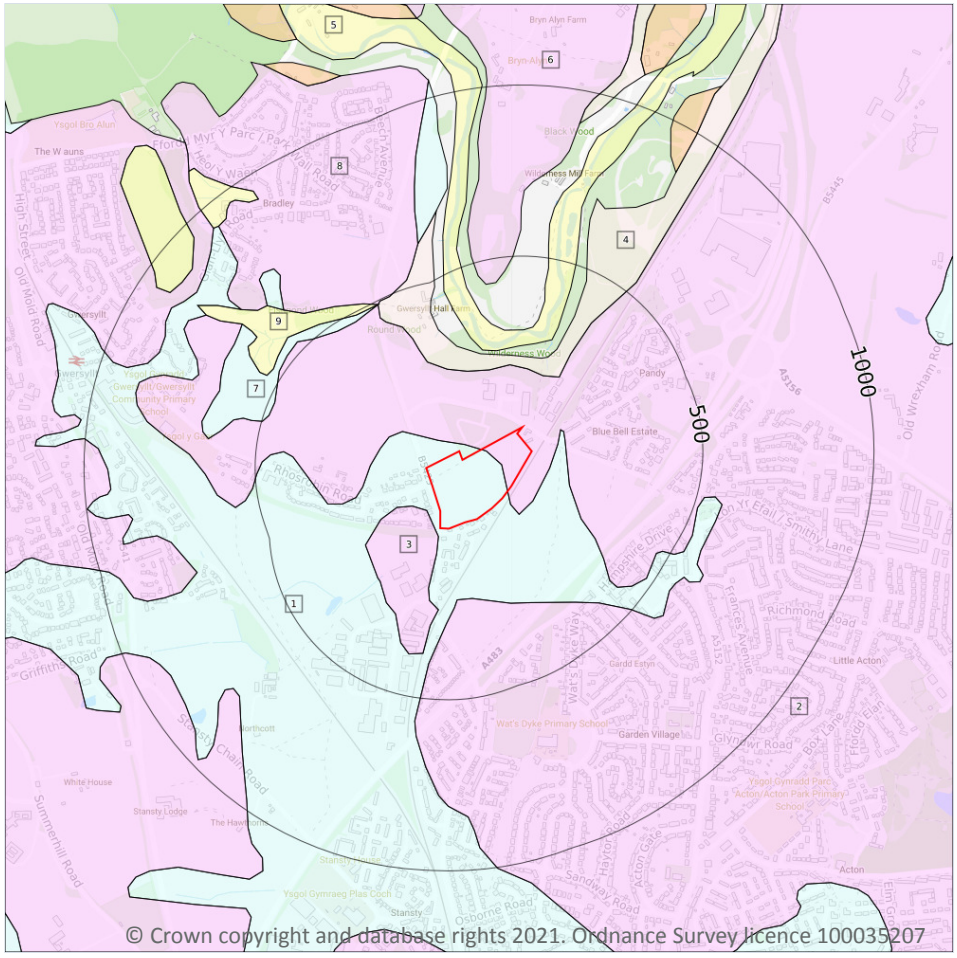
Records within 50m	**1**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any artificial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
25m SW	Mixed	Very High	Low

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Superficial



Site Outline

Search buffers in metres (m)

Landslip (50k)

Superficial geology (50k)
Please see table for more details.

15.4 Superficial geology (50k)

Records within 500m **9**

Superficial geological deposits at 1:50,000 scale. Also known as 'drift', these are the youngest geological deposits, formed during the Quaternary. They rest on older deposits or rocks referred to as bedrock.

Features are displayed on the Geology 1:50,000 scale - Superficial map on **page 88**

ID	Location	LEX Code	Description	Rock description
1	**On site**	**TILLD-DMTN**	**TILL, DEVENSIAN**	**DIAMICTON**
2	**On site**	**GFSDD-XSV**	**GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN**	**SAND AND GRAVEL**
3	15m SW	GFDUD-XSV	GLACIOFLUVIAL DEPOSITS, DEVENSIAN	SAND AND GRAVEL

ID	Location	LEX Code	Description	Rock description
4	163m N	GLLDD-XCZ	GLACIOLACUSTRINE DEPOSITS, DEVENSIAN	CLAY AND SILT
5	234m N	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL
6	430m N	GFDUD-XSV	GLACIOFLUVIAL DEPOSITS, DEVENSIAN	SAND AND GRAVEL
7	474m NW	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON
8	490m NW	GFSDD-XSV	GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN	SAND AND GRAVEL
9	490m NW	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

This data is sourced from the British Geological Survey.

15.5 Superficial permeability (50k)

Records within 50m **3**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Mixed**	**High**	**Low**
On site	**Intergranular**	**Very High**	**High**
15m SW	Intergranular	Very High	High

This data is sourced from the British Geological Survey.

15.6 Landslip (50k)

Records within 500m **0**

Mass movement deposits on BGS geological maps at 1:50,000 scale. Primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground.

This data is sourced from the British Geological Survey.

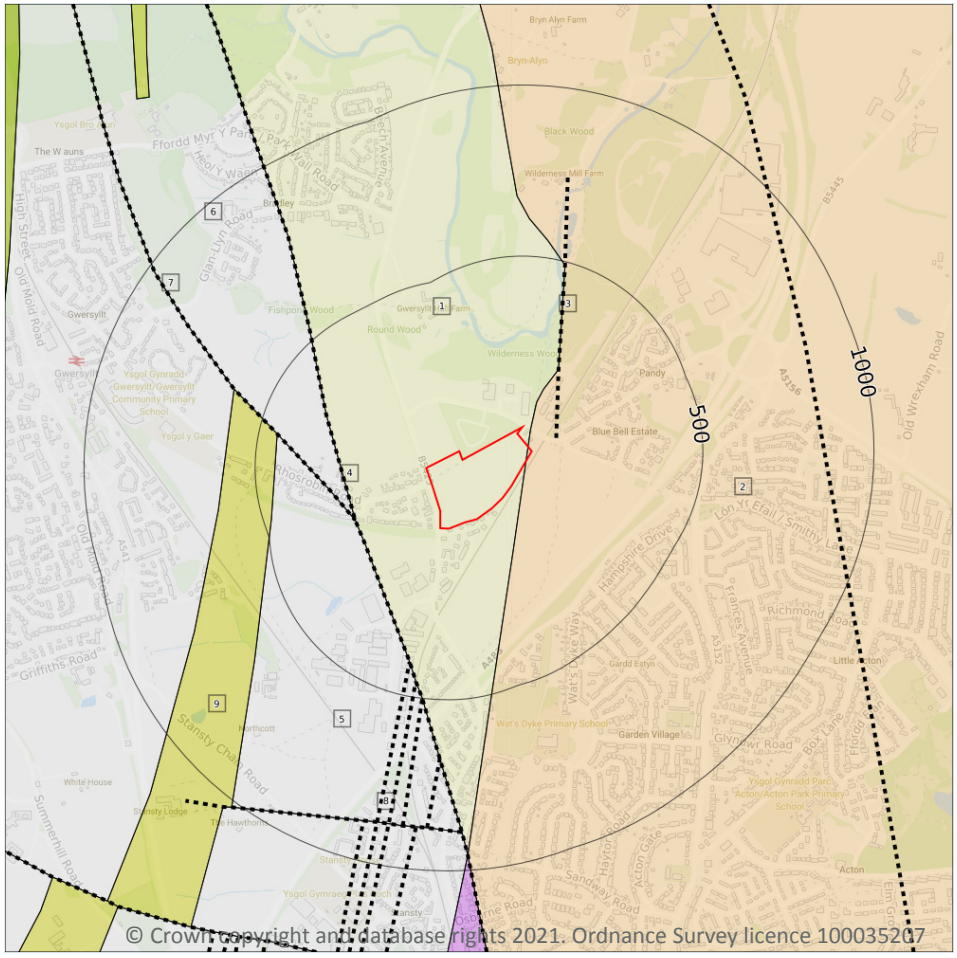
15.7 Landslip permeability (50k)

Records within 50m	0

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any landslip deposits (the zone between the land surface and the water table).

This data is sourced from the British Geological Survey.

Geology 1:50,000 scale - Bedrock



Site Outline

Search buffers in metres (m)

Bedrock faults and other linear features (50k)

Bedrock geology (50k)
Please see table for more details.

15.8 Bedrock geology (50k)

Records within 500m	5

Bedrock geology at 1:50,000 scale. The main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 91**

ID	Location	LEX Code	Description	Rock age
1	On site	HA-MDSS	HALESOWEN FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
2	On site	SAL-MDSC	SALOP FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE	WESTPHALIAN

ID	Location	LEX Code	Description	Rock age
5	222m W	PLMC-MDSS	PENNINE LOWER COAL MEASURES FORMATION AND PENNINE MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
6	241m W	PLMC-MDSS	PENNINE LOWER COAL MEASURES FORMATION AND PENNINE MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
9	441m W	PLMC-SDST	PENNINE LOWER COAL MEASURES FORMATION AND PENNINE MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED) - SANDSTONE	WESTPHALIAN

This data is sourced from the British Geological Survey.

15.9 Bedrock permeability (50k)

Records within 50m **2**

A qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of bedrock (the zone between the land surface and the water table).

Location	Flow type	Maximum permeability	Minimum permeability
On site	**Fracture**	**Moderate**	**Low**
On site	**Fracture**	**Moderate**	**Low**

This data is sourced from the British Geological Survey.

15.10 Bedrock faults and other linear features (50k)

Records within 500m **5**

Linear features at the ground or bedrock surface at 1:50,000 scale of six main types; rock, fault, fold axis, mineral vein, alteration area or landform. Features are either observed or inferred, and relate primarily to bedrock.

Features are displayed on the Geology 1:50,000 scale - Bedrock map on **page 91**

ID	Location	Category	Description
3	76m E	FAULT	Fault, inferred, displacement unknown
4	222m W	FAULT	Fault, inferred, displacement unknown
7	245m W	FAULT	Fault, inferred, displacement unknown

ID	Location	Category	Description
8	401m S	ROCK	Coal seam, inferred
10	453m S	ROCK	Coal seam, inferred

This data is sourced from the British Geological Survey.

16 Boreholes



Site Outline

Search buffers in metres (m)

- Confidential
- 0 - 10m
- 10 - 30m
- 30m+
- Unknown

16.1 BGS Boreholes

Records within 250m **7**

The Single Onshore Boreholes Index (SOBI); an index of over one million records of boreholes, shafts and wells from all forms of drilling and site investigation work held by the British Geological Survey. Covering onshore and nearshore boreholes dating back to at least 1790 and ranging from one to several thousand metres deep.

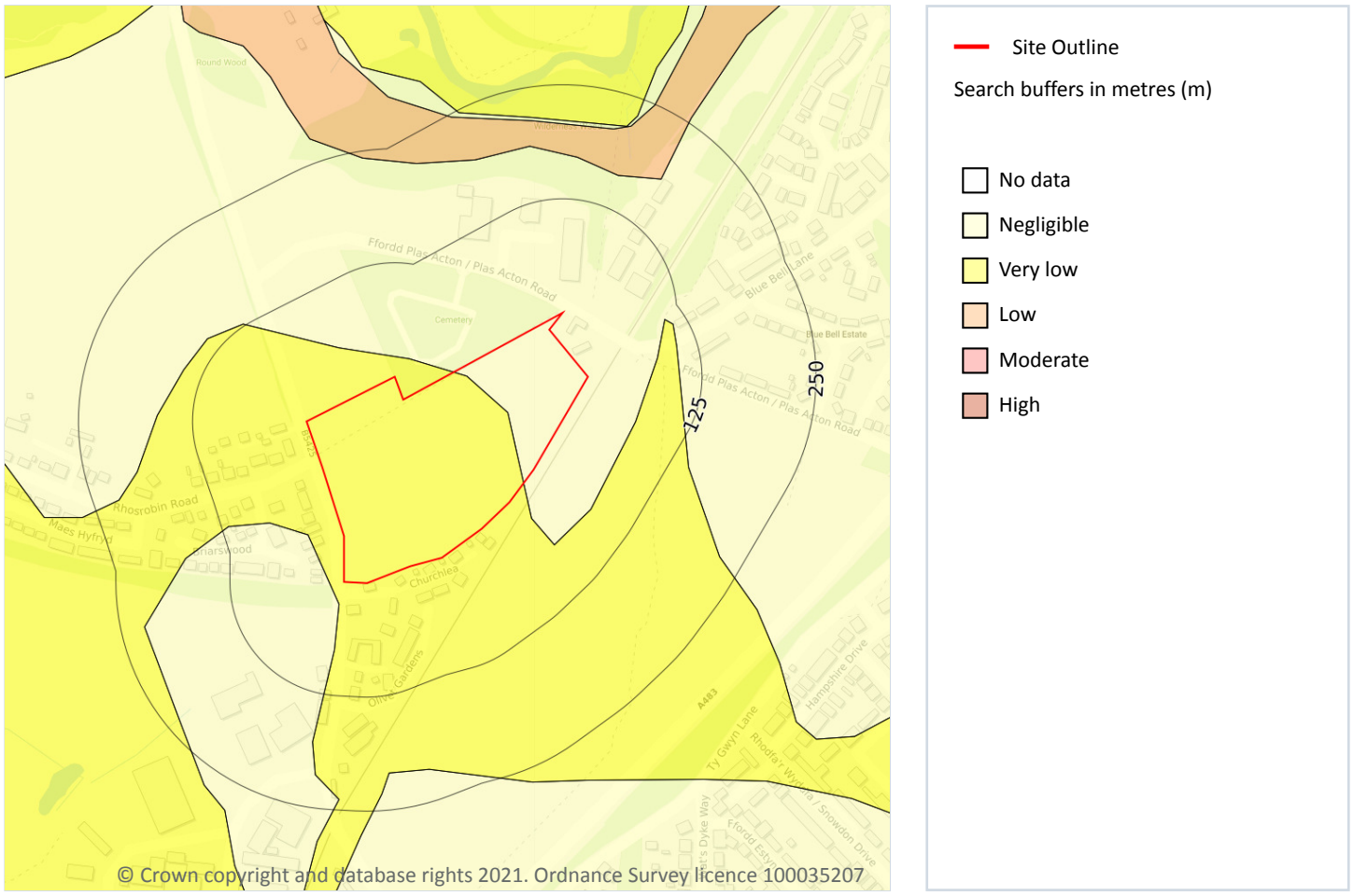
Features are displayed on the Boreholes map on **page 94**

ID	Location	Grid reference	Name	Length	Confidential	Web link
1	103m E	333350 353080	PANDY, BLUEBELL LANE 2	3.27	N	155538
2	108m NE	333280 353220	PANDY PUMPING STATION TP17	-	Y	N/A
A	135m NE	333280 353250	PANDY PUMPING STATION TP16	-	Y	N/A

ID	Location	Grid reference	Name	Length	Confidential	Web link
A	139m NE	333290 353250	PANDY PUMPING STATION 1	-	Y	N/A
B	141m E	333390 353070	PANDY, BLUEBELL LANE 1	3.2	N	155537
B	144m E	333390 353090	PANDY, BLUEBELL LANE 3	3.2	N	155539
B	156m E	333400 353100	PANDY, BLUEBELL LANE 4	3.2	N	155540

This data is sourced from the British Geological Survey.

17 Natural ground subsidence - Shrink swell clays



17.1 Shrink swell clays

Records within 50m	3

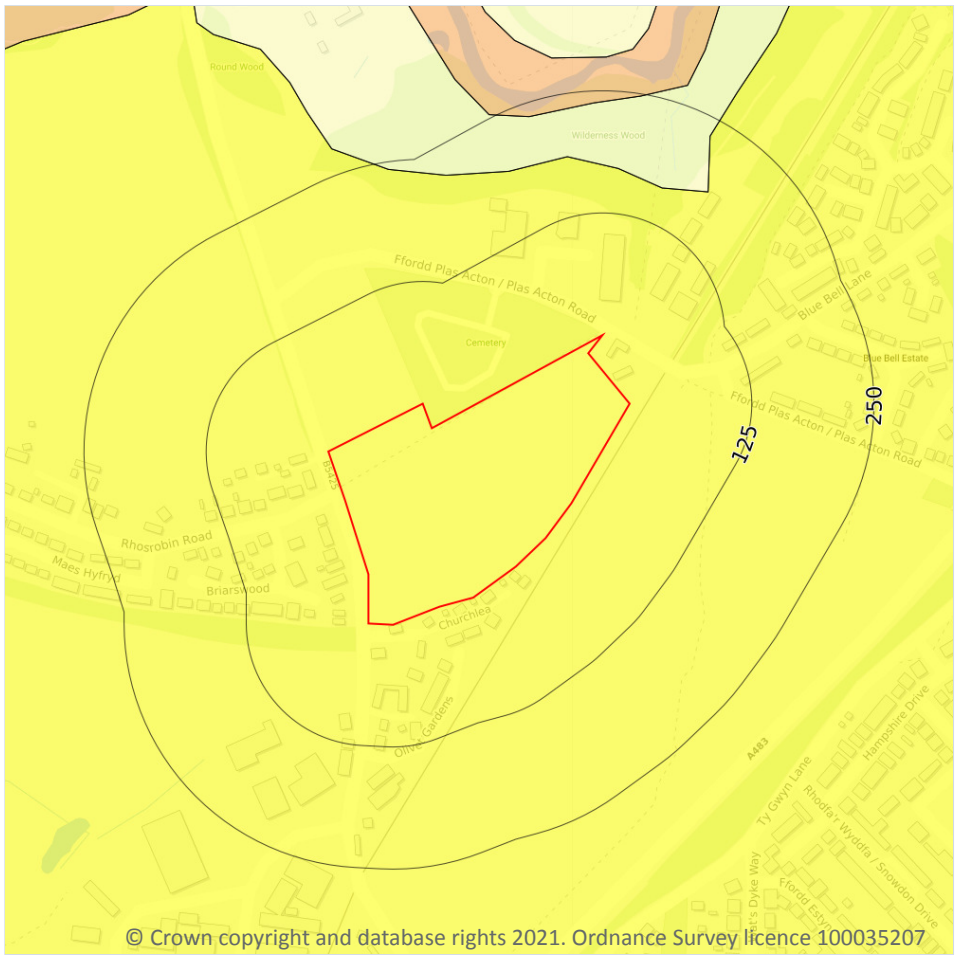
The potential hazard presented by soils that absorb water when wet (making them swell), and lose water as they dry (making them shrink). This shrink-swell behaviour is controlled by the type and amount of clay in the soil, and by seasonal changes in the soil moisture content (related to rainfall and local drainage).

Features are displayed on the Natural ground subsidence - Shrink swell clays map on **page 96**

Location	Hazard rating	Details
On site	**Negligible**	**Ground conditions predominantly non-plastic.**
On site	**Very low**	**Ground conditions predominantly low plasticity.**
15m SW	Negligible	Ground conditions predominantly non-plastic.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Running sands



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.2 Running sands

Records within 50m	1

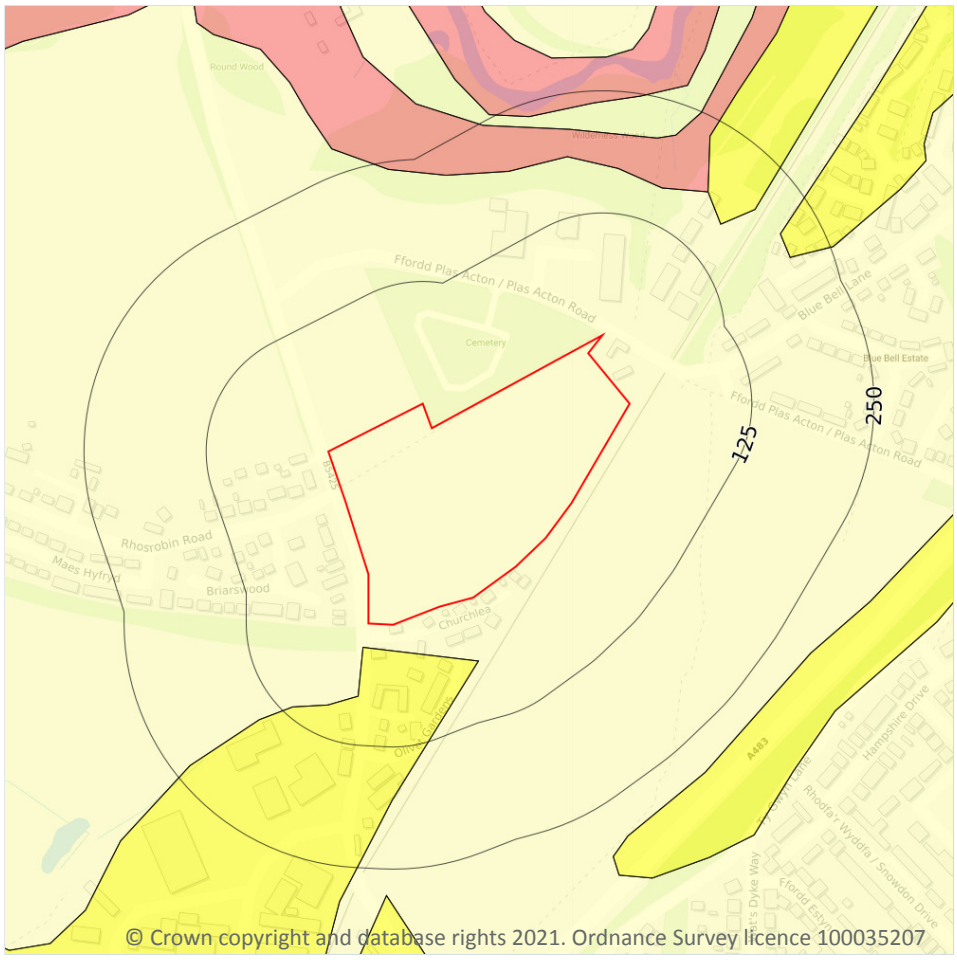
The potential hazard presented by rocks that can contain loosely-packed sandy layers that can become fluidised by water flowing through them. Such sands can 'run', removing support from overlying buildings and causing potential damage.

Features are displayed on the Natural ground subsidence - Running sands map on **page 98**

Location	Hazard rating	Details
On site	**Very low**	**Running sand conditions are unlikely. No identified constraints on land use due to running conditions unless water table rises rapidly.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Compressible deposits



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.3 Compressible deposits

Records within 50m	2

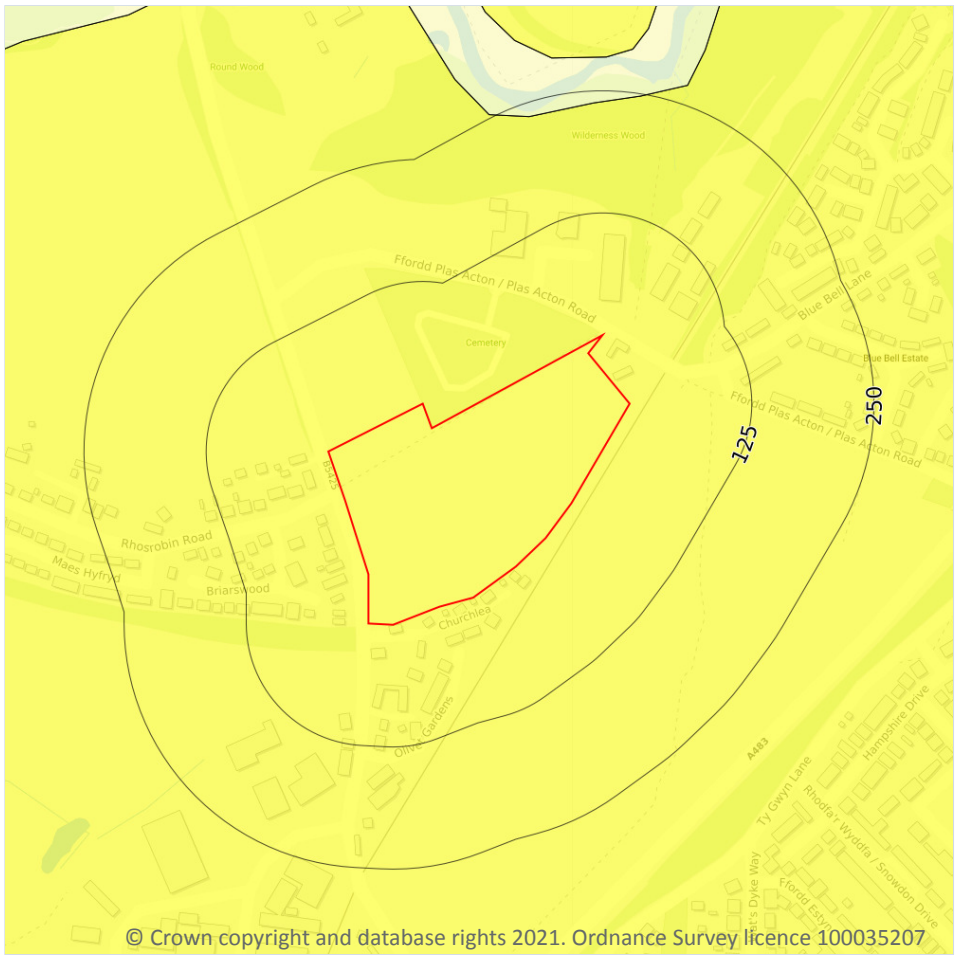
The potential hazard presented by types of ground that may contain layers of very soft materials like clay or peat and may compress if loaded by overlying structures, or if the groundwater level changes, potentially resulting in depression of the ground and disturbance of foundations.

Features are displayed on the Natural ground subsidence - Compressible deposits map on **page 99**

Location	Hazard rating	Details
On site	**Negligible**	**Compressible strata are not thought to occur.**
25m S	Very low	Compressibility and uneven settlement problems are not likely to be significant on the site for most land uses.

This data is sourced from the British Geological Survey.

Natural ground subsidence - Collapsible deposits



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.4 Collapsible deposits

Records within 50m	1

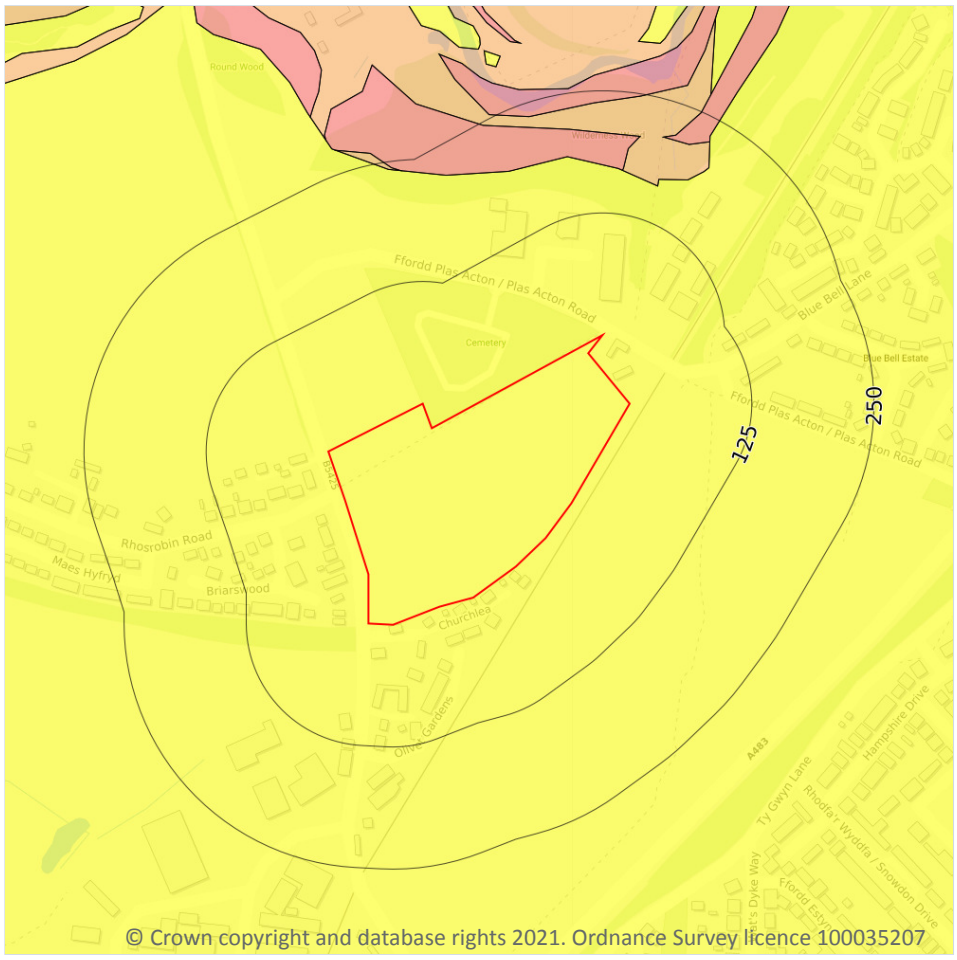
The potential hazard presented by natural deposits that could collapse when a load (such as a building) is placed on them or they become saturated with water.

Features are displayed on the Natural ground subsidence - Collapsible deposits map on **page 101**

Location	Hazard rating	Details
On site	**Very low**	**Deposits with potential to collapse when loaded and saturated are unlikely to be present.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Landslides



17.5 Landslides

Records within 50m	1

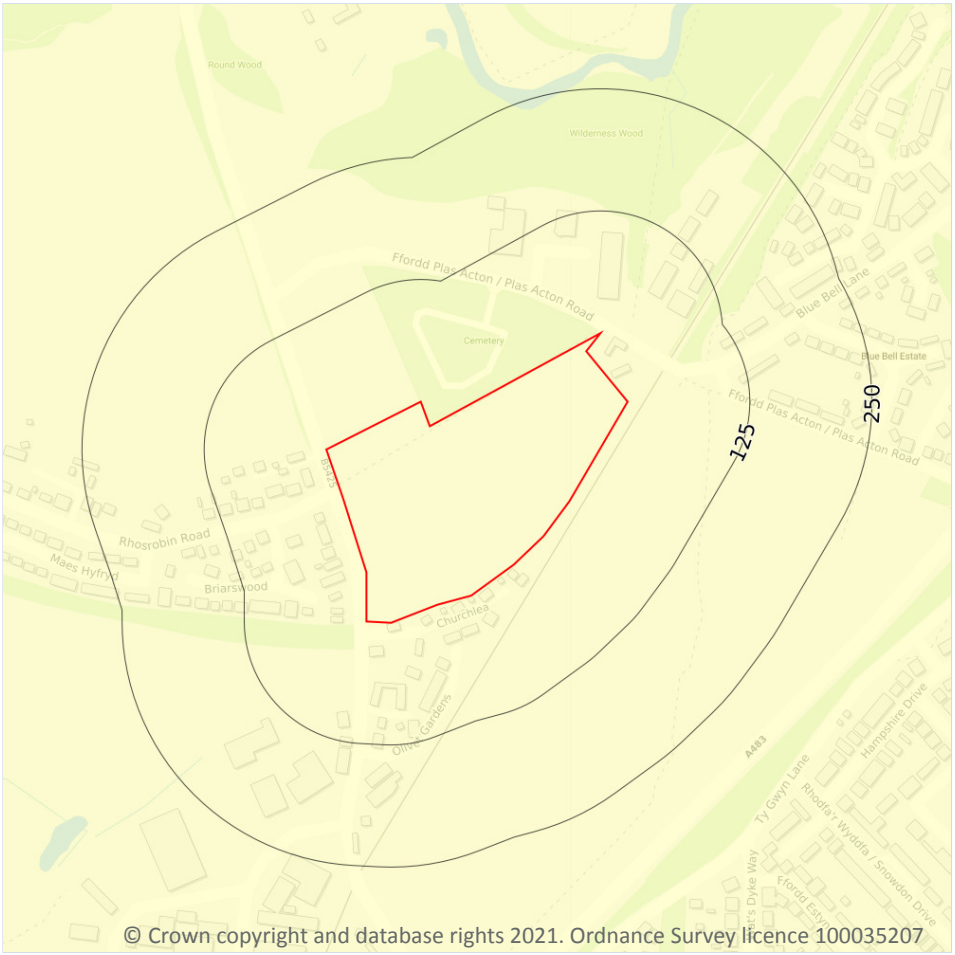
The potential for landsliding (slope instability) to be a hazard assessed using 1:50,000 scale digital maps of superficial and bedrock deposits, combined with information from the BGS National Landslide Database and scientific and engineering reports.

Features are displayed on the Natural ground subsidence - Landslides map on **page 102**

Location	Hazard rating	Details
On site	**Very low**	**Slope instability problems are not likely to occur but consideration to potential problems of adjacent areas impacting on the site should always be considered.**

This data is sourced from the British Geological Survey.

Natural ground subsidence - Ground dissolution of soluble rocks



Site Outline

Search buffers in metres (m)

- No data
- Negligible
- Very low
- Low
- Moderate
- High

17.6 Ground dissolution of soluble rocks

Records within 50m	1

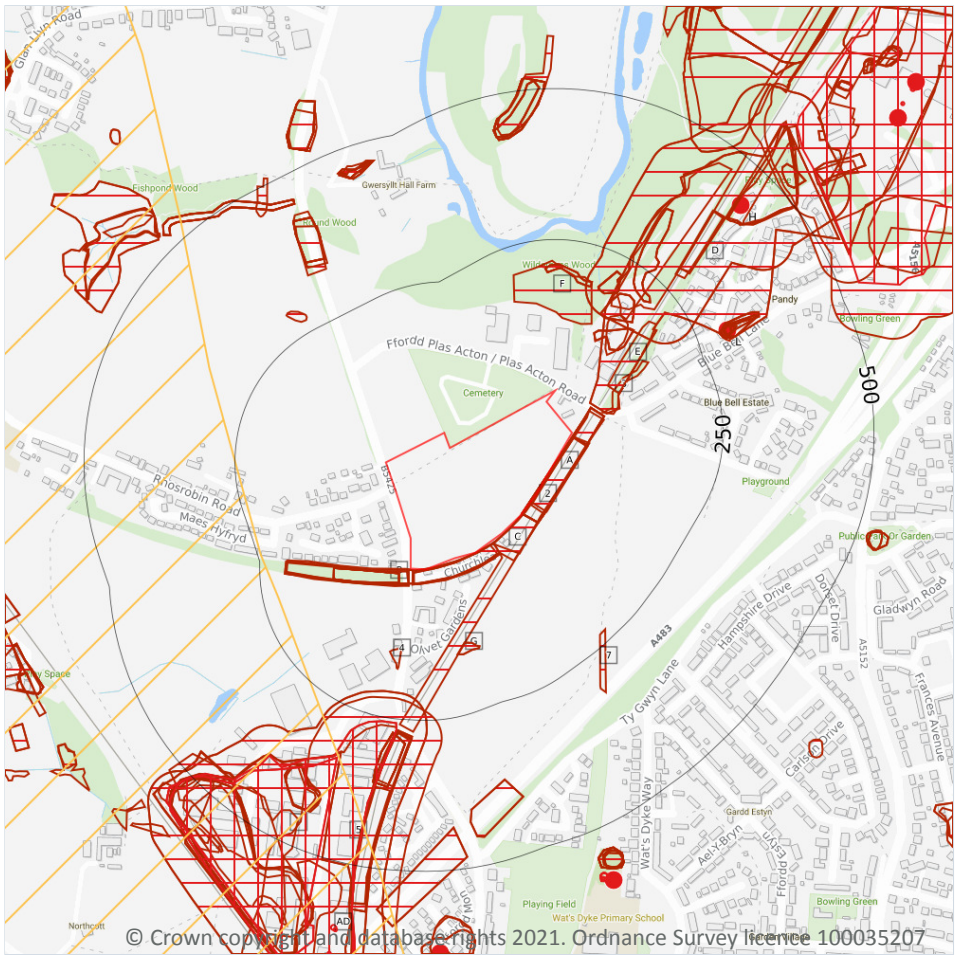
The potential hazard presented by ground dissolution, which occurs when water passing through soluble rocks produces underground cavities and cave systems. These cavities reduce support to the ground above and can cause localised collapse of the overlying rocks and deposits.

Features are displayed on the Natural ground subsidence - Ground dissolution of soluble rocks map on **page 103**

Location	Hazard rating	Details
On site	**Negligible**	**Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.**

This data is sourced from the British Geological Survey.

18 Mining, ground workings and natural cavities



Site Outline

Search buffers in metres (m)

- Natural cavities (Area)
- Natural cavities (Point)
- BritPits
- Surface ground workings
- Underground workings
- Historical Mineral Planning Areas
- Mining Cavities

Non Coal Mining

- Sporadic underground mining of restricted extent possible
- Localised small scale underground mining possible
- Small scale mining possible
- Underground mining known or likely within or in close proximity
- Underground mining known within or in very close proximity

18.1 Natural cavities

Records within 500m	0

Industry recognised national database of natural cavities. Sinkholes and caves are formed by the dissolution of soluble rock, such as chalk and limestone, gulls and fissures by cambering. Ground instability can result from movement of loose material contained within these cavities, often triggered by water.

This data is sourced from Stantec UK Ltd.

18.2 BritPits

Records within 500m	2

BritPits (an abbreviation of British Pits) is a database maintained by the British Geological Survey of currently active and closed surface and underground mineral workings. Details of major mineral handling sites, such as wharfs and rail depots are also held in the database.

Features are displayed on the Mining, ground workings and natural cavities map on **page 105**

ID	Location	Details	Description
L	302m E	Name: Wilderness Wood Gravel Pit Address: Gwersyllt, WREXHAM, Denbighshire Commodity: Sand & Gravel Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority
H	433m NE	Name: Wilderness Wood Gravel Pit Address: Gwersyllt, WREXHAM, Denbighshire Commodity: Sand & Gravel Status: Ceased	Type: A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site Status description: Site which, at date of entry, has ceased to extract minerals. May be considered as Closed by operator. May be considered to have Active, Dormant or Expired planning permissions by Mineral Planning Authority

This data is sourced from the British Geological Survey.

18.3 Surface ground workings

Records within 250m	57

Historical land uses identified from Ordnance Survey mapping that involved ground excavation at the surface. These features may or may not have been subsequently backfilled.

Features are displayed on the Mining, ground workings and natural cavities map on **page 105**

ID	Location	Land Use	Year of mapping	Mapping scale
A	**On site**	**Cuttings**	**1989**	**1:10000**
A	**On site**	**Cuttings**	**1992**	**1:10000**
A	**On site**	**Cuttings**	**1980**	**1:10000**
A	**On site**	**Cuttings**	**1974**	**1:10000**
A	**On site**	**Cuttings**	**1985**	**1:10000**
A	**On site**	**Cuttings**	**1964**	**1:10560**

ID	Location	Land Use	Year of mapping	Mapping scale
B	**On site**	**Cuttings**	**1938**	**1:10560**
C	**On site**	**Cuttings**	**1909**	**1:10560**
1	0m S	Cuttings	1872	1:10560
2	0m SE	Cuttings	1949	1:10560
C	1m SE	Cuttings	1938	1:10560
C	1m SE	Cuttings	1949	1:10560
A	2m SE	Cuttings	1938	1:10560
A	3m SE	Cuttings	1938	1:10560
B	4m SW	Cuttings	1938	1:10560
B	4m SW	Cuttings	1949	1:10560
B	8m SW	Cuttings	1872	1:10560
B	21m W	Cuttings	1989	1:10000
B	21m W	Cuttings	1992	1:10000
B	21m W	Cuttings	1980	1:10000
B	21m W	Cuttings	1974	1:10000
B	21m W	Cuttings	1985	1:10000
B	21m W	Cuttings	1964	1:10560
D	54m NE	Brick and Tile Works	1938	1:10560
D	54m NE	Brick and Tile Works	1938	1:10560
3	61m NE	Unspecified Ground Workings	1949	1:10560
E	87m E	Cuttings	1872	1:10560
E	104m NE	Refuse Heap	1949	1:10560
E	106m NE	Unspecified Ground Workings	1980	1:10000
E	106m NE	Unspecified Ground Workings	1974	1:10000
E	106m NE	Unspecified Ground Workings	1964	1:10560
F	118m N	Sewage Works	1949	1:10560
4	134m S	Pond	1872	1:10560
G	136m S	Pond	1980	1:10000

ID	Location	Land Use	Year of mapping	Mapping scale
G	136m S	Pond	1974	1:10000
E	146m NE	Unspecified Heap	1980	1:10000
E	146m NE	Unspecified Heap	1974	1:10000
E	146m NE	Unspecified Heap	1964	1:10560
H	147m NE	Brick and Tile Works	1938	1:10560
H	147m NE	Brick and Tile Works	1898	1:10560
D	165m NE	Unspecified Heap	1949	1:10560
D	168m NE	Brick and Tile Works	1909	1:10560
E	180m NE	Unspecified Pit	1989	1:10000
E	180m NE	Unspecified Pit	1980	1:10000
E	180m NE	Unspecified Pit	1974	1:10000
E	180m NE	Unspecified Pit	1985	1:10000
E	180m NE	Unspecified Pit	1964	1:10560
F	181m N	Unspecified Ground Workings	1989	1:10000
F	181m N	Unspecified Ground Workings	1992	1:10000
F	181m N	Unspecified Ground Workings	1985	1:10000
I	207m S	Colliery	1938	1:10560
I	207m S	Colliery	1898	1:10560
D	208m NE	Unspecified Ground Workings	1980	1:10000
D	208m NE	Unspecified Ground Workings	1974	1:10000
D	208m NE	Unspecified Ground Workings	1964	1:10560
5	216m S	Colliery	1872	1:10560
7	233m SE	Pond	1964	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.4 Underground workings

Records within 1000m	23

Historical land uses identified from Ordnance Survey mapping that indicate the presence of underground workings e.g. mine shafts.

Features are displayed on the Mining, ground workings and natural cavities map on **page 105**

ID	Location	Land Use	Year of mapping	Mapping scale
I	257m S	Colliery	1939	1:10560
I	336m S	Unspecified Disused Mine	1974	1:10000
I	336m S	Unspecified Disused Mine	1964	1:10560
12	534m E	Unspecified Mine	1964	1:10560
AA	571m S	Unspecified Disused Shaft	1989	1:10000
AA	571m S	Unspecified Disused Shaft	1992	1:10000
AA	571m S	Unspecified Disused Shaft	1980	1:10000
AA	571m S	Unspecified Disused Shaft	1974	1:10000
AA	571m S	Unspecified Disused Shaft	1985	1:10000
AA	571m S	Unspecified Disused Shaft	1964	1:10560
AA	576m S	Unspecified Old Shaft	1898	1:10560
AA	577m S	Old Coal Shaft	1939	1:10560
AD	604m S	Unspecified Disused Shaft	1992	1:10000
AD	608m S	Unspecified Shaft	1872	1:10560
AD	649m S	Unspecified Shafts	1872	1:10560
W	716m NE	Unspecified Shaft	1938	1:10560
-	718m S	Unspecified Shafts	1872	1:10560
W	725m NE	Unspecified Disused Shaft	1989	1:10000
W	725m NE	Unspecified Disused Shaft	1992	1:10000
W	725m NE	Unspecified Disused Shaft	1985	1:10000
-	735m S	Unspecified Shaft	1872	1:10560
W	744m NE	Unspecified Shaft	1939	1:10560
W	771m NE	Unspecified Shaft	1938	1:10560

This is data is sourced from Ordnance Survey/Groundsure.

18.5 Historical Mineral Planning Areas

Records within 500m	0

Boundaries of mineral planning permissions for England and Wales. This data was collated between the 1940s (and retrospectively to the 1930s) and the mid 1980s. The data includes permitted, withdrawn and refused permissions.

This data is sourced from the British Geological Survey.

18.6 Non-coal mining

Records within 1000m	2

The potential for historical non-coal mining to have affected an area. The assessment is drawn from expert knowledge and literature in addition to the digital geological map of Britain. Mineral commodities may be divided into seven general categories - vein minerals, chalk, oil shale, building stone, bedded ores, evaporites and 'other' commodities (including ball clay, jet, black marble, graphite and chert).

Features are displayed on the Mining, ground workings and natural cavities map on **page 105**

ID	Location	Name	Commodity	Class	Likelihood
6	222m W	Not available	Iron Ore (Bedded)	B	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
-	956m S	Not available	Vein Mineral	A	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

This data is sourced from the British Geological Survey.

18.7 Mining cavities

Records within 1000m	0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

18.8 JPB mining areas

Records on site	0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

18.9 Coal mining

Records on site	1

Areas which could be affected by past, current or future coal mining.

Location	Details
On site	**The site is located within a coal mining area as defined by the Coal Authority. A Consultants Coal Mining Report is recommended to further assess coal mining issues at the site. This can be ordered directly through Groundsure or your preferred search provider.**

This data is sourced from the Coal Authority.

18.10 Brine areas

Records on site	0

The Cheshire Brine Compensation District indicates areas that may be affected by salt and brine extraction in Cheshire and where compensation would be available where damage from this mining has occurred. Damage from salt and brine mining can still occur outside this district, but no compensation will be available.

This data is sourced from the Cheshire Brine Subsidence Compensation Board.

18.11 Gypsum areas

Records on site	0

Generalised areas that may be affected by gypsum extraction.

This data is sourced from British Gypsum.

18.12 Tin mining

Records on site	0

Generalised areas that may be affected by historical tin mining.

This data is sourced from Groundsure.

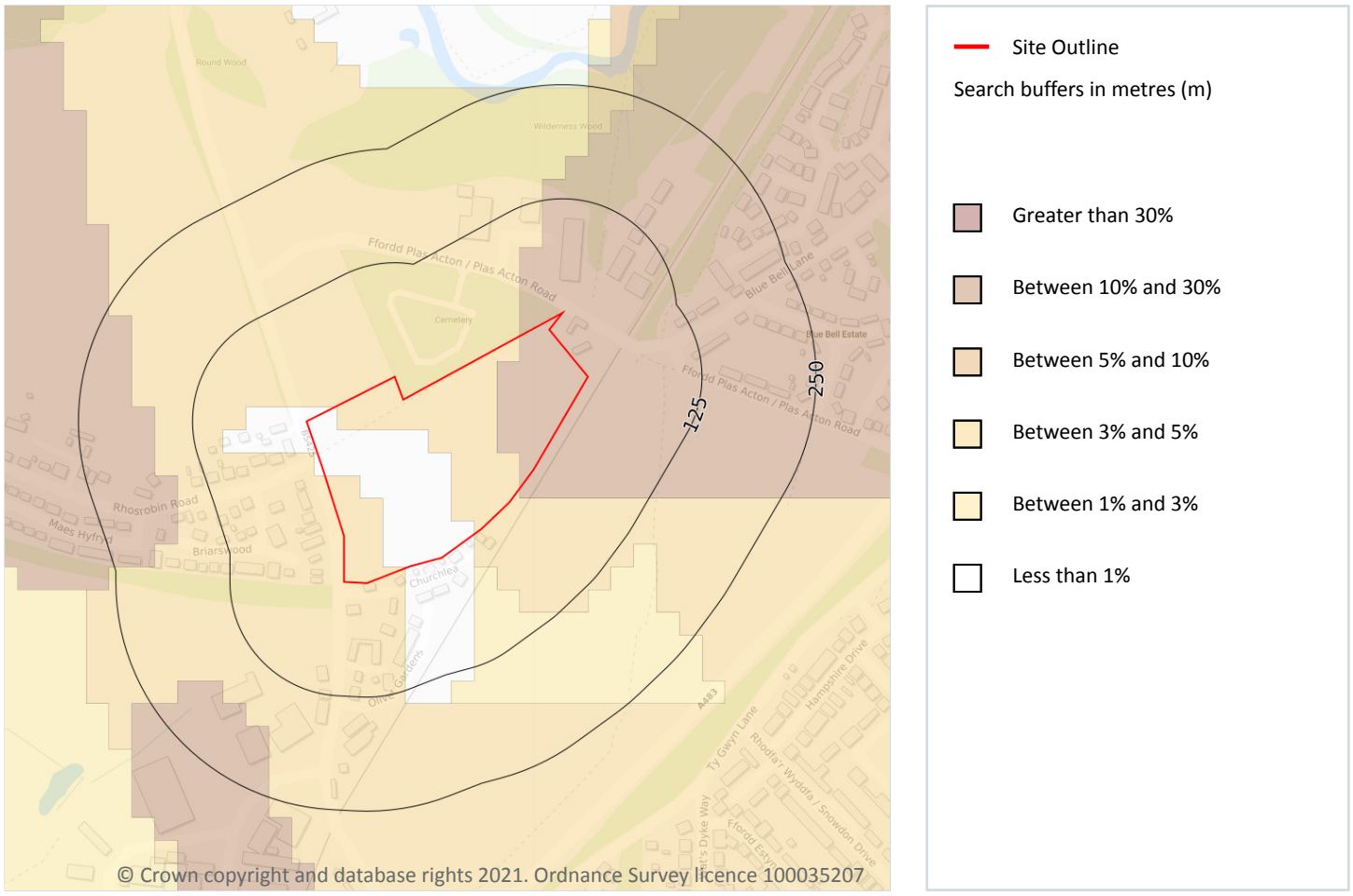
18.13 Clay mining

Records on site	0

Generalised areas that may be affected by kaolin and ball clay extraction.

This data is sourced from the Kaolin and Ball Clay Association (UK).

19 Radon



19.1 Radon

Records on site	3

Estimated percentage of dwellings exceeding the Radon Action Level. This data is the highest resolution radon dataset available for the UK and is produced to a 75m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain. The data was derived from both geological assessments and long term measurements of radon in more than 479,000 households.

Features are displayed on the Radon map on **page 113**

Location	Estimated properties affected	Radon Protection Measures required
On site	**Between 10% and 30%**	**Full**
On site	**Less than 1%**	**None****

Location	Estimated properties affected	Radon Protection Measures required
On site	**Between 3% and 5%**	**Basic**

This data is sourced from the British Geological Survey and Public Health England.

20 Soil chemistry

20.1 BGS Estimated Background Soil Chemistry

Records within 50m	18

The estimated values provide the likely background concentration of the potentially harmful elements Arsenic, Cadmium, Chromium, Lead and Nickel in topsoil. The values are estimated primarily from rural topsoil data collected at a sample density of approximately 1 per 2 km^2. In areas where rural soil samples are not available, estimation is based on stream sediment data collected from small streams at a sampling density of 1 per 2.5 km^2; this is the case for most of Scotland, Wales and southern England. The stream sediment data are converted to soil-equivalent concentrations prior to the estimation.

Location	Arsenic	Bioaccessible Arsenic	Lead	Bioaccessible Lead	Cadmium	Chromium	Nickel
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
On site	**15 mg/kg**	**No data**	**100 mg/kg**	**60 mg/kg**	**1.8 mg/kg**	**60 - 90 mg/kg**	**15 - 30 mg/kg**
11m E	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
11m E	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
15m SW	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
42m N	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg
42m NW	15 mg/kg	No data	100 mg/kg	60 mg/kg	1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg

This data is sourced from the British Geological Survey.

20.2 BGS Estimated Urban Soil Chemistry

Records within 50m	0

Estimated topsoil chemistry of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc and bioaccessible Arsenic and Lead in 23 urban centres across Great Britain. These estimates are derived from interpolation of the measured urban topsoil data referred to above and provide information across each city between the measured sample locations (4 per km^2).

This data is sourced from the British Geological Survey.

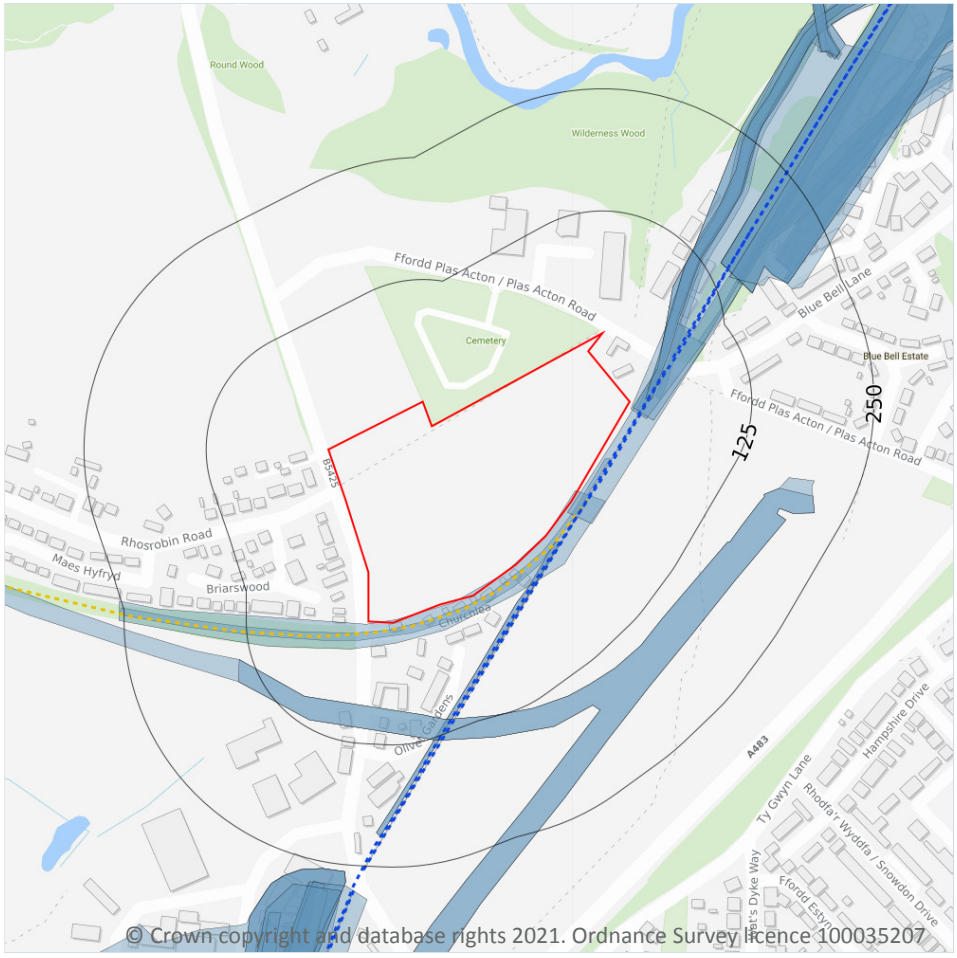
20.3 BGS Measured Urban Soil Chemistry

Records within 50m	0

The locations and measured total concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Copper, Nickel, Lead, Tin and Zinc in urban topsoil samples from 23 urban centres across Great Britain. These are collected at a sample density of 4 per km^2.

This data is sourced from the British Geological Survey.

21 Railway infrastructure and projects



Site Outline

Search buffers in metres (m)

- Crossrail 1 Stations
- Crossrail 1 Route
- Crossrail 1 Worksites
- Crossrail 2 Stations
- Crossrail 2 Route
- Crossrail 2 Worksites
- Crossrail 2 Safeguarding
- Crossrail 2 Headhouses
- Railway stations
- Active railways
- Active tunnels
- Abandoned railways
- Historic railways
- Historic tunnels
- Underground stations
- Underground Lines
- Royal Mail tunnels
- HS2 optimised route
- HS2 Stations
- HS2 Depots
- HS2 Surface Safeguarding
- HS2 Subsurface Safeguarding

21.1 Underground railways (London)

Records within 250m	0

Details of all active London Underground lines, including approximate tunnel roof depth and operational hours.

This data is sourced from publicly available information by Groundsure.

21.2 Underground railways (Non-London)

Records within 250m	0

Details of the Merseyrail system, the Tyne and Wear Metro and the Glasgow Subway. Not all parts of all systems are located underground. The data contains location information only and does not include a depth assessment.

This data is sourced from publicly available information by Groundsure.

21.3 Railway tunnels

Records within 250m	0

Railway tunnels taken from contemporary Ordnance Survey mapping.

This data is sourced from the Ordnance Survey.

21.4 Historical railway and tunnel features

Records within 250m	20

Railways and tunnels digitised from historical Ordnance Survey mapping as scales of 1:1,250, 1:2,500, 1:10,000 and 1:10,560.

Features are displayed on the Railway infrastructure and projects map on **page 117**

Location	Land Use	Year of mapping	Mapping scale
On site	**Railway Sidings**	**1964**	**10560**
3m SE	Railway Sidings	1898	10560
4m SE	Railway Sidings	1938	10560
6m SE	Railway Sidings	1938	10560
6m S	Railway Sidings	1961	2500
10m SE	Railway Sidings	1899	2500
11m SE	Railway Sidings	1874	2500
11m SE	Railway Sidings	1899	2500
17m E	Tramway Sidings	1909	10560
23m NE	Railway Sidings	1937	2500
27m E	Railway Sidings	1912	2500
86m S	Railway	1939	-
86m S	Railway	1912	-
93m NE	Railway Sidings	1912	2500
141m NE	Railway Sidings	1980	10000
141m NE	Railway Sidings	1974	10000
141m NE	Railway Sidings	1964	10560

Location	Land Use	Year of mapping	Mapping scale
142m NE	Railway Sidings	1949	10560
147m E	Railway Sidings	1937	2500
150m NE	Railway Sidings	1961	2500

This data is sourced from Ordnance Survey/Groundsure.

21.5 Royal Mail tunnels

Records within 250m	**0**

The Post Office Railway, otherwise known as the Mail Rail, is an underground railway running through Central London from Paddington Head District Sorting Office to Whitechapel Eastern Head Sorting Office. The line is 10.5km long. The data includes details of the full extent of the tunnels, the depth of the tunnel, and the depth to track level.

This data is sourced from Groundsure/the Postal Museum.

21.6 Historical railways

Records within 250m	**1**

Former railway lines, including dismantled lines, abandoned lines, disused lines, historic railways and razed lines.

Features are displayed on the Railway infrastructure and projects map on **page 117**

Location	Description
7m S	Abandoned

This data is sourced from OpenStreetMap.

21.7 Railways

Records within 250m	**4**

Currently existing railway lines, including standard railways, narrow gauge, funicular, trams and light railways.

Features are displayed on the Railway infrastructure and projects map on **page 117**

Location	Name	Type
13m SE	Not given	Single Track
13m SE	Shrewsbury to Chester Line	rail

Location	Name	Type
63m NE	Not given	Single Track
183m NE	Not given	Single Track

This data is sourced from Ordnance Survey and OpenStreetMap.

21.8 Crossrail 1

Records within 500m	0

The Crossrail railway project links 41 stations over 100 kilometres from Reading and Heathrow in the west, through underground sections in central London, to Shenfield and Abbey Wood in the east.

This data is sourced from publicly available information by Groundsure.

21.9 Crossrail 2

Records within 500m	0

Crossrail 2 is a proposed railway linking the national rail networks in Surrey and Hertfordshire via an underground tunnel through London.

This data is sourced from publicly available information by Groundsure.

21.10 HS2

Records within 500m	0

HS2 is a proposed high speed rail network running from London to Manchester and Leeds via Birmingham. Main civils construction on Phase 1 (London to Birmingham) of the project began in 2019, and it is currently anticipated that this phase will be fully operational by 2026. Construction on Phase 2a (Birmingham to Crewe) is anticipated to commence in 2021, with the service fully operational by 2027. Construction on Phase 2b (Crewe to Manchester and Birmingham to Leeds) is scheduled to begin in 2023 and be operational by 2033.

This data is sourced from HS2 ltd.

Data providers

Groundsure works with respected data providers to bring you the most relevant and accurate information. To find out who they are and their areas of expertise see https://www.groundsure.com/sources-reference.

Terms and conditions

Groundsure's Terms and Conditions can be accessed at this link: https://www.groundsure.com/terms-and-conditions-jan-2020/.

APPENDIX D

Trial Pit Logs/Trench Photographs

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP02	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Soft brown very sandy CLAY. (TOPSOIL)
					0.40			Firm to stiff brownish blue very sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse of sandstone and coal. (GLACIAL TILL)
		1.20		HVP=80.0				
		2.00		HVP=85.0				
					2.90			End of Borehole at 2.900m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.90	0.60	Pit Stable					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP01	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES					Medium dense brown slightly clayey SAND. (TOPSOIL)
					0.35			
		1.00	D					Firm brown very sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of sandstone and coal. (GLACIAL TILL)
		1.00		HVP=85.0				
		2.10		HVP=40.0	2.10			
		2.20	D					Loose brown slightly gravelly SAND. Gravel is subrounded to subangular fine to coarse of sandstone and coal. (FLUVIOGLACIAL DEPOSITS)
					2.70			End of Borehole at 2.700m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.80	0.60	Pit unstable at base.					

Remarks

Slow groundwater infiltration at base.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP03	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Medium dense brown slightly clayey SAND. (TOPSOIL)
					0.40			Firm brown very sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse of coal and mudstone. (GLACIAL TILL)
		1.00		HVP=65.0				
		1.50		HVP=85.0				
					2.10			Loose brown slightly gravelly SAND. (FLUVIOGLACIAL DEPOSITS)
					2.60			End of Borehole at 2.600m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.90	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP05	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			Loose to medium dense brown clayey SAND. (TOPSOIL)
								Firm brown mottled orange very sandy gravelly CLAY with low cobble content. Gravel is subrounded to subangular fine to coarse of mudstone with occasional coal traces. Cobbles are rounded of mudstone. (GLACIAL TILL)
					1.60			Loose brown slightly gravelly SAND Gravel is subrounded to subangular fine to coarse of mudstone with occasional coal traces. (FLUVIOGLACIAL DEPOSITS)
					2.00			Stiff brown mottled orange gravelly slightly sandy CLAY. Gravel is subrounded to subangular fine to coarse of mudstone with occasional coal. (GLACIAL TILL)
		2.40		HVP=90.0				
					2.70			End of Borehole at 2.700m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.90	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP04	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES					Loose to medium dense brown slightly clayey SAND. (TOPSOIL)
					0.45			Firm brown mottled orange very sandy gravelly CLAY. (GLACIAL TILL)
		1.20	D					
		1.50		HVP=90.0				
		2.00		HVP=85.0				
					2.40			Loose brown slightly gravelly SAND. Gravel is subrounded to rounded fine to coarse of sandstone with occasional coal. (FLUVIOGLACIAL DEPOSITS)
					2.75			End of Borehole at 2.750m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.80	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP06	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES					Loose dark brown very gravelly SAND. (FLUVIOGLACIAL DEPOSITS)
					0.45			Firm to stiff brown mottled blue sandy gravelly CLAY. (GLACIAL TILL)
		1.00	D					
		2.00		HVP=100.0				
					2.70			End of Borehole at 2.700m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Pit stable.					

Remarks

Becoming wet at 2.50m.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP07	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Soft dark brown sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse of mixed lithologies. (TOPSOIL)
		1.00	D					Firm to stiff brown mottled blue sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mudstone with occasional coal. (GLACIAL TILL)
		2.00		HVP=94.0				
					2.70			End of Borehole at 2.700m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.90	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP08	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Sift brown sandy gravelly CLAY. Gravel is subrounded to subangular fine to coarse of mixed lithologies. (TOPSOIL)
					0.30			Soft to firm brown mottled grey sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mudstone with occasional coal. (GLACIAL TILL)
		2.00		HVP=65.0				
					2.30			Loose brown gravelly clayey SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (FLUVIOGLACIAL DEPOSITS)
					2.50			Firm to stiff brown mottled grey sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lilthologies. (GLACIAL TILL)
		2.70		HVP=80.0				
					2.90			End of Borehole at 2.900m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP09	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.35			Loose dark brown very gravelly slightly clayey SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
		1.00	D					Firm to stiff brown mottled blue sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mudstone and occasional coal. (GLACIAL TILL)
		1.50		HVP=80.0				*Thin band of sand between 2.30 and 2.40m.*
					2.60			End of Borehole at 2.600m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.80	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP10	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		1.00	D		0.35			Loose dark brown very gravelly SAND. Gravel is subangular to angular fine to coarse of mixed lithologies. (TOPSOIL)
					2.70			Firm to stiff brown mottled blue very sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mudstone with occasional coal. (GLACIAL TILL)
								End of Borehole at 2.750m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

GroundSolve Ltd

Trial Pit Log

Project Name: St Peters Close	Client: SG Estates	Date: 04/08/2021
Location:	Contractor: Harvey Plant Hire	
Project No. : 2585	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP11	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES					Loose dark brown very gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
					0.40			Soft to firm brown very sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
		1.00	D					
		1.50						
		1.80	D		1.70			Firm to stiff brown mottled blue sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mudstone with occasional coal. (GLACIAL TILL)
		2.50						
					2.75			End of Borehole at 2.700m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.90	0.60	Pit stable.					

Remarks

No groundwater encountered.

AGS

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP201	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over loose brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies (TOPSOIL)
					0.20			Loose gravelly SAND. (FLUVIOGLACIAL DEPOSITS)
					2.00			End of Borehole at 2.000m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.40	0.60	Pit Stable					

Remarks

No groundwater encountered. Soakaway test carried out.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP202	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
					0.25			Soft brown gravelly sandy CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
								Sand content increasing with depth from 1.10m.
					2.00			End of Borehole at 2.000m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.40	0.60	Pit Stable					

Remarks

No groundwater encountered.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP203	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over very gravelly SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies. (TOPSOIL)
					0.20			Loose brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (FLUVIOGLACIAL DEPOSITS)
					1.30			End of Borehole at 1.300m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.40	0.60	Pit Stable					

Remarks

No groundwater encountered. Soakaway testing carried out.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP204	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			Grass over loose brown very clayey gravelly SAND. Gravel is subangular to angular fine to coarse of mixed lithologies. (TOPSOIL)
								Stiff brown mottled blue gravelly slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					1.80			End of Borehole at 1.800m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.50	1.80	Pit stable					

Remarks

No groundwater encountered.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP205	TP			1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15			Grass over loose brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
								Firm brown sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					1.50			End of Borehole at 1.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.50	0.60	Pit Stable					

Remarks

Soakaway carried out. No drop in level recorded over day.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP206	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over loose brown very gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
					0.25			Soft to firm very sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					1.50			End of Borehole at 1.500m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.40	0.60	Pit stable.					

Remarks

No groundwater ecnountered.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP207	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			Loose brown slightly gravelly SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies. (TOPSOIL)
					2.00			Soft to firm very sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed litholigies. (GLACIAL TILL)
								End of Borehole at 2.500m

1
2
3
4
5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.40	0.60	Pit Stable					

Remarks

No groundwater encountered.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP208	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			Grass over loose brown slightly gravelly SAND Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
								Stiff brown gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					2.50			End of Borehole at 2.500m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.50	0.60	Pit Stable					

Remarks

No groundwater encountered.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP209	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Gass over loose brown gravelly SAND. Gravel is subrounded to subangular fine to coarse of mixed lithologies. (TOPSOIL)
					0.25			Firm brown gravelly very sandy CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					0.40			Loose brown subrounded to rounded fine to coarse SAND and GRAVEL. (FLUVIOGLACIAL DEPOSITS)
					3.40			End of Borehole at 3.400m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.80	0.60	Pit Stable					

Remarks

No groundwater encounterd.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP210	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over loose brown gravelly SANd. Gravel is subangular to subrounded fine to coarse of mixed lithologies. (TOPSOIL)
					0.30			Loose yellowish brown gravelly SAND. Gravel is subangular to subrounded fine to coarse of sandstone. (FLUVIOGLACIAL DEPOSITS)
					0.60			Firm to stiff brown slightly sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					1.80			medium dense brown subrounded to rounded fine to coarse SAND and GRAVEL. (FLUVIOGLACIAL DEPOSITS)
					3.10			Stiff brown slightly sandy CLAY. (GLACIAL TILL)
					3.20			End of Borehole at 3.200m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.80	0.60	Pit Stable					

Remarks

No groundwater encountered.

Trial Pit Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 09/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name:	Equipment: JCB 3CX

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP211	TP		ES	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grass over loos brown gravelly slightly clayey SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies. (TOPSOIL)
					0.30			Stiff brown mottled blue slightly sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					3.00			End of Borehole at 3.000m

1 2 3 4 5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
2.00	0.60	Pit Stable					

Remarks

No groundwater encountered.



Trench 1



Trench 2



Trench 3



Trench 4



View of trench excavations.

APPENDIX E

Borehole logs

Percussion Drilling Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 14/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name: Cheshire Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH01	CP		ES	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.40			Grass over brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
		2.50 - 3.50	B					Loose gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (FLUVIOGLACIAL DEPOSITS)
					3.50			Medium dense brown clayey gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (FLUVIOGLACIAL DEPOSITS)
		4.50 - 5.50	B		4.50			Medium dense sandy subrounded to subangular fine to coarse GRAVEL of mixed lithologies with high cobble content. Cobbles are rounded of sandstone and limestone. (FLUVIOGLACIAL DEPOSITS)
		5.50 - 6.50	B					
		7.00 - 8.00	B					
		9.00 - 10.00	B					
					10.00			End of Borehole at 10.000m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
10.00	200	10.00	200								

Remarks

No groundwater encountered. Falling head depths carried out at various depths.

Percussion Drilling Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 15/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name: Cheshire Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH02	CP		ES	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.40			Grass over brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
		2.30	B		2.30			Loose to medium dense clayey gravelly SAND. GRavel is subrounded to rounded fine to coarse of mixed lithologies. (FLUVIOGLACIAL DEPOSITS)
					5.00			Firm brown very sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
								Cobbles or angular limestone recorded @ 4.85m.
								End of Borehole at 5.000m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
				4.85		01:00					

Remarks

No groundwater encountered.

Percussion Drilling Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 15/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name: Cheshire Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH03	CP		ES	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.60			Grass over brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
								Firm brown very gravelly sandy CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					4.40			Medium dense brown very gravelly slightly clayey SAND with medium cobble content. Gravel is subrounded to rounded fine to coarse of mixed lithologies. Cobbles are rounded of sandstone and limestone. (FLUVIOGLACIAL DEPOSITS)
		5.00	B					*Cobble content increasing with depth from 7.0m.*
					10.00			End of Borehole at 10.000m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
0.00	200	0.00	200								

Remarks

No groundwater encountered. Falling head tests carried out at various depths.

Percussion Drilling Log

Project Name: St Peters Close additional SI	Client: SG Estates	Date: 14/09/2021
Location: Rhosrobin	Contractor: Harvey Plant Hire	
Project No. : 2609	Crew Name: Cheshire Drilling	Drilling Equipment: Dando 2000

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
BH2A	CP		ES	1:50	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.50			Grass over brown gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)
								Soft to firm brown mottled blue sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)
					4.80			
		5.00	B					Medium dense brown very gravelly SAND. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (FLUVIOGLACIAL DEPOSITS)
		6.00	B					
		7.00	B					
					7.50			End of Borehole at 7.500m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
7.50	200	7.50	200								

Remarks

No groundwater encountered. Falling head tests carried out at various depths.

APPENDIX F

Soakaway Test Results

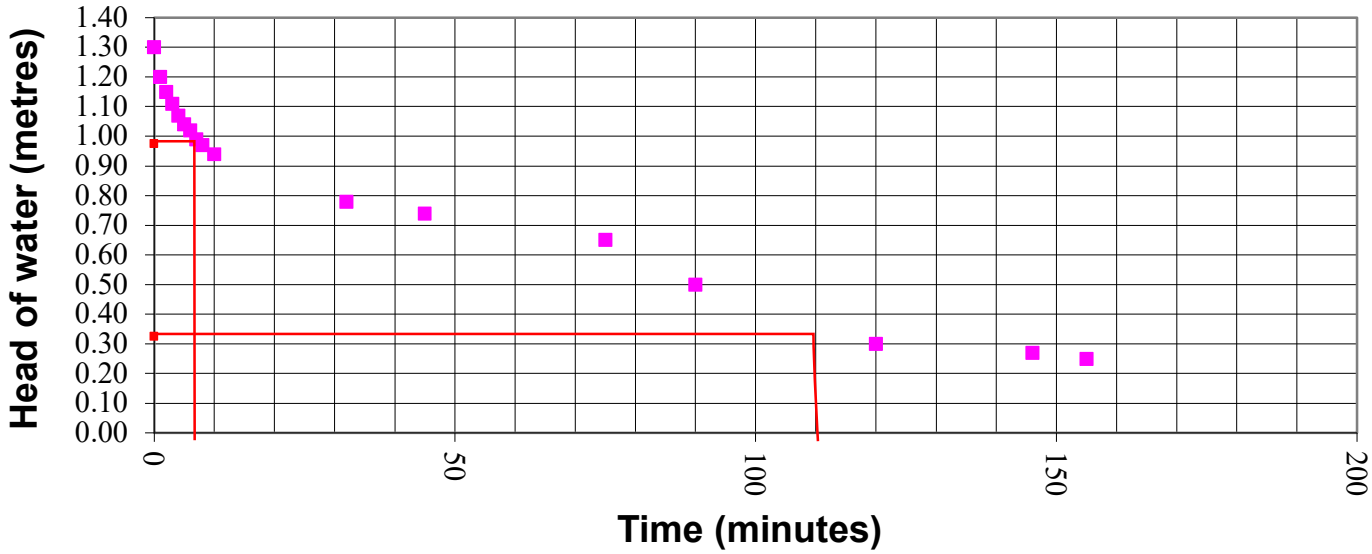
Time (Mins)	Depth of Water	Head of Water
0	0.70	1.30
1	0.80	1.20
2	0.85	1.15
3	0.89	1.11
4	0.93	1.07
5	0.96	1.04
6	0.98	1.02
7	1.01	0.99
8	1.03	0.97
10	1.06	0.94
32	1.22	0.78
45	1.26	0.74
75	1.35	0.65
90	1.50	0.50
120	1.70	0.30
146	1.73	0.27
155	1.75	0.25

GroundSolve Ltd

2609. St Peters Close Additional Works

TP201- Test 1

09/09/2021



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
2.00	1.40	0.60	0.975	0.33	1.30	3.440	0.546	1.00	9	110	2.619E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

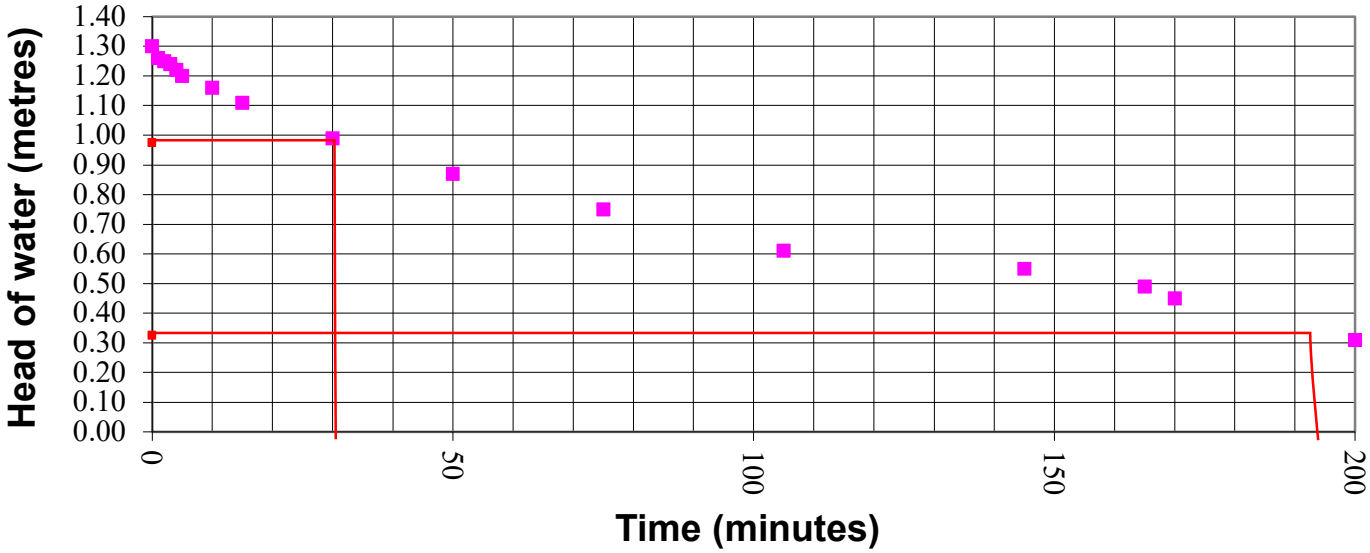
Time (Mins)	Depth of Water	Head of Water
0	0.70	1.30
1	0.74	1.26
2	0.75	1.25
3	0.76	1.24
4	0.78	1.22
5	0.80	1.20
10	0.84	1.16
15	0.89	1.11
30	1.01	0.99
50	1.13	0.87
75	1.25	0.75
105	1.39	0.61
145	1.45	0.55
165	1.51	0.49
170	1.55	0.45
200	1.69	0.31

GroundSolve Ltd

2609. St Peters Close Additional Works

TP201- Test 2

09/09/2021



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
2.00	1.40	0.60	0.975	0.33	1.30	3.440	0.546	1.00	30	192	1.633E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

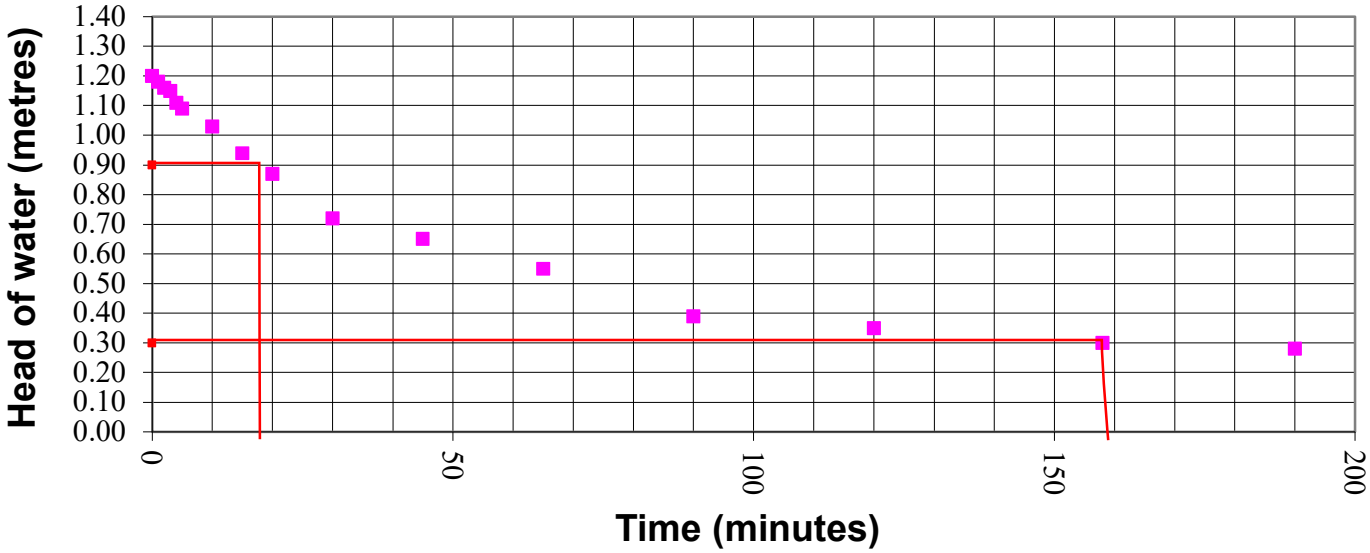
Time (Mins)	Depth of Water	Head of Water
0	0.60	1.20
1	0.62	1.18
2	0.64	1.16
3	0.65	1.15
4	0.69	1.11
5	0.71	1.09
10	0.77	1.03
15	0.86	0.94
20	0.93	0.87
30	1.08	0.72
45	1.15	0.65
65	1.25	0.55
90	1.41	0.39
120	1.45	0.35
158	1.50	0.30
190	1.52	0.28

GroundSolve Ltd

2609. St Peters Close Additional Works

TP201- Test 3

10/09/2021



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.80	1.40	0.60	0.900	0.30	1.20	3.240	0.504	1.00	30	159	2.010E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

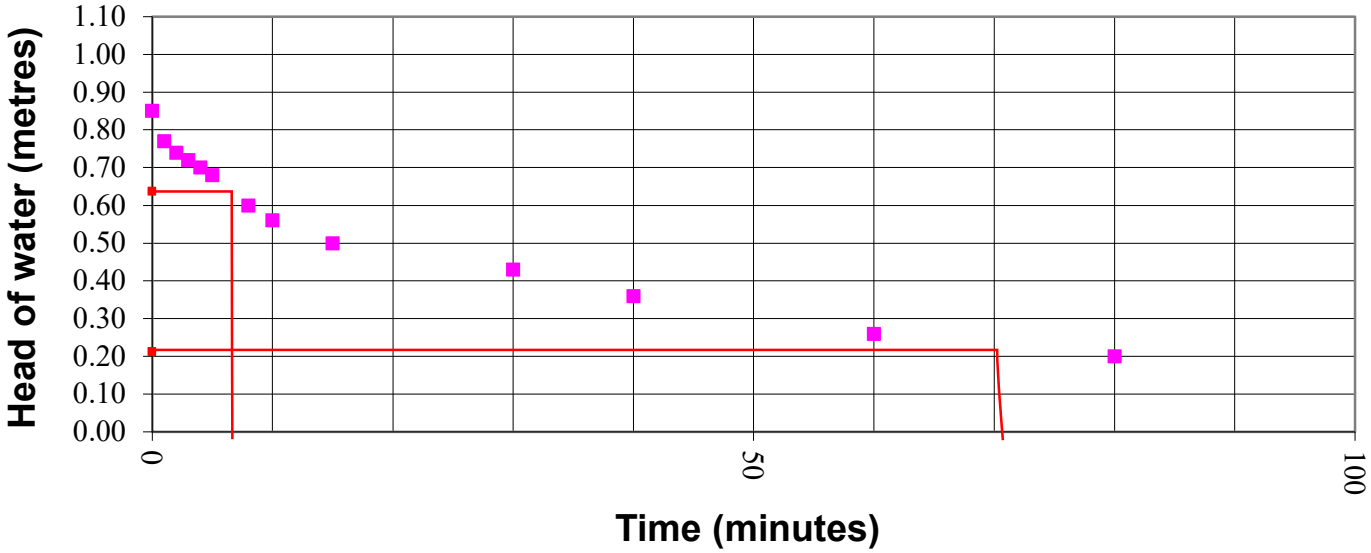
Time (Mins)	Depth of Water	Head of Water
0	0.45	0.85
1	0.53	0.77
2	0.56	0.74
3	0.58	0.72
4	0.60	0.70
5	0.62	0.68
8	0.70	0.60
10	0.74	0.56
15	0.80	0.50
30	0.87	0.43
40	0.94	0.36
60	1.04	0.26
80	1.10	0.20

GroundSolve Ltd

2609. St Peters Close Additional Works

TP203- Test 1

09/09/2021



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.30	1.30	0.60	0.638	0.21	0.85	2.395	0.332	1.00	8	70	3.721E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

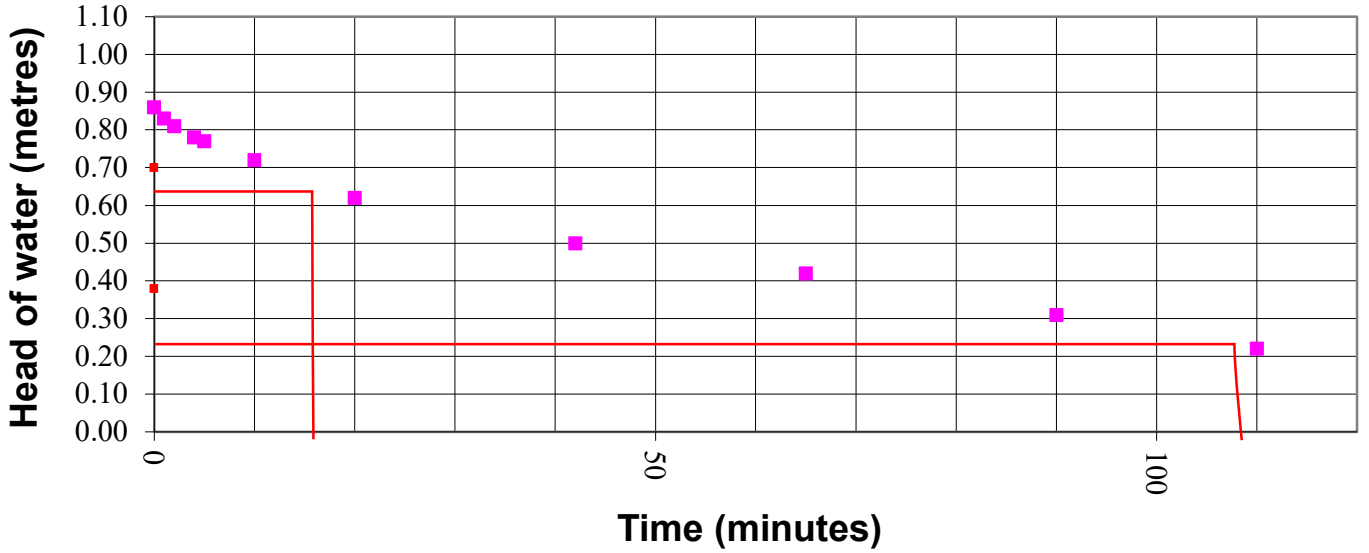
Time (Mins)	Depth of Water	Head of Water
0	0.44	0.86
1	0.47	0.83
2	0.49	0.81
4	0.52	0.78
5	0.53	0.77
10	0.58	0.72
20	0.68	0.62
42	0.80	0.50
65	0.88	0.42
90	0.99	0.31
110	1.08	0.22

GroundSolve Ltd

2609. St Peters Close Additional Works

TP203- Test 2

09/09/2021



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.30	1.30	0.60	0.645	0.22	0.86	2.414	0.335	1.00	15	108	2.490E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

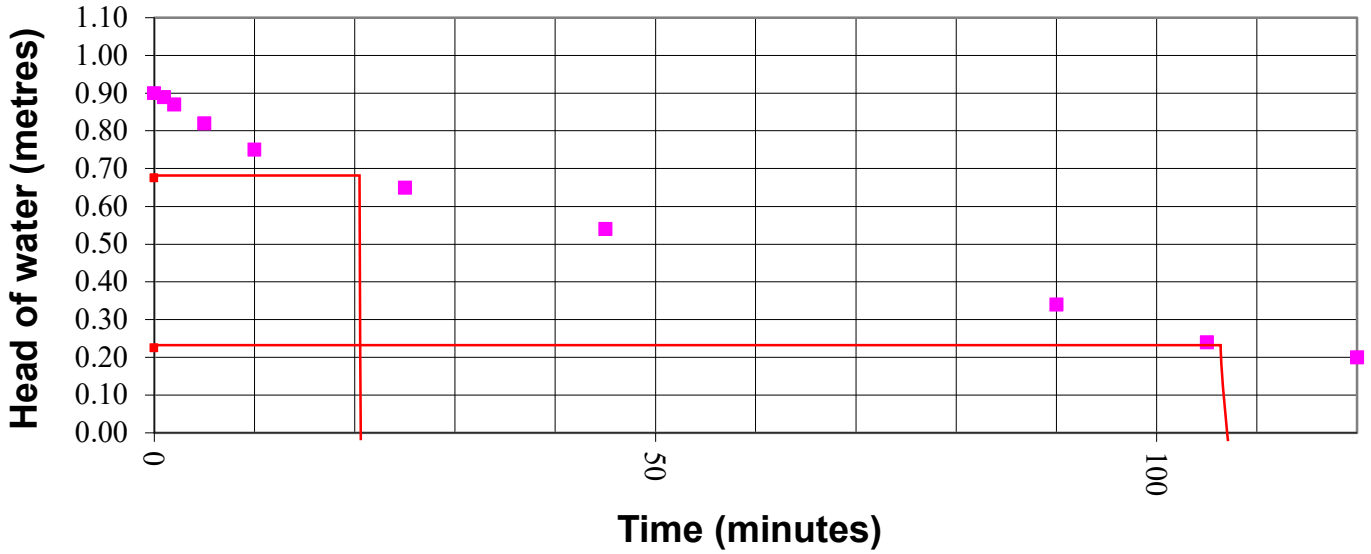
Time (Mins)	Depth of Water	Head of Water
0	0.40	0.90
1	0.41	0.89
2	0.43	0.87
5	0.48	0.82
10	0.55	0.75
25	0.65	0.65
45	0.76	0.54
90	0.96	0.34
105	1.06	0.24
120	1.10	0.20

GroundSolve Ltd

2609. St Peters Close Additional Works

TP203- Test 3

09/09/2021



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
1.30	1.30	0.60	0.675	0.23	0.90	2.490	0.351	1.00	20	108	2.670E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

APPENDIX G

Falling Head Permeability Test Results

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

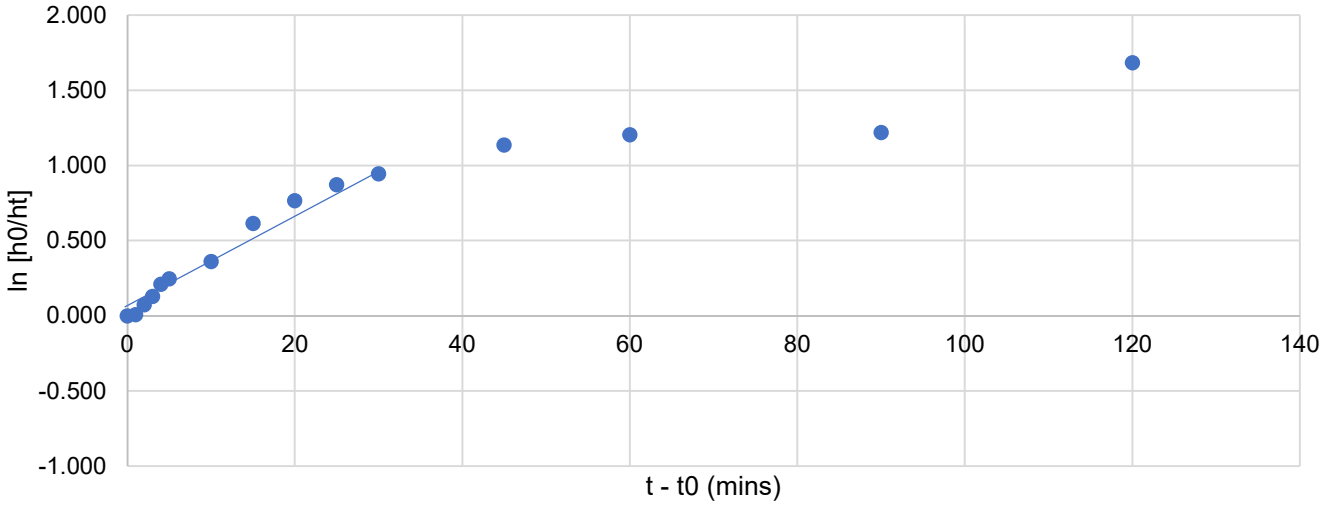
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH1
Date	

BH Depth (m)	4.00
Casing Depth (m)	3.00
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	1.63	0.000
1	1.65	0.008
2	1.80	0.074
3	1.92	0.131
4	2.08	0.211
5	2.15	0.248
10	2.35	0.362
15	2.72	0.616
20	2.90	0.768
25	3.01	0.873
30	3.08	0.946
45	3.24	1.137
60	3.29	1.205
90	3.30	1.220
120	3.56	1.684
		-0.523
		-0.523
		-0.523
		-0.523
		-0.523



α (gradient)	0.03399
Area of BH (m^2)	0.05552

Infiltration Rate, k	**7.796E-04**	m/s

Notes	Test carried out between 3&4m, within slightly clayey sand and gravels.

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

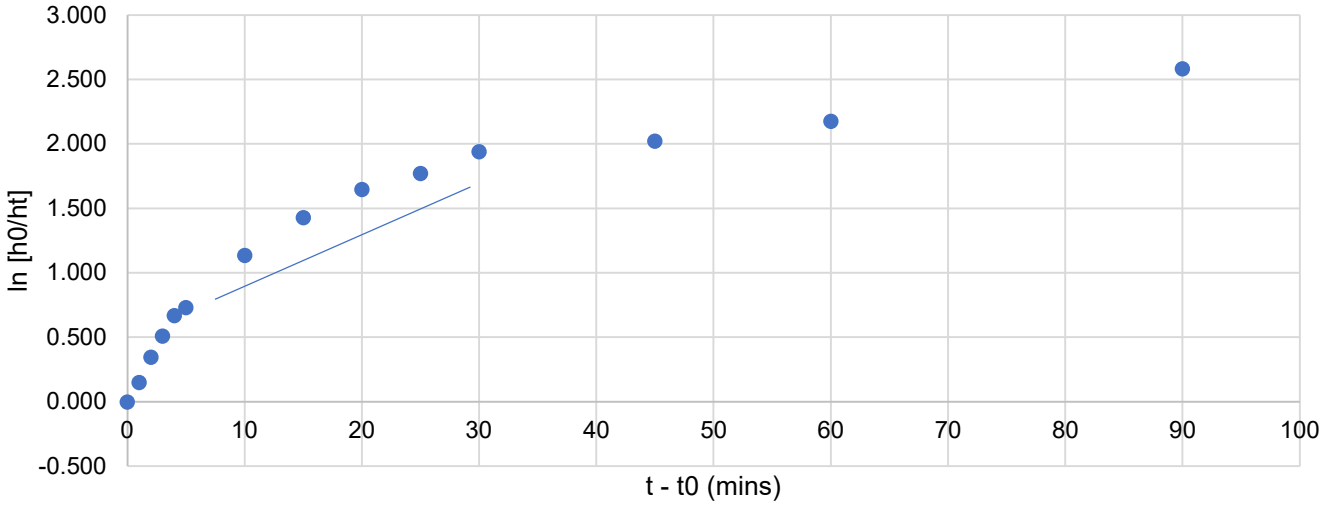
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH1
Date	

BH Depth (m)	5.50
Casing Depth (m)	4.50
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	0.20	0.000
1	0.94	0.150
2	1.75	0.346
3	2.32	0.511
4	2.79	0.671
5	2.95	0.732
10	3.80	1.137
15	4.23	1.429
20	4.48	1.648
25	4.60	1.773
30	4.74	1.942
45	4.80	2.024
60	4.90	2.179
90	5.10	2.584
		-0.037
		-0.037
		-0.037
		-0.037
		-0.037
		-0.037



α (gradient)	0.05784
Area of BH (m^2)	0.05552

Infiltration Rate, k	**1.37E10-4**	m/s

Notes	Test carried out between 4.5+5.5m, within sand and gravels.

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

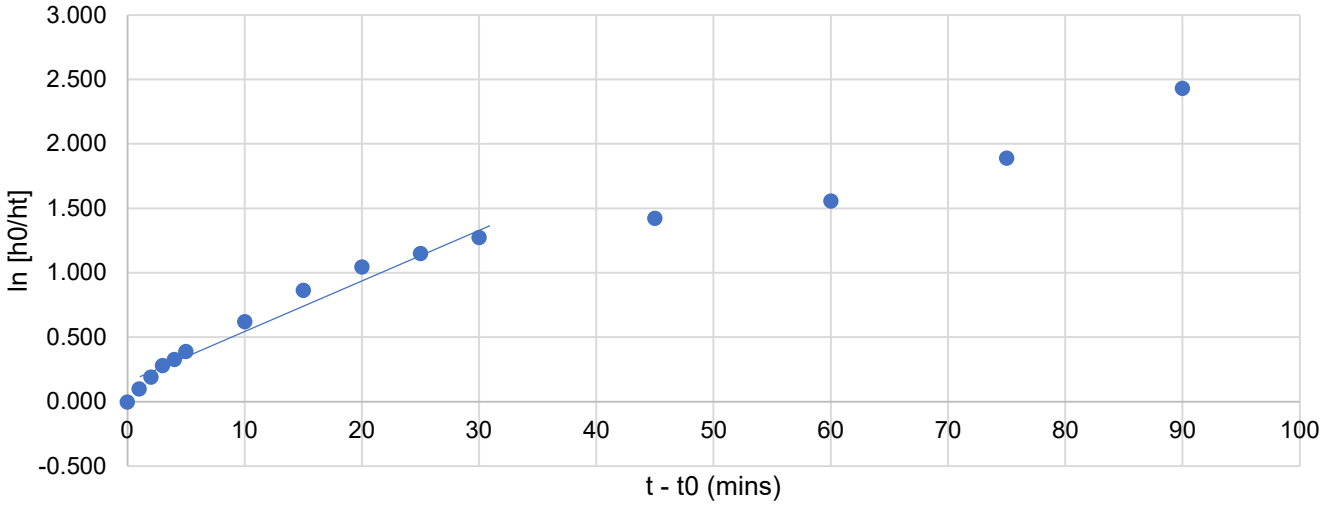
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH1
Date	

BH Depth (m)	6.50
Casing Depth (m)	5.50
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	0.80	0.000
1	1.35	0.101
2	1.80	0.193
3	2.20	0.282
4	2.40	0.329
5	2.65	0.392
10	3.44	0.622
15	4.10	0.865
20	4.50	1.047
25	4.70	1.153
30	4.91	1.277
45	5.13	1.426
60	5.30	1.558
75	5.64	1.891
90	6.00	2.434
		-0.131
		-0.131
		-0.131
		-0.131
		-0.131



α (gradient)	0.04127
Area of BH (m^2)	0.05552

Infiltration Rate, k	**9.466E-04**	m/s

Notes	Test carried out between 5.5+6.5m, within sand and gravels.

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

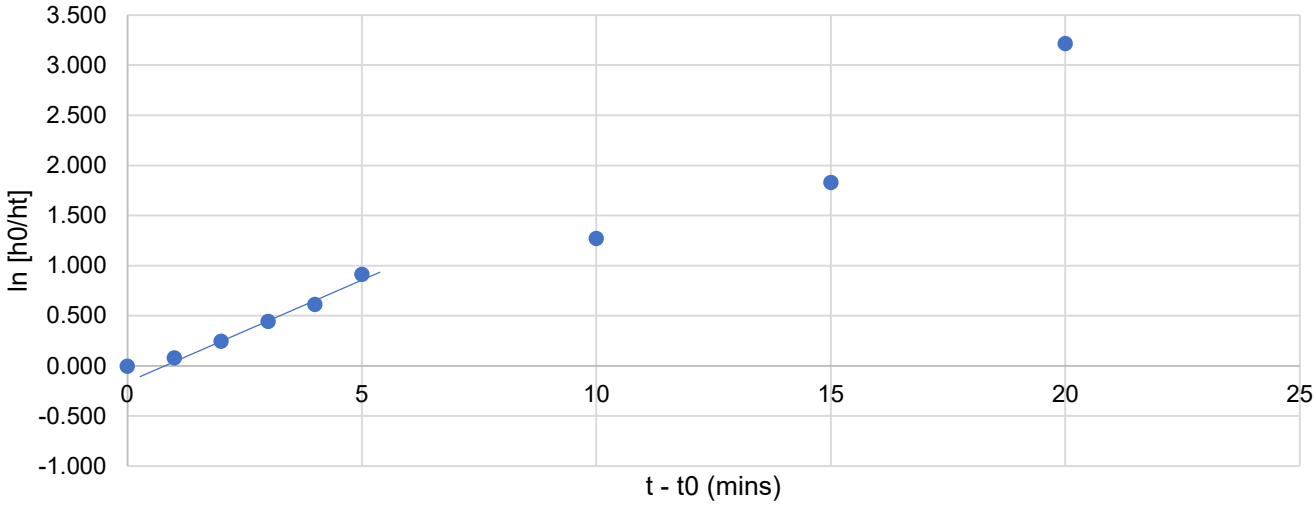
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH1
Date	

BH Depth (m)	8.00
Casing Depth (m)	7.00
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	3.00	0.000
1	3.40	0.083
2	4.10	0.248
3	4.80	0.446
4	5.30	0.616
5	6.00	0.916
10	6.60	1.273
15	7.20	1.833
20	7.80	3.219
		-0.470
		-0.470
		-0.470
		-0.470
		-0.470



α (gradient)	0.14604
Area of BH (m^2)	0.05552

Infiltration Rate, k	**3.350E-03**	m/s

Notes	Test carried out between 7+8m, slightly sand and gravels.

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

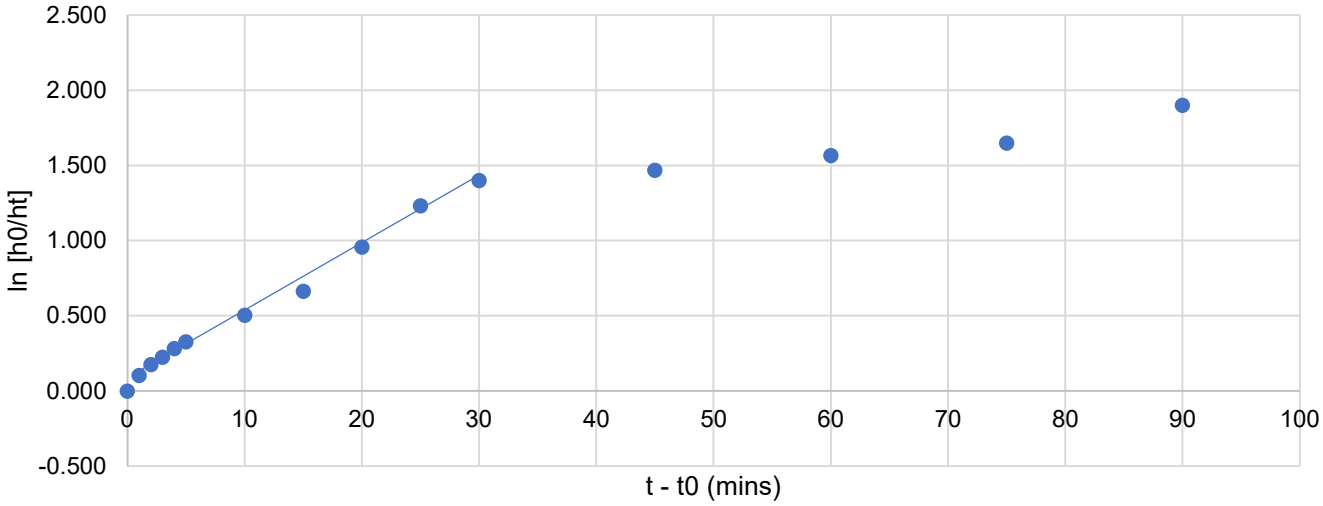
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH2a
Date	

BH Depth (m)	6.00
Casing Depth (m)	5.00
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	1.78	0.000
1	2.20	0.105
2	2.46	0.176
3	2.63	0.225
4	2.82	0.283
5	2.96	0.328
10	3.45	0.504
15	3.83	0.665
20	4.38	0.957
25	4.77	1.233
30	4.96	1.401
45	5.03	1.470
60	5.12	1.568
75	5.19	1.651
90	5.37	1.902
		-0.352
		-0.352
		-0.352
		-0.352
		-0.352



α (gradient)	0.04389
Area of BH (m^2)	0.05552

Infiltration Rate, k	**1.007E-03**	m/s

Notes	Test carried out between 5+6m, within sand and gravels.

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

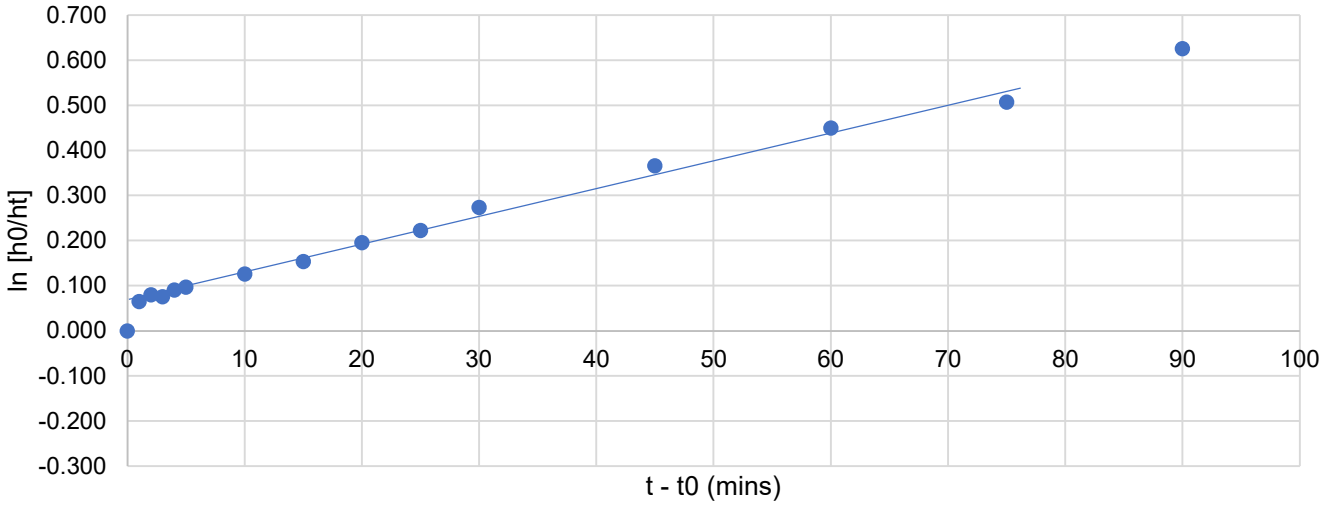
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH3
Date	

BH Depth (m)	6.00
Casing Depth (m)	5.00
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	0.95	0.000
1	1.27	0.065
2	1.34	0.080
3	1.32	0.076
4	1.39	0.091
5	1.42	0.098
10	1.55	0.126
15	1.67	0.154
20	1.85	0.196
25	1.96	0.223
30	2.16	0.274
45	2.50	0.367
60	2.78	0.450
75	2.96	0.508
90	3.30	0.626
		-0.172
		-0.172
		-0.172
		-0.172
		-0.172



α (gradient)	0.00650
Area of BH (m^2)	0.05552

Infiltration Rate, k	**1.491E-04**	m/s

Notes	Test carried out between 5+6m, within sand and gravels.

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

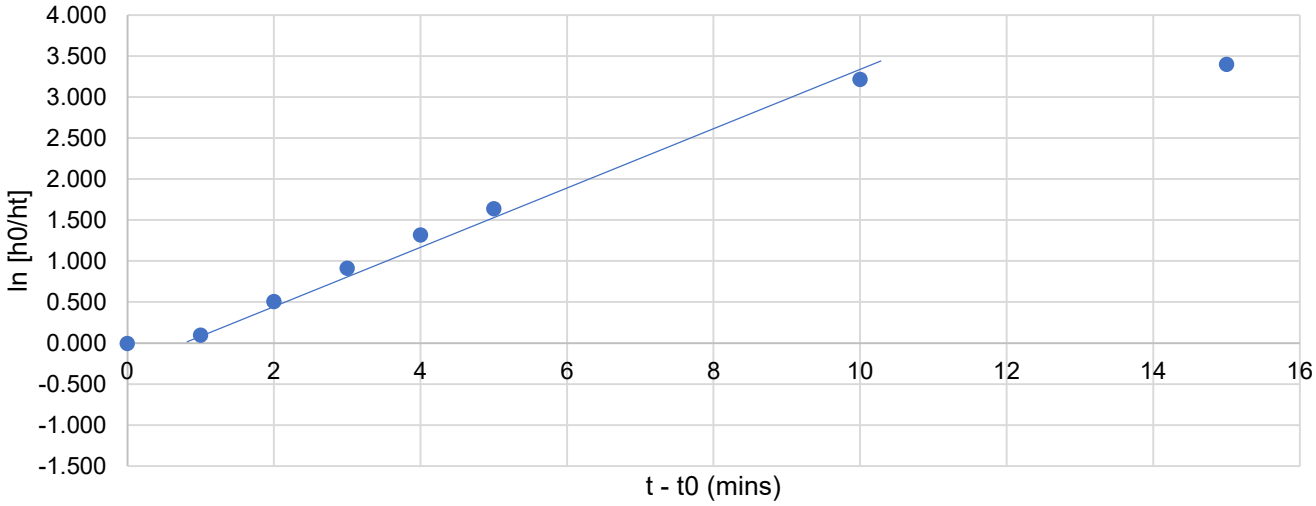
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH3
Date	

BH Depth (m)	7.00
Casing Depth (m)	6.00
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	4.00	0.000
1	4.29	0.102
2	5.20	0.511
3	5.80	0.916
4	6.20	1.322
5	6.42	1.643
10	6.88	3.219
15	6.90	3.401
		-0.847
		-0.847
		-0.847
		-0.847
		-0.847



α (gradient)	0.21491
Area of BH (m^2)	0.05552

Infiltration Rate, k	**4.929E-03**	m/s

Notes	Test carried out between 6+7m, within sand and gravels.

GroundSolve Ltd
Unit 1 Well House Barns
Chester Road
Bretton
Flintshire CH4 0DH

FALLING HEAD TEST PERMEABILITY CALCULATION

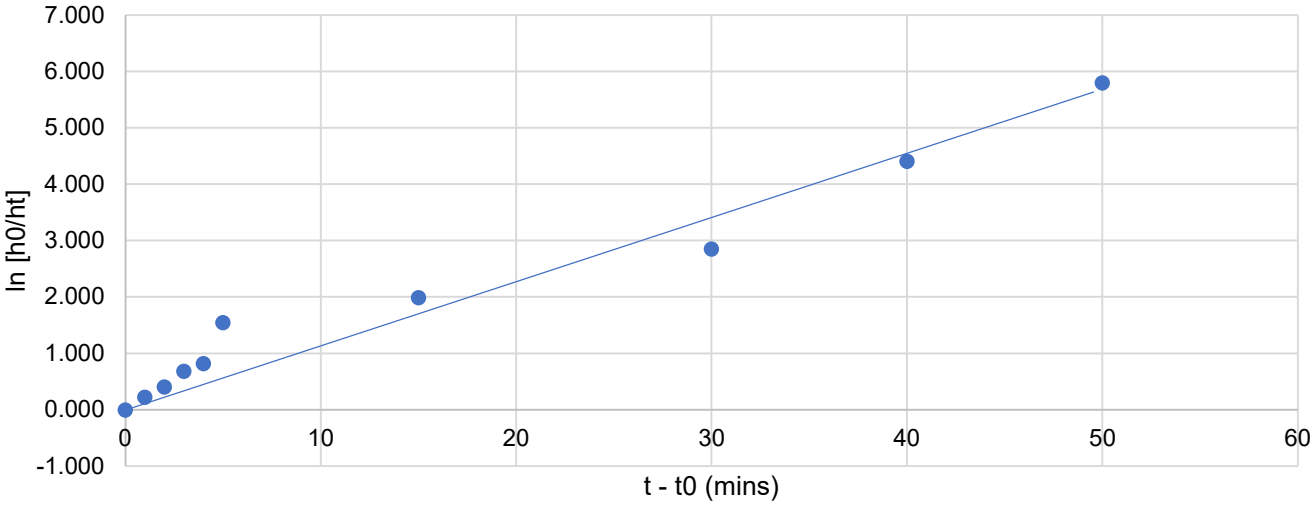
Variable Head Test Method, BS EN ISO 22282-2:2012

Project No.	2609
Project Name	St Peters Close
Borehole	BH3
Date	

BH Depth (m)	9.00
Casing Depth (m)	8.00
Casing Dia (m)	0.15
Casing Height (m)	0.00

L/D Ratio	3.85
Shape Factor	2.4205

Time (mins)	Depth to Water	ln (h0/ht)
0	2.40	0.000
1	3.72	0.223
2	4.60	0.405
3	5.68	0.687
4	6.10	0.822
5	7.60	1.551
15	8.10	1.992
30	8.62	2.855
40	8.92	4.413
50	8.98	5.799
		-0.310
		-0.310
		-0.310
		-0.310
		-0.310



α (gradient)	0.09808
Area of BH (m^2)	0.05552

Infiltration Rate, k	**2.250E-03**	m/s

Notes	Test carried out between 8+9m, within sand and gravels.

APPENDIX H

CBR Test Results

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

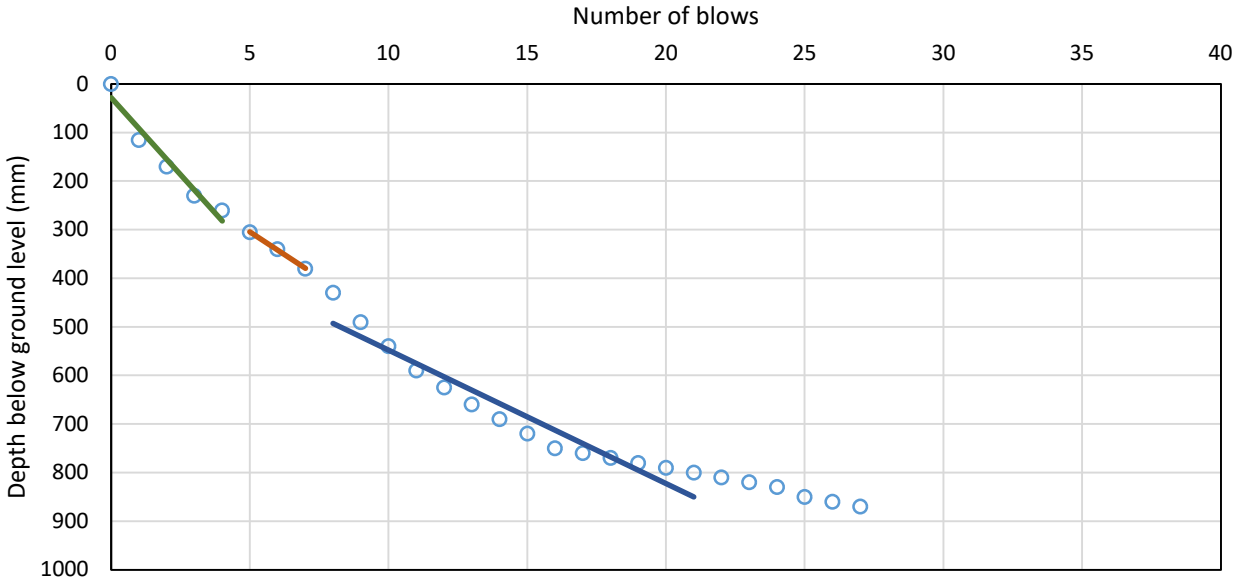
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP1



Layer 0-280mm bgl

50th Percentile penetration rate	32	mm/blow	
Estimated CBR	7.7	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	65.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	101.9	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	19	mm/blow	
Estimated CBR	13.4	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	92.7	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	146.8	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	14	mm/blow	
Estimated CBR	18.6	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	114.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	181.9	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

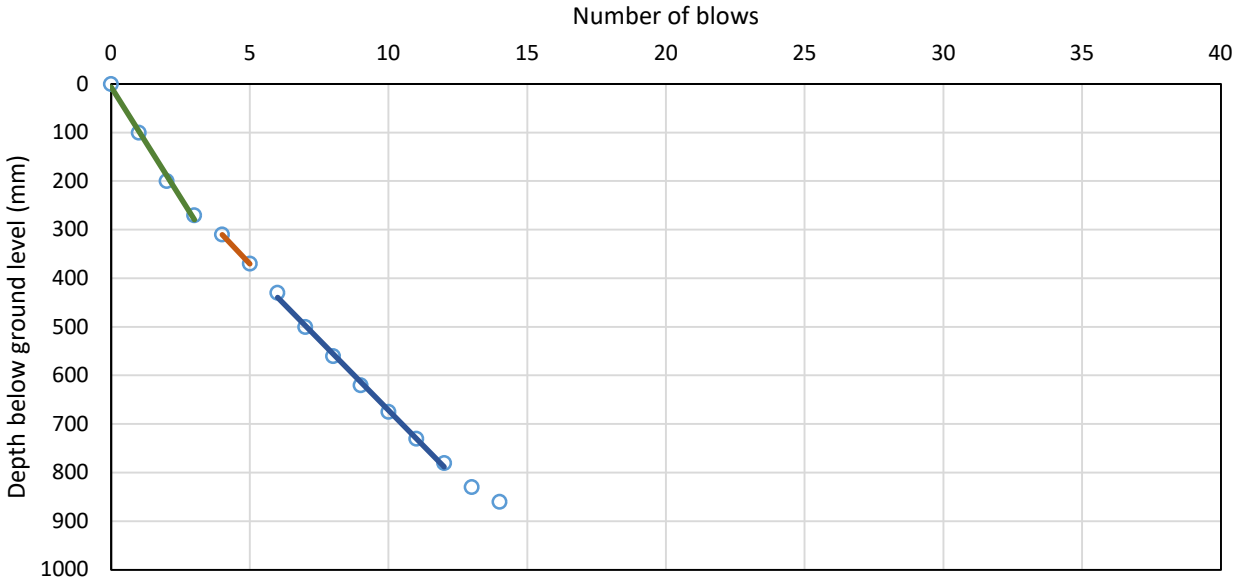
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP2



Layer 0-280mm bgl

50th Percentile penetration rate	46	mm/blow	
Estimated CBR	5.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	51.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	79.0	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	30	mm/blow	
Estimated CBR	8.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	68.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	106.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	30	mm/blow	
Estimated CBR	8.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	68.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	106.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

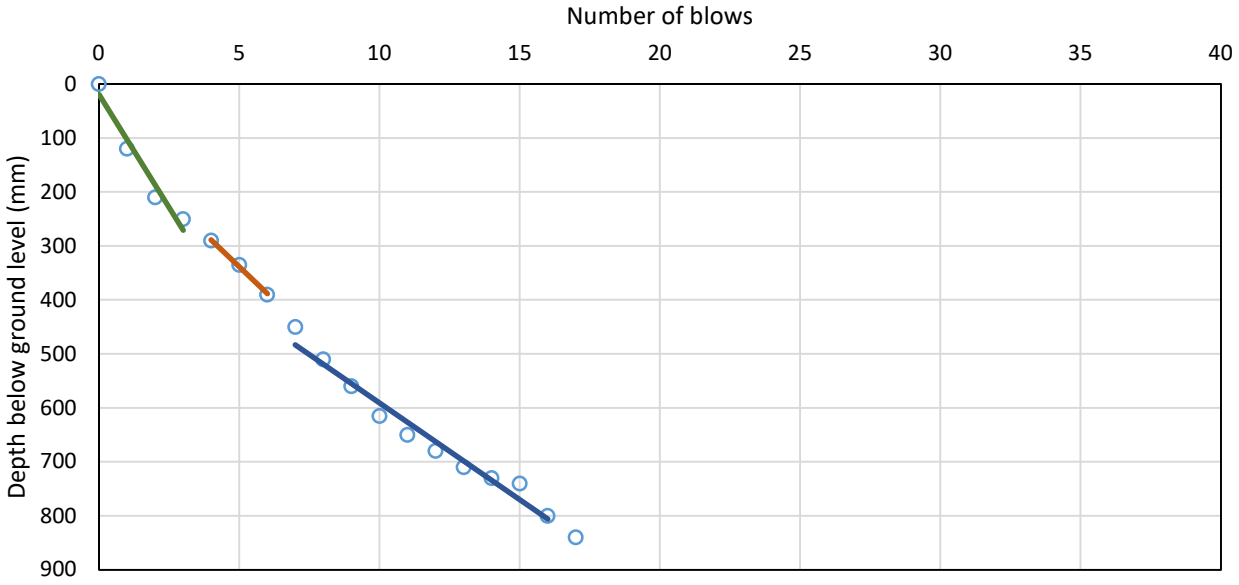
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP3



Layer 0-280mm bgl

50th Percentile penetration rate	42	mm/blow	
Estimated CBR	5.8	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	54.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	84.2	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	25	mm/blow	
Estimated CBR	10.1	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	77.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	121.1	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	18	mm/blow	
Estimated CBR	14.2	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	96.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	152.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

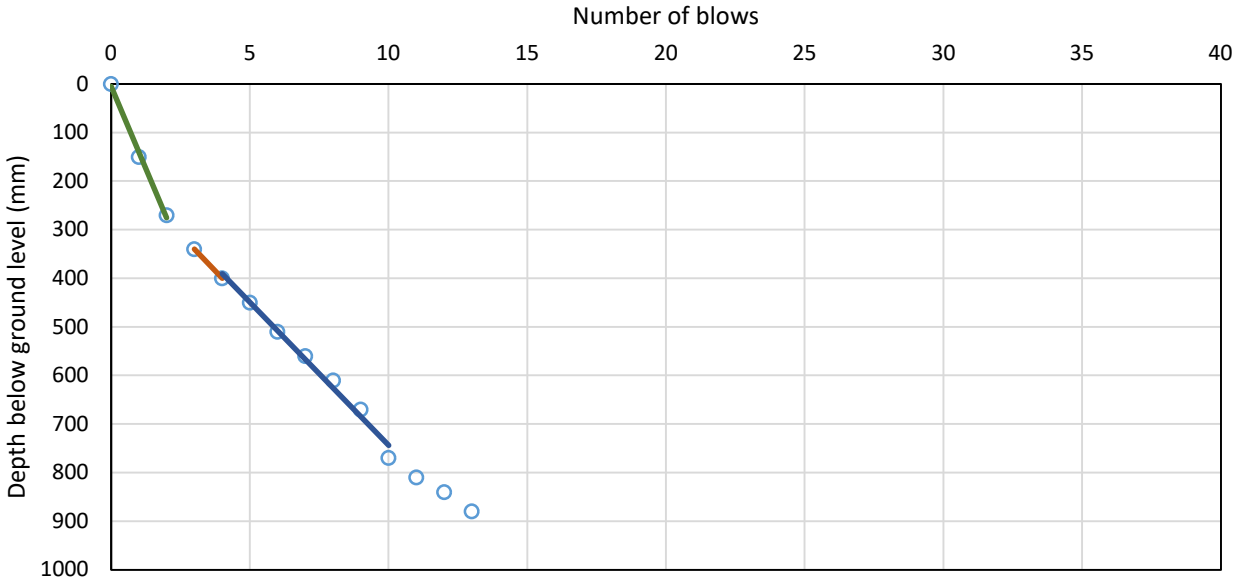
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP4



Layer 0-280mm bgl

50th Percentile penetration rate	68	mm/blow	
Estimated CBR	3.5	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	39.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	60.0	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	30	mm/blow	
Estimated CBR	8.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	68.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	106.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	30	mm/blow	
Estimated CBR	8.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	68.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	106.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

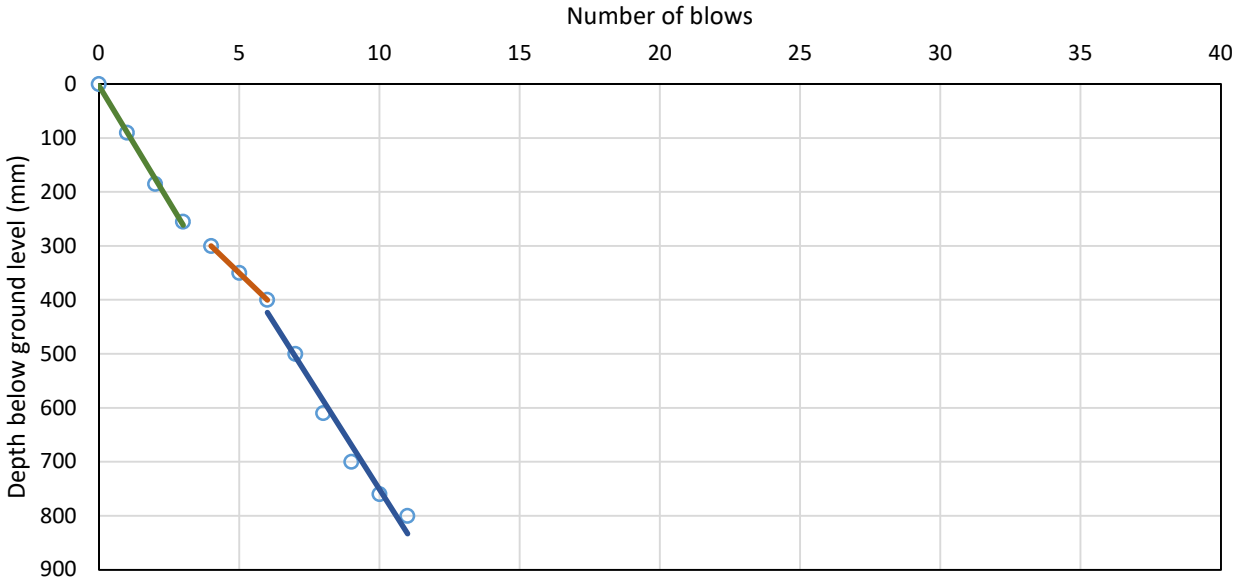
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP5



Layer 0-280mm bgl

50th Percentile penetration rate	43	mm/blow	
Estimated CBR	5.7	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	53.4	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	82.8	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	25	mm/blow	
Estimated CBR	10.1	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	77.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	121.1	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	41	mm/blow	
Estimated CBR	6.0	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	55.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	85.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

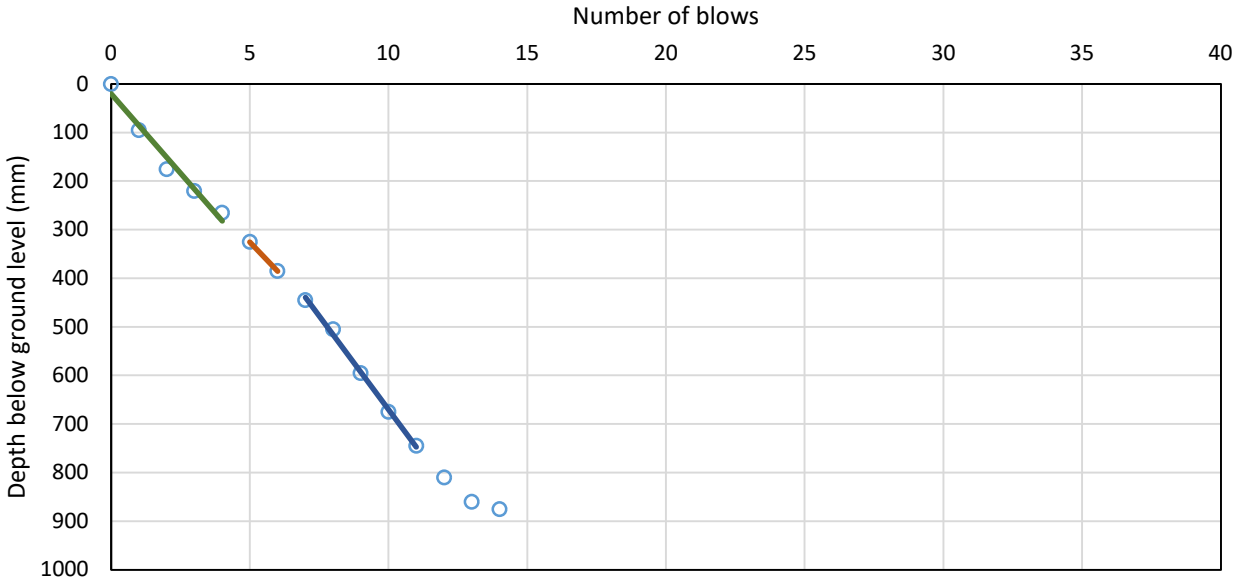
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP6



Layer 0-280mm bgl

50th Percentile penetration rate	33	mm/blow	
Estimated CBR	7.5	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	63.8	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	99.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	30	mm/blow	
Estimated CBR	8.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	68.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	106.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	39	mm/blow	
Estimated CBR	6.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	57.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	88.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

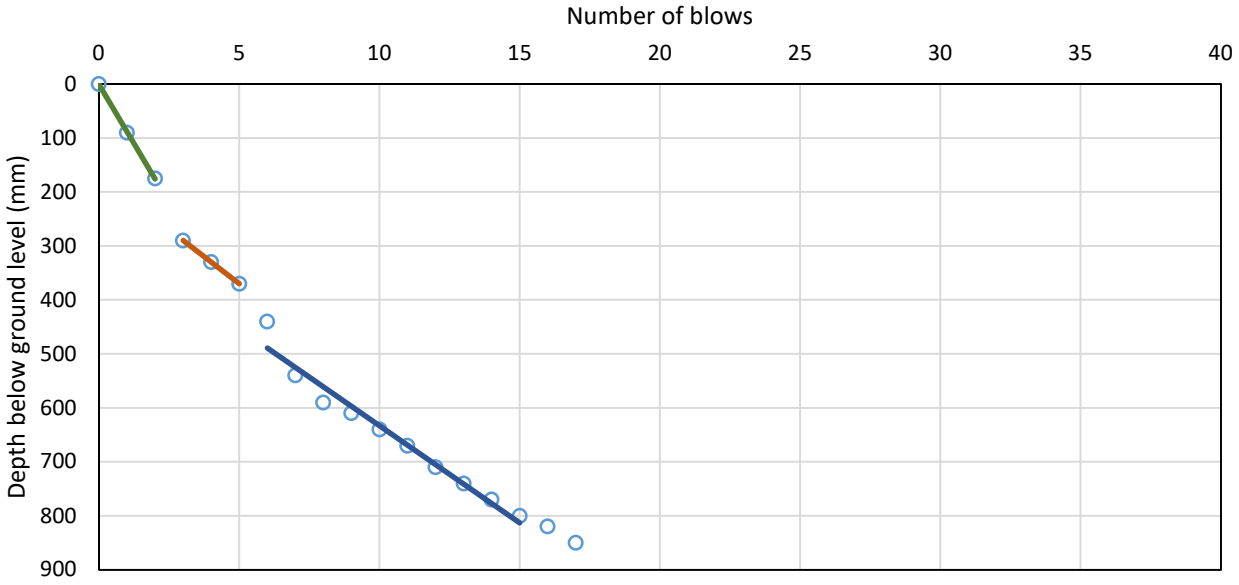
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP7



Layer 0-280mm bgl

50th Percentile penetration rate	44	mm/blow	
Estimated CBR	5.5	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	52.5	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	81.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	20	mm/blow	
Estimated CBR	12.7	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	89.6	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	141.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	18	mm/blow	
Estimated CBR	14.2	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	96.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	152.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

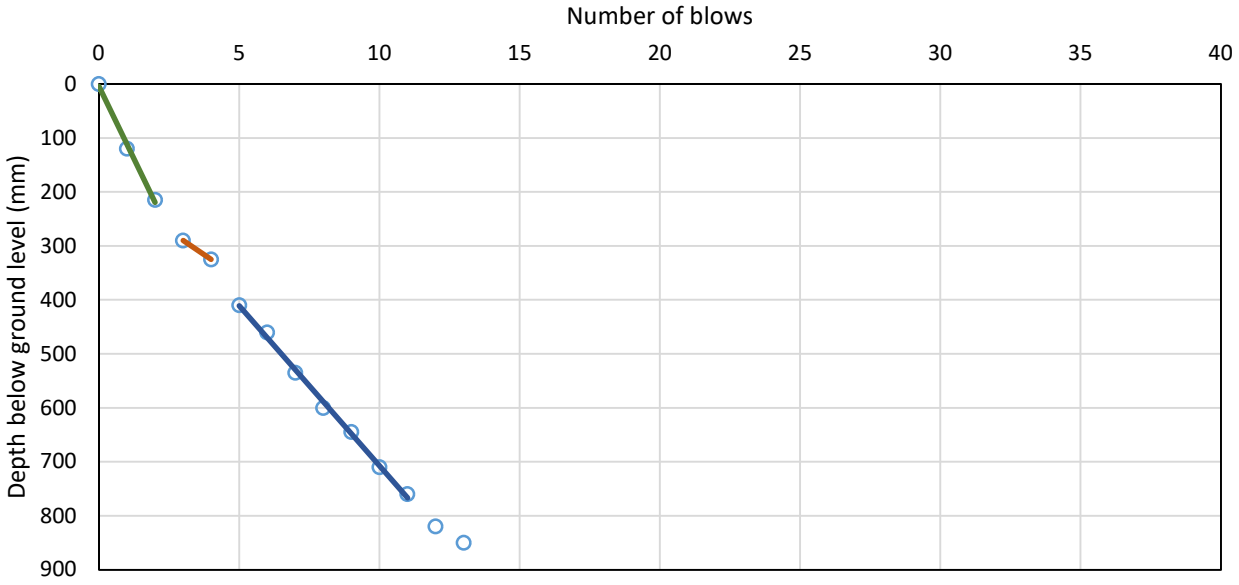
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP8



Layer 0-280mm bgl

50th Percentile penetration rate	54	mm/blow	
Estimated CBR	4.5	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	45.7	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	70.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	18	mm/blow	
Estimated CBR	14.2	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	96.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	152.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	30	mm/blow	
Estimated CBR	8.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	68.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	106.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

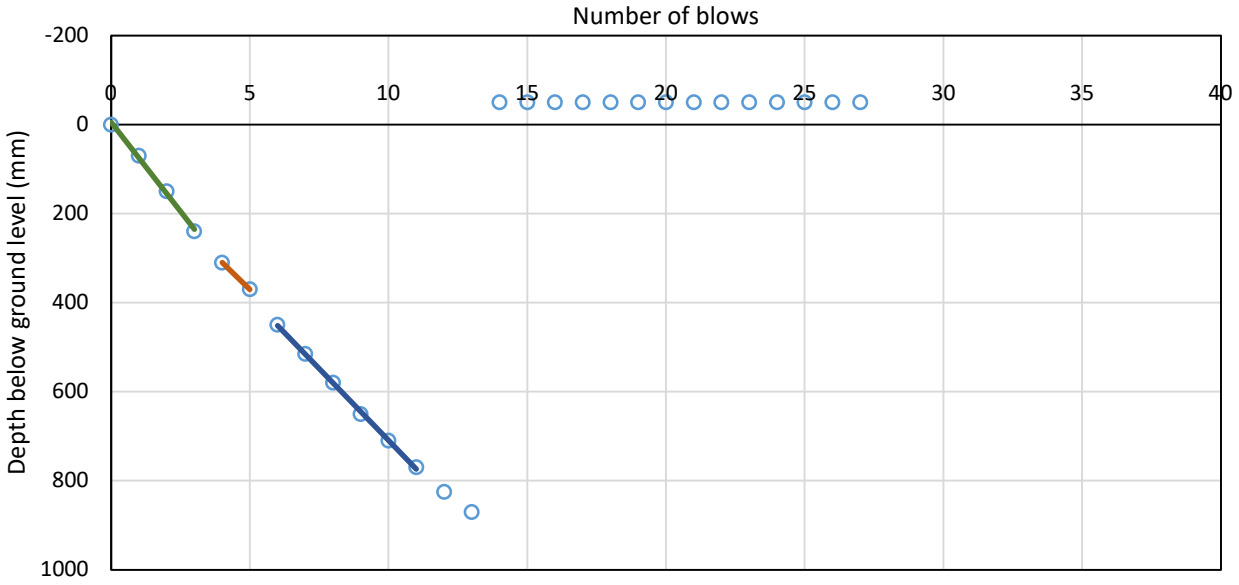
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP9



Layer 0-280mm bgl

50th Percentile penetration rate	40	mm/blow	
Estimated CBR	6.1	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	56.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	87.1	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	30	mm/blow	
Estimated CBR	8.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	68.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	106.6	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	33	mm/blow	
Estimated CBR	7.5	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	63.8	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	99.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

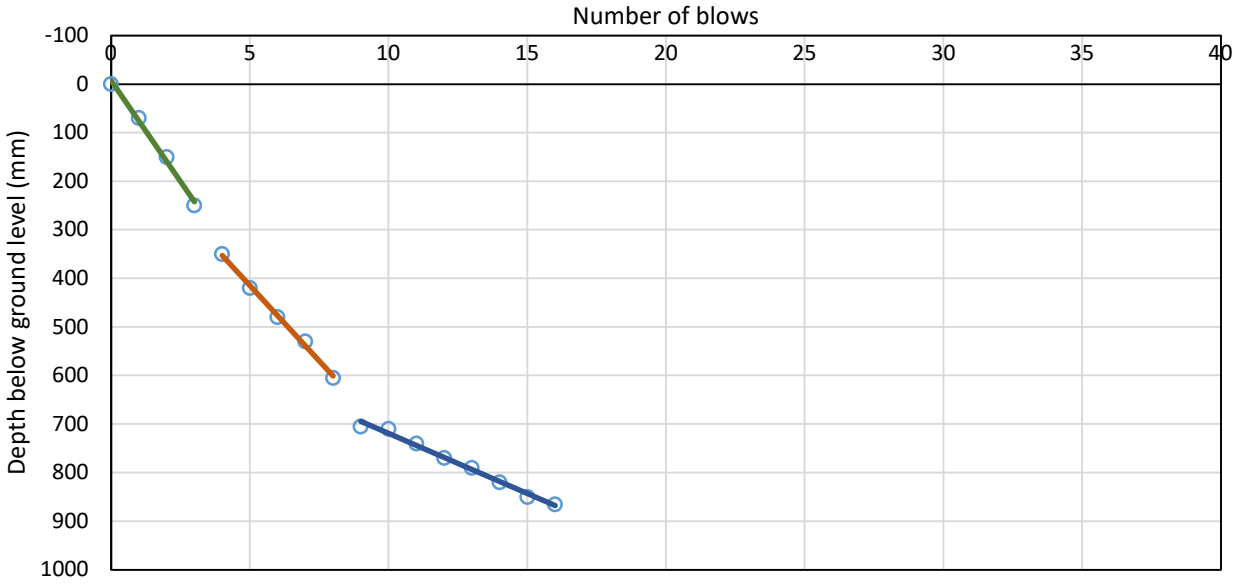
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP10



Layer 0-280mm bgl

50th Percentile penetration rate	42	mm/blow	
Estimated CBR	5.8	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	54.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	84.2	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 350-700mm bgl

50th Percentile penetration rate	31	mm/blow	
Estimated CBR	8.0	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	66.6	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	104.1	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 700-900mm bgl

50th Percentile penetration rate	13	mm/blow	
Estimated CBR	20.1	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	119.9	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	191.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

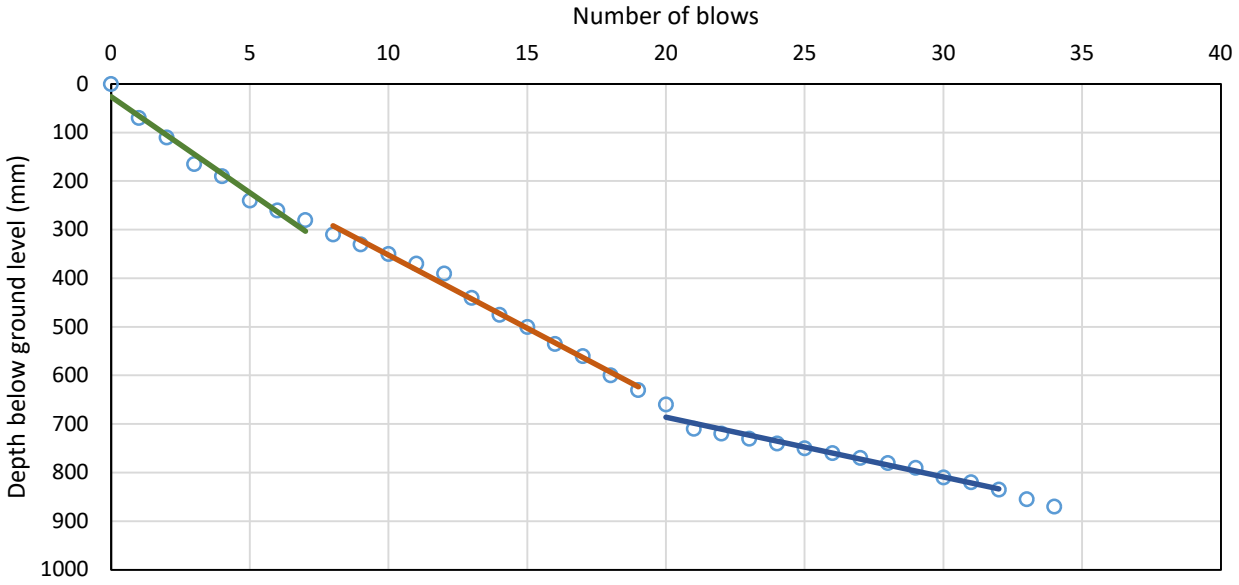
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP11



Layer 0-300mm bgl

50th Percentile penetration rate	20	mm/blow	
Estimated CBR	12.7	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	89.6	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	141.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 300-650mm bgl

50th Percentile penetration rate	16	mm/blow	
Estimated CBR	16.1	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	104.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	165.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 650-850mm bgl

50th Percentile penetration rate	7	mm/blow	
Estimated CBR	38.6	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	182.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	296.0	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

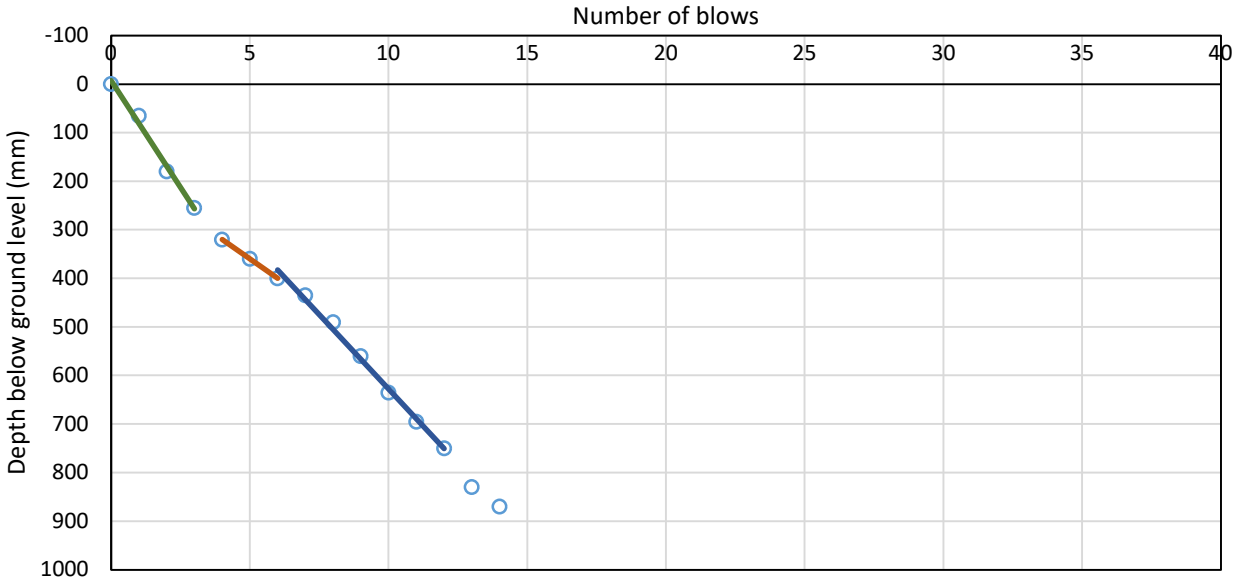
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP12



Layer 0-280mm bgl

50th Percentile penetration rate	44	mm/blow	
Estimated CBR	5.5	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	52.5	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	81.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 280-400mm bgl

50th Percentile penetration rate	20	mm/blow	
Estimated CBR	12.7	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	89.6	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	141.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	31	mm/blow	
Estimated CBR	8.0	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	66.6	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	104.1	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

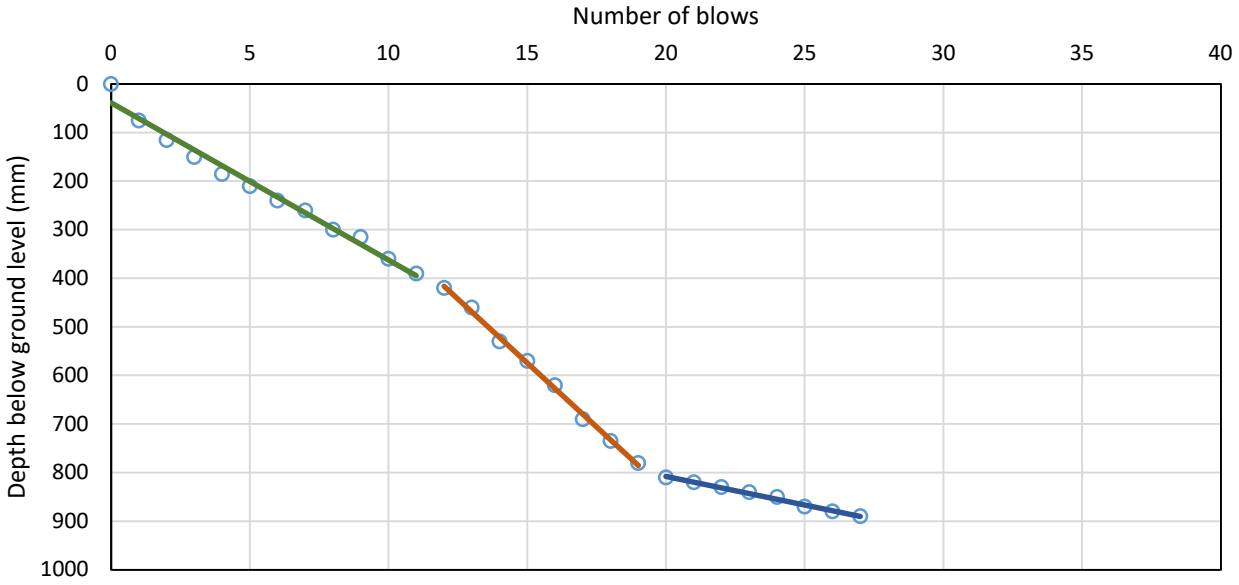
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP13



Layer 0-400mm bgl

50th Percentile penetration rate	17	mm/blow	
Estimated CBR	15.1	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	100.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	158.8	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-800mm bgl

50th Percentile penetration rate	27	mm/blow	
Estimated CBR	9.3	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	73.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	114.8	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 800-900mm bgl

50th Percentile penetration rate	6	mm/blow	
Estimated CBR	45.4	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	202.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	329.8	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

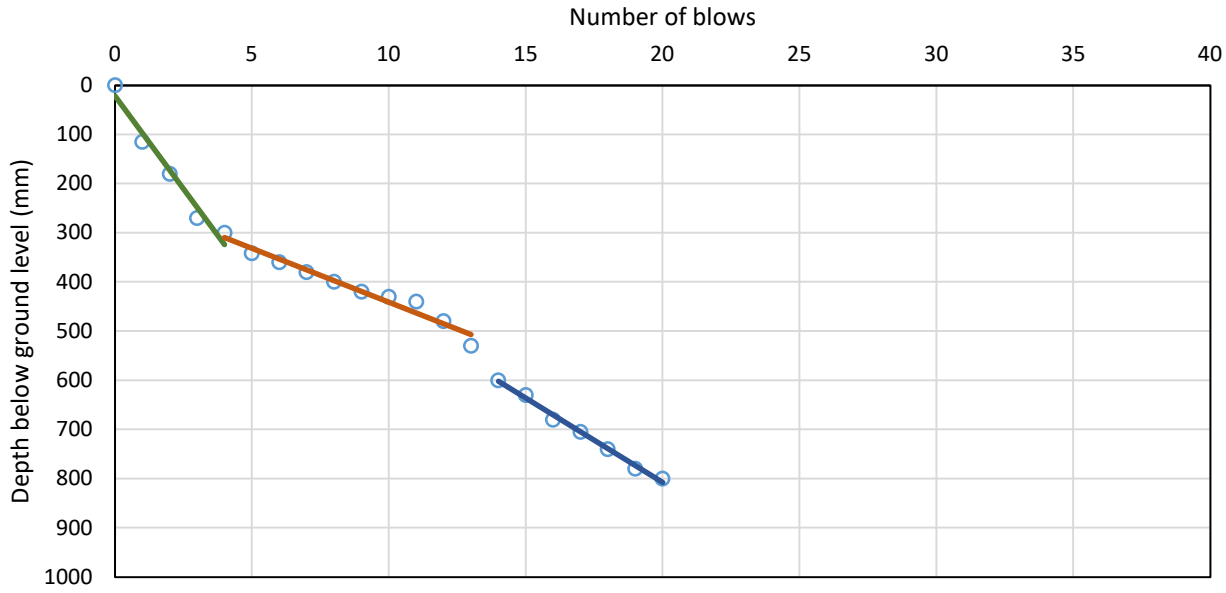
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP14



Layer 0-300mm bgl

50th Percentile penetration rate	38	mm/blow	
Estimated CBR	6.5	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	58.0	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	90.3	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 300-550mm bgl

50th Percentile penetration rate	11	mm/blow	
Estimated CBR	23.9	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	134.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	215.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 550-800mm bgl

50th Percentile penetration rate	18	mm/blow	
Estimated CBR	14.2	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	96.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	152.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

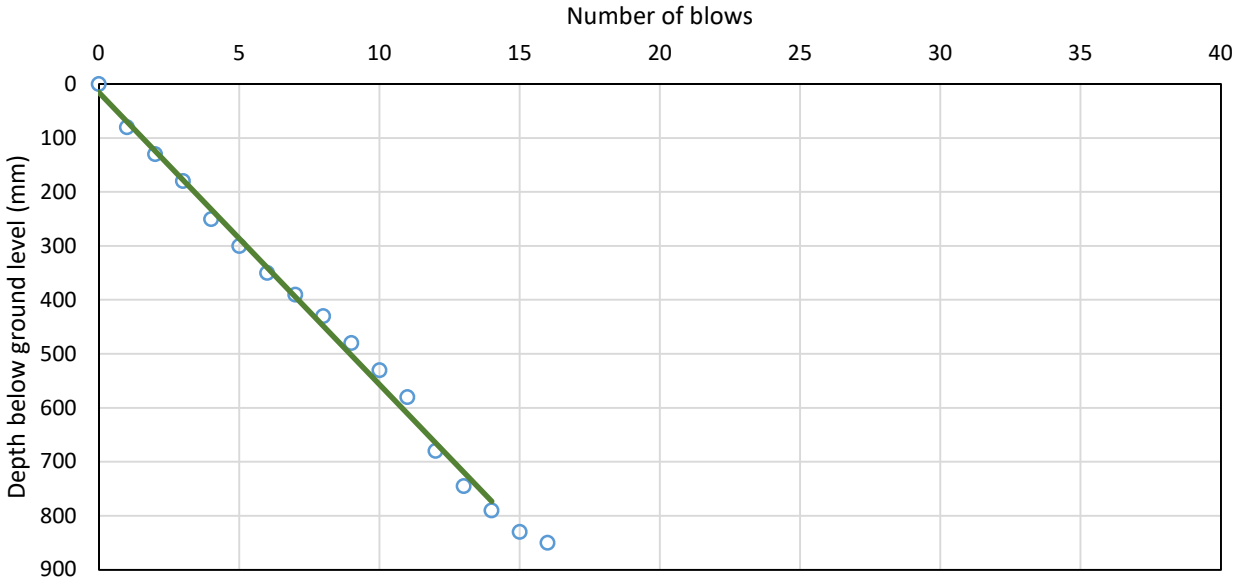
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP15



Layer 0-800mm bgl

50th Percentile penetration rate	28	mm/blow	
Estimated CBR	8.9	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	71.3	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	111.9	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

DYNAMIC CONE PENETROMETER TEST REPORT

GroundSolve Ltd

Well House Barns • Bretton • CH4 0DH

Project: 2585

Project name: St Peters Close

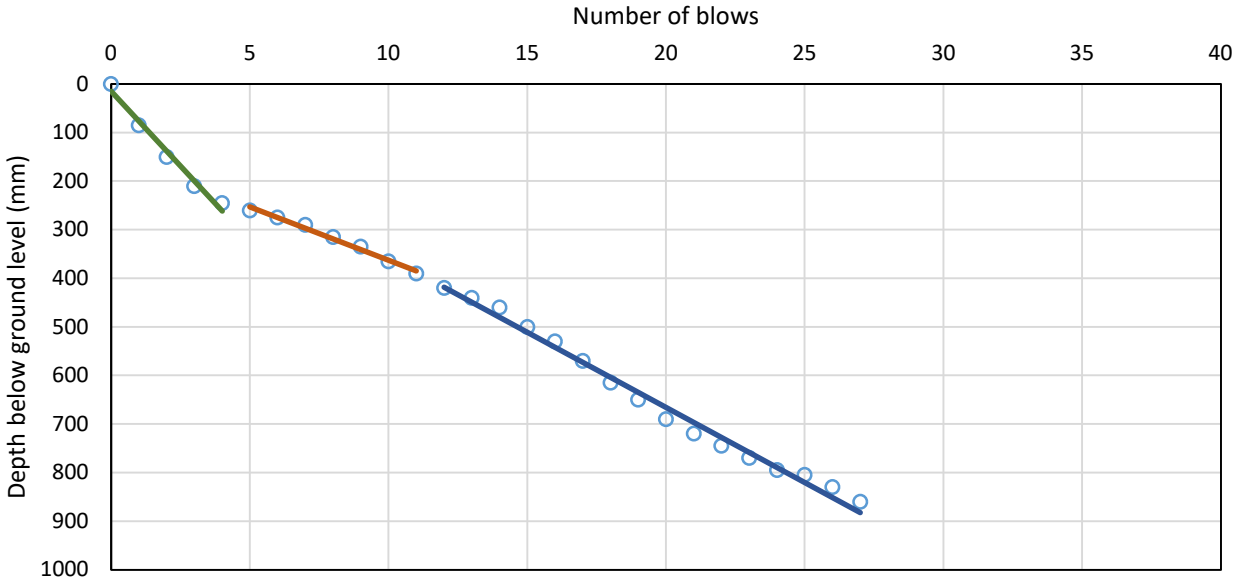
Report date: 05/08/2021

Operator: CK

Notes:

Test date: 05/08/2021

Test location: DCP16



Layer 0-250mm bgl

50th Percentile penetration rate	31	mm/blow	
Estimated CBR	8.0	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	66.6	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	104.1	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 250-400mm bgl

50th Percentile penetration rate	11	mm/blow	
Estimated CBR	23.9	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	134.2	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	215.5	kPa	[PCA - Design of Concrete Pavement. 1955]

Layer 400-900mm bgl

50th Percentile penetration rate	16	mm/blow	
Estimated CBR	16.1	%	[IAN 73/06 Rev1 (2009) - Clause 893]
Subgrade surface modulus	104.1	MPa	[TRRL LR 1132 - Appendix C Equation C1]
Estimated bearing capacity	165.7	kPa	[PCA - Design of Concrete Pavement. 1955]

Produced by	Dated	Checked by	Dated
TG	05/08/21		

APPENDIX I

Physical Test Results

LABORATORY REPORT

4043

Contract Number: PSL21/6865

Report Date: 02 September 2021

Client's Reference:

Client Name: Dets
Park Rd Industrial Estate
South Consett
Co Durham
DH8 5PY

For the attention of: Adam Fenwick

Contract Title: 21-17044

Date Received: 25/8/2021
Date Commenced: 25/8/2021
Date Completed: 2/9/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Assistant Laboratory Manager)	S Eyre (Senior Technician)	T Watkins (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP01	1889375		1.00		Brown slightly gravelly very sandy CLAY
TP04	1889376		1.00		Brown slightly gravelly very sandy CLAY
TP07	1889379		1.00		Brown gravelly very sandy CLAY
TP09	1889381		1.00		Brown slightly gravelly very sandy CLAY
TP11	1889383		1.00		Brown mottled grey slightly gravelly very sandy CLAY

UKAS TESTING
4043

Professional Soils Laboratory

21-17044

Contract No:
PSL21/6865
Client Ref:

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP01	1889375		1.00		13			31	15	16	94	Low Plasticity CL
TP04	1889376		1.00		14			27	13	14	96	Low Plasticity CL
TP07	1889379		1.00		13			29	14	15	87	Low Plasticity CL
TP09	1889381		1.00		14			34	17	17	96	Low Plasticity CL
TP11	1889383		1.00		15			32	17	15	95	Low Plasticity CL

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

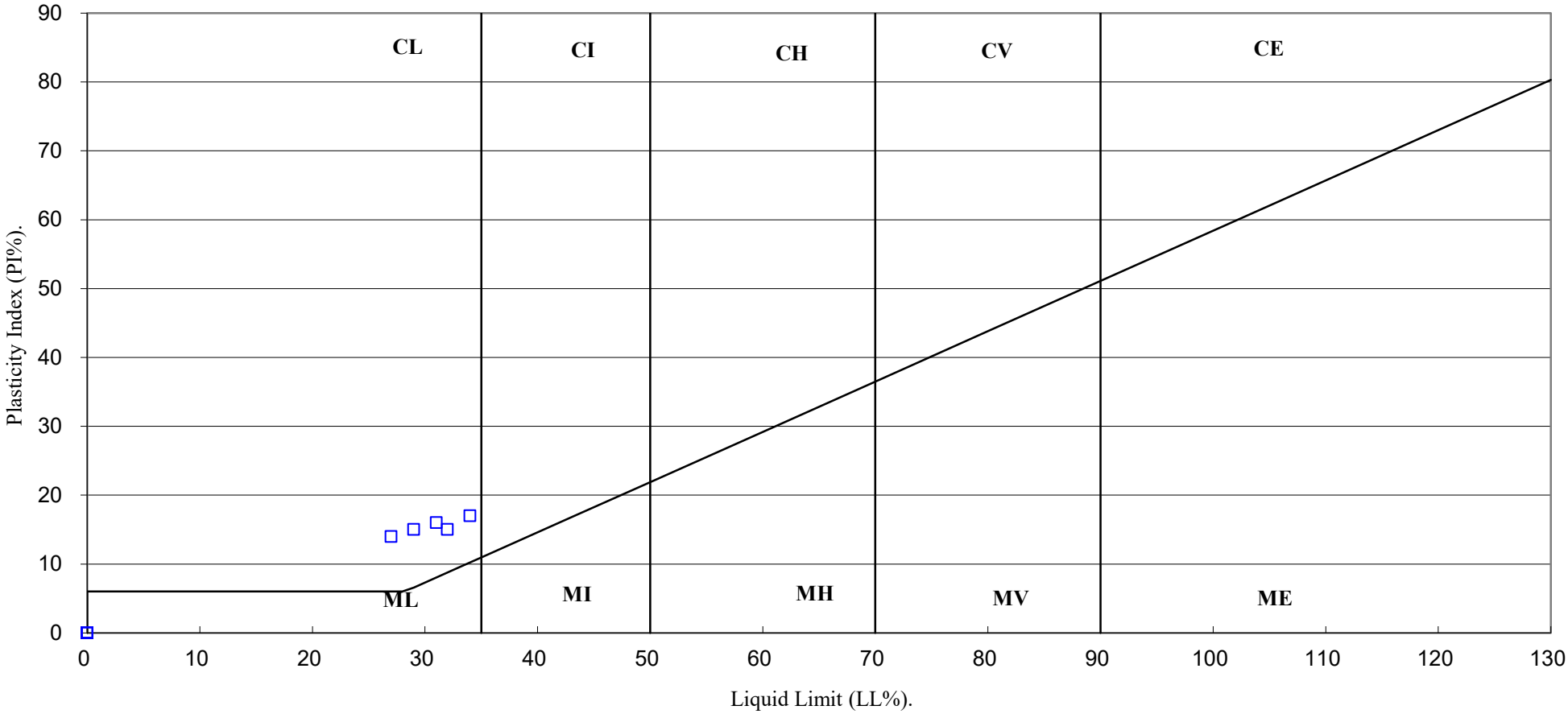
21-17044

Contract No:

PSL21/6865

Client Ref:

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	21-17044	Contract No: PSL21/6865 Client Ref:

APPENDIX J

Chemical Test Results

Certificate of Analysis

Certificate Number	21-17044	*Issued:*	02-Sep-21
Client	GroundSolve Limited Unit 1 Well House Barns Bretton Flintshire FAO Adam Fenwick CH4 0DH		
Our Reference	21-17044		
Client Reference	2585		
Order No	(not supplied)		
Contract Title	St Peters Close		
Description	10 Soil samples.		
Date Received	13-Aug-21		
Date Started	13-Aug-21		
Date Completed	02-Sep-21		
Test Procedures	Identified by prefix DETSn (details on request).		
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.		

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-17044
Client Ref 2585
Contract Title St Peters Close

	Lab No	1889374	1889375	1889376	1889377	1889378	1889379
	.Sample ID	TP01	TP01	TP04	TP04	TP06	TP07
	Depth	0.20	1.00	1.00	0.20	0.20	1.00
	Other ID						
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampling Date	04/08/2021	04/08/2021	04/08/2021	04/08/2021	04/08/2021	04/08/2021
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Preparation							
Moisture Content	DETSC 1004	0.1	%		11	12			11
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	13			8.1	9.2	
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.2			0.3	0.5	
Cadmium	DETSC 2301#	0.1	mg/kg	0.2			0.3	0.4	
Chromium	DETSC 2301#	0.15	mg/kg	16			15	21	
Chromium III	DETSC 2301*	0.15	mg/kg	16			15	21	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0			< 1.0	< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	26			17	29	
Lead	DETSC 2301#	0.3	mg/kg	81			53	87	
Mercury	DETSC 2325#	0.05	mg/kg	0.09			0.06	0.11	
Nickel	DETSC 2301#	1	mg/kg	14			12	13	
Selenium	DETSC 2301#	0.5	mg/kg	2.4			1.9	1.6	
Zinc	DETSC 2301#	1	mg/kg	220			170	66	
Inorganics									
pH	DETSC 2008#		pH	6.5	7.2	7.7		5.7	
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.5			0.5	0.7	
Organic matter	DETSC 2002#	0.1	%	4.0			4.2	4.6	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	95	62	33	16	19	
Sulphide	DETSC 2024*	10	mg/kg	24			< 10	20	
Sulphur (free)	DETSC 3049#	0.75	mg/kg	1.3			< 0.75	2.1	
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01	< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01	< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01	< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5			< 1.5	< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2			< 1.2	< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5			< 1.5	< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4			< 3.4	< 3.4	
Aliphatic C35-C40	DETSC 3072*	3.4	mg/kg	< 3.4			< 3.4	< 3.4	
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10			< 10	< 10	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01	< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01	< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01	< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9			< 0.9	< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5			< 0.5	< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6			< 0.6	< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4			< 1.4	< 1.4	
Aromatic C35-C40	DETSC 3072*	1.4	mg/kg	< 1.4			< 1.4	< 1.4	
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10			< 10	< 10	
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10			< 10	< 10	
PAHs									

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-17044
Client Ref 2585
Contract Title St Peters Close

				Lab No	1889374	1889375	1889376	1889377	1889378	1889379
				.Sample ID	TP01	TP01	TP04	TP04	TP06	TP07
				Depth	0.20	1.00	1.00	0.20	0.20	1.00
				Other ID						
				Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date	04/08/2021	04/08/2021	04/08/2021	04/08/2021	04/08/2021	04/08/2021
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03			< 0.03	< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03			< 0.03	< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03			< 0.03	< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03			< 0.03	< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.05			< 0.03	< 0.03	
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03			< 0.03	< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.21			0.05	0.07	
Pyrene	DETSC 3303#	0.03	mg/kg	0.19			0.04	0.06	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.10			0.03	< 0.03	
Chrysene	DETSC 3303	0.03	mg/kg	0.10			< 0.03	< 0.03	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.19			0.10	0.10	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04			< 0.03	< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.08			< 0.03	< 0.03	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.03			< 0.03	< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03			< 0.03	< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.03			< 0.03	< 0.03	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.97			0.19	0.23	
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3			< 0.3	0.5	

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-17044
Client Ref 2585
Contract Title St Peters Close

				Lab No	1889380	1889381	1889382	1889383
				.Sample ID	TP09	TP09	TP11	TP11
				Depth	0.20	1.00	0.20	1.00
				Other ID				
				Sample Type	SOIL	SOIL	SOIL	SOIL
				Sampling Date	04/08/2021	04/08/2021	04/08/2021	04/08/2021
				Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Preparation								
Moisture Content	DETSC 1004	0.1	%		12		14
Metals								
Arsenic	DETSC 2301#	0.2	mg/kg	10		11	
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.4		0.4	
Cadmium	DETSC 2301#	0.1	mg/kg	0.4		0.2	
Chromium	DETSC 2301#	0.15	mg/kg	18		19	
Chromium III	DETSC 2301*	0.15	mg/kg	18		19	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0		< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	25		25	
Lead	DETSC 2301#	0.3	mg/kg	54		56	
Mercury	DETSC 2325#	0.05	mg/kg	0.07		0.07	
Nickel	DETSC 2301#	1	mg/kg	17		18	
Selenium	DETSC 2301#	0.5	mg/kg	1.9		1.1	
Zinc	DETSC 2301#	1	mg/kg	72		57	
Inorganics								
pH	DETSC 2008#		pH	8.6	6.7	5.7	7.6
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.6		0.6	
Organic matter	DETSC 2002#	0.1	%	4.4		4.3	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	12	< 10	15	< 10
Sulphide	DETSC 2024*	10	mg/kg	< 10		< 10	
Sulphur (free)	DETSC 3049#	0.75	mg/kg	1.2		< 0.75	
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4	
Aliphatic C35-C40	DETSC 3072*	3.4	mg/kg	< 3.4		< 3.4	
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4	
Aromatic C35-C40	DETSC 3072*	1.4	mg/kg	< 1.4		< 1.4	
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10	
TPH Ali/Aro Total C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10	
PAHs								

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-17044
Client Ref 2585
Contract Title St Peters Close

				Lab No	1889380	1889381	1889382	1889383
				.Sample ID	TP09	TP09	TP11	TP11
				Depth	0.20	1.00	0.20	1.00
				Other ID				
				Sample Type	SOIL	SOIL	SOIL	SOIL
				Sampling Date	04/08/2021	04/08/2021	04/08/2021	04/08/2021
				Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.07		< 0.03	
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.21		0.06	
Pyrene	DETSC 3303#	0.03	mg/kg	0.18		0.05	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.11		0.03	
Chrysene	DETSC 3303	0.03	mg/kg	0.12		0.04	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.22		0.11	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05		< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.10		< 0.03	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.05		< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.05		< 0.03	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	1.2		0.25	
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4		0.4	

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 21-17044
Client Ref 2585
Contract Title St Peters Close

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1889374	TP01 0.20	SOIL	NAD	none	Colin Patrick
1889377	TP04 0.20	SOIL	NAD	none	Colin Patrick
1889378	TP06 0.20	SOIL	NAD	none	Colin Patrick
1889380	TP09 0.20	SOIL	NAD	none	Colin Patrick
1889382	TP11 0.20	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 21-17044
Client Ref 2585
Contract St Peters Close

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1889374	TP01 0.20 SOIL	04/08/21	GJ 250ml, GJ 60ml x2	Sulphur (free) (7 days), pH + Conductivity (7 days)	
1889375	TP01 1.00 SOIL	04/08/21	PT 1L	pH + Conductivity (7 days)	
1889376	TP04 1.00 SOIL	04/08/21	PT 1L	pH + Conductivity (7 days)	
1889377	TP04 0.20 SOIL	04/08/21	GJ 250ml, GJ 60ml x2	Sulphur (free) (7 days), pH + Conductivity (7 days)	
1889378	TP06 0.20 SOIL	04/08/21	GJ 250ml, GJ 60ml x2	Sulphur (free) (7 days), pH + Conductivity (7 days)	
1889379	TP07 1.00 SOIL	04/08/21	PT 1L		
1889380	TP09 0.20 SOIL	04/08/21	GJ 250ml, GJ 60ml x2	Sulphur (free) (7 days), pH + Conductivity (7 days)	
1889381	TP09 1.00 SOIL	04/08/21	PT 1L	pH + Conductivity (7 days)	
1889382	TP11 0.20 SOIL	04/08/21	GJ 250ml, GJ 60ml	Sulphur (free) (7 days), pH + Conductivity (7 days)	
1889383	TP11 1.00 SOIL	04/08/21	PT 1L	pH + Conductivity (7 days)	

Key: G-Glass J-Jar P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

APPENDIX K

BGS Radon Report

GeoReports

British Geological Survey

LIZ SMITH
GROUNDSOLVE LTD
UNIT 1
WELL HOUSE BARNS
CHESTER ROAD
BRETTON
FLINTSHIRE
CH4 0DH

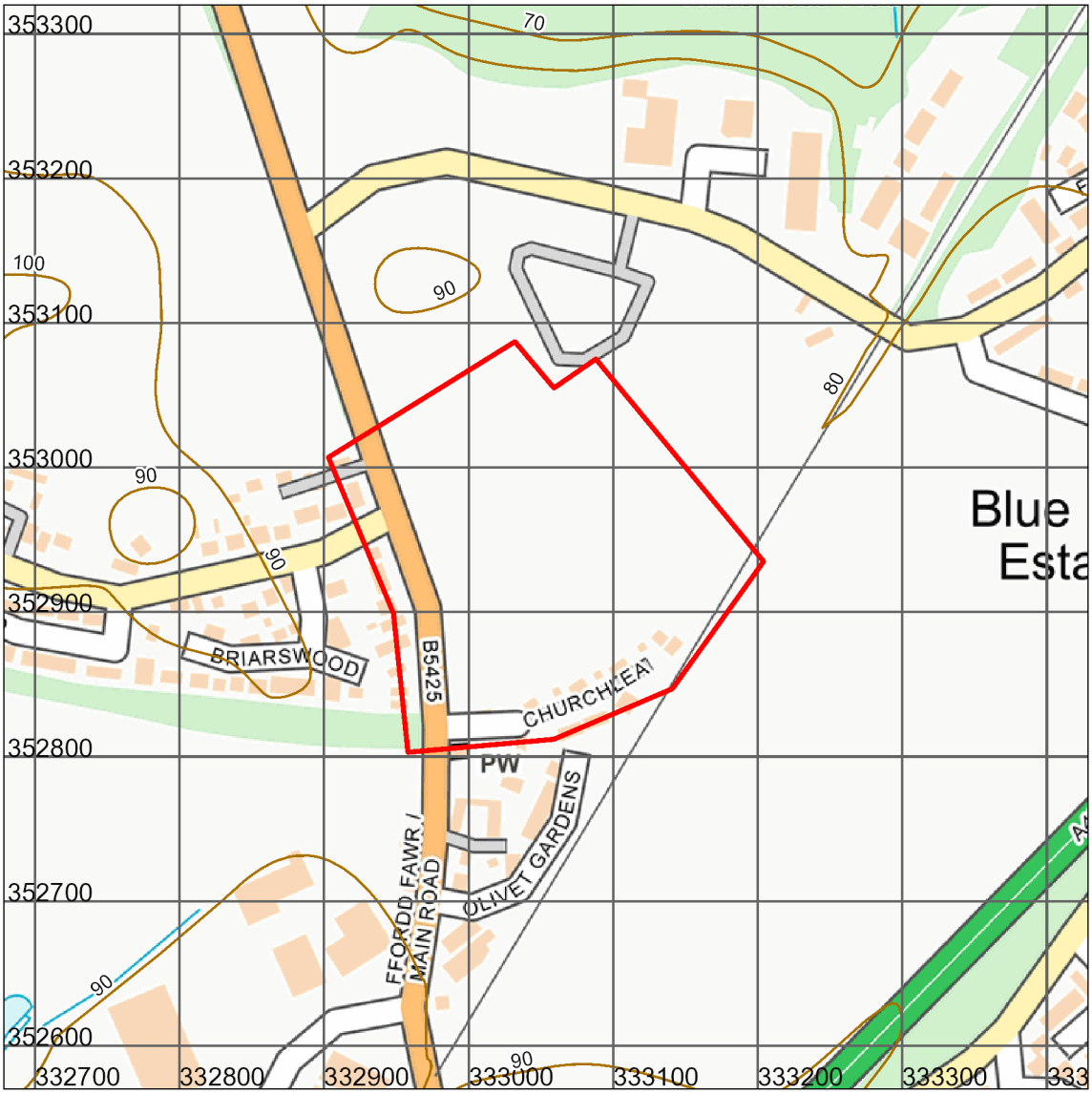
Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: ***BGS_323452/30434***

Client reference: Land Off Llay New Road

Search location



Contains OS data © Crown Copyright and database right 2022. OS OpenMap Local: Scale: 1:5 000 (1cm = 50 m)
Search location indicated in red

This report describes a site located at National Grid Reference 333054, 352945. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.

© UKRI, 2022. All rights reserved.

Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2015 edition), which also provides guidance on what to do if the* result *indicates that protective measures are required.*

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2015 edition) Radon: Guidance on protective measures for new buildings?

FULL RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

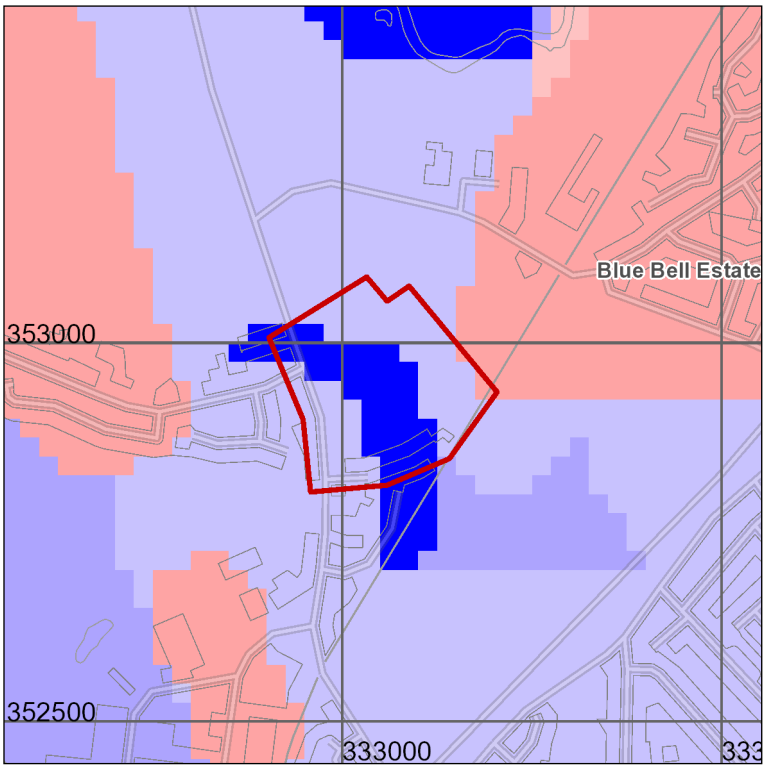
More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2015 Edition)*. Additional information and guidance is available from the Building Research Establishment website (http://www.bre.co.uk/radon/).

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The UKHSA provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

© UKRI, 2022. All rights reserved.

Radon Affected Area



	% Homes estimated to be at or above the action level
	0-1%
	1-3%
	3-5%
	5-10%
	10-30%
	30-100%

Contains OS data © Crown Copyright and database right 2022
Scale: 1:10 000 (1cm = 100 m)
Search area indicated in red

Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 10 TO 30% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

The UKHSA recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to exceed the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a radon problem in the property; the only way to find out whether the radon level is above or below the Action Level is to carry out a radon measurement.

© UKRI, 2022. All rights reserved.

The UKHSA advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels above the Action Level (200 Bq m^{-3}) should be remediated. Householders with levels between the Target Level (100 Bq m^{-3}) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. The UKHSA provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by the UKHSA. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from the UKHSA at www.ukradon.org.

© UKRI, 2022. All rights reserved.

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.
Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293)**: Radon in the workplace.** BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.ukwebsite: www.brebookshop.com

© **UKRI, 2022. All rights reserved.**

Contact Details

Keyworth Office
British Geological Survey
Environmental Science Centre
Nicker Hill
Keyworth
Nottingham
NG12 5GG
Tel: 0115 9363143
Email: enquiries@bgs.ac.uk

Wallingford Office
British Geological Survey
Maclean Building
Wallingford
Oxford
OX10 8BB
Email: enquiries@bgs.ac.uk

Edinburgh Office
British Geological Survey
Lyell Centre
Research Avenue South
Edinburgh
EH14 4AP
Tel: 0131 6671000
Email: enquiry@bgs.ac.uk

© UKRI, 2022. All rights reserved.

Terms and Conditions

General Terms & Conditions

This Report is supplied in accordance with the GeoReports Terms & Conditions available on the BGS website at https://shop.bgs.ac.uk/georeports and also available from the BGS Enquiry Service at the above address.

Important notes about this Report

- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

Copyright:
Copyright in materials derived from the British Geological Survey's work, is owned by UK Research and Innovation (UKRI) and/ or the authority that commissioned the work. You may not copy or adapt this publication, or provide it to a third party, without first obtaining UKRI's permission, but if you are a consultant purchasing this report solely for the purpose of providing advice to your own individual client you may incorporate it unaltered into your report to that client without further permission, provided you give a full acknowledgement of the source. Please contact the BGS Copyright Manager, British Geological Survey, Environmental Science Centre, Nicker Hill, Keyworth, Nottingham NG12 5GG. Telephone: 0115 936 3100.
© UKRI 2022 All rights reserved.

This product includes mapping data licensed from the Ordnance Survey® with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright 2022. All rights reserved. Licence number 100021290 EUL

Ordnance Survey

Report issued by
BGS Enquiry Service