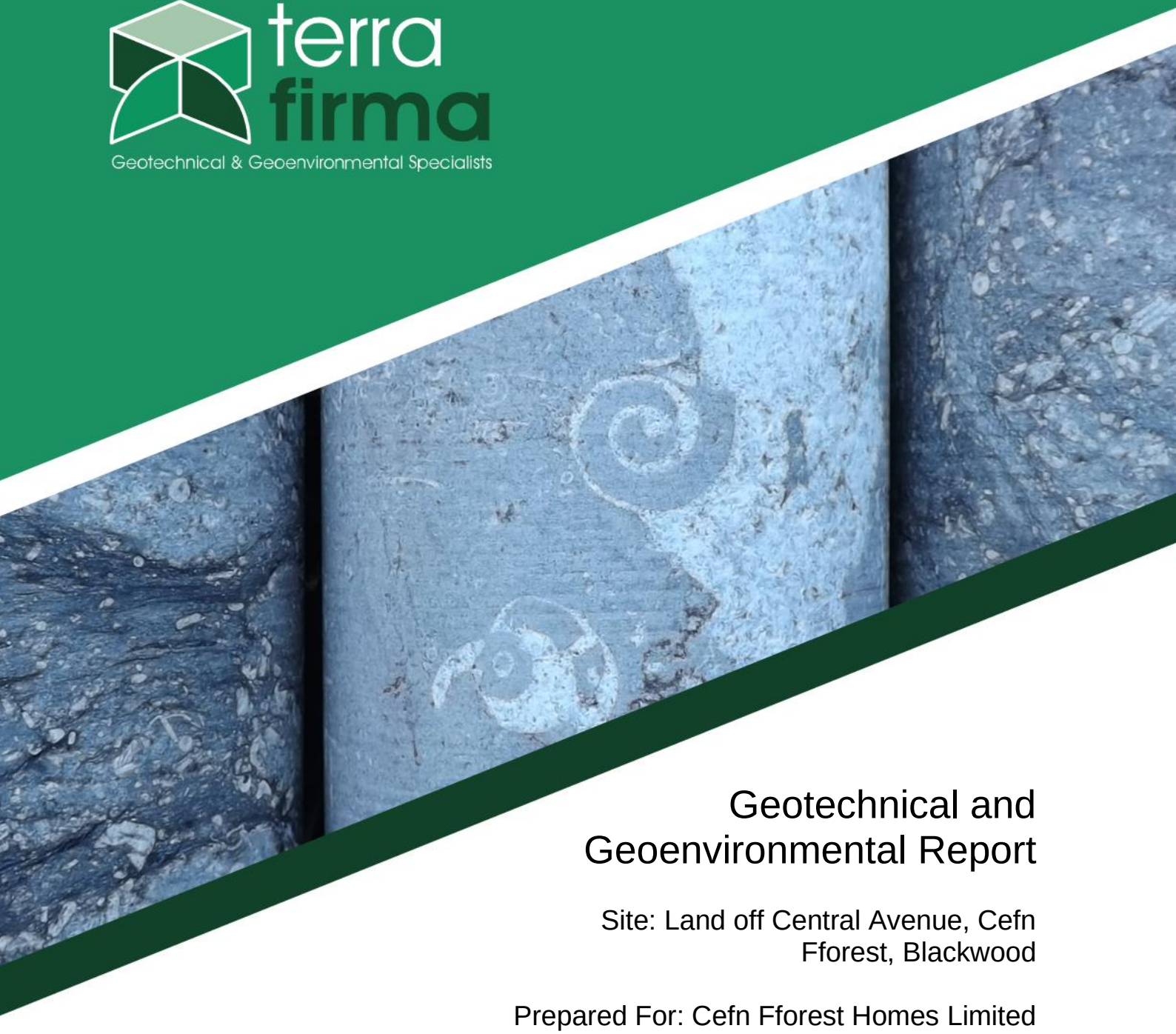
terra firma
Geotechnical & Geoenvironmental Specialists



Geotechnical and Geoenvironmental Report

Site: Land off Central Avenue, Cefn Fforest, Blackwood

Prepared For: Cefn Fforest Homes Limited

Issue Date: September 2011
(Updated March 2021)

Job No: 11230

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V3

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Executive Summary

Site Location and Proposed Development	*Cefn Fforest Homes Limited is proposing the residential development of circa 21 houses with access road, areas of hard and soft landscaping and gardens. The site is located at the end of Central Avenue, Cefn Forest, Blackwood.*
Site History	*The earliest historic map shows the site to be mainly field land with a small portion of woodland and a track in the north. By 1920 the site is shown to contain two defunct quarries with the remainder of the site being field land and woodland. By the early 1960's the quarries are shown to be partially backfilled and in the edition covering the early 1970's and issue is indicated in the position of the southernmost quarry. In 1993 a small building is present in the eastern portion which is then absent on the 2010 edition.*
Geology	*The site is seen to be underlain by rocks of the Grovesend Beds of the Upper Coal Measures. The site is predominantly underlain by sandstone of the Grovesend Beds. The rocks in the area are seen to dip to the south at approximately 2°. The site is shown to be overlain by boulder clay and made ground is expected in the area of the former quarry.*
Radon	*Basic radon protection is required for the development.*
Coal Mining Risk Assessment	*The Coal Authority report concluded that the site lay within the zone of likely influence of seven seams located between 30m and 770m depth, last worked in 1971. The shallowest worked coal seam beneath the site is the Mynyddislwyn coal seam.* *The Coal Authority does not hold records of mine entries within, or within 20m of, the site.* *The report also states that 'In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past.' By referring to the generalised vertical section given in the 10,560 scale geology map of the area it can be seen that the coal seam referred to is the Small Rider coal seam that occurs approximately 30m above the Mynyddislwyn coal seam in the stratigraphical sequence. This seam is known to be thin (<10in) and of poor quality and is consequently un-worked in the area. Based upon the above it is considered that there is an insignificant risk to the surface stability of the site from shallow coal mining.*
Ground Conditions	*Much of the site is underlain by layers of medium dense sand / sand and gravel. This is then underlain by the weathered sandstone bedrock. In the area of the infilled quarry the made ground is encountered ranging in thickness from 0.40 to 2.20m. Additionally the windowless sampling borehole in this area has found the ground to be soft to a depth of 3.50m.*
Contamination of Concern	*Much of the site is not affected by contamination. Two samples taken from the made ground in the former quarry have found slightly elevated levels of benzo(a)pyrene and dibenzo(ah)anthracene.*
Mitigation Measures	*Mitigation measures will be required in **Zone B** s identified on **Drawing 01** and **Drawing 02**. To protect future site users from the identified contamination the site will need to be capped. The capping should consist of the proposed buildings and hard standings. In garden and soft landscaped areas, the capping should consist of 600mm of suitable inert topsoil, and subsoil if desired. Alternatively made ground soils could be removed from site and disposed of at a suitably licenced landfill site.*
Ground Gas Risk Assessment	*Three gas wells were installed in the site to determine the risk of ground gas from the infilled quarry. Six rounds of monitoring were undertaken, and the site has been found to fall into Gas Characteristic Situation 1 and no special precautions are therefore required.*
Foundation Solution	*In **Zone A**, a combination of mass concrete strip and trench fill foundations founded within the medium dense brown in areas slightly clayey sand with occasional rounded gravels may be used. Based upon the site investigation data the depth to the above in-situ founding horizon is likely to vary between 0.8 and 1.2m below the existing ground level.* *For the above foundations founded within the above in-situ materials an allowable bearing capacity of 100kN/m^2 may be used for design purposes.* *If during the excavations for the foundation formations encounter bedrock then all the foundation formations must be founded within the rock in order to avoid differential settlements. Should this be the case then an increased bearing pressure of 250kN/m^2 may be used for design purposes.* *Based upon the above foundations and above quoted allowable bearing capacity, maximum total settlements should not exceed 30mm and angular distortion should be no greater than 1:750.* *The floor slabs may be designed and constructed as suspended. Alternatively provided all made ground and soft materials are removed and replaced with well compacted imported granular materials as previously described then the floor slabs may be designed as ground bearing. However, in order to satisfy the NHBC guidelines should the depth of fill be greater than 600mm then the floor slabs should be designed as suspended.* *If after any cut and/or fill the depth to the in-situ founding horizon becomes prohibitive then an alternative foundation/floor slab solution would be to use a reinforced concrete raft type foundation/floor slab solution founded at shallow depth within well compacted made ground may be used. For the raft, an allowable bearing pressure of 75Kn/m^2 may be used for design purposes. Similar total and differential settlements as previously quoted may be expected.* *For **Zone B**, apart from the infilled quarry areas, foundation solutions as quoted above may again be used. WS02 in the quarry has found soft ground to a depth of 4.00m and if this depth is prohibitive for traditional foundations deep foundations may be required. Consideration should then be given to the use of a piled foundation. Consideration could be given to a continuous flight auger (CFA) or precast concrete pile however these may struggle if obstructions are present in the made ground. Alternatively, a rotary ODEX type pile could be utilised. The piles should be installed / driven to an appropriate set within underlying bedrock.*

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SECTION 1 Introduction and Proposed Development

1.1 Introduction

Cefn Fforest Homes Limited (the Client) is proposing a residential development at a parcel of land off Central Avenue, Cefn Fforest, Blackwood. The development comprises approximately 21 houses with access road, hard and soft landscaped areas and gardens.

A site investigation was undertaken on the 30th June and 1st July 2011 and reported in September 2011. Terra Firma (Wales) Limited have been commissioned by Mr Martin Plow on behalf of the Client to update the report to current standards. Subsequent phases of investigation were also undertaken in 2012 and 2013 (gas monitoring and CBR testing, respectively) and have been incorporated into this report. No further works have been undertaken since and the report has been updated using the information collected between 2011 and 2013.

The main objectives of the geoenvironmental assessment programme are:

- Investigate the potential human health and environmental liabilities at the site associated with any contamination.
- Provide a summary of the human health and environmental conditions at the site, together with any necessary further intrusive works and / or remediation works to render the site fit for its intended use.

The main objectives of the geotechnical site investigation are:

- Investigated the type, strength and bearing characteristics of the shallow superficial and underlying solid geology.
- Investigate the risk, if any, from historical shallow underground mining features.
- Provide engineering foundation and floor slab recommendations for the proposed development.
- Provide infiltration rates and stormwater drainage viability.
- Provide recommendations regarding any other geotechnical aspects pertaining to the development.

In order to achieve the above objectives, Terra Firma (Wales) Limited carried out an assessment programme including a site walkover, a review of existing data, followed by a field investigation to collect geotechnical and geoenvironmental data from selected locations.

1.2 Limitations and Exceptions of Investigation

The Client has requested that a Geoenvironmental Site Assessment (GSA) and Geotechnical Investigation (GI) be performed to enable the outlined main objectives.

The GSA and GI were conducted, and this report has been prepared for the sole internal reliance of the Client and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geoenvironmental and geotechnical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may be required.

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

The investigation was limited by the underground services and sensitive wildlife.

1.3 Quality Assurance

The quality and environmental aspects of the assessment comply with Terra Firma Wales Ltd business management system which is UKAS Accredited to ISO 9001:2015 and ISO 14001:2015 standards.

SECTION 2 Review of Existing Data

2.1 Physical Setting and Current Site Use

The site locates off Central Avenue, Cefn Fforest, near Blackwood, Caerphilly. The approximate National Grid Reference is: 316080 197720.

The site is irregular in plan and occupies an area of approximately 1.6 hectares. The site was visited on 15th November 2010 by a Terra Firma Wales Ltd Engineer. The site was seen to comprise sloping land which descended towards the west. The site was dissected by a walkway running west from Central Avenue. To the south of the track the site had a cover of rough vegetation with occasional trees that were more abundant to the north of the track. Undeveloped land was present to the north of the site. The site was bound by the Cefn Fforest estate to the east and by Waun Borfa Road to the west. Former foundations were noted in the east of the site, associated with the small buildings formerly positioned in that area.

Small areas of fly tipping were apparent at the site and overhead powerlines were noted to the west of the site.

The site location can be seen on **Figure 2.1** along with the proposed site layout on **Drawing 01**.

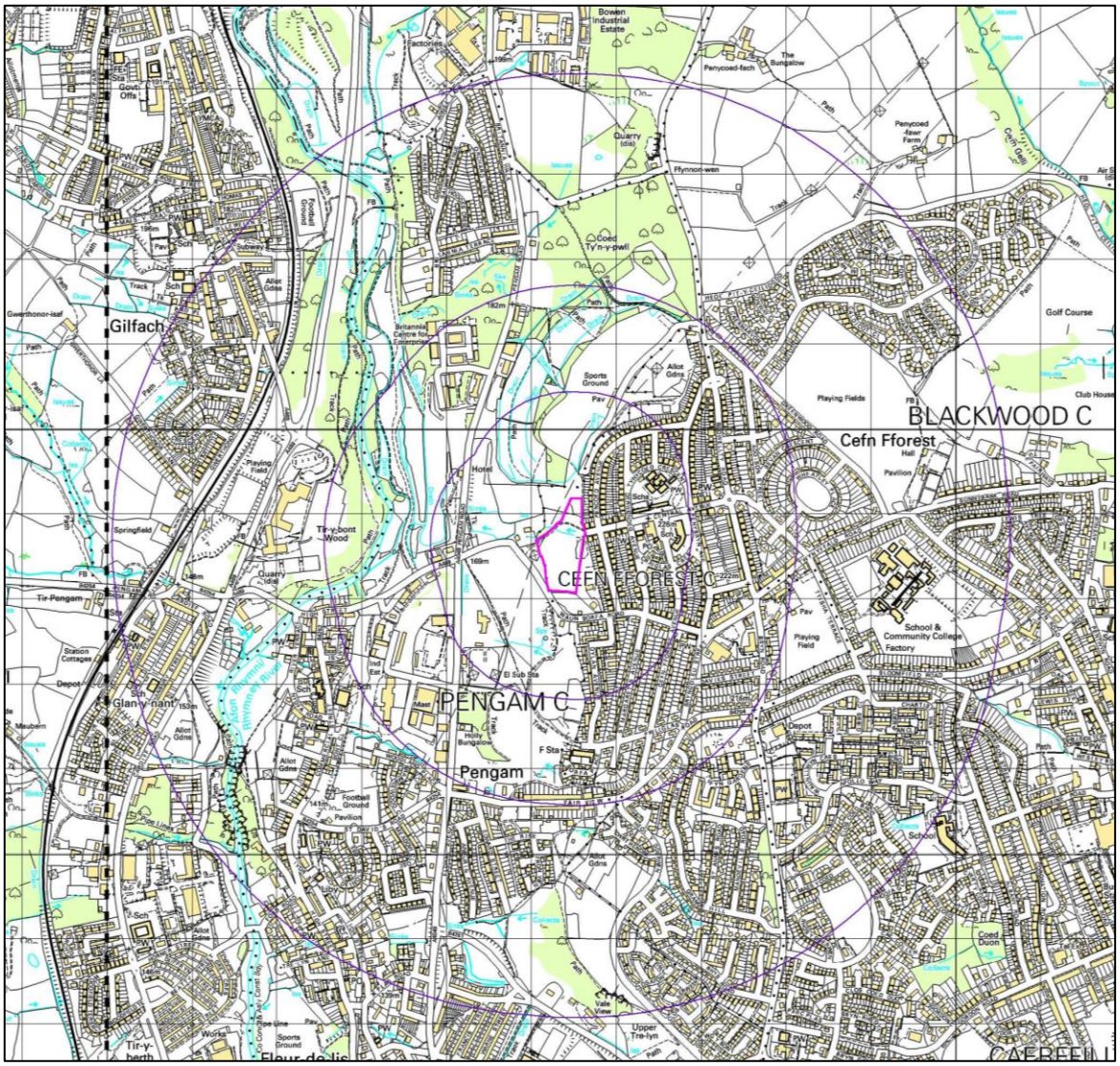


Figure 2.1 Site Location

2.2 Site History

Historical maps of the site have been provided by Landmark Information Group. These are presented in **Annex A**. The most relevant editions are summarised below:

1879/1880
The earliest edition dated 1879/1880 shows the majority of the site to comprise a field. A portion of the north of the site lies within woodland. A track passes through the north of the site. A well is positioned close to the western boundary of the site. An 'Old' (i.e., defunct) coal mine shaft is indicated approximately 200m northwest of the site. A cluster of buildings named Cefn-y-fforest lies approximately 150m east of the site and includes a saw pit. The site is surrounded by fields and woodland.

1886
The 1886 edition shows the site to be undeveloped as previously. A railway line, running north-south locates approximately 250m west of the site and the River Rhymney locates approximately 350m west of the site. Gilfach Quarry and Gilfach Colliery are located approximately 400m north of the site.

1901
The 1901 edition shows the site to comprise a field and, in the north, woodland. A well locates near the western boundary of the study site. A few isolated properties lie beyond the site. The disused Gwaun-y-borfa colliery is indicated approximately 250m southwest of the site. The disused Upper Pengam Colliery lies approximately 300m north of the site and Plas Colliery is indicated approximately 600m southwest of the site. Several air shafts are indicated in the vicinity of Pengam Woods to the southwest of the site.

1920
The 1920 edition shows two defunct quarries to lie within the site's boundary. The remainder of the site comprises a field and woodland. A square structure is located immediately west of the site. The feature is not labelled although we believe it to be a reservoir, associated with the adjacent spring. A large housing estate (Cefn Fforest) has been constructed immediately east of the site since the previous edition. Britannia Colliery is located approximately 250m northwest of the site and two shafts are indicated approximately 300m northwest of the site. A defunct airshaft is indicated 200m northwest of the site. A tramway runs eastwards from the colliery, approximately 200m north of the study site. A quarry locates approximately 100m south of the site.

1922
The 1922 edition shows those features mentioned previously. In addition, Pengam Colliery is indicated approximately 275m southwest of the site.

1938/1945
The 1938/1945 edition show the site to comprise a field and woodland with two quarries located therein. A further quarry locates approximately 100m south of the site. Housing locates to the east of the study site while the land remains undeveloped to the north and south of the site. A square structure, believed to be a reservoir, locates to the west of the site. Britannia Colliery lies approximately 250m northwest of the site and Pengam Colliery lies approximately 300m southwest of the site.

1945/1949 Aerial Photo
The 1945/1949 Aerial Photo shows the site to be undeveloped. Housing is apparent to the east of the site. The morphology of the ground approximately 400m north of the site appears to be consistent with that of a colliery tip.

1953
The 1953 edition show those features mentioned previously. In addition, spoil heaps are now apparent around 200m north of the site. Pengam Colliery and Britannia Colliery are still

indicated. The 1953 edition shows an Electricity Transmission Line to pass over the western corner of the study site. Woodland has been cleared from the site.

1960/1961/1965
The 1960/1961/1965 maps show the quarries which formerly occupied the site appear to have been partially backfilled since the previous edition. The square structure which formerly occupied the land to the west of the site has been removed by this edition. The Britannia Colliery is still indicated. Pengam Colliery is shown as disused. Issues are recorded within the site. A cluster of small buildings, possibly domestic garages are indicated in the east of the site.

1970/1975
The 1970/1975 editions show the site to contain a series of small buildings on its eastern side. Issues are noted in the vicinity of a former quarry. Britannia Colliery is still indicated to the northwest. Spoil Heaps are indicated approximately 50m northwest of the site.

1993
The 1993 edition shows the site to still contain small buildings in its eastern portion. The location of the former quarries is apparent in the morphology and issues are indicated from the southernmost quarry. The site of the Britannia Colliery was vacated by this time.

1999/2006
The 1999/2006 editions again show the site to contain small buildings in its eastern portion. A depression is apparent at the location of the southernmost quarry and water issues from this location.

2010
The 2010 edition shows the site to be devoid of the small buildings formerly located in the east of the site. An issue is still identified from the location of the former quarry. Cefn Fforest estate lies immediately east of the site.

2.3 Geological Setting

2.3.1 Geology

The 1:10,560 scale geological map of the area (Sheet ST19 NE, BGS 1964) shows the site to be underlain by rocks of the Grovesend Beds of the Upper Coal Measures. The site is predominantly underlain by sandstone members of the Grovesend Beds. The Small Rider Coal Seam (thin) is conjectured to outcrop immediately west of the site and the Mynyddislwyn Coal Seam (5ft 9in. thick) is conjectured to outcrop approximately 200m west of the site, lower down the valley side.

The geology is shown to dip at 2° to the south although this may vary locally. Given the regional dip and the conjectured outcrop we would anticipate that the Mynyddislwyn Coal Seam would lie at over 30m depth beneath the lowest point of the site.

A fault is indicated approximately 140m south of the study site.

The solid geology is shown to be overlain by boulder clay.

Made ground may also overlie areas of the site particularly around the old quarries.

2.3.2 Radon

A Radon (RPM) Site Report from the British Geological Survey (BGS) confirms that **basic** radon protection measures are required in the development. A copy of this report is presented in **Annex B.**

2.3.3 Mining

A Coal Mining and Brine Report was obtained from the Coal Authority. The report concluded that the site lay within the zone of likely influence of seven seams located between 30m and 770m depth, last worked in 1971.

As stated in **Section 2.3.1** the shallowest worked coal seam beneath the site is the Mynyddislwyn coal seam.

The report also records that any movement associated with these seams should, by now, have stopped.

The Coal Authority does not hold records of mine entries within, or within 20m of, the site.

The report also states that 'In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past.'

By referring to the generalised vertical section given in the 10,560 scale geology map of the area it can be seen that the coal seam referred to is the Small Rider coal seam that occurs approximately 30m above the Mynyddislwyn coal seam in the stratigraphical sequence.
This seam is known to be thin (<10in) and of poor quality and is consequently un-worked in the area.

Based upon the above it is considered that there is an insignificant risk to the surface stability of the site from shallow coal mining.

A copy of the Coal Authority Report is presented in **Annex C**.

2.4 Environment Agency Data

The 'What's in your back yard' feature on the Environment Agency website was consulted for information.

Pollution
The Environment Agency database recorded one 'Significant' pollution incident to water in the immediate vicinity. The incident relates to a pollution incident on March 25, 2002 located at NGR of 315298, 197542 involving sewage. The location of the incident is down hydraulic gradient of the site.

Landfill Records
The Environment Agency Landfill Records do not record historical landfill facilities within 250m of the study site boundary.

Flooding
The Environment Agency website does not locate the study site within an area affected by flooding by a river event with a 1:100 chance or 1:1000 chance of occurring within any one year.

Water Framework Directive
Under the Water Framework Directive, the Current Quantitative Groundwater Quality beneath the site has been classified and 'Good' and the Current Chemical Quality has been classified as 'Poor'. These statuses are predicted to be unaltered by 2015.

The River Rhymney, located to the west of the site, has been given a 'Good' current ecological status. Chemical testing is not required for the river under the Water Framework Directive.

2.4.1 Hydrogeology and Hydrology

The Environment Agency groundwater maps were consulted via their website. The solid geology beneath the site was classified as a Secondary (B) Aquifer. The overlying superficial geology was not classified.

A Secondary (B) Aquifer is defined as “predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers”.

The nearest surface water feature apparent on the available maps comprises an issue located within the base of the former quarry located within the site’s boundary. The issue flows west into the River Rhymney, located approximately 350m west of the site.

SECTION 3 Coal Mining Risk Assessment

3.1 Geotechnical Risk

3.1.1 Underground Mining

Based upon geological map data, the stratigraphical sequence within 30m of the ground surface of the site is illustrated in **Figure 3.1**.

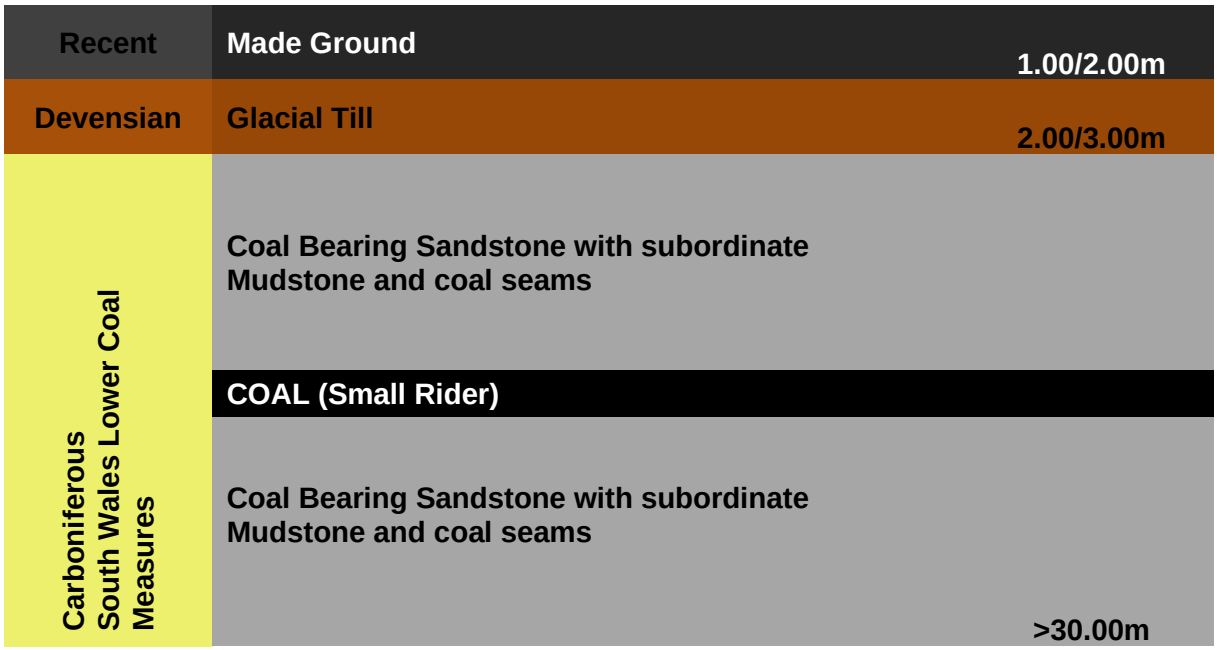


Figure 3.1 Geology and Strata Base below Ground Level

The Coal Authority Report concludes that the site lies within the zone of likely influence of seven seams located between 30m and 770m depth, last worked in 1971. The report also records that any movement associated with these seams should, by now, have stopped.

The report also states that 'In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past.'

The Small Rider Coal Seam (thin) is conjectured to outcrop immediately west of the site and the Mynyddislwyn Coal Seam (5ft 9in. thick) is conjectured to outcrop approximately 200m west of the site, lower down the valley side.

The geology is shown to dip at 2° to the south although this may vary locally. Given the regional dip and the conjectured outcrop we would anticipate that the Mynyddislwyn Coal Seam would lie at over 30m depth beneath the lowest point of the site.

By referring to the generalised vertical section given in the 10,560 scale geology map of the area it can be seen that the coal seam referred to is the Small Rider coal seam that occurs approximately 30m above the Mynyddislwyn coal seam in the stratigraphical sequence.

3.1.2 Shafts & Adits

The Coal Authority does not hold records of mine entries within, or within 20m of, the site.

3.1.3 Conclusion

This Small Rider coal seam is known to be thin (<10in) and of poor quality and is consequently un-worked in the area. Additionally, the Mynyddislwyn is at a depth which would not pose a risk to the surface.

Based upon the above it is considered that there is an insignificant risk to the surface stability of the site from shallow coal mining.

A copy of the Coal Authority Report is presented in **Annex C**.

SECTION 4 Preliminary Human Health and Environmental Risk Assessment

4.1 General

The preliminary human health and environmental risk assessment is a qualitative evaluation of unacceptable risks to human health or the environment from potential 'contaminated land', based on reviewed information in preceding sections of this report.

For 'contaminated land' to exist as defined in Part 2A of the Environmental Protection Act (EPA) 1990, a Pollutant Linkage needs to be identified. Pollutant linkages are defined by having a valid 'source – pathway – receptor' as established in the preliminary conceptual site model.

For our definitions of pollution linkage and how we define risk please refer to **Annex D** which includes our classifications of consequence and probability, and risk assessment matrix.

4.2 Potential Sources of Contamination

The potential contamination beneath the site, whether in the matrix of soil or groundwater will be related to the sites past use.

The site has historically contained small buildings which may have been used as domestic garages. In addition, former quarries were partially backfilled with unknown material.

Since the source of the quarry backfill material has not been identified, we would recommend that the soils contained therein be subject to analysis for a broad suite of general determinants. In addition, we would recommend analysis for Petroleum Hydrocarbons in the vicinity of the former small buildings.

- Heavy metals: lead, zinc, chromium, cadmium, copper and nickel, mercury
- Semi Metal: arsenic
- Inorganic Chemicals: cyanide, sulphate
- Organic Chemicals: polyaromatic hydrocarbons (PAH), petroleum hydrocarbons, phenols.

4.3 Potential Pollution Pathways

The potential pollution linkages relating to human health and the protection of the aquatic environment on the site are as follows:

- Ingestion of soil and soil dust
- Ingestion of home grown vegetables
- Inhalation of soil dust, both indoors and outdoors
- Dermal contact with soil and soil dust
- Inhalation of radon gas
- Indoor migration of landfill gas/ground gas leading to potential risk of explosion
- Surface water runoff
- Leaching into the groundwater
- Groundwater transport
- Permeation of water pipes - Organic contaminants have the potential to adsorb into plastic water pipes which may be used for drinking water supply. Toxic and corrosive contaminants may also enter the potable water source.

4.4 Potential Receptors

The potential receptors of any contamination are taken to be:

During Construction

- Construction workers
- Neighbouring site users
- Residents and visitors
- Passers-by
- The Aquatic Environment - Surface waters, perched groundwater, issue on site and River Rhymney

Following Construction

- Site End Users – Residents and visitors.
- The Aquatic Environment - Surface waters, perched groundwater, issue on site and River Rhymney
- Building Materials - these are potentially at risk from aggressive ground conditions involving sulphates, sulphides, magnesium ions, ammonium ions, carbon dioxide, chloride ions and phenols.
- Vegetation upon the site is potentially at risk from phytotoxic contaminants.

4.5 Preliminary Conceptual Site Model

The preliminary conceptual site model establishes potential pollutant linkages between contaminants (source), pathways and receptors, realised during the preparation of the desk study report. Where a potential pollutant linkage is identified an assessment of risk is subsequently undertaken. The preliminary conceptual site model is tabulated in **Table 4.1**.

Outcomes of the preliminary conceptual site model are used as a basis for the design and implementation of the site investigation, whereby areas of potential contamination can be targeted as well as investigating the wider site.

Findings of the site investigation can in turn be used to develop and refine the conceptual site model.

Table 4.1 Preliminary Conceptual Site Model

Source	Pathway	Receptor	Preliminary Risk Assessment		
			Consequence	Probability	Risk
Human Health					
Contaminated Soils	Direct soil and dust ingestion Dermal contact Inhalation of dust and vapours	Construction and maintenance workers	**Medium**	**Low Likelihood**	**Medium Risk -** COSHH assessment and good level of PPE/ hygiene by site workers/ staff; dust suppression measures if required. Suitably designed site investigation recommended
		Passers-by or neighbouring site users	**Medium**	**Unlikely**	**Low Risk** - Dust suppression measures if required.
		Future site users (residents)	**Medium**	**Low Likelihood**	**Medium Risk -** Suitably designed site investigation recommended
Radon Gas	Horizontal and vertical migration of ground gasses and vapours	Future site users (residents)	**Medium**	**Unlikely**	**Low Risk** - Basic radon protection measures required
Landfill Gas Ground Gas Vapours		Future site users (residents) Construction and maintenance workers	**Severe**	**Unlikely**	**Moderate Risk** – An infilled quarry is present on site and is a potential source of ground gas.
Mine Gas			**Severe**	**Unlikely**	**Low Risk**
Impacted Groundwaters	Horizontal and vertical migration of contaminants (saturated zone) Dermal contact	Construction and maintenance workers	**Medium**	**Unlikely**	**Low Risk**
Contaminated Soils	Plant uptake Consumption of home grown produce	Future site users (residents)	**Medium**	**Unlikely**	**Low Risk**
Contaminated Soils	Direct Contact	Construction materials (water pipes)	**Mild**	**Low Likelihood**	**Low Risk**
Aggressive ground conditions - Sulphates		Construction materials (concrete)			
Aquatic Environment					
Contaminated Soils	Vertical migration of leachates (unsaturated zone)	Groundwater (aquifer) Surface waters (river/lake)	**Mild**	**Low Likelihood**	**Medium Risk** - Potential source of contamination from the infilled quarry
	Surface run-off	Surface waters (river/lake)			
	Horizontal and vertical migration of contaminants (saturated zone)				

SECTION 5 Field Investigation

5.1 Site Works

A geo-technical and geo-environmental site investigation comprising 23 machine excavated trial pits was undertaken on 30th June and 1st July 2011. The site investigation also included 3 in-situ permeability tests. The trial pits were excavated with a JCB 3CX.

The fieldworks were supervised by Terra Firma (Wales) Limited, who also logged the trial pits to the requirements of BS5930:1999.

The trial pit logs are presented in **Annex E** and their locations are shown on **Drawing 01** and **Drawing 02.**

Additionally, three mini percussive boreholes were undertaken on 19th January 2012. The boreholes were sunk using a Terrier 2000 mini percussive drilling rig to facilitate the installation of the gas monitoring stations. Two holes were targeted at the infilled quarry on the site and a third was located south, between the quarry and the proposed phase 1 development.

Terra Firma (Wales) Limited logged the soils to the requirements of BS:5930:1999 and collected samples of the made ground in the quarry for asbestos testing.

The detailed borehole logs can be found in **Annex F** and their locations found on **Drawing 02**.

Further site works comprising 5 CBR tests was undertaken on 17th August 2013. The site works comprised 5 CBR tests undertaken on 17th August 2013. Mr Paul Perry positioned the tests along the route of the proposed road and excavated to the approximate level of the road. In areas where the road is to be raised the topsoil was removed.

The fieldworks were undertaken by Southern Ground Testing Limited and supervised by Terra Firma (Wales) Limited. The location of the tests can be found on **Drawing 03** and are discussed later in this report.

5.2 Ground Conditions

When describing the ground conditions beneath the site it is convenient to divide the site into two zones, **Zone A** and **Zone B** and treat these areas separately. The ground conditions encountered by the trial pits for the two zones can in general be summarised as shown in **Table 5.1** and **Table 5.2**The approximate boundaries of the two zones are shown on **Drawing 02** and **Drawing 03.**

Table 5.1 Summary of Typical Ground Conditions – Zone A

Depth (m)			Thickness (m)	Stratum
0.00	-	0.10/0.30	0.10/0.30	Soft to firm, dark brown, very slightly gravelly **CLAY.** Fine to coarse, sub-angular to sub-rounded gravels of sandstone. Many fine roots.
0.10/0.30	-	0.60/1.20	0.50/0.90	Medium dense, orange to orange brown, clayey gravelly **SAND.** Fine to coarse, sub-angular to sub-rounded gravels of sandstone. Sand is fine to coarse grained.
0.60/1.20	-	1.80/3.10	1.20/1.90	Medium dense to dense, grey brown, slightly clayey **SAND** and **GRAVEL.** Fine to coarse, angular to sub-rounded gravels, cobbles and occasional small boulder of sandstone. Sand is fine to coarse grained.

-	-	>1.80/3.10	-	**WEATHERED BEDROCK:** Weathered grey green, sandstone.

In TP02 did not encounter the orange clayey gravelly **SAND** and bedrock was at 1.65m.

TP13 has been divided into two logs as the bedrock varied between 0.90m depth at the northern end and 1.90m depth at the southern end of the pit. Also, no SAND and GRAVEL was encountered in the northern end.

The SAND and GRAVEL deposits were also absent in TP14 and TP15 with the bedrock also being shallower than the majority of Zone A at 1.00m and 1.30m, respectively.

Table 5.2 Summary of Typical Ground Conditions – Zone B

Depth (m)			Thickness (m)	Stratum
0.00	-	0.40/2.20	0.40/2.20	**MADE GROUND:** Soft, dark grey, **CLAY** with fine to coarse, angular to subrounded gravels of sandstone with glass, metal and brick. And/or **MADE GROUND:** Soft, dark grey, slightly sandy gravelly **CLAY** with fine to coarse, subangular to subrounded gravels of sandstone with plastic bag, ceramic tile and cup, slate roof tiles, coal and brick.
0.40/2.20	-	3.10	0.90/2.90	**MADE GROUND:** Soft to firm, orange brown, slightly sandy gravelly **CLAY** with fine to coarse, angular to subrounded gravels of sandstone.
3.10	-	>3.60	-	**MADE GROUND:** Loose to medium dense, black, ashy, clayey **SAND** and **GRAVEL** with fine angular gravels of mudstone and coal. Contains glass, coal, ceramic items and slag.

The ground conditions in **Zone B** varied greatly. TP16 encountered made ground to a depth of 0.40m. Below this to a depth of 3.00m was sandy gravelly CLAY. This was then underlain by 0.20m of stiff to hard grey with orange mottling, slightly gravelly CLAY. In this trial pit grey fossiliferous mudstone bedrock was encountered at 3.20m.

TP19 also encountered MADE GROUND to a depth of 2.20m. This comprised soft, dark grey, slightly sandy gravelly CLAY with plastic bags, ceramic fragments, slate roof tiles, brick and coal. Below this was weathered, grey green sandstone bedrock.

WS02 undertaken in the infilled quarry found soft material to a depth of 4.00m and which point it improves to a firm material before bedrock was encountered at a depth of 4.60m.

TP17, TP20, TP21, TP22 and TP23 encountered similar ground conditions as were found in Zone A.

5.3 Groundwater

No ground water was encountered on the site, however the investigation was conducted after a dry period and it should be noted that the ground water table will be higher after times of peak rainfall.

5.4 Installation Well Construction

Gas well locations were selected on a targeted basis to investigate the infilled quarry present on the site. Two wells were positioned inside the quarry with a third located outside in the phase 1 area of the site.

Gas installation well construction details are summarised in **Table 5.3**.

Table 5.3 Installation Well Summary

Location	Installation Depth (m)	Pipework Description	Backfill Description
WS01	2.00	Slotted Pipe = 2.00 to 0.50m Plain Pipe = 0.50m to GL	Gravel Backfill = 2.00 to 0.50m Bentonite Seal = 0.50 to 0.20m Concrete and Top Hat Cover
WS02	4.00	Slotted Pipe = 4.00 to 0.50m Plain Pipe = 0.50 to GL	Gravel Backfill = 4.00 to 0.50m Bentonite Seal = 0.50 to 0.20 Concrete and Top Hat Cover
WS03	2.00	Slotted Pipe = 2.00 to 0.50m Plain Pipe = 0.50 to GL	Gravel Backfill = 2.00 to 0.50m Bentonite Seal = 0.50 to 0.20m Concrete and Top Hat Cover

5.5 Laboratory Chemical Testing

5.5.1 Sampling Strategy

The sampling regime was conducted in accordance with BS5930: 1999 in order to satisfy the following criteria:

- Identify and confirm suspected sources of contamination
- Determine type and concentration of contamination
- Determine lateral and vertical spread of contaminants
- Ensure representation of the entire site
- Provide sufficient data to determine suitable remedial measures if necessary

Sample locations, depths and suspected/known contamination source targets are summarised in **Table 5.4**:

Table 5.4 Sample Locations, Depths and Targets

Location	Depth (m)	MCERTS Sample Description
TP01	0.90	Brown loam with many stones/occasional organic matter.
TP02	0.40	Brown loam with many stones/occasional organic matter.
TP04	0.50	Brown clay with occasional stones and occasional organic matter.
TP05	0.80	Brown loam with many stones/occasional organic matter.
TP08	0.30	Brown loam with many stones/occasional organic matter.
TP09	0.10	Brown loam with many stones and some organic matter.
TP14	0.20	Brown loam with many stones and some organic matter.
TP17	1.00	Brown loam with many stones and some organic matter.
TP18	0.30	Brown loam with many stones and some organic matter.
TP19	0.60	Black loam with many stones and some organic matter.
TP22	0.20	Brown loam with many stones and occasional organic matter.
TP23	0.80	No description in report
WS01	0.50	None
WS02	1.00	None

5.5.2 Soil Laboratory Analysis

The soil samples taken from the trial pits in 2001 were despatched to the laboratories of STS Coventry for laboratory chemical testing. The following chemical tests were undertaken:

Additionally, two samples were collected from the windowless sampling boreholes in 2012 and submitted to Derwentside Environmental Testing Services Limited. These two samples were subject to asbestos testing.

Table 5.5 Soil Laboratory Analysis

Metals & Metalloids	In-Organics	Organics	Others
Arsenic	Cyanide	Phenols	pH (acidity)
Cadmium	Sulphate	Speciated PAH	Asbestos ID (2 Samples)
Chromium		Petroleum Hydrocarbons	
Copper			
Lead			
Mercury			
Nickel			
Selenium			
Zinc			

The results are discussed in detail in **SECTION 6** and the laboratory test results certificates may be found in **Annex G**.

5.6 Soil Property Testing

5.6.1 In-situ Permeability Testing

During the site investigation three trial pit soakaway tests were undertaken in TP02, TP03 and TP04 and carried out in general accordance with BRE DG 365.

Soakaway test results are summarised in **Table 5.6**.

Table 5.6 Summary of Soakaway Results

Trial Pit	Depth of Test (m)	Infiltration Rate (ms^{-1})
TP02	1.70	$6.17x\ 10^{-4}$
TP03	2.16	$8.48x\ 10^{-4}$
TP04	2.00	Infiltration too rapid to measure

The test results are discussed in **SECTION 10.6** and the calculation sheets may be found in **Annex H**.

5.6.2 In-situ CBR Testing

A site visit was made during August 2013 during which 5 in-situ CBR test were undertaken. The CBR tests were undertaken by Southern Ground Testing Limited to the requirements of the British standard.

The CBR test results are presented in **Annex I** and the locations are presented on **Drawing 03**.

5.6.3 Laboratory Geotechnical Testing

A schedule of laboratory tests was prepared by Terra Firma Wales Ltd and samples were despatched to the accredited laboratories of Geo Testing Laboratory Services Limited. A summary of the testing carried out is presented in **Table 5.7**.

Table 5.7 Summary of Geotechnical Testing

Geotechnical Test	Standard (BS1377:1990)	No. Tested
Moisture Content	Part 2, Clause 3.2	3
4 Point Liquid and Plastic Limit	Part 2, Clause 4.3 & 5.3	3

The test results are presented in **Annex J** and discussed in **SECTION 7** of this report.

5.6.4 Drain Trace

A drain trace was conducted to try and identify the source of the water that is being discharged on to the northern portion of the site.

The manhole covers on Central Avenue were lifted. The sewers were seen to be running in a north south orientation, parallel to the site.

The manhole was also lifted on the surface water drainage. The manhole was seen to be receiving water from two shallow gully drains on either side of Central Avenue. The pipe work was a seen to be running from east to west in the bottom of the manhole with the flow of water to the west.

The volume of water in the surface water drainage was consistent with the amount of water being discharged on the site. A red drain tracing dye was also placed in the surface water manhole and the dyed water was observed at the point of discharge onto the site.

It is therefore concluded that the source of water on the site is the surface water drainage from Central Avenue.

Pictorial records of the drain trace were made and can be seen in **Annex K**.

SECTION 6 Evaluation of Geoenvironmental Analytical Results

6.1 Assessment Methodology

Comparison of the analytical results has been made with the 2015 Suitable 4 Use Levels (S4UL) provided by Land Quality Management (LQM) Limited and the Chartered Institute of Environmental Health (CIEH) or provisional Category 4 Screening Levels (pC4SL).

Soil leachate and groundwater analytical results have been compared with available published guidelines in the Water Framework Direction (Standards and Classification) Directions (England and Wales) 2015 and Drinking Water Directive (98/83/EC).

Sulphate results have been compared to guidelines presented in British Research Establishment (BRE SD1:2015). Sulphate levels need only be considered for buried concrete risk assessment and are not human health related.

Soils subjected to a UK Water Industry Research (UKWIR) suite of testing have been compared with guidelines set out in UKWIR Guidance for the Selection of Water Supply Pipes to be Used in Brownfield Sites (Ref 10/WM/03/21).

6.2 Soil Test Results

A summary of the chemical test results which include the regulatory soil guideline values used in a residential setting with plant uptake* are given in the following tables. The complete results can be found in **Annex G**.

6.2.1 Inorganics & Miscellaneous

Twelve samples were tested for a standard suite of inorganics, pH and organic matter. The summarised results are in **Table 6.1**.

Table 6.1 Summary of Soil Chemical Test Results – Inorganics & Miscellaneous

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Arsenic	37	LQM/CIEH	7.2	37	0
Cadmium	11	LQM/CIEH	<0.20	0.73	0
Chromium III	910	LQM/CIEH	8.7	20	0
Chromium VI	6	LQM/CIEH	<0.1	0.37	0
Copper	2400	LQM/CIEH	<5.0	170	0
Lead	200	pC4SL	6.3	110	0
Mercury (inorganic)	40	LQM/CIEH	<0.35	0.36	0
Nickel	180	LQM/CIEH	7.1	34	0
Selenium	250	LQM/CIEH	0.58	1.2	0
Zinc	3700	LQM/CIEH	53	730	0
Cyanide	-	-	<2.5	<2.5	-
Sulphate (%)	0.24	BRE	<0.024	0.068	0
Organic Matter (%)	-	-	1.0	16	-
pH	-	-	4.8	7.1	-

Notes:
- No available guideline

6.2.2 Organics

Six samples were tested for speciated polycyclic aromatic hydrocarbons. The summarised results are in **Table 6.2**.

Table 6.2 Summary of Soil Chemical Test Results – Speciated Polycyclic Aromatic Hydrocarbons

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Naphthalene	2.3	LQM/CIEH	<0.1	2.0	0
Acenaphthylene	170	LQM/CIEH	<0.1	<0.1	0
Acenaphthene	210	LQM/CIEH	<0.1	0.44	0
Fluorene	170	LQM/CIEH	<0.1	0.27	0
Phenanthrene	95	LQM/CIEH	<0.1	5.5	0
Anthracene	2400	LQM/CIEH	<0.1	1.6	0
Fluoranthene	280	LQM/CIEH	0.14	9.7	0
Pyrene	620	LQM/CIEH	0.11	7.4	0
Benzo(a)anthracene	7.2	LQM/CIEH	<0.1	4.5	0
Chrysene	15	LQM/CIEH	<0.1	4.5	0
Benzo(b)fluoranthene	2.6	LQM/CIEH	<0.1	3.3	0
Benzo(k)fluoranthene	77	LQM/CIEH	<0.1	1.8	0
Benzo(a)pyrene	2.2	LQM/CIEH	<0.1	3.7	**2**
Indeno(123cd)pyrene	27	LQM/CIEH	<0.1	2.2	0
Dibenzo(ah)anthracene	0.24	LQM/CIEH	<0.1	0.41	**2**
Benzo(ghi)perylene	320	LQM/CIEH	<0.1	2	0
Total PAH	-	-	<1.0	49	-

Notes:
Thresholds based on 1.0% soil organic matter.
- No available guidelines

Six samples were tested for petroleum hydrocarbons. The summarised results are shown in **Table 6.3**.

Table 6.3 Summary of Soil Chemical Test Results – Petroleum Hydrocarbons

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Aliphatic					
PH C5 – C6 Ali	42	LQM/CIEH	<0.11	<0.12	0
PH C6 – C8 Ali	100	LQM/CIEH	<0.11	<0.12	0
PH C8 – C10 Ali	27	LQM/CIEH	<0.14	<0.12	0
PH C10 – C12 Ali	130	LQM/CIEH	<1.1	3.1	0
PH C12 – C16 Ali	1100	LQM/CIEH	<1.1	25	0
PH C16 – C35 Ali	65000	LQM/CIEH	<1.1	880	0
PH C35 – C44 Ali	65000	LQM/CIEH	<1.1	260	0
Aromatic					
PH C5 – C7 Arom	70	LQM/CIEH	<0.011	<0.012	0
PH C7 – C8 Arom	130	LQM/CIEH	<0.011	<0.012	0
PH C8 – C10 Arom	34	LQM/CIEH	<0.11	<0.12	0

PH C10 – C12 Arom	74	LQM/CIEH	<1.1	<1.2	0
PH C12 – C16 Arom	140	LQM/CIEH	<1.1	21	0
PH C16 – C21 Arom	260	LQM/CIEH	<1.1	90	0
PH C21 – C35 Arom	1100	LQM/CIEH	<1.0	710	0
PH C35 – C44 Arom	1100	LQM/CIEH	<1.1	420	0

Notes:
PH – Petroleum Hydrocarbon
Ali – Aliphatic
Arom – Aromatic
Thresholds based on 1.0% soil organic matter

6.2.3 Asbestos Testing

Two samples of the made ground taken from the infilled quarry were scheduled for asbestos screening. Asbestos was not detected.

SECTION 7 Geotechnical Testing Results

Geotechnical testing results are summarised in the following sections and presented in their entirety in **Annex J**.

7.1 Plasticity & Moisture Content Testing

During the investigation three samples of the shallow clay material was taken and submitted for plasticity testing. The test results are summarised in **Table 7.1**.

Table 7.1 Plasticity & Moisture Content Test Results

Location	Depth (m)	Laboratory Principal Soil Type	Moisture Content (%)	Plasticity Index (%)	Passing 425µm Sieve (%)	Modified Plasticity Index (%)	Volume Change Potential
TP04	0.50	CLAY	18	12	95	11.4	Low
TP17	1.00	CLAY	20	18	85	15.3	Low
TP18	2.00	CLAY	28	23	85	19.5	Low

In line with the NHBC (Chapter 4.2), the modified plasticity index for each sample was calculated. For design purposes the soils on site should be assumed to have a low volume change potential.

SECTION 8 Ground Gas Risk Assessment

8.1 Gas Screening Value

Three ground gas monitoring wells were installed in WS01, WS02 and WS03. Installation details are shown on the relevant logs.

Six rounds of gas monitoring have been completed. The installations were tested for carbon dioxide, methane, oxygen, carbon monoxide and hydrogen sulphide using a Gas Analyser GA2000.

Recorded gas concentrations are summarised in **Table 8.1**.

Table 8.1 Measured Gas Concentration Summary

Gas	Minimum (% V/V)	Maximum (% V/V)
Methane	Not Detected	0.1
Carbon Dioxide	0.8	2.7
Oxygen	18.2	20.8

The gas flow rate from the boreholes was also assessed, a maximum flow rate of 0.1 l/hr was recorded.

Based on a flow rate of 0.1 l/hr and the highest recorded carbon dioxide concentration of 2.7%, a gas screening value of 0.0027 l/hr is calculated, as follows:

(2.7/100) x 0.1 = 0.0027 l/hr

The results are presented in **Annex L**.

8.2 Conclusion

When this monitoring result is compared with Table 8.5 of CIRIA report C665, the site is classified as ‘Gas Characteristic Situation 1’ (GCS1). Table 8.6 of the same publication confirms that no special precautions are required for a GCS1 site.

SECTION 9 Quantitative Risk Assessment

9.1 Contaminants of Concern

Contaminants identified as part of the investigation are summarised in **Table 9.1**, along with an interpretation of the likely contamination source. Where applicable, the contaminant, source relationship is based on the inferences made in the preliminary conceptual site model.

All substances in the soil from Area A were found to be below their respective guideline values, with no exceptions. Area A can be considered as not contaminated. No special precautions are required to deal with contamination in Zone A.

In Zone B most of the substances in soil were found to be below their respective guideline values, with the exception of the determinants listed in the table below.

Table 9.1 Contaminants of Concern

Location	Depth	Contaminant	Source
TP18	0.30	Benzo(a)pyrene Dibenzo(ah)anthracene	Made Ground
TP19	0.60	Benzo(a)pyrene Dibenzo(ah)anthracene	Made Ground

9.2 Pollutant Linkages

Based on the findings of the intrusive site investigation and identified contaminants, the preliminary conceptual site model has been revised. Significant pollutant linkages are tabulated in the refined conceptual site model **Table 9.2**. Identified pollutant linkages will require detailed risk assessment, appropriate mitigation or remedial measures.

Table 9.2 Refined Conceptual Site Model

Source	Pathway	Receptor
Made Ground	Ingestion of soil and soil dust Ingestion of home grown vegetables Inhalation of soil dust, both indoors and outdoors Dermal contact with soil and soil dust Permeation of water pipes	Construction Workers Neighbouring Site Users and Passers By Site End Users
Made Ground	Surface water runoff Leaching into the groundwater Groundwater transport	Aquatic Environment

9.3 Refined Illustrative Conceptual Site Model

Due to the differing ground conditions, it is more informative to split the site in two the two Zones, A and B and produce conceptual site models for each zone. These can be found overleaf in **Figure 9.1** and **Figure 9.2**.

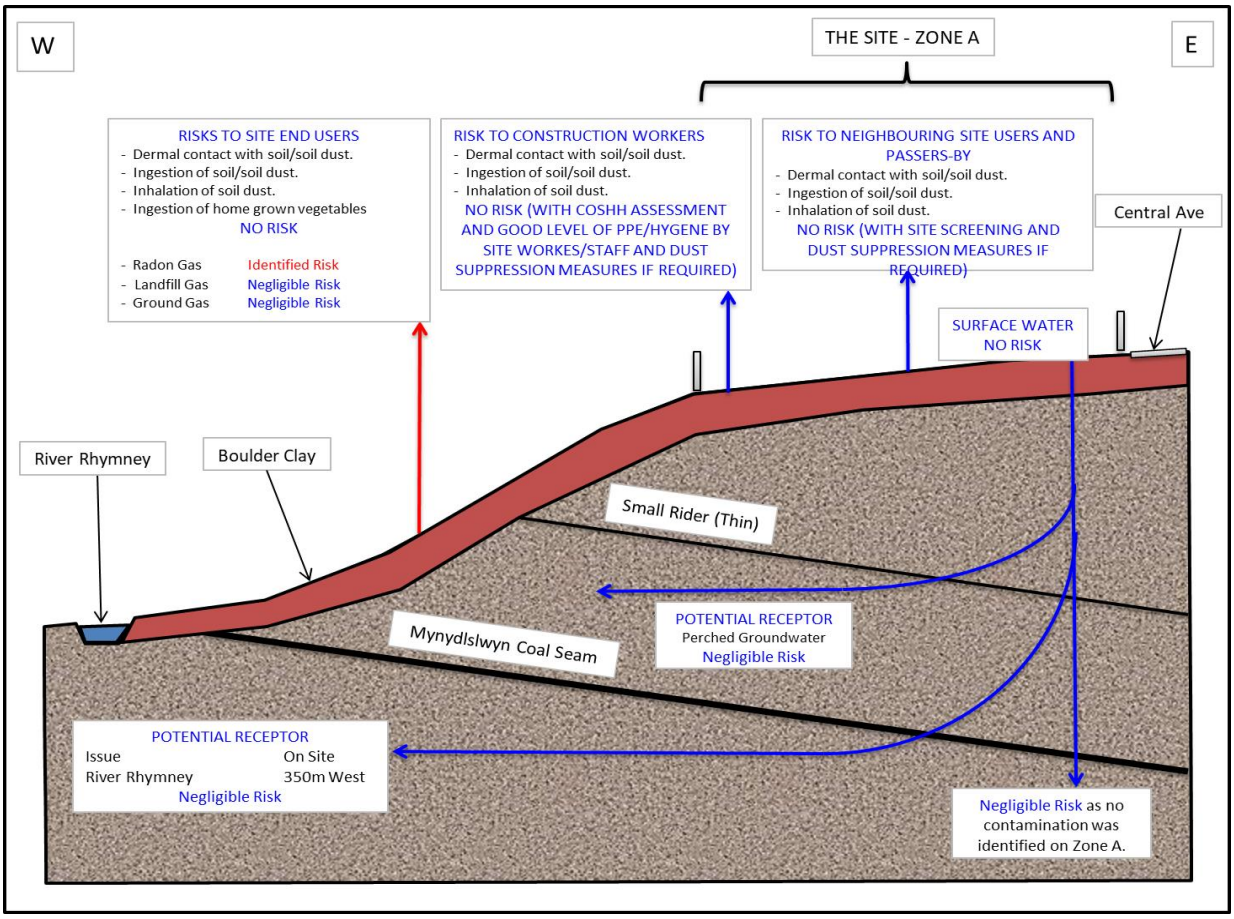


Figure 9.1 Refined Illustrative Conceptual Site Model – Zone A

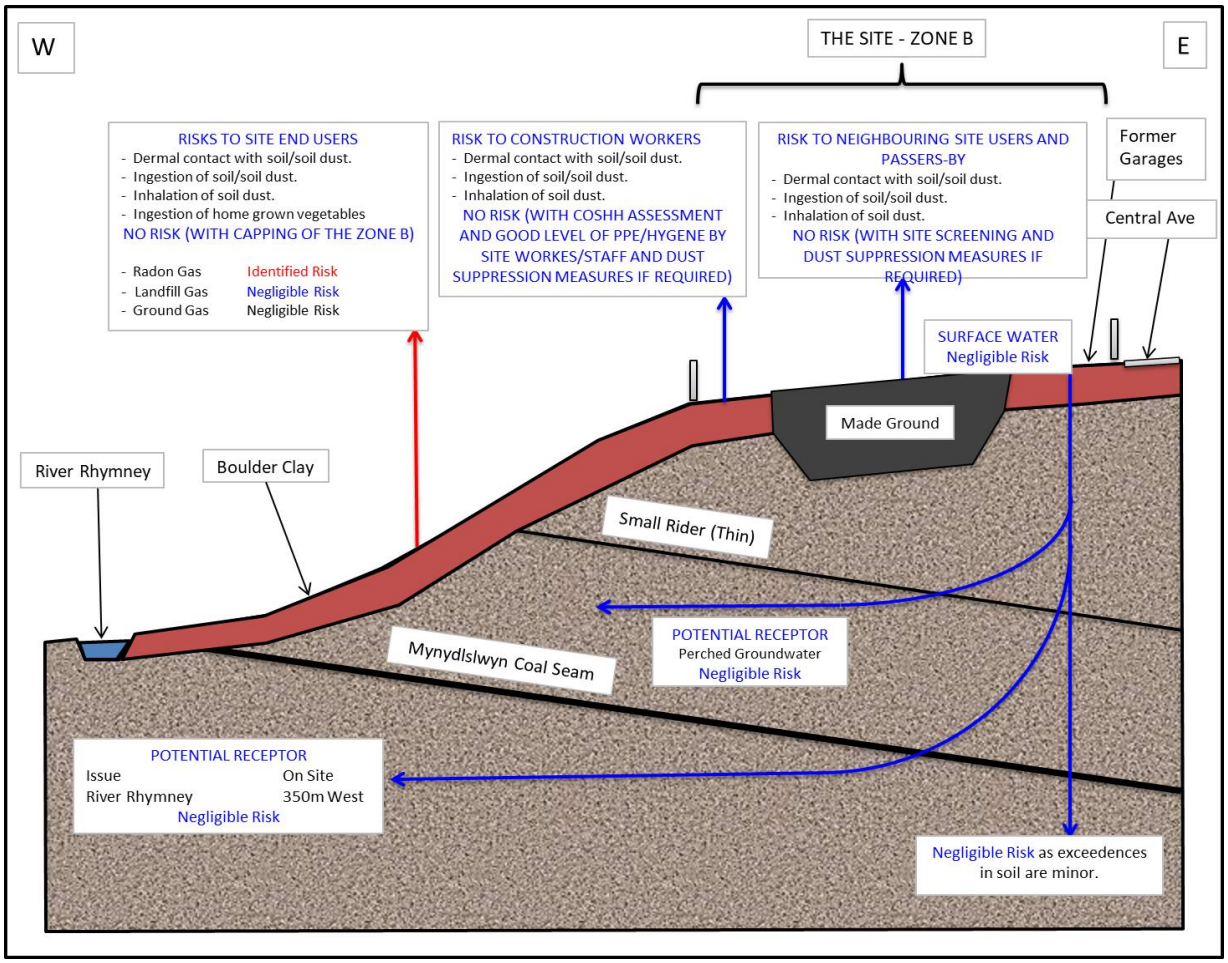


Figure 9.2 Refined Illustrative Conceptual Site Model – Zone B

9.4 Mitigation and Remedial Measures

The following sections summarise the likely mitigation and remedial measures suitable for the identified contamination and proposed development. Detailed methodology to achieve the measures should be prescribed in a Remediation Strategy Report and the results presented in a Validation Report upon completion of the development.

9.4.1 Human Health

9.4.1.1 Contaminated Soils

No mitigation measures are required in **Zone A** of the site.

In **Zone B**, to protect future site users from the identified contamination the site will need to be capped. The capping should consist of the proposed buildings and hard standings. In garden and soft landscaped areas, the capping should consist of 600mm of suitable inert topsoil, and subsoil if desired. Alternatively made ground soils could be removed from site and disposed of at a suitably licenced landfill site.

As good practice, construction workers should adhere to good site management, COSHH, good standards of hygiene and appropriate health & safety on site, with personal protection equipment (PPE) and dust suppression where appropriate.

All imported soils should be validated as clean and suitable for use in accordance with 'Requirements for the Chemical Testing of Imported Soils for Various End Uses and Validation Cover Systems'.

For proposed new supply water pipes, the UK Water Industry Research publication 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (Report 10/WM/03/21)' should be consulted.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 soils destined for off-site disposal should be classified based on their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified based on their specific chemical properties.

If during earthworks ground conditions are encountered that are markedly different to those found during the investigation then the ground should be subject to additional sampling and testing and any necessary remedial measures designed and implemented before continuing with the works.

9.4.1.2 Ground Gas/Radon

To mitigate against the risk to future site users from radon gas, basic protection measures will be required in all structures. Reference should be made to guidance publication BR 211:2015 for further details on required protection elements. Verification of the installed protection measures is highly recommended. Terra Firma Wales Ltd. offer a comprehensive ground gas protection system verification service.

Gas monitoring has found the site to be gas characteristic situation 1 and no special precautions are therefore required.

9.4.2 Aquatic Environment

Site specific mitigation and remedial measures are not required with respect to the aquatic environment. The contamination identified in the soils from TP18 and TP19 is only slightly elevated and can be considered as minor.

During the construction period, there is a risk to the environment/adjacent sites from de-watering, digging foundations, moving contaminated soil, drainage misconnections, discharges to local surface waters or the ground, runoff from construction materials and/or exposed ground, wheel washings and oil or chemical spills.

The risk is considered to be negligible as any adverse effects will be easily preventable by due diligence to good construction practise and housekeeping in preventing surface runoff and the spillage of materials.

The basic measures that should be taken are as follows:

- Prepare a drainage plan and mark the manholes to prevent pollutants accidently reaching the surface water sewers.
- Carry out any activities that could cause pollution in a designated, bunded area, away from rivers or boreholes. Where possible it should drain to the foul sewer.
- Use settlement ponds to remove silty water.
- Store all oils and chemicals in a fully bunded area to prevent leaks or spills.
- Get advice on whether you need an environmental permit and apply in good time

SECTION 10 Engineering Recommendations

10.1 Preparation of Site

The existing garage bases and all foundations can be demolished, and hard standing areas broken out and removed from site to an appropriately licensed landfill facility.

All topsoil, scrub vegetation and trees including all roots and hard standings and the above ground tank should be removed from beneath the footprint of the proposed buildings.

The reduced levels should be brought up to the required levels with well, compacted imported granular materials. Department of Transport (DoT) Type 2 sub-base or similar may be used and should be compacted in layers, in accordance with the Specification for Highway Works. Alternatively, appropriately selected inert imported fill could be used.

Allowances should be made for removing any 'soft spots/area' and their replacement with well compacted granular materials.

Contingencies should also be made for the protection/diversion of any underground services present beneath the site brought about because of the proposed works.

Further contingencies should be allowed for any necessary temporary/permanent support works to existing structures made necessary because of the proposed works.

As the site is located on a hillside an element of cut and fill will be required to develop the site. Steepening of the hillside is not recommended. Therefore, retaining walls will be required.

Any retaining walls should be constructed in small lengths prior to constructing adjacent lengths.

Prior to placing any fill onto the existing hillside, it should be adequately cut and stepped in order to prevent slippage at the interface of the new fill and existing ground.

Appropriate drainage should be constructed at the top and bottom of any cut and or fill areas. For any large areas of cut and/or fill appropriate herringbone drainage should be constructed to aid drainage.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 soils and other materials destined for off-site disposal should be classified based on their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified based on their specific chemical properties. Terra Firma (Wales) Ltd offer this service if required.

10.2 Foundation and Floor Slab Solution

In **Zone A**, a combination of mass concrete strip and trench fill foundations founded within the medium dense brown in areas slightly clayey sand with occasional rounded gravels may be used.

Based upon the site investigation data the depth to the above in-situ founding horizon is likely to vary between 0.8 and 1.2m below the existing ground level.

For the above foundations founded within the above in-situ materials an allowable bearing capacity of 100kN/m^2 may be used for design purposes.

If during the excavations for the foundation formations encounter bedrock then all the foundation formations must be founded within the rock in order to avoid differential settlements.

Should this be the case then an increased bearing pressure of 250kN/m^2 may be used for design purposes.

Based upon the above foundations and above quoted allowable bearing capacity, maximum total settlements should not exceed 30mm and angular distortion should be no greater than 1:750.

The floor slabs may be designed and constructed as suspended. Alternatively provided all made ground and soft materials are removed and replaced with well compacted imported granular materials as previously described then the floor slabs may be designed as ground bearing. However, in order to satisfy the NHBC guidelines should the depth of fill be greater than 600mm then the floor slabs should be designed as suspended.

If after any cut and/or fill the depth to the in-situ founding horizon becomes prohibitive then an alternative foundation/floor slab solution would be to use a reinforced concrete raft type foundation/floor slab solution founded at shallow depth within well compacted made ground may be used.

For the raft, an allowable bearing pressure of 75Kn/m^2 may be used for design purposes. Similar total and differential settlements as previously quoted may be expected.

For **Zone B**, apart from the infilled quarry areas, foundation solutions as quoted above may again be used. WS02 in the quarry has found soft ground to a depth of 4.00m and if this depth is prohibitive for traditional foundations deep foundations may be required. Consideration should then be given to the use of a piled foundation.

Consideration could be given to a continuous flight auger (CFA) or precast concrete pile however these may struggle if obstructions are present in the made ground. Alternatively, a rotary ODEX type pile could be utilised. The piles should be installed / driven to an appropriate set within underlying bedrock.

Pile lengths, diameters and capacity will need to be confirmed with additional site investigation works.

Due to obstructions in the made ground it may be necessary to pre-bore the pile locations. Allowances should also be made for re-driving / installing piles where obstructions are encountered in the made ground.

Measurements should be kept on pile vibrations during installation. Measures should also be taken to dampen such vibrations. If, however, vibrations exceed permissible values then consideration should be given to an alternative pile solution.

Allowances should be made for the removal of any ‘soft spots’ and their replacement with well-compacted granular materials. Department of Transport (DoT) Type 2 materials or similar could be used and should be compacted in layers to the specification for Highway Works.

All foundation formations should be inspected by a suitably qualified Engineer before being concreted.

10.3 Excavations and Formations

Most shallow excavations should be possible with normal soil excavating machinery. However, allowances should be made for the use of hydraulic breaker attachments when excavating areas of hard standing/foundations is association with the former garages and less weathered bedrock.

Shallow perched water and groundwater flows were not encountered during the investigation. Any water inflows together with rainwater infiltration should be dealt with by conventional

pumping techniques. However, it should be noted that during times of heavy rainfall a higher water table will be encountered.

The sides of any excavations deeper than 1.20m, or shallower if unstable, should be supported by planking and strutting or other proprietary means.

The sub-formations/formations are likely to be susceptible to loosening, softening and deterioration by exposure to weather (rain, frost and drying conditions), the action of water (flood water or removal of groundwater) and site traffic.

Formations should never be left unprotected and continuously exposed to rain causing degradation, or left exposed/uncovered overnight, unless permitted by a qualified engineer.

Construction plant and other vehicular traffic should not be operated on unprotected formations.

As a minimum the formation/excavation surfaces must be protected by blinding concrete immediately after exposure.

Allowances should be made for the removal of soft spots/areas and their replacement with well compacted granular materials.

Allowances should also be made for special precautions to prevent formation deterioration in addition to the above.

10.4 Protection of Buried Concrete

In **Zone A** the laboratory soil chemical tests revealed total sulphate contents of less than 240 mg/kg to 680 mg/kg and pH values of between 4.8 and 6.1.

Based on the above it is recommended that all buried concrete should as a minimum conform to Class AC-3z of BRE Special Digest 1:2005.

In **Zone B** the laboratory soil chemical tests revealed total sulphate contents of less than 240 mg/kg to 610 mg/kg and pH values of between 6.1 and 7.2.

Based on the above it is recommended that all buried concrete should as a minimum conform to Class AC-2z of BRE Special Digest 1:2005.

10.5 Access Roads and Car Parking Areas

During the August 2013 works 5 in-situ CBR tests were undertaken. The CBR values recorded across the site varied and therefore two recommendations have been made.

Firstly, for access roads and car parking formations within the in-situ materials across the majority of the site an average CBR Value of 2.39% may be used for design purposes.

Secondly for access roads and car parking formations within the is-situ material in the in-filled quarry area of the site a CBR value of 0.65% may be used for design purposes.

Allowances should be made for the removal of any ‘soft spots/areas’ and their replacement with well-compacted granular materials.

10.6 Storm Water Drainage

During the investigation three soakaway tests were undertaken in TP02, TP03 and TP04 at depths of 1.70m, 2.16m and 2.00m, respectively.

The infiltration rates calculated are as follows.

SA01 in TP02 = 6.1716 x 10^{-4} m/s
SA02 in TP03 = 8.4849 x 10^{-4} m/s
SA03 in TP04 = N/A

No infiltration rate was recorded in SA03 (TP04) as the water was leaving the trial pit as fast as the water was being pumped in. It is considered that the infiltration rate is quicker than the permeability in SA01 and SA02.

Any soakaways should not be within influencing distance of existing or proposed buildings and structures. Soakaways should be at least 5.00m from these.

10.7 Retaining Walls

Due to the sloping nature of the site cut and fill is likely undertaken and retaining walls may be required. The existing steepness of any embankments should not be increased. Any cuts should be undertaken in small sections and in such a way so as not to induce any instability to the ground.

Effective shear parameters for retaining wall design are presented in **Table 10.1**.

Table 10.1 Effective Shear Stress Parameters

Stratum Description	Bulk Unit Weight (γ) kN/m^3	Effective Cohesion (c') kN/m^2	Effective Angle of Shearing Resistance (ϕ') degrees
Made ground	18-19	0	25
Well compacted, suitable materials compacted as per Specification for Highway Works and other relevant guidance such as British Standards (BS) 6031: 1981. Code of Practise for Earthworks.	18-21	0	35
Competent sandstone bedrock	21	10	45

The parameters are based on experience in similar ground conditions.

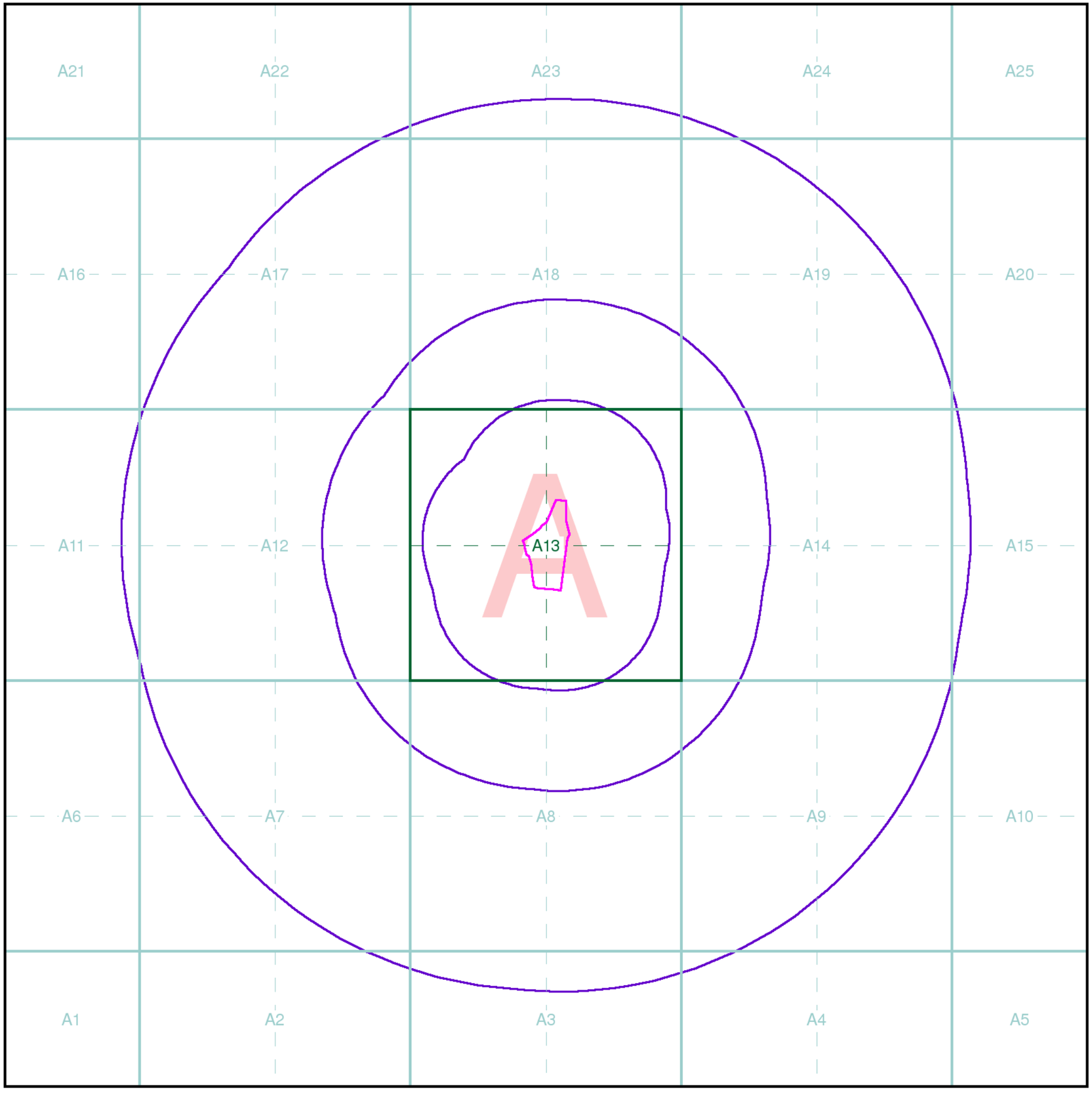
The materials to be in-filled behind the retaining wall should be placed at or close to its optimum moisture content/maximum dry density and compacted in layers as per the requirements of the Specification for Highway Works. During the earthworks suitable in-situ testing should be carried out to ensure that the compaction process is achieving the required maximum dry density to achieve at least 95% compaction.

The acceptability of the filling works should be verified by appropriate on-site testing. A certification report should also be prepared on the earthworks by a suitably qualified Geotechnical Engineer.

Appropriate drainage should be incorporated in the design to prevent the build-up of hydrostatic pressure.

Appropriate cutting and benching of the existing slope should be conducted prior to the replacement of any imported fill to minimise the risk of any slip surfaces forming on the interface between the existing imported materials.

ANNEX A
Envirocheck Historical Maps



terrafirma

Index Map

For ease of identification, your site and buffer have been split into Slices, Segments and Quadrants. These are illustrated on the Index Map opposite and explained further below.

Slice
Each slice represents a 1:10,000 plot area (2.7km x 2.7km) for your site and buffer. A large site and buffer may be made up of several slices (represented by a red outline), that are referenced by letters of the alphabet, starting from the bottom left corner of the slice "grid". This grid does not relate to National Grid lines but is designed to give best fit over the site and buffer.

Segment
A segment represents a 1:2,500 plot area. Segments that have plot files associated with them are shown in dark green, others in light blue. These are numbered from the bottom left hand corner within each slice.

Quadrant
A quadrant is a quarter of a segment. These are labelled as NW, NE, SW, SE and are referenced in the datasheet to allow features to be quickly located on plots. Therefore a feature that has a quadrant reference of A7NW will be in Slice A, Segment 7 and the NW Quadrant.

A selection of organisations who provide data within this report:

Ordnance Survey® Licensed Partner

British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL

Environment Agency

CYNGOR CEFN GWLAD CYMRU COUNTRYSIDE COUNCIL FOR WALES

Envirocheck reports are compiled from 136 different sources of data.

Client Details

Ms L Dow, Terra Firma (Wales) Ltd, 5 Deryn Court, Warfdale Road, Pentwyn, Cardiff, CF23 7HB

Order Details

Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197710
Site Area (Ha):	1.6
Search Buffer (m):	1000

Site Details

Site at 316100, 197720

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LANDMARK TERMS AND CONDITIONS

Version 6.04 28 Jul 2007

Definitions

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"First Purchaser's Lender" means the funding provider for the First Purchaser

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"Websites" means websites hosted by Landmark and includes the Content and any report, service, document, data-set, software or information contained therein, derived there from or thereby.

1. Terms & Conditions

a. These Terms govern the relationship between You and Landmark whether You are an unregistered visitor to the Website or are purchasing Services. Where these Terms are not expressly accepted by You they will be deemed to have been accepted by You, and You agree to be bound by these Terms when You place any Order, or pay for any Services provided

b. If the person communicating with Landmark is an Authorised Reseller, they must ensure that You agree to these Terms.

c. The headings in these Terms are for convenience only and shall not affect the meaning or interpretation of any part of these Terms.

d. Landmark may modify these Terms, and may discontinue or revise any or all other aspects of the Services at our sole discretion, with immediate effect and without prior notice, including without limitation changing the Services available at any given time. Any amendment or variation to these Terms shall be posted on our Websites. Continued use of the Services by You shall be deemed an acceptance by You to be bound by any such amendments to the Terms.

e. These Terms, together with the prices and delivery details set out on our Websites, Landmark's Privacy Policy and Your Order comprise the whole agreement relating to the supply of Services to You by Landmark. No prior stipulation, agreement, promotional material or statement whether written or oral made by any sales or other person or representative on our behalf should be understood as a variation of these Terms. Save for fraud or misrepresentation, Landmark shall have no liability for any such representation being untrue or misleading.

f. These Terms shall prevail at all times to the exclusion of all other terms and conditions including any terms and conditions which You may purport to apply even if such other provisions are submitted in a later document or purport to exclude or override these Terms and neither the course of conduct between parties nor trade practice shall act to modify these Terms.

2. Services

a. Landmark will use reasonable care and skill in providing the Services to You, however, the Services are provided on the express basis that the information and data supplied in the Services are derived from third party sources and Landmark does not warrant the accuracy or completeness of such information or data. Such information is derived solely from those sources specifically cited in the Services and Landmark does not claim that these sources represent an exhaustive or comprehensive list of all sources that might be consulted.

3. Intellectual Property

a. You acknowledge that all Intellectual Property Rights in the Services are and shall remain owned by either Landmark or our Suppliers and nothing in these Terms purports to transfer, assign or grant any rights to You in respect of the Intellectual Property Rights.

b. Subject always to these Terms You may, without further charge, make the Services available to;
   i. the owner of the Property at the date of the Report,
   ii. any person who purchases the whole of the Property Site,
   iii. any person who provides funding secured on the whole of the Property Site,
   iv. any person for whom You act in a professional or commercial capacity,
   v. any person who acts for You in a professional or commercial capacity; and
   vi. prospective buyers of the Property Site as part of an Information Pack but for the avoidance of doubt, Landmark shall have no liability to such prospective buyer unless the prospective buyer subsequently purchases the Property Site, and the prospective (or actual) buyer shall not be entitled to make the Service available to any other third party.
   Accordingly Landmark shall have the same duties and obligations to those persons in respect of the Services as it has to You.

c. Each of those persons referred to in clause 3.b. shall have the benefit and the burden of Your rights and obligations under these Terms. The limitations of Landmark's liability as set out in clause 6 shall apply to all users of the Service in question in aggregate and Landmark shall not be liable to any other person.

d. All parties given access to the Services agree that they will treat as strictly private and confidential the Services and all information which they obtain from the Services and shall restrict any disclosure to employees or professional advisors to enable the relevant party to conduct its internal business. The requirement in this clause to treat the Services as confidential shall include a requirement to maintain adequate security measures to safeguard the Services from unauthorised access, use or copying.

e. Each recipient of the Services agrees (and agrees it will cause its employees, agents or contractors who may from time to time have access to the Services to agree) it will not, except as permitted herein or by separate agreement with Landmark:-
   i. effect or attempt to effect any modification, merger or change to the Service, nor permit any other person to do so; or
   ii. copy, use, market, re-sell, distribute, merge, alter, add to or carry on any redistribution, reproduction, translation, publication, reduction to any electronic medium or machine readable form or commercially exploit or in any other way deal with or utilise or (except as expressly permitted by applicable law) reverse engineer, decompile or disassemble the Services, Content or Website; or
   iii. remove, alter or in any way change any trademark or proprietary marking in any element of the Services and You shall acknowledge the ownership of the Content, where such Content is incorporated or used into Your own documents, reports, systems or services whether or not these are supplied to any third party.
   iv. create any product which is derived directly or indirectly from the data contained in the Services

f. The mapping contained in any Services is protected by Crown Copyright and must not be used for any purpose outside the context of the Services or as specifically provided by these Terms.

g. You are permitted to make five copies of any Report, but are not authorised to re-sell the Report, any part thereof or any copy thereof unless you are an Authorised Reseller. Further copies may not be made in whole or in part without the prior written permission of Landmark who shall be entitled to make a charge for each additional copy.

4. Charges

a. VAT at the prevailing rate shall be payable in addition to the Landmark Fees. You shall pay any other applicable indirect taxes related to Your use of the Services.

b. An individual or a monthly invoice showing all Orders created by You will be generated subject to these Terms. You will pay the Landmark Fees at the rates set out in Landmark's or its Authorised Reseller's invoice. The Landmark Fees are payable in full within 30 days without deduction, counterclaim or set off. You acknowledge that time is of the essence with respect to the payment of such invoices. Landmark reserve the right to amend the Landmark Fees from time to time and the Services will be charged at the Landmark Fee applicable at the date on which the Service is ordered.

c. We may charge interest on late payment at a rate equal to 3% per annum above the base lending rate of National Westminster Bank plc.

d. Landmark or its Authorised Reseller shall not be obliged to invoice any party other than You for the provision of Services, but where Landmark or its Authorised Reseller does so invoice any third party at Your request, and such invoice is not accepted or remains unpaid, Landmark or its Authorised Reseller shall have the option at any time to cancel such invoice and invoice You direct for such Services. Where Your order comprises a number of Services or severable elements within any one or more Services, any failure by Landmark or its Authorised Reseller to provide an element or elements of the Services shall not prejudice Landmark's or its Authorised Reseller's ability to require payment in respect of the Services delivered to You.

5. Termination

a. Landmark may suspend or terminate Your rights under these Terms without any liability to You with immediate effect if at any time:-
   i. You fail to make any payment due in accordance with clause 4;
   ii. You repeatedly breach or commit or cause to be committed any material breach of these Terms; or
   iii. You commit a breach and You fail to remedy the breach within 7 days of receipt of a written notice to do so; additionally, without prejudice to the foregoing, Landmark may remedy the breach and recover the costs thereof from You.

b. If Your rights are terminated under this clause and You have made an advance payment We will refund You a reasonable proportion of the balance as determined by Us in relation to the value of Services previously purchased.

c. Landmark reserves the right to refuse to supply any or all Services to You without notice or reason.

6. Liability

a. We provide warranties and accept liability only to the extent stated in this clause 6 and clause 7.

b. Nothing in these Terms excludes either party's liability for death or personal injury caused by that party's negligence or wilful default, and the remainder of this clause 6 is subject to this provision and Your statutory rights.

c. As most of the information contained in the Services is provided to Landmark by others, Landmark cannot control its accuracy or completeness, nor is it within the scope of Landmark's Services to check the information on the ground. Accordingly, Landmark will only be liable to You for any loss or damage caused by its negligence or willful default and subject to clause 6.o below neither Landmark nor any person providing information contained in any Services shall in any circumstances be liable for any inaccuracies, faults or omissions in the Services, nor shall Landmark have any liability if the Services are used otherwise than in accordance with these Terms.

d. Save as precluded by law, Landmark shall not be liable for any indirect or consequential loss, damage or expenses (including loss of profits, loss of contracts, business or goodwill) howsoever arising out of any problem, event, action or default by Landmark.

e. In any event, and notwithstanding anything contained in these Terms, Landmark's liability in contract, tort (including negligence or breach of statutory duty) or otherwise howsoever arising by reason or in connection with this Contract (except in relation to death or personal injury) shall be limited to an aggregate amount not exceeding £1 million if the complaint is in relation to a Report on residential property and an aggregate amount not exceeding £10 million in respect of any other Report or Service purchased from Landmark.

f. Landmark will not be liable for any defect, failure or omission relating to Services that is not notified to Landmark within six months of the date of the issue becoming apparent and in any event, within twelve years of the date of the Service.

g. You acknowledge that:-
   i. Subject to clause 6.o below You shall have no claim or recourse against any Third Party Content supplier nor any of our other Suppliers. You will not in any way hold us responsible for any selection or retention of, or the acts of omissions of Third Party Content suppliers or other Suppliers (including those with whom We have contracted to operate various aspects or parts of the Service) in connection with the Services (for the avoidance of doubt Landmark is not a Third Party Content supplier). Landmark does not promise that the supply of the Services will be uninterrupted or error free or provide any particular facilities or functions, or that the Content will always be complete, accurate, precise, free from defects of any other kind, computer viruses, software locks or other similar code although Landmark will use reasonable efforts to correct any inaccuracies within a reasonable period of them becoming known to us;
   ii. Landmark's only obligation is to exercise reasonable skill and care in providing environmental property risk information to persons acting in a professional or commercial capacity who are skilled in the use of property and environmental information and You hereby acknowledge that You are such a person;
   iii. no physical inspection of the Property Site reported on is carried out as part of any Services offered by Landmark and Landmark do not warrant that all land uses or features whether past or current will be identified in the Services. The Services do not include any information relating to the actual state or condition of any Property Site nor should they be used or taken to indicate or exclude actual fitness or unfitness of a Property Site for any particular purpose nor should it be relied upon for determining saleability or value or used as a substitute for any physical investigation or inspection. Landmark recommends that You inspect and take other advice in relation to the Property Site and not rely exclusively on the Services.
   iv. Subject to clause 6.o below, Landmark shall not be responsible for error or corruption in the Services resulting from inaccuracy or omission in primary or secondary information and data, inaccurate processing of information and data by third parties, computer malfunction or corruption of data whilst in the course of conversion, geo-coding, processing by computer or electronic means, or in the course of transmission by telephone or other communication link, or printing.
   v. Landmark will not be held liable in any way if a Report on residential property is used for commercial property or more than the one residential property for which it was ordered.
   vi. the Services have not been prepared to meet Your or anyone else's individual requirements; that You assume the entire risk as to the suitability of the Services and waive any claim of detrimental reliance upon the same; and You confirm You are solely responsible for the selection or omission of any specific part of the Content;
   vii. Landmark offer no warranty for the performance of any linked internet service not operated by Landmark;
   viii. You will on using the Services make a reasonable inspection of any results to satisfy Yourself that there are no defects or failures. In the event that there is a material defect You will notify us in writing of such defect within seven days of its discovery;
   ix. Any support or assistance provided to You in connection with these Terms is at Your risk;

h. All liability for any insurance products purchased by You rests solely with the insurer. Landmark does not endorse any particular product or insurer and no information contained within the Services should be deemed to imply otherwise. You acknowledge that if You Order any such insurance Landmark will deem such as Your consent to forward a copy of the Report to the insurers. Where such policy is purchased, all liability remains with the insurers and You are entirely responsible for ensuring that the insurance policy offered is suitable for Your needs and should seek independent advice. Landmark does not guarantee that an insurance policy will be available on a Property Site. All decisions with regard to the offer of insurance policies for any premises will be made solely at the discretion of the insurers and Landmark accepts no liability in this regard. The provision of a Report does not constitute any indication by Landmark that insurance will be available on the property.

i. Professional opinions contained in Reports are provided to Landmark by third parties, and such third parties are solely liable for the opinion provided. For the avoidance of doubt, those parties providing assessments or professional opinions on Landmark products include RPS Plc & Wilbourn Associates Limited, and any issues with regard to the provision of such opinion should be taken up with the relevant third party.
   If Landmark provides You with any additional service obtained from a third party, including but not limited to any interpretation or conclusion, risk assessment or environmental report or search carried out in relation to a Report on Your Property Site, subject to clause 6.o below Landmark will not be liable in any way for any information contained therein or any issues arising out of the provision of those additional services to You. Landmark will be deemed to have acted as an agent in these circumstances and the supply of these additional services will be governed by the terms and conditions of those Third Parties.

j. In any event no person may rely on a Service more than 12 months after its original date.

k. If You wish to vary any limitation of liability as set out in these Terms, You must request such variation prior to ordering the Service. Landmark shall use its reasonable endeavours to agree such variation but shall not be obliged to do so.

l. Time shall not be of the essence with respect to the provision of the Services.

m. Ordnance Survey have undertaken a positional accuracy improvement programme which may result in discrepancies between the positioning of features used in datasets in the Services and the updated Ordnance Survey mapping. Subject to clause 6.o below, Landmark and its Suppliers exclude all and any liability incurred as a result of the implementation of such positional accuracy improvement programme.

n. Where Landmark provides its own risk assessment in connection with any Report, Landmark shall carry out such assessment with all reasonable skill and care but shall have no liability for any such risk assessment conclusion which is provided for information only, save where Landmark conducted the same negligently, in which case the provisions of clause 6 shall apply. Notwithstanding the provision of any such risk assessment conclusion you should carefully examine the remainder of the Report and should not take or refrain from taking any action based solely on the basis of the risk assessment. For the avoidance of doubt, the provisions of this clause 6n apply solely to risk assessments conducted by Landmark, and the provision of any other risk assessment by a third party shall be governed by such third party's terms in accordance with the provisions of clause 6i above.

o. Landmark obtains much of the information contained in its Report from third parties. Landmark will not accept any liability to You for any negligent or incorrect entry, or error or corruption in the Third Party Content supplied to Landmark, but Landmark's Suppliers may be liable for such negligent or incorrect entries, or errors or corruptions, subject to the terms and conditions on which they supply the Third Party Content to Landmark.

7. Contribution

a. Save where expressly provided, this clause 7 shall apply solely to Envirosearch Residential Reports (regardless of the result of such Report). Nothing in this clause 7 shall operate to override or vary the provisions of clause 6.

b. Landmark are prepared to offer, at their sole discretion, and without any admission or inference of liability a contribution towards the costs of any remediation works required under a Notice (as defined below) on the terms of this clause 7 ("the Contribution")

c. In the event that a Remediation Notice is served on the First Purchaser or First Purchaser's Lender of a Property Site under Part II(A) of the Environmental Protection Act 1990 ("the Notice") Landmark will contribute to the cost of such works as either the First Purchaser or First Purchaser's Lender (but not both) are required to carry out under the Notice subject to the provisions of this clause 7 and on the following terms:
   i. the Contribution shall only apply to contamination or a pollution incident present or having occurred prior to the date of the Report;
   ii. the Contribution shall only apply where the Property Site is a single residential dwelling house or a single residential flat within a block of flats. For the avoidance of doubt, this obligation does not apply to any commercial property, nor to any Property Site being developed or redeveloped whether for residential purposes or otherwise;
   iii. the Contribution is strictly limited to the cost of works at the Property Site and at no other site.
   iv. the Contribution will not be paid in respect of any of the following:
   Radioactive contamination of whatsoever nature, directly or indirectly caused by or contributed to or arising from ionising radiations or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel or the radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof.
   Asbestos arising out of or related in any way to asbestos or asbestos-containing materials on or in structures or services serving the structures.
   Naturally occurring materials arising from the presence or required removal of naturally occurring materials except in circumstances where such materials are present in concentrations which are in excess of their natural concentration.
   Intentional non-compliance arising from the intentional disregard of or knowing wilful or deliberate non-compliance by any owner or occupier of the Property Site with any statute, regulation, administrative complaint, notice of violation, or notice letter of any Regulatory Authority.
   Any condition which is known or ought reasonably to have been known to the First Purchaser or the First Purchaser's Lender prior to the purchase of the Report.
   Any condition which is caused by acts of War or an Act of Terrorism.
   Any property belonging to or in the custody or control of the First Purchaser which does not form a fixed part of the Property Site or the structure.
   Any fines liquidated damages punitive or exemplary damages.
   Any bodily injury including without limitation, death, illness or disease, mental injury, anguish or nervous shock.
   Any financial loss in respect of any loss of any rental, profit, revenue, savings or business or any consequential indirect or economic loss damage or expense including the cost of rent of temporary premises or business interruption.
   Any losses incurred following a material change in use of, alteration or development of the Property Site.

d. The maximum sum that shall be contributed by Landmark in respect of any Contribution shall be limited to £60,000. In the event that more than one Report is purchased on the Property Site the Contribution will only be payable under the first Report purchased by or on behalf of any First Purchaser or First Purchaser's Lender and no Contribution will be made in respect of subsequent Reports purchased by or on behalf of such First Purchaser, First Purchaser's Lender or any person connected to them.

e. Landmark shall only pay a Contribution where the Notice is served within 36 months of the date of the Report.

f. Any rights to a Contribution under this Clause 7 are not assignable in the event of a sale of the Property Site and Landmark will not make any Contribution after the date of completion of such sale.

g. In the event the First Purchaser or First Purchaser's Lender wishes to claim any Contribution, it shall notify Landmark in writing within 3 months of the date of the Notice. The First Purchaser or First Purchaser's Lender (as applicable) shall comply with all reasonable requirements of Landmark with regard to the commission and conduct of the remediation works to be carried out under the Notice, and in the event the First Purchaser or First Purchaser's Lender (as applicable) does not do so, including without limitation, obtaining Landmark's prior written consent to any estimates for such works or complying with any other reasonable request by Landmark, Landmark shall not be required to pay any Contribution. Notwithstanding the payment of the Contribution by Landmark the First Purchaser or First Purchaser's Lender as applicable shall take all reasonable steps to mitigate any costs incurred in connection with the conduct of works required under the terms of any Notice.

h. In the event that the First Purchaser or First Purchaser's Lender receives any communication from a statutory authority to the effect that there is an intent to serve a notice received under PartII(A) of the Environmental Protection Act 1990 they will advise Landmark within a maximum period of two months from receipt of such communication. This clause 7h and the service of any notice under it shall not affect the provisions of clauses 7 e and g, and any such communications, even if advised to Landmark will not operate as notice under clause 7e.

i. Landmark reserve the right at any time prior to a claim for Contribution being made in accordance with clause 7 g) above, to withdraw the offer of payment of Contributions without further notice.

8. Events Beyond Our Control

a. You acknowledge that Landmark shall not be liable for any delay, interruption or failure in the provision of the Services which are caused or contributed to by any circumstance which is outside our reasonable control including but not limited to, lack of power, telecommunications failure or overload, computer malfunction, inaccurate processing of data, or delays in receiving, loading or checking data, corruption of data whilst in the course of conversion, geo-coding, processing by computer in the course of electronic communication, or printing.

9. Severability

a. If any provision of these Terms are found by either a court or other competent authority to be void, invalid, illegal or unenforceable, that provision shall be deemed to be deleted from these Terms and never to have formed part of these Terms and the remaining provisions shall continue in full force and effect.

10. Governing Law

a. These terms shall be governed by and construed in accordance with English law and each party agrees irrevocably submit to the exclusive jurisdiction of the English courts If any dispute arises out of or in connection with this agreement (a "Dispute") the parties undertake that, prior to the commencement of Court proceedings, they will seek to have the Dispute resolved amicably by use of an alternative dispute resolution procedure acceptable to both parties with the assistance of the Centre for Dispute Resolution (CEDR) if required, by written notice initiating that procedure. If the Dispute has not been resolved to the satisfaction of either party within 60 days of initiation of the procedure or if either party fails or refuses to participate in or withdraws from participating in the procedure then either party may refer the Dispute to the Court.

11. General; Complaints

a. Landmark may assign its rights and obligations under these Terms without prior notice or any limitation.

b. Landmark may authorise or allow our contractors and other third parties to provide to Landmark and/or to You services necessary or related to the Services and to perform Landmark's obligations and exercise Landmark's rights under these Terms, which may include collecting payment on Landmark's behalf.

c. No waiver on Landmark's part to exercise, and no delay in exercising, any right, power or provision hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or provision hereunder preclude the exercise of that or any other right, power or provision.

d. Unless otherwise stated in these Terms, all notices from You to Landmark must be in writing and sent to the Landmark registered office (or in the case of an Authorised Reseller, to its registered office address) and subject to paragraph e below all notices from Landmark to You will be displayed on our Websites from time to time.

e. Any complaints in relation to the Services should, in the first instance, be in writing addressed to the Customer Service Support Manager at the Landmark registered office. Landmark or its agents will respond to any such complaints in writing as soon as practicably possible.

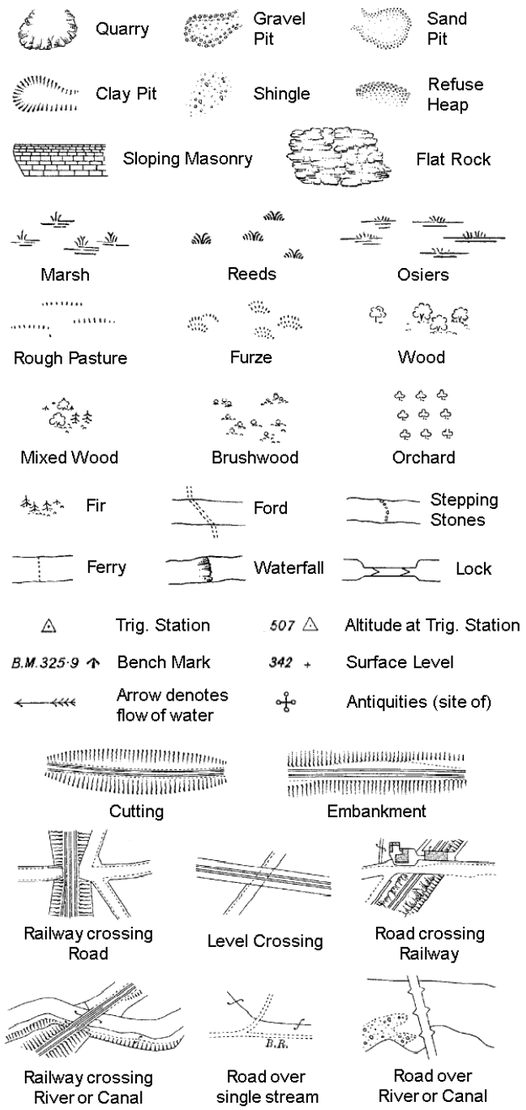
f. A person who is not a party to any contract made pursuant to these Terms shall have no right under the Contract (Right of Third Parties) Act 1999 to enforce any terms of such contract and Landmark shall not be liable to any such third party in respect of any Services supplied.

g. Landmark's Privacy Policy as displayed on the Website governs the use made of any information You supply to Landmark.

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Historical Mapping Legends

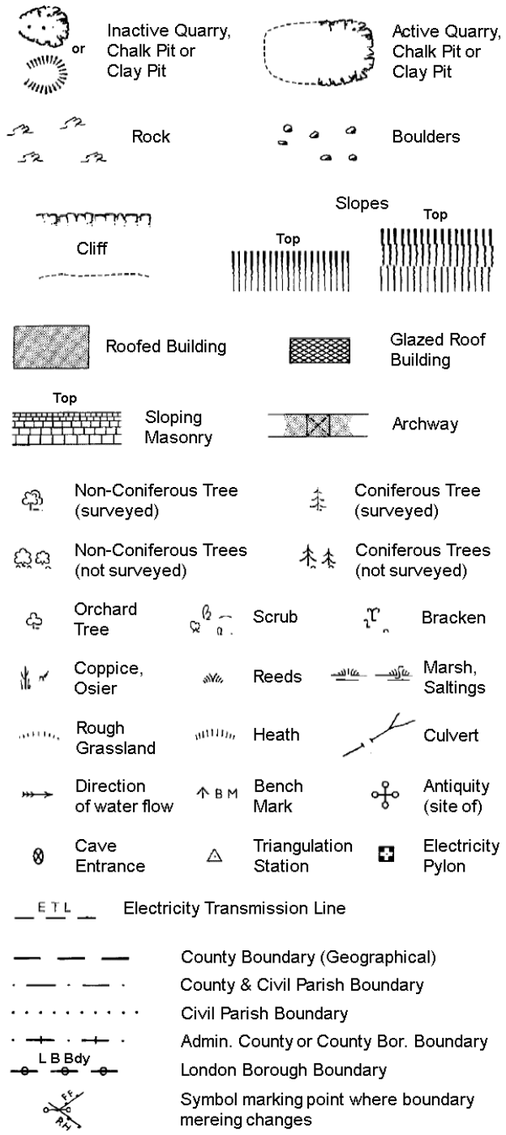
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)

B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

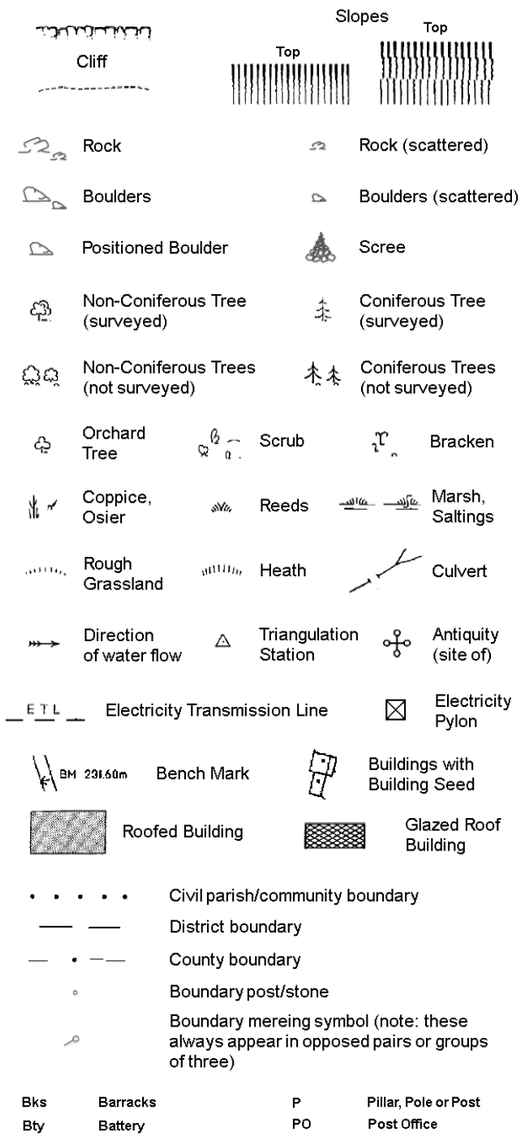
Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



County Boundary (Geographical)
County & Civil Parish Boundary
Civil Parish Boundary
Admin. County or County Bor. Boundary
L B Bdy London Borough Boundary
Symbol marking point where boundary mereing changes

BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



Civil parish/community boundary
District boundary
County boundary
Boundary post/stone
Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

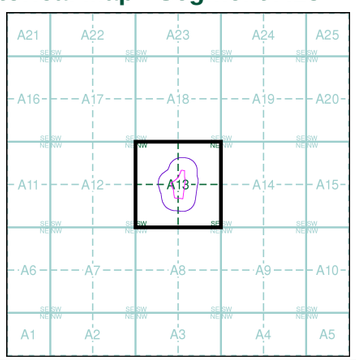
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Monmouthshire	1:2,500	1879 - 1880	2
Glamorganshire	1:2,500	1880	3
Glamorganshire	1:2,500	1901	4
Glamorganshire	1:2,500	1920	5
Ordnance Survey Plan	1:1,250	1959	6
Additional SIMs	1:1,250	1959 - 1992	7
Ordnance Survey Plan	1:2,500	1960 - 1961	8
Ordnance Survey Plan	1:1,250	1970 - 1975	9
Ordnance Survey Plan	1:2,500	1971	10
Supply of Unpublished Survey Information	1:1,250	1973	11
Additional SIMs	1:2,500	1987	12
Additional SIMs	1:1,250	1988 - 1989	13
Large-Scale National Grid Data	1:1,250	1993	14
Large-Scale National Grid Data	1:1,250	1994 - 1995	15

Historical Map - Segment A13



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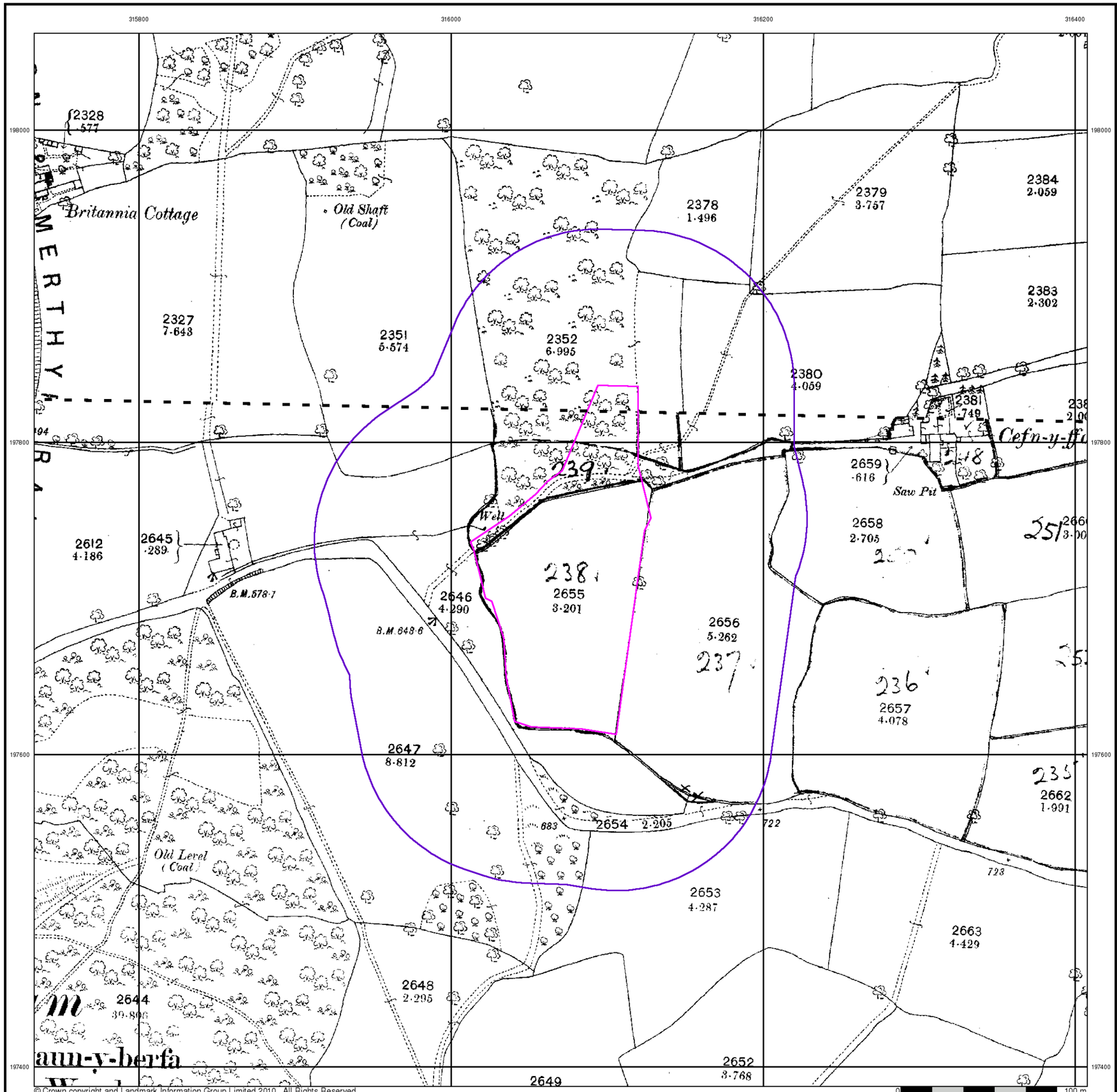
Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
Search Buffer (m):	100

Site Details

Site at 316100, 197720

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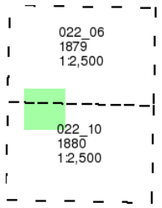
Monmouthshire

Published 1879 - 1880

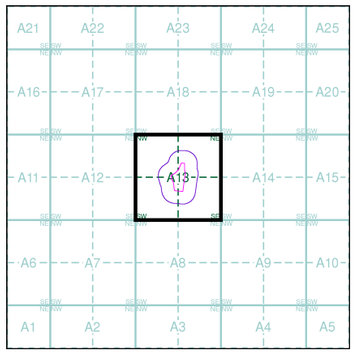
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



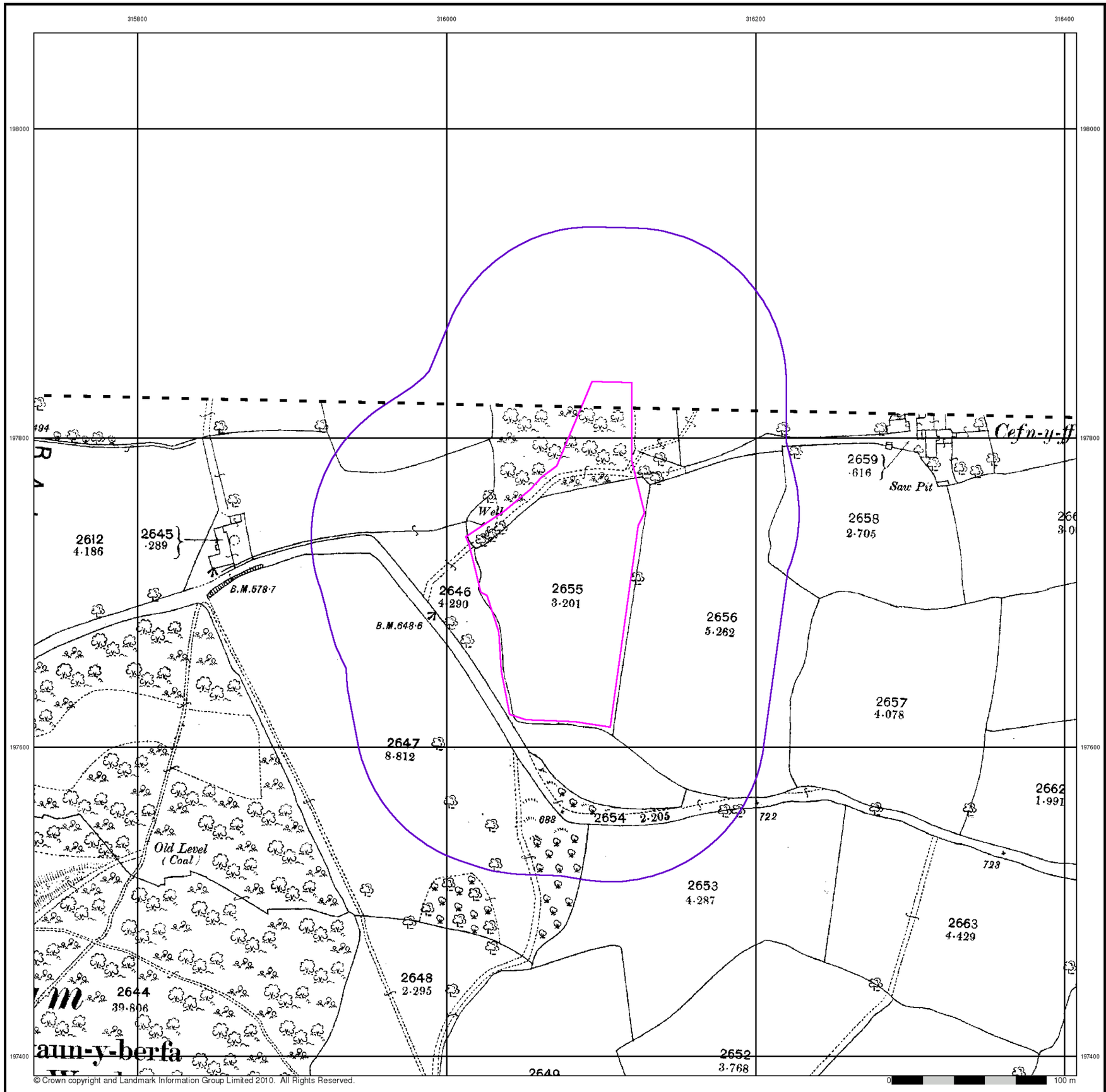
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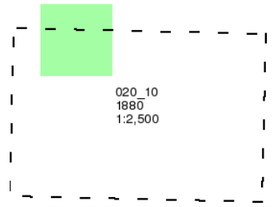
Glamorganshire

Published 1880

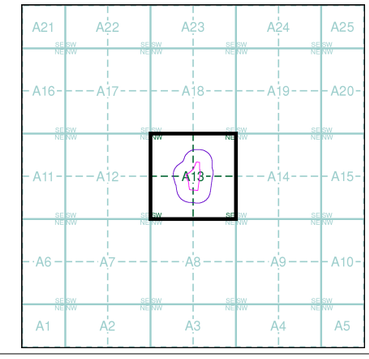
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



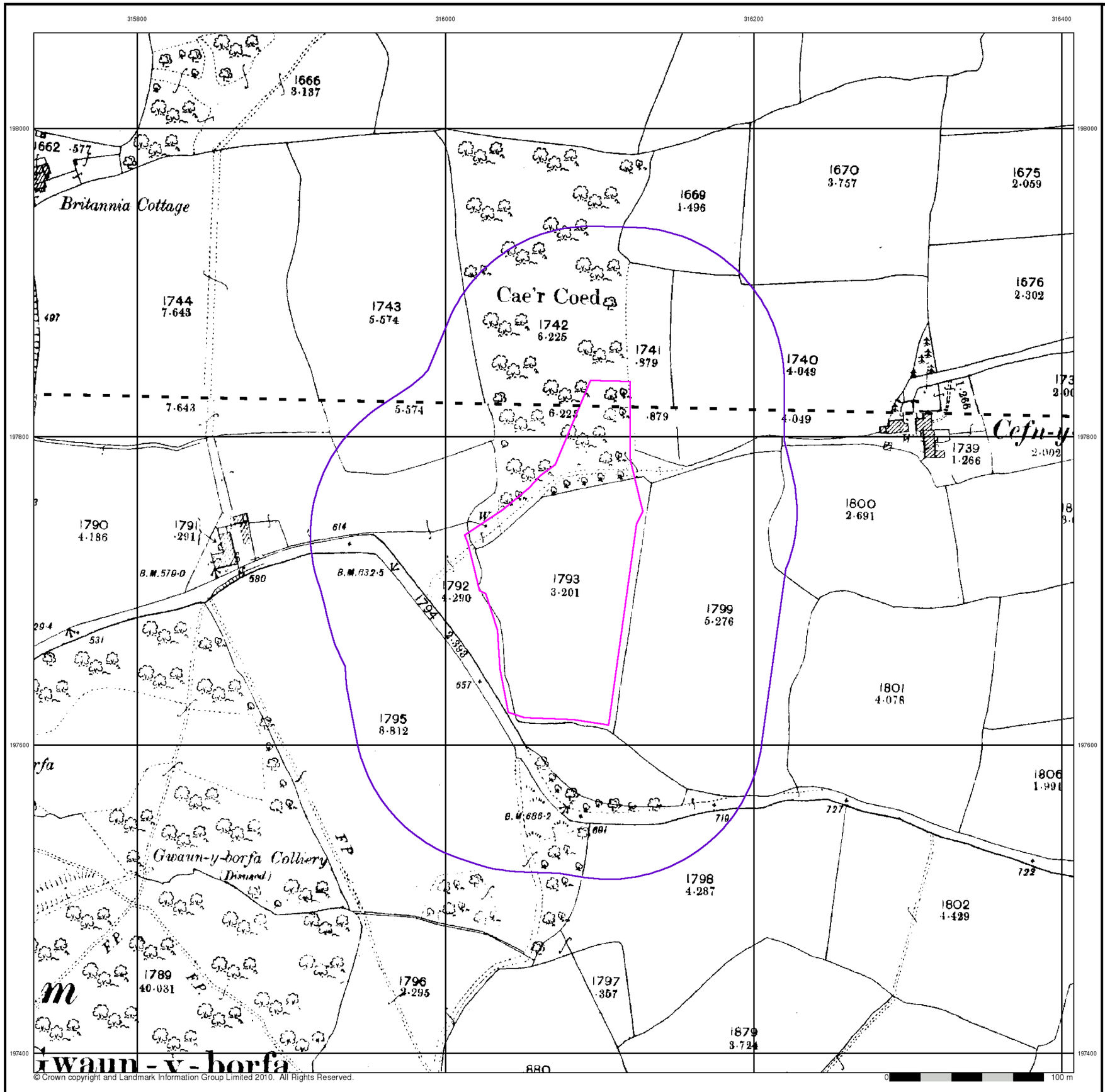
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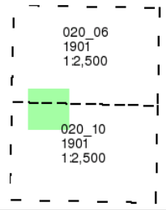
Glamorganshire

Published 1901

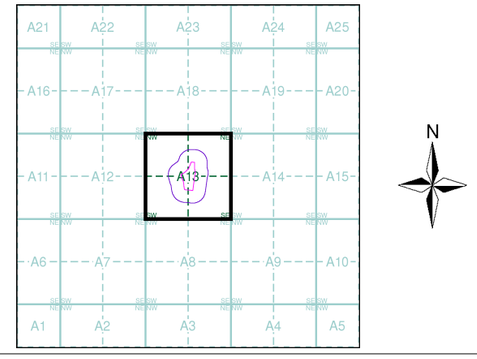
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



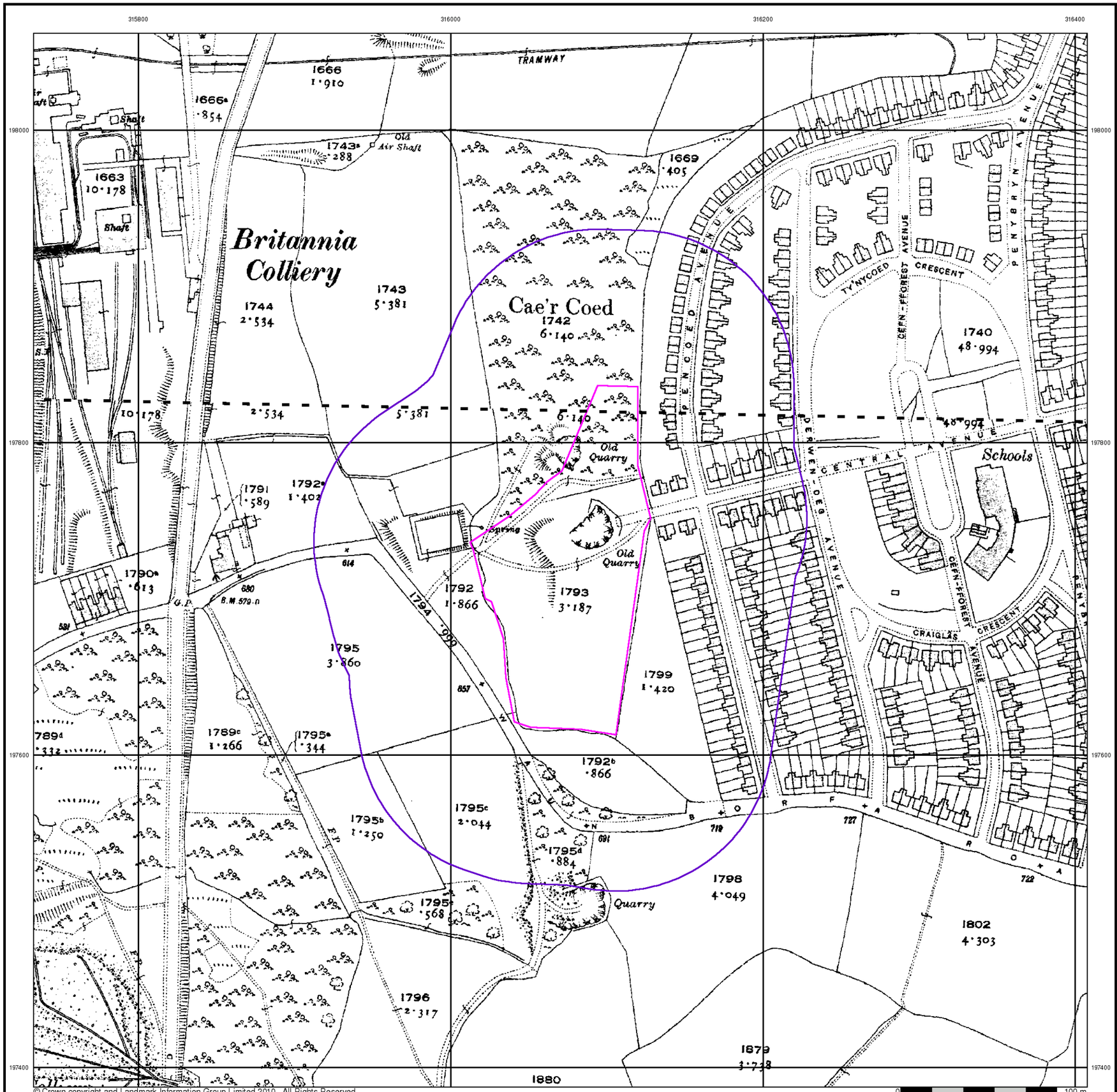
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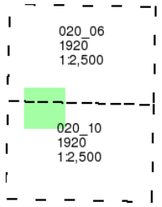
Glamorganshire

Published 1920

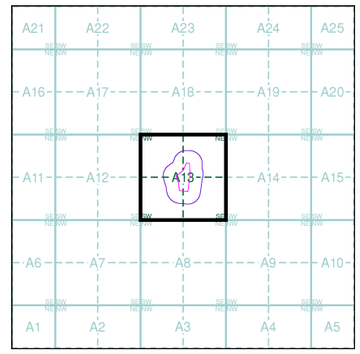
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



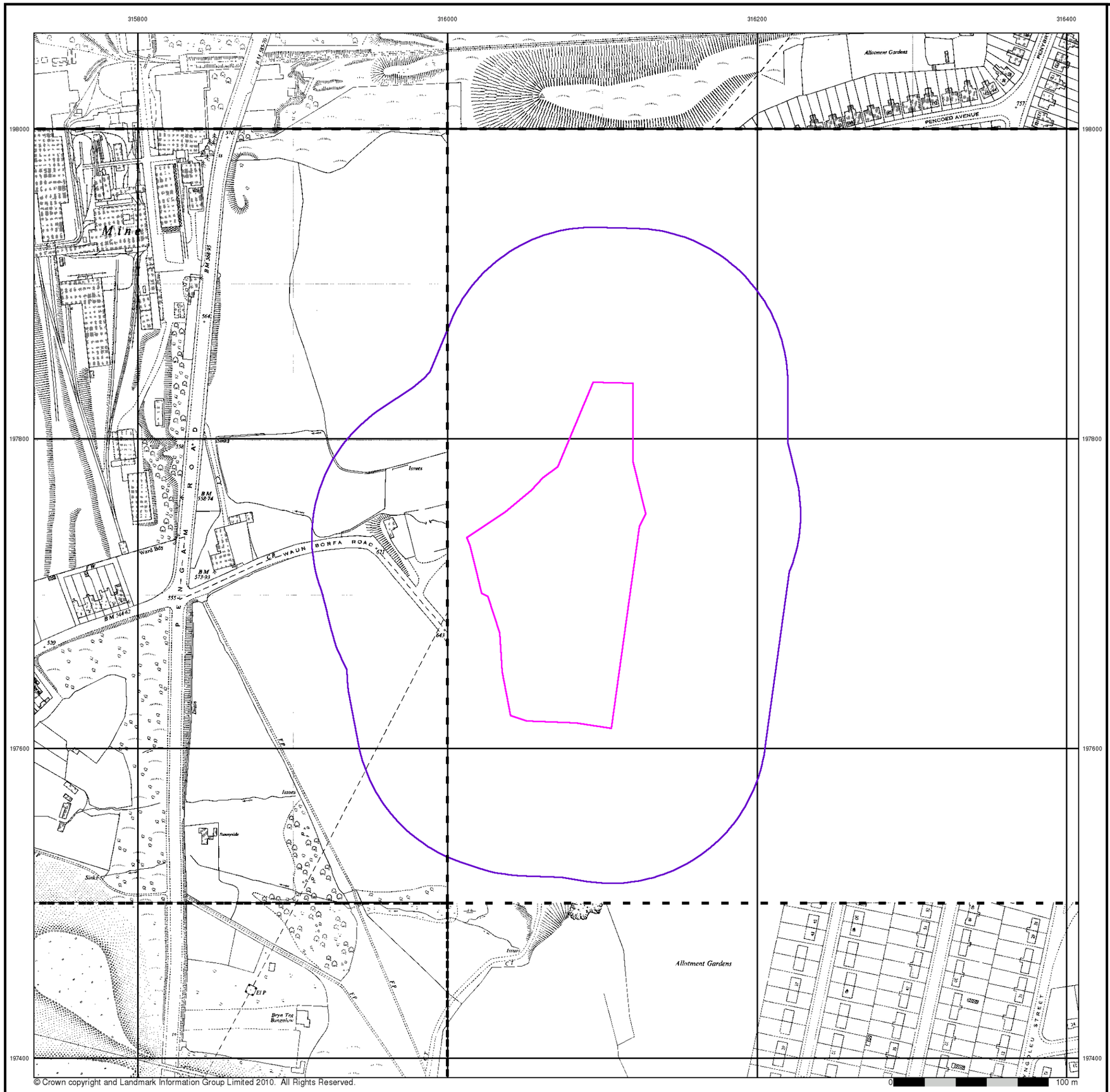
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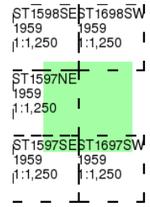
Ordnance Survey Plan

Published 1959

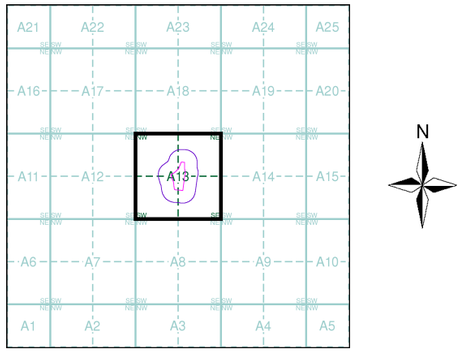
Source map scale - 1:1,250

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
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Site Details

Site at 316100, 197720

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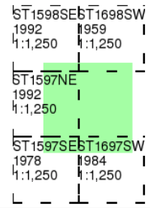
Additional SIMs

Published 1959 - 1992

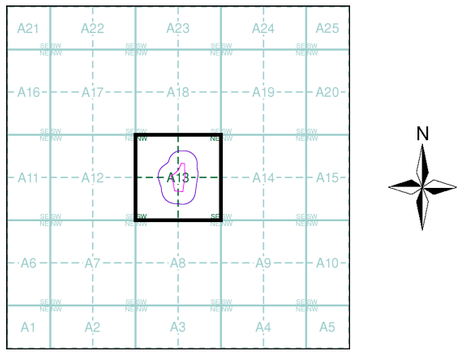
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

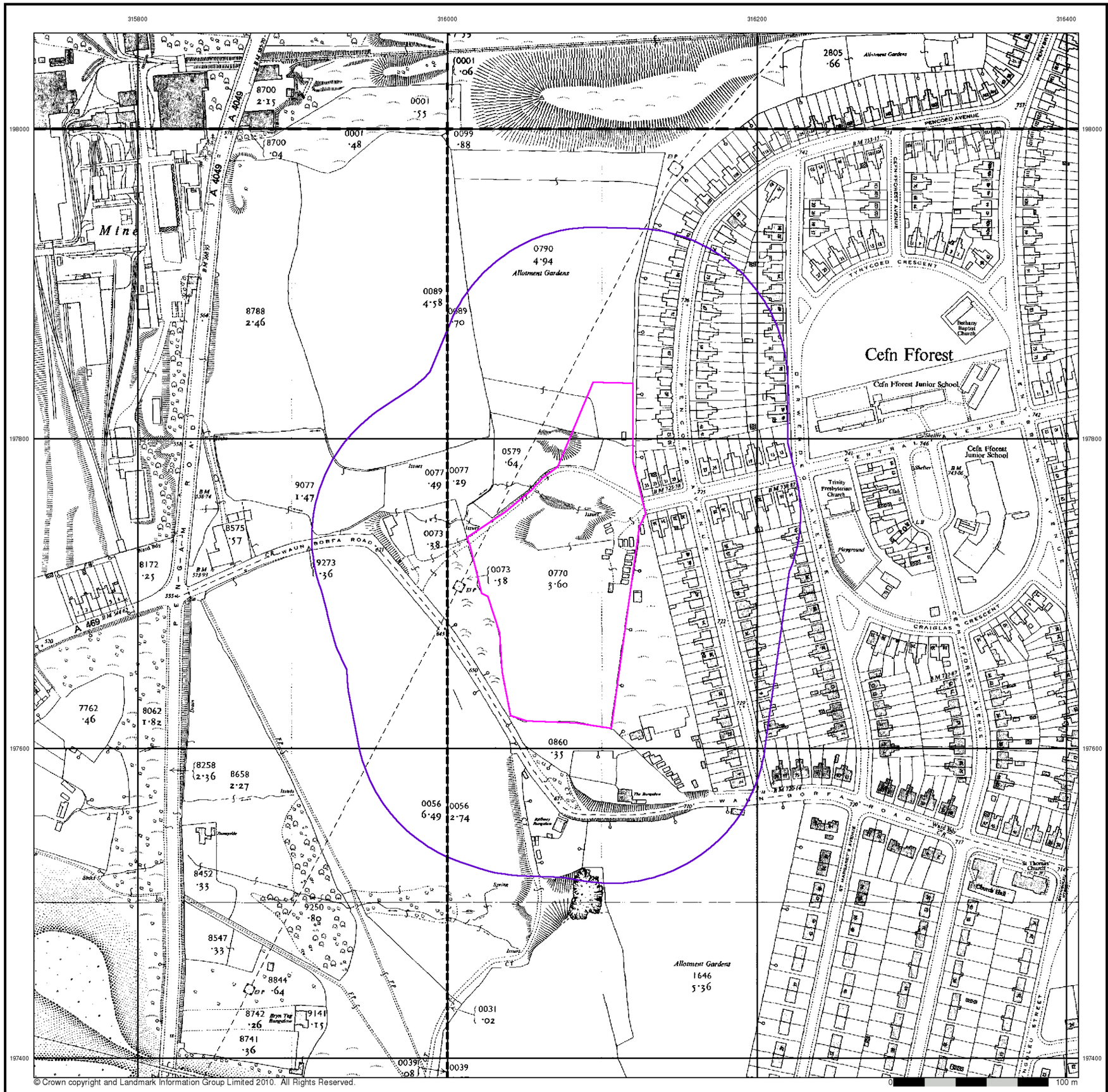
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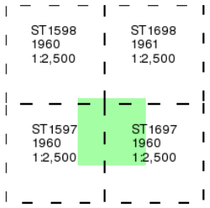
Ordnance Survey Plan

Published 1960 - 1961

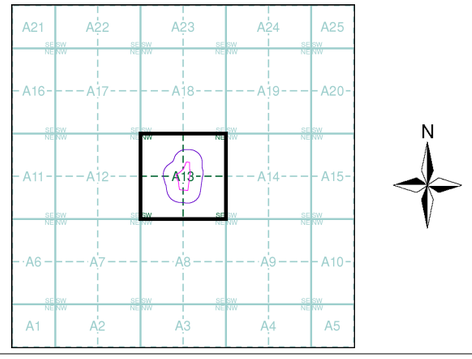
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



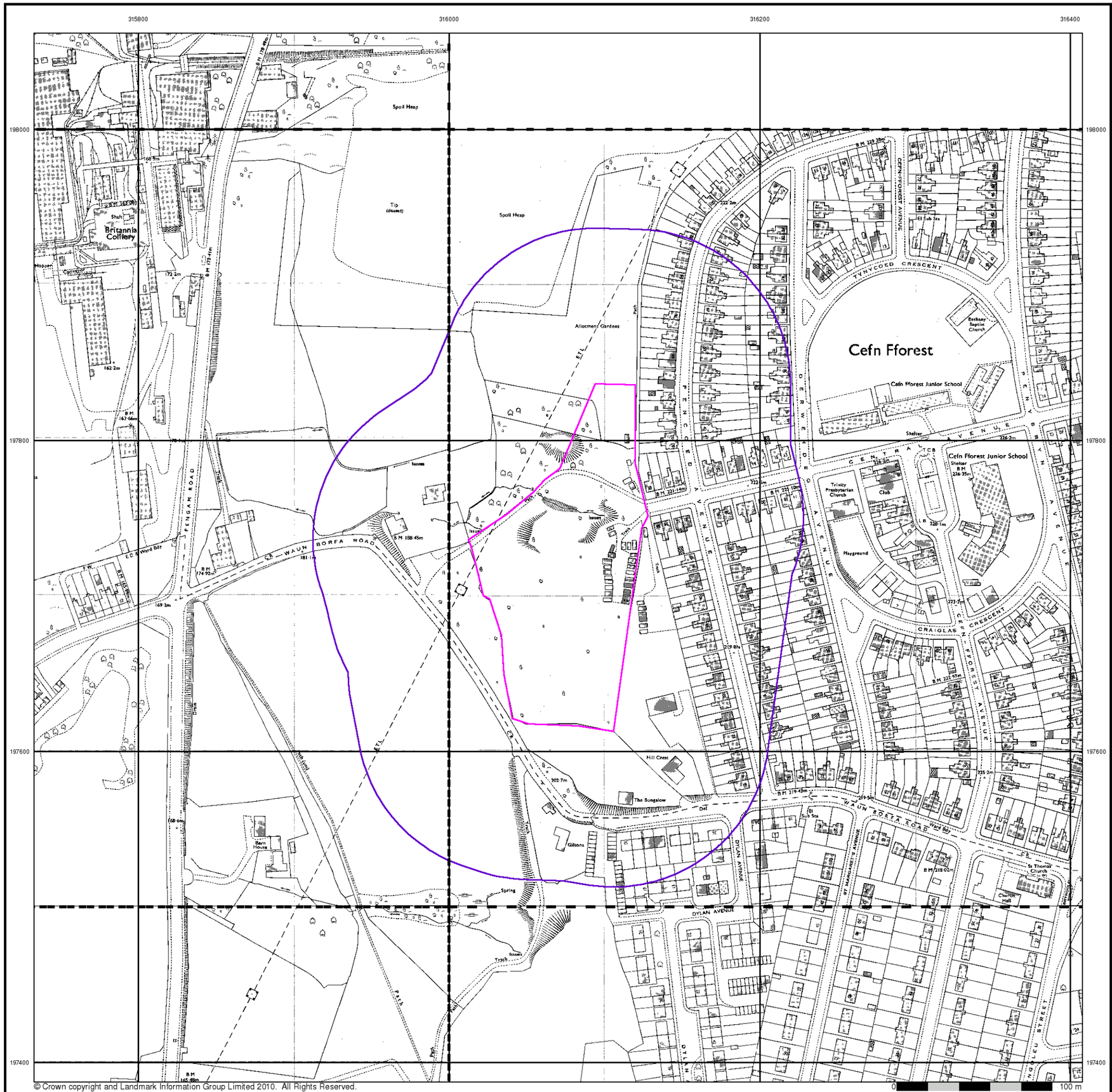
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Site Area (Ha):	1.6
Search Buffer (m):	100

Site Details

Site at 316100, 197720

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Ordnance Survey Plan

Published 1970 - 1975

Source map scale - 1:1,250

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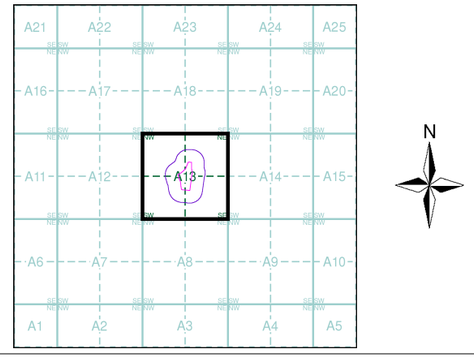
Map Name(s) and Date(s)

ST1598SE
1970
1:1,250

ST1597NE ST1697NW
1975 1971
1:1,250 1:1,250

ST1597SE ST1697SW
1970 1973
1:1,250 1:1,250

Historical Map - Segment A13



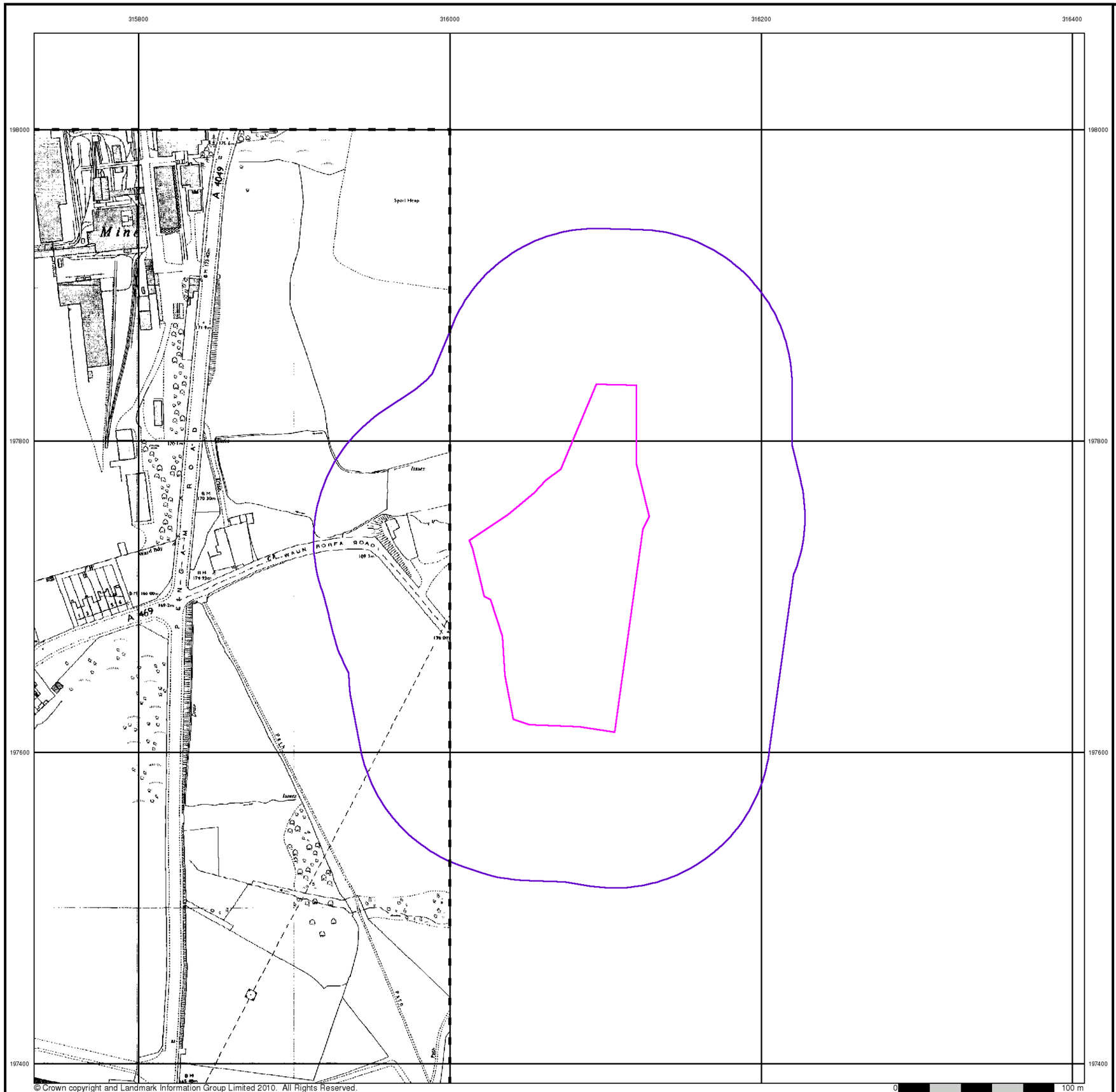
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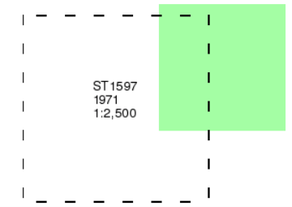
Ordnance Survey Plan

Published 1971

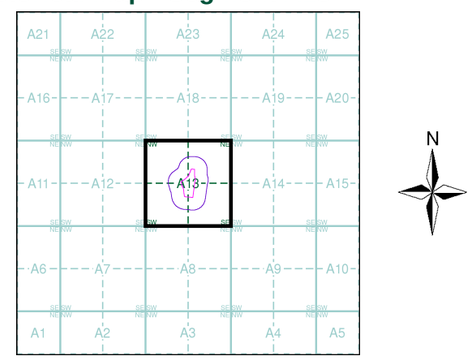
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

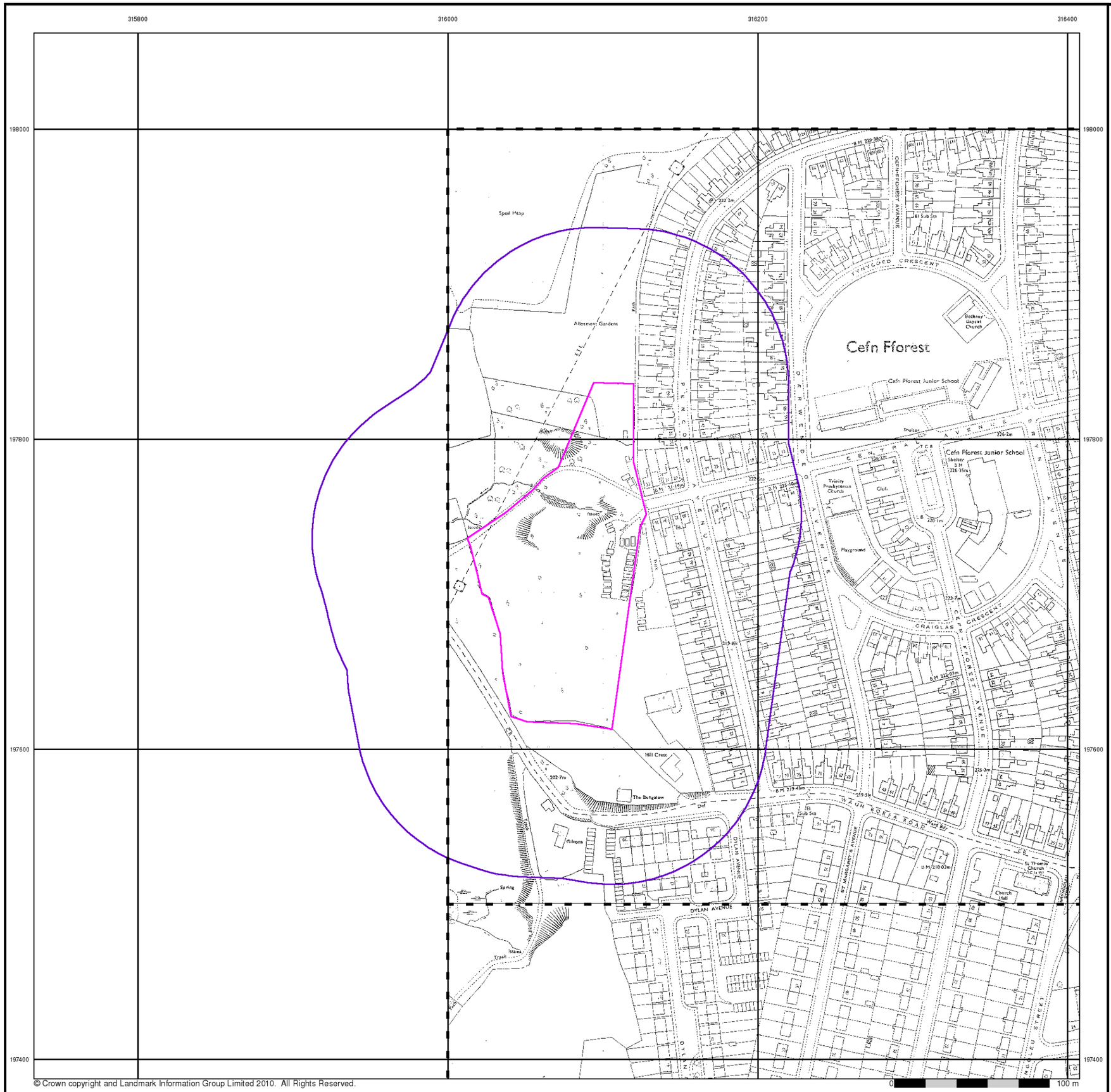
Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
Search Buffer (m):	100

Site Details

Site at 316100, 197720

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Supply of Unpublished Survey Information

Published 1973

Source map scale - 1:1,250

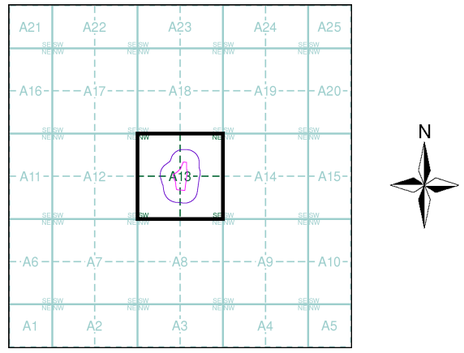
SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a `work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

ST1697NW
1973
1:1,250

ST1697SW
1973
1:1,250

Historical Map - Segment A13



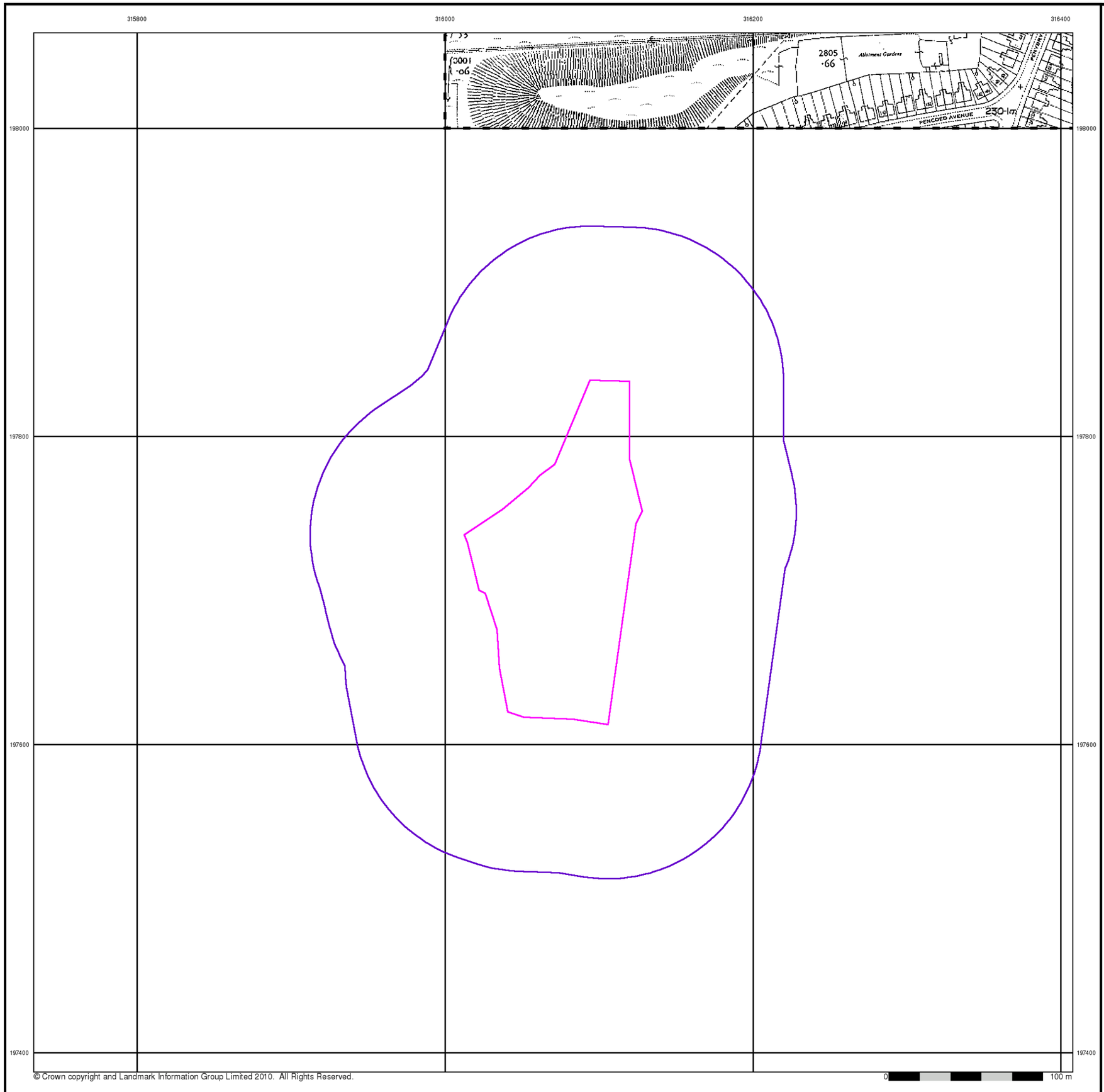
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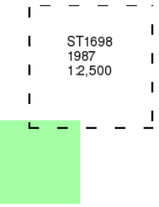
Additional SIMs

Published 1987

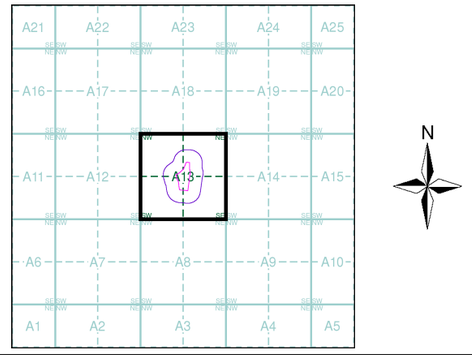
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

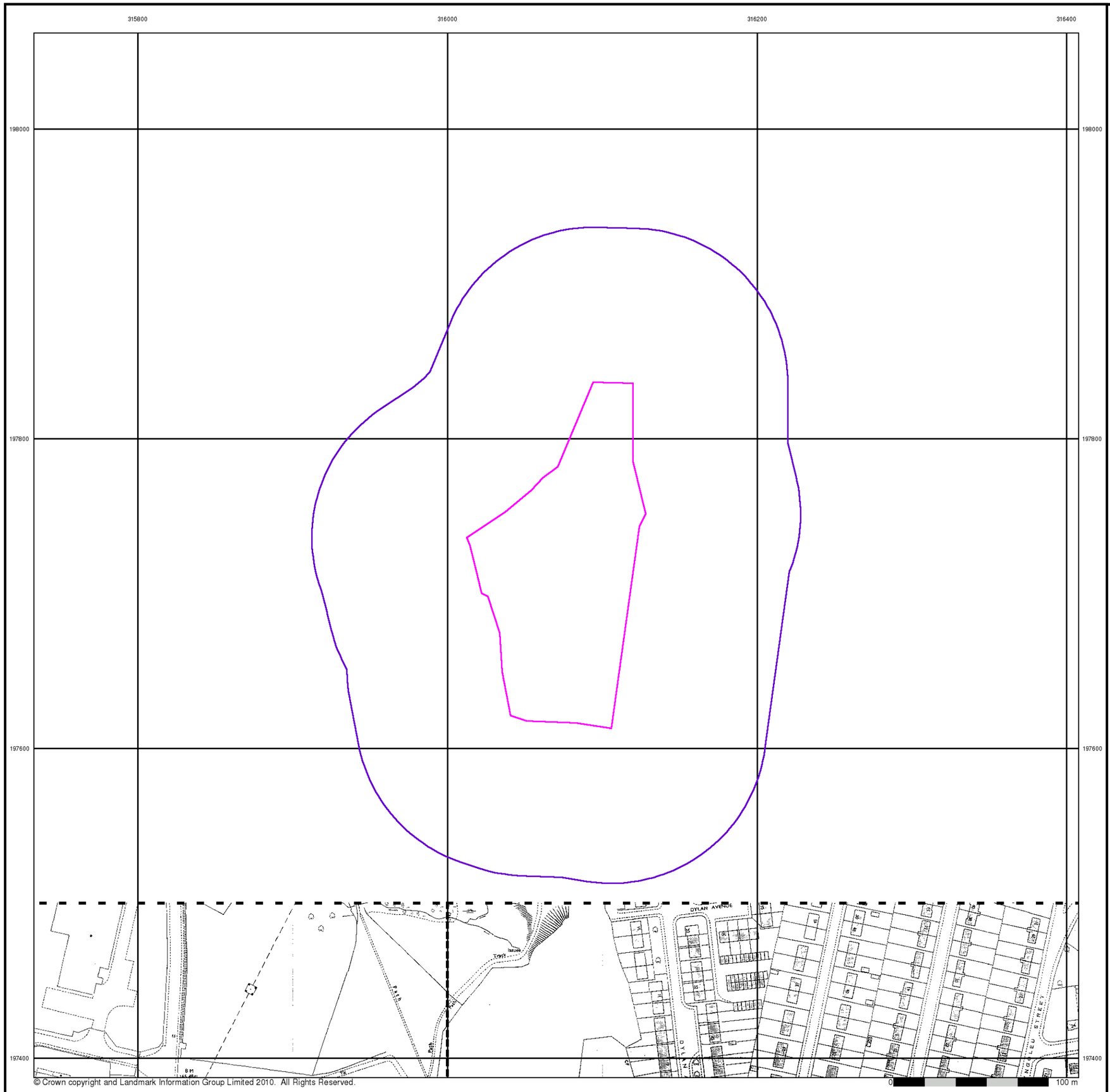
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Customer Ref:	11230
National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
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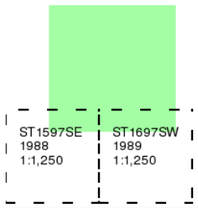
Additional SIMs

Published 1988 - 1989

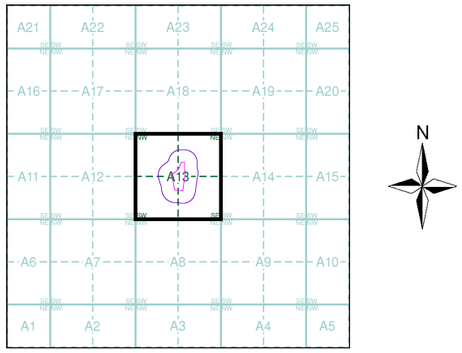
Source map scale - 1:1,250

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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

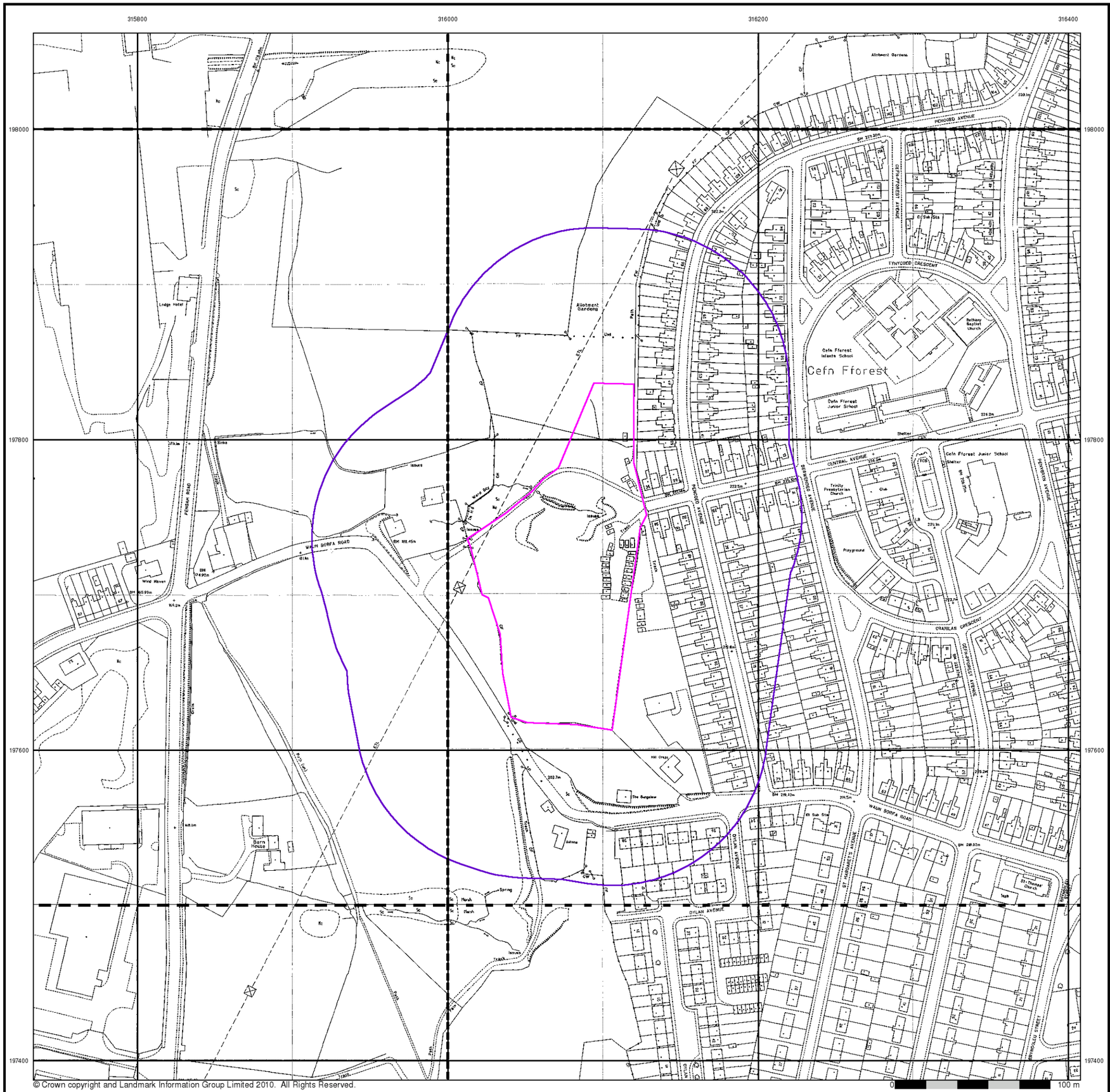
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National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
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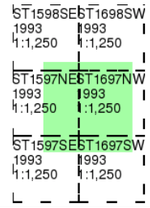
Large-Scale National Grid Data

Published 1993

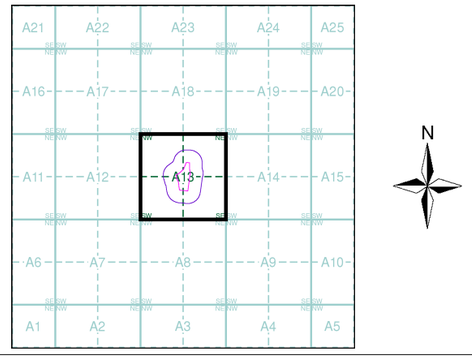
Source map scale - 1:1,250

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

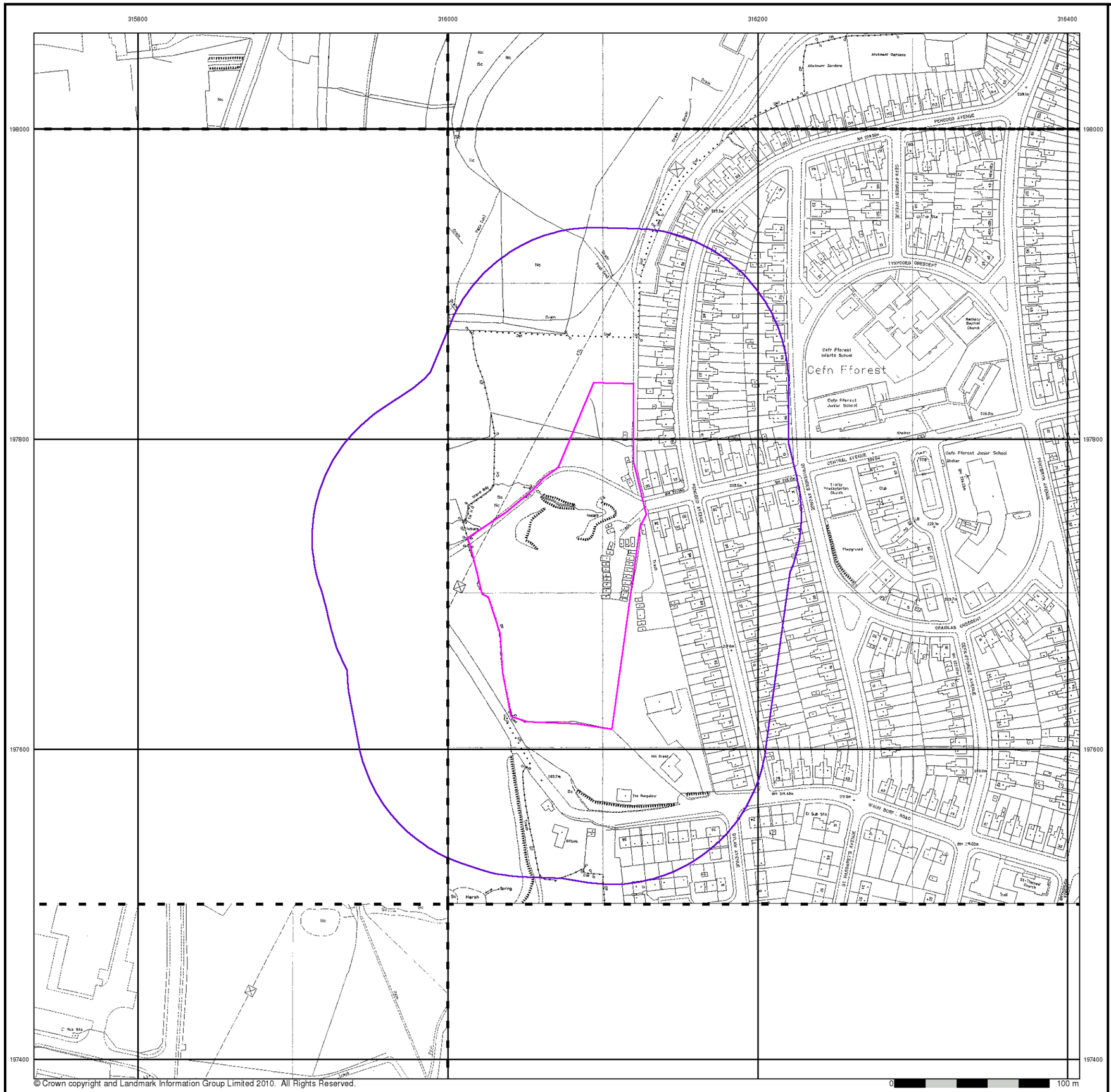
Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197720
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Site Area (Ha):	1.6
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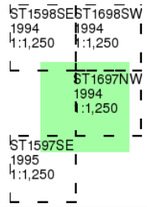
Large-Scale National Grid Data

Published 1994 - 1995

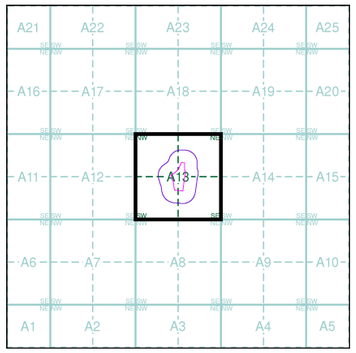
Source map scale - 1:1,250

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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
Search Buffer (m):	100

Site Details

Site at 316100, 197720

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Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
·285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy. County Borough Boundary (England)
Co. Burgh Bdy. County Burgh Boundary (Scotland)
R.D. Bdy. Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Pylon
Electricity Transmission Line
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Road Under
Road Over
Level Crossing
Foot Bridge
Standard Gauge Single Track
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

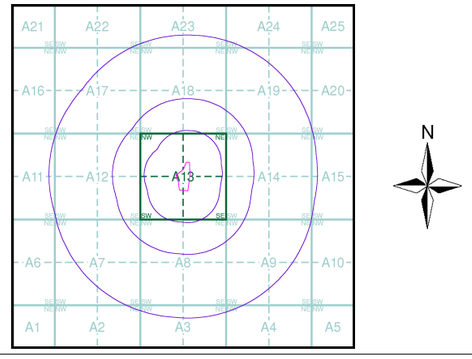
Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Mud
Sand
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHW(S) Mean high water (springs)
MLW(S) Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

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Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Monmouthshire	1:10,560	1886	2
Glamorganshire	1:10,560	1901	3
Glamorganshire	1:10,560	1922	4
Glamorganshire	1:10,560	1938 - 1945	5
Historical Aerial Photography	1:10,560	1945 - 1949	6
Glamorganshire	1:10,560	1953	7
Ordnance Survey Plan	1:10,000	1960 - 1965	8
Ordnance Survey Plan	1:10,000	1965	9
Ordnance Survey Plan	1:10,000	1974 - 1975	10
Ordnance Survey Plan	1:10,000	1986	11
Ordnance Survey Plan	1:10,000	1995	12
10K Raster Mapping	1:10,000	1999	13
10K Raster Mapping	1:10,000	2006	14
10K Raster Mapping	1:10,000	2010	15

Historical Map - Slice A



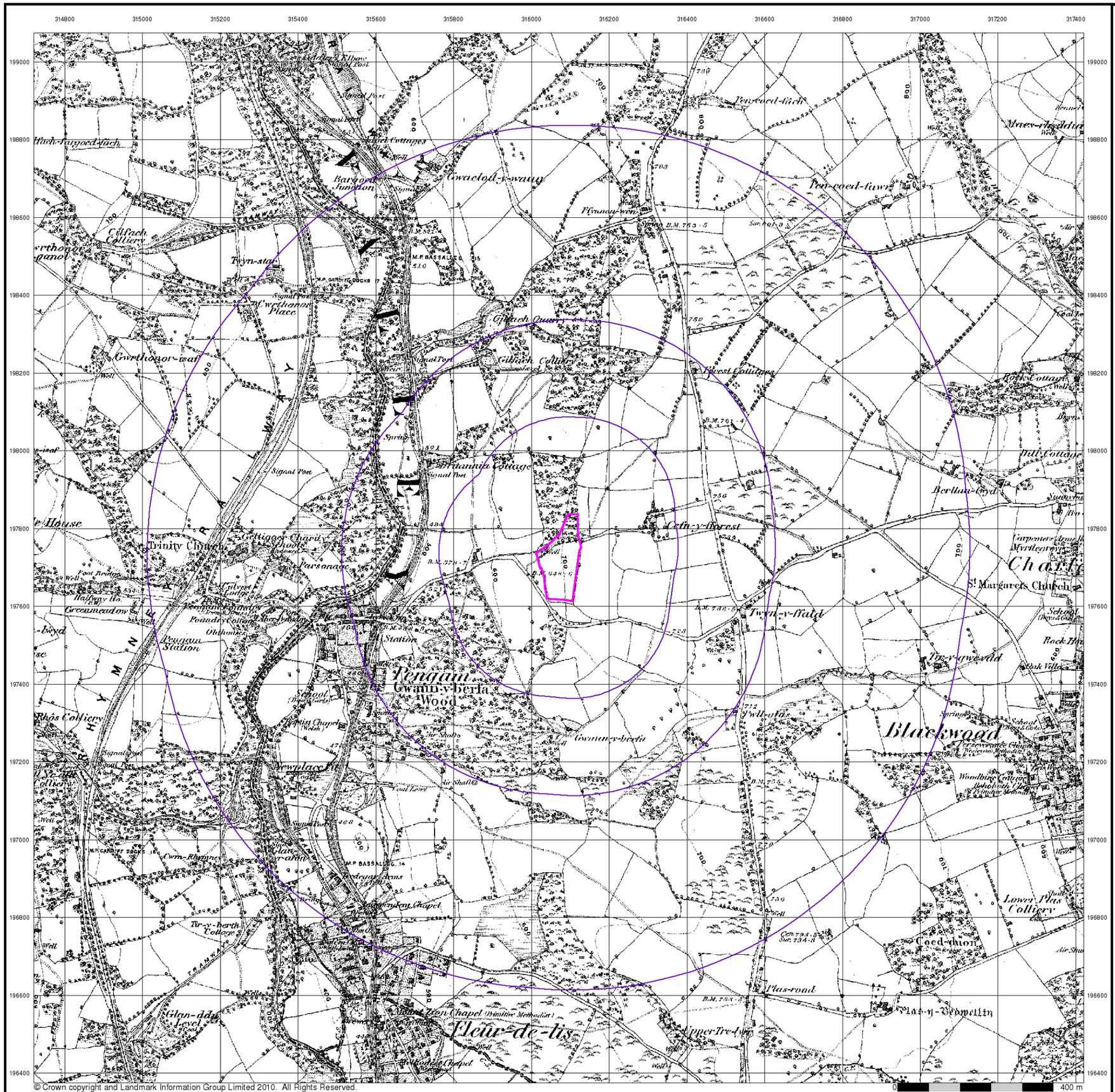
Order Details

Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
Search Buffer (m):	1000

Site Details

Site at 316100, 197720

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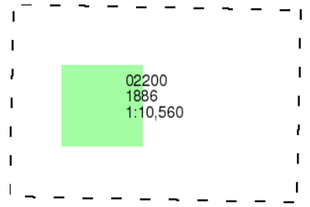
Monmouthshire

Published 1886

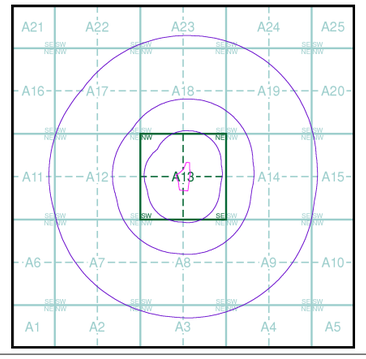
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

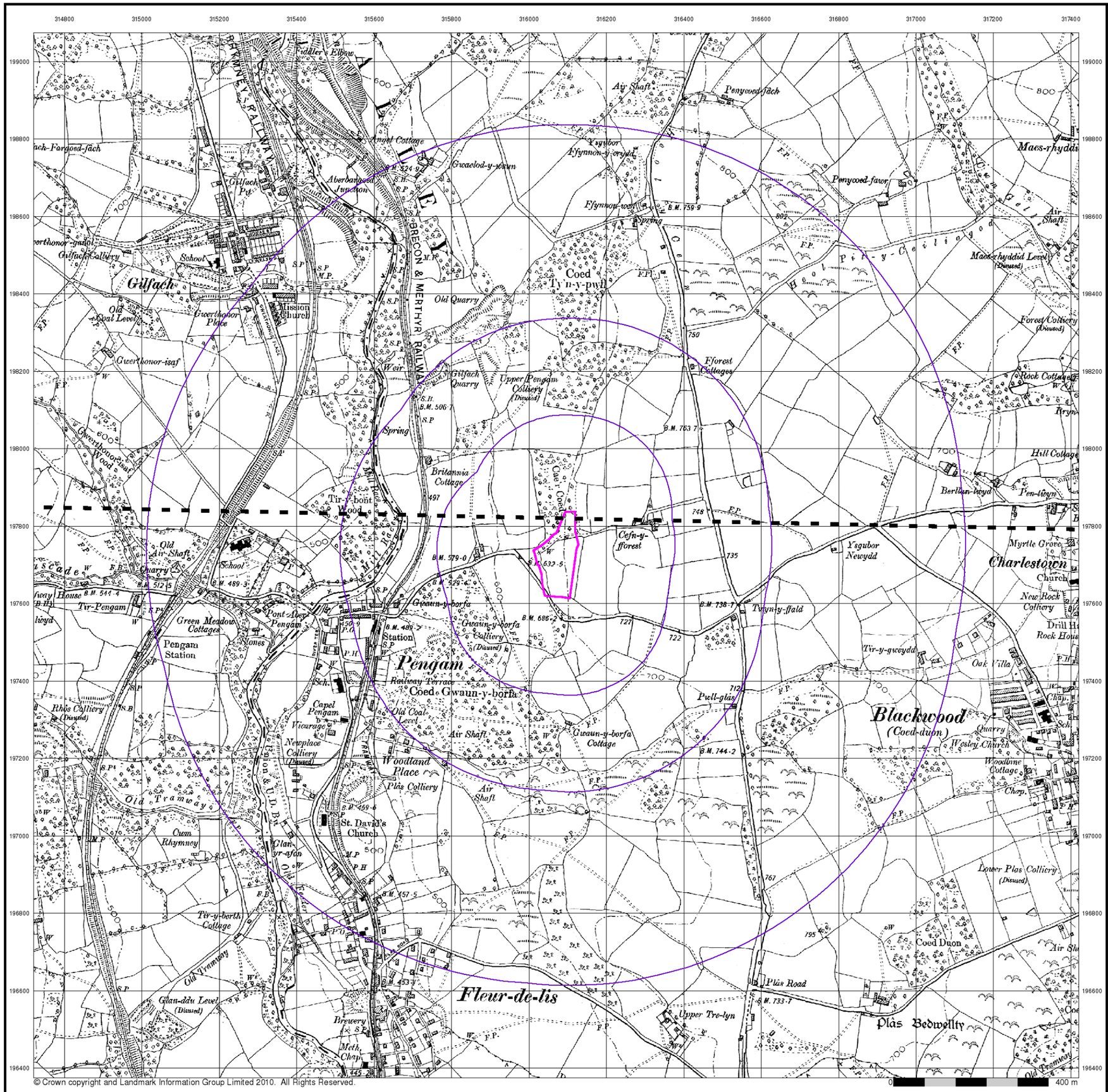
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Slice:	A
Site Area (Ha):	1.6
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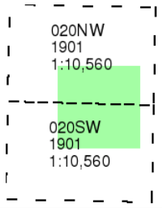
Glamorganshire

Published 1901

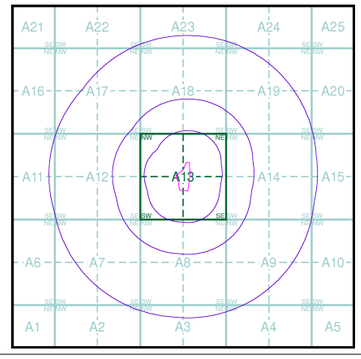
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

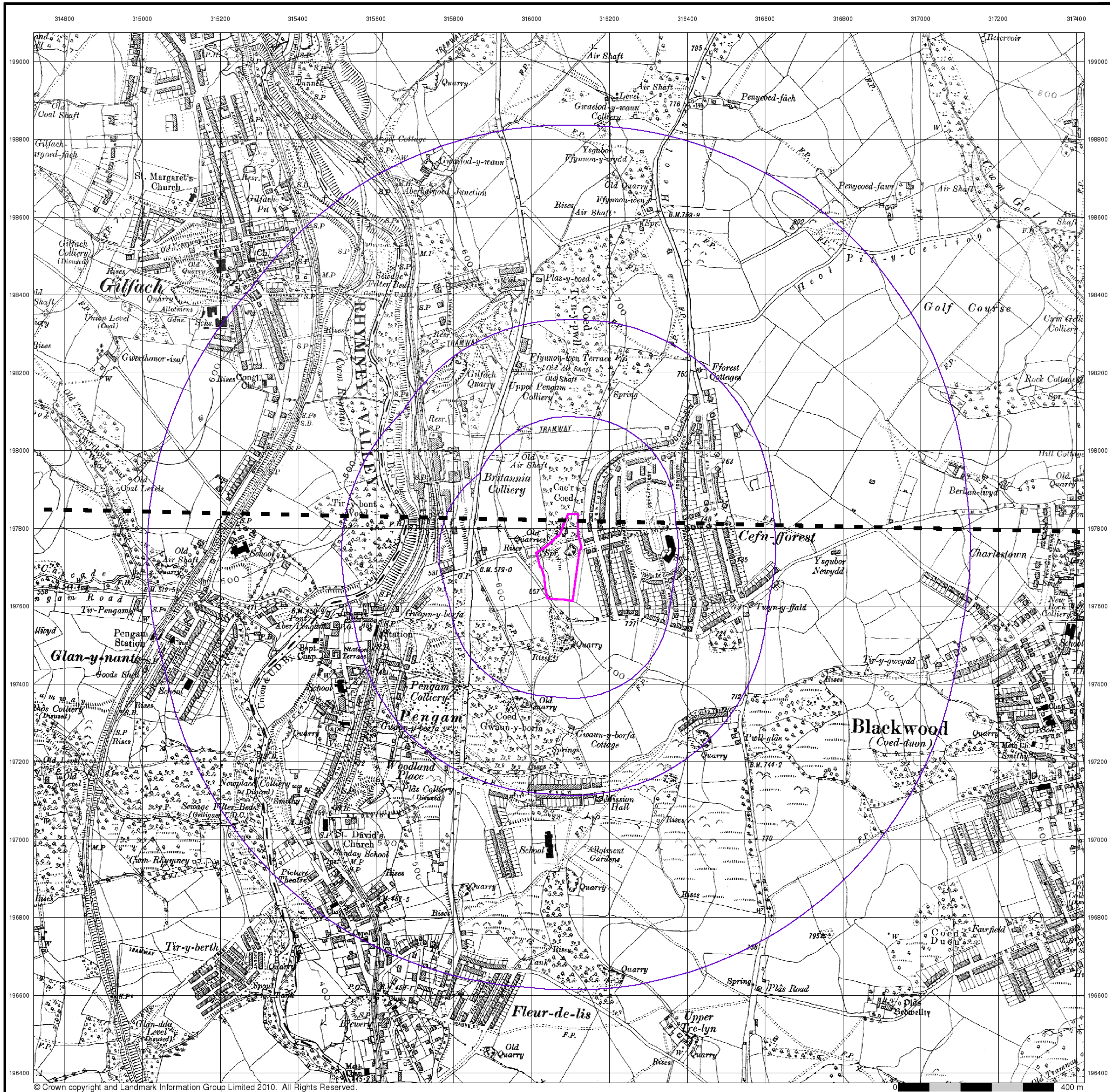
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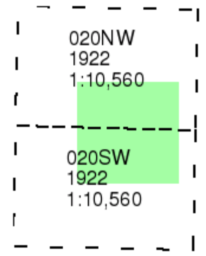
Glamorganshire

Published 1922

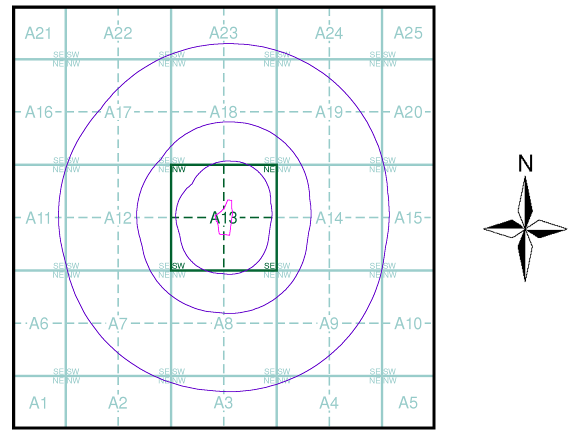
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



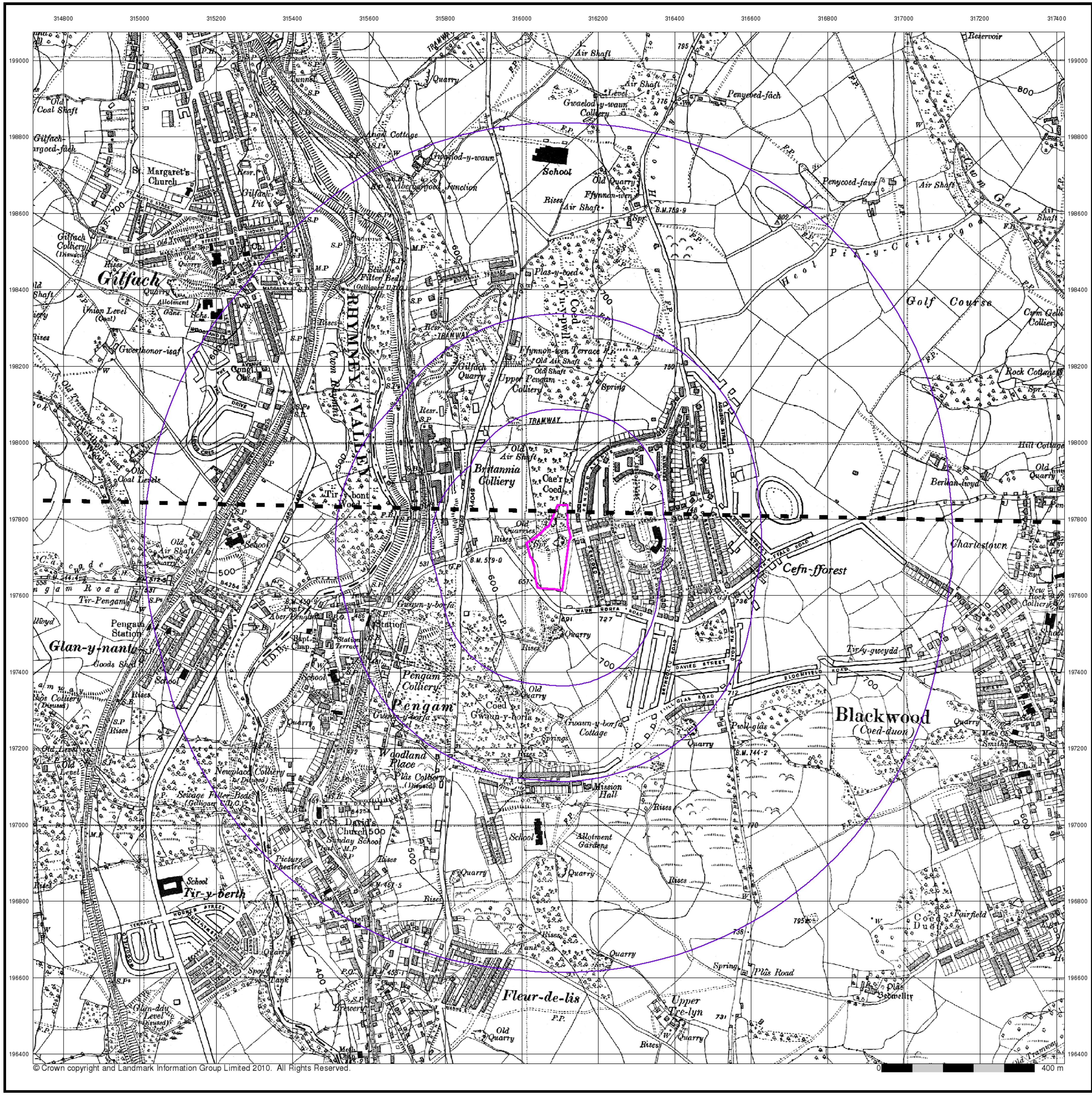
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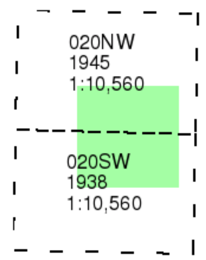
Glamorganshire

Published 1938 - 1945

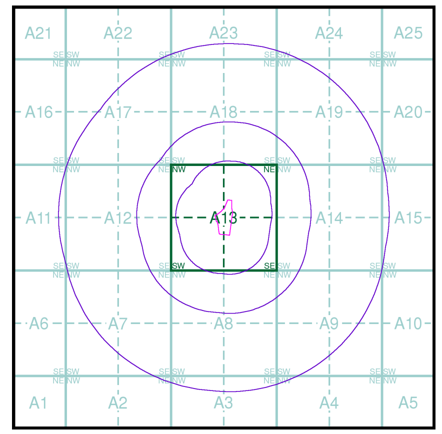
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



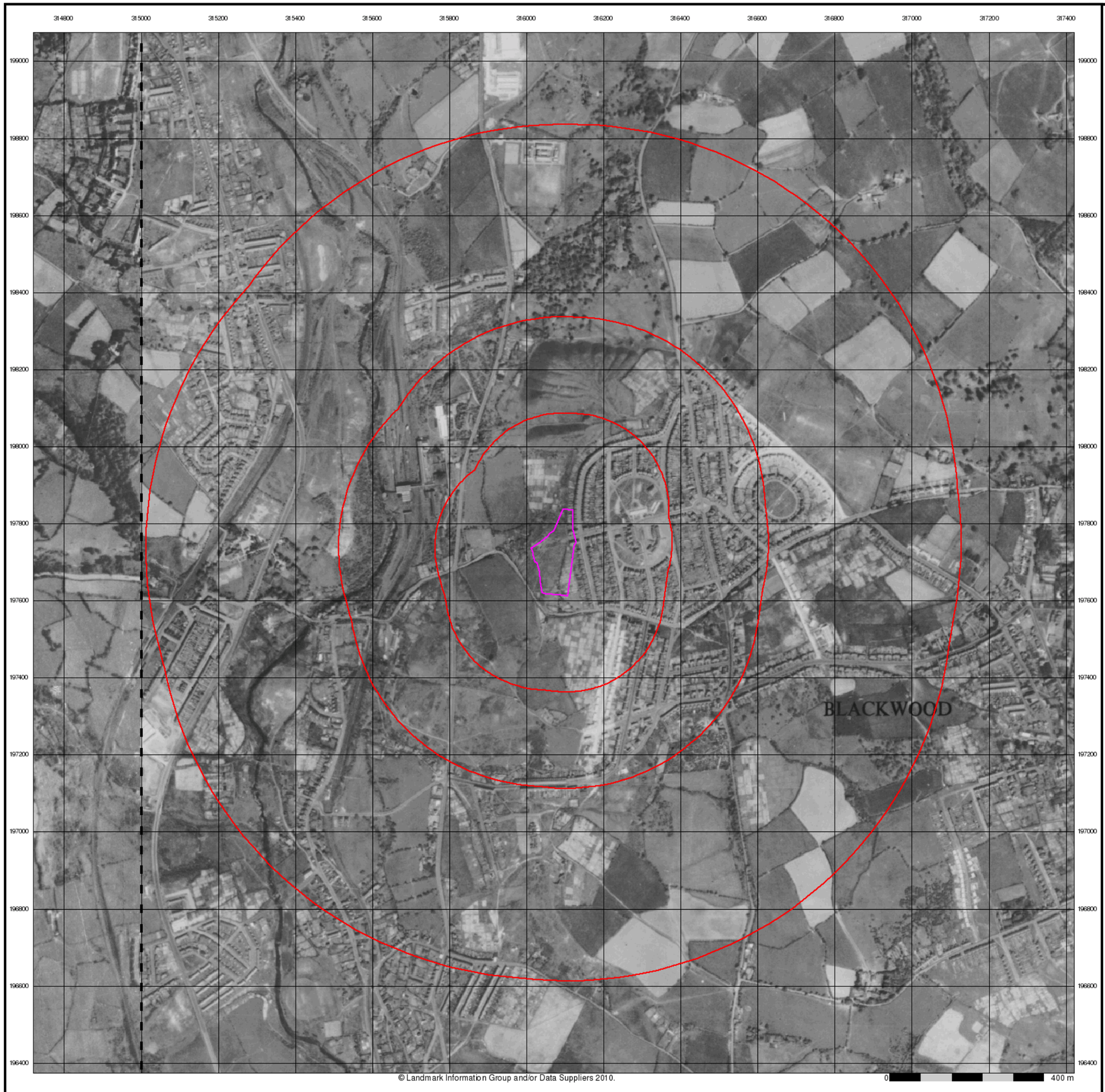
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Customer Ref: 11230
National Grid Reference: 316080, 197720
Slice: A
Site Area (Ha): 1.6
Search Buffer (m): 1000

Site Details

Site at 316100, 197720

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Historical Aerial Photography

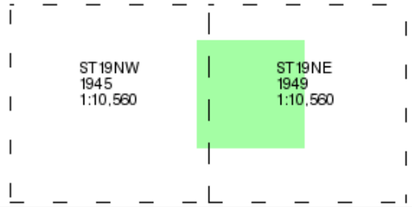
Published 1945 - 1949

Source map scale - 1:10,560

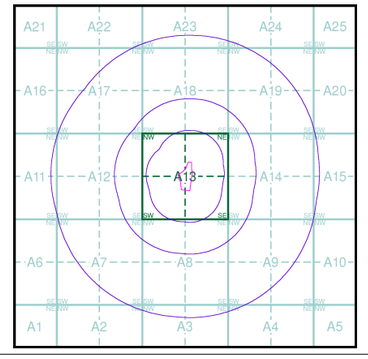
The Historical Aerial Photos were produced by the Ordnance Survey at a scale of 1:1,250 and 1:10,560 from Air Force photography. They were produced between 1944 and 1951 as an interim measure, pending preparation of conventional mapping, due to post war resource shortages. New security measures in the 1950's meant that every photograph was re-checked for potentially unsafe information with security sites replaced by fake fields or clouds. The original editions were withdrawn and only later made available after a period of fifty years although due to the accuracy of the editing, without viewing both revisions it is not easy to spot the edits. Where available Landmark have included both revisions.

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Map Name(s) and Date(s)



Historical Aerial Photography - Slice A



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Order Details

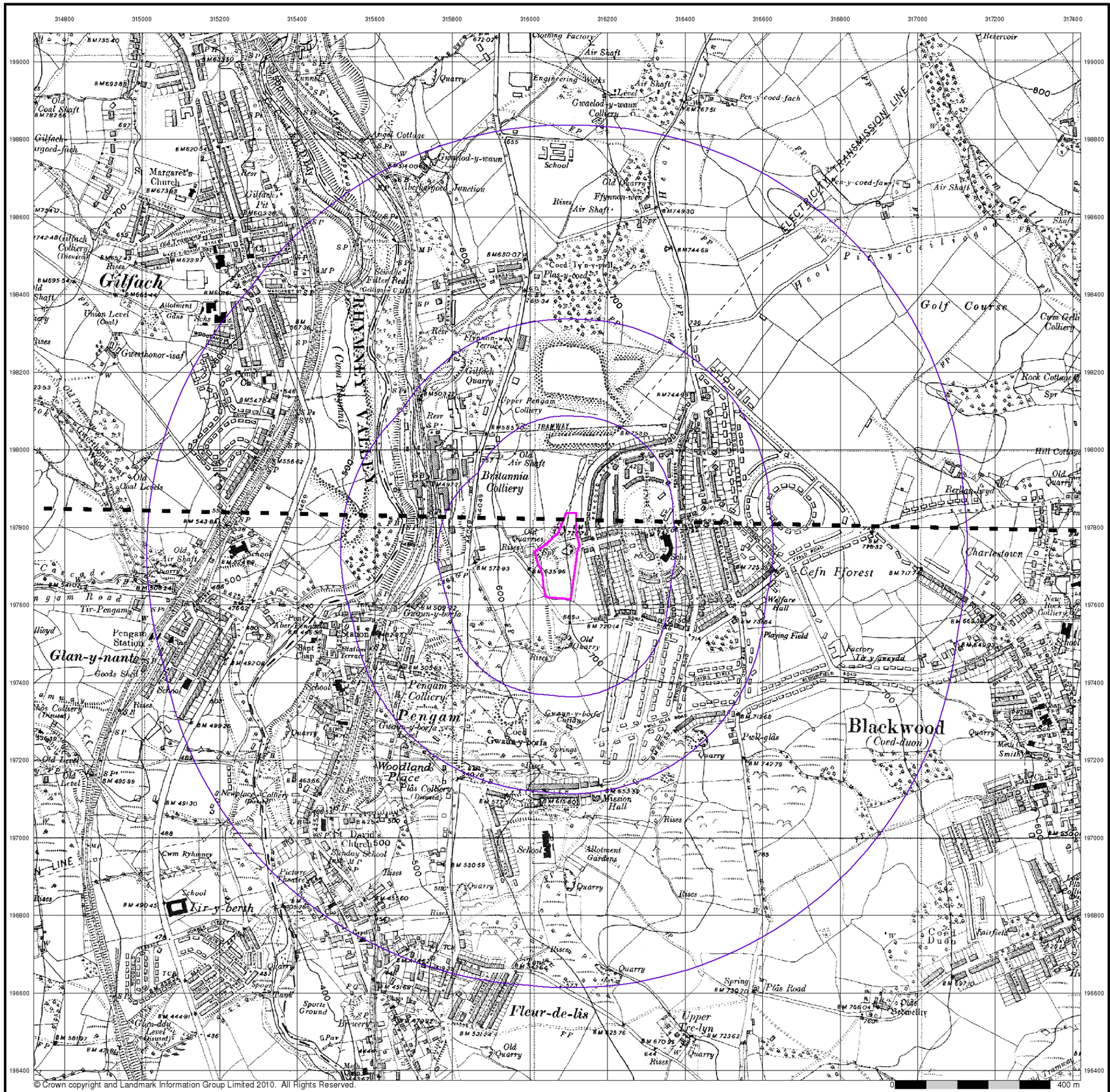
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Search Buffer (m):	1000

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Glamorganshire

Published 1953

Source map scale - 1:10,560

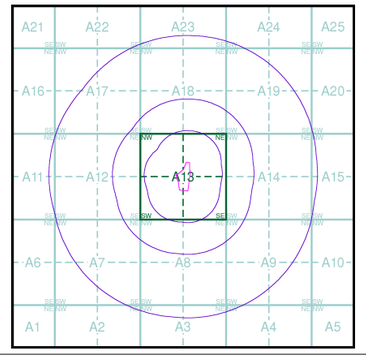
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

020NW
1953
1:10,560

020SW
1953
1:10,560

Historical Map - Slice A



Order Details

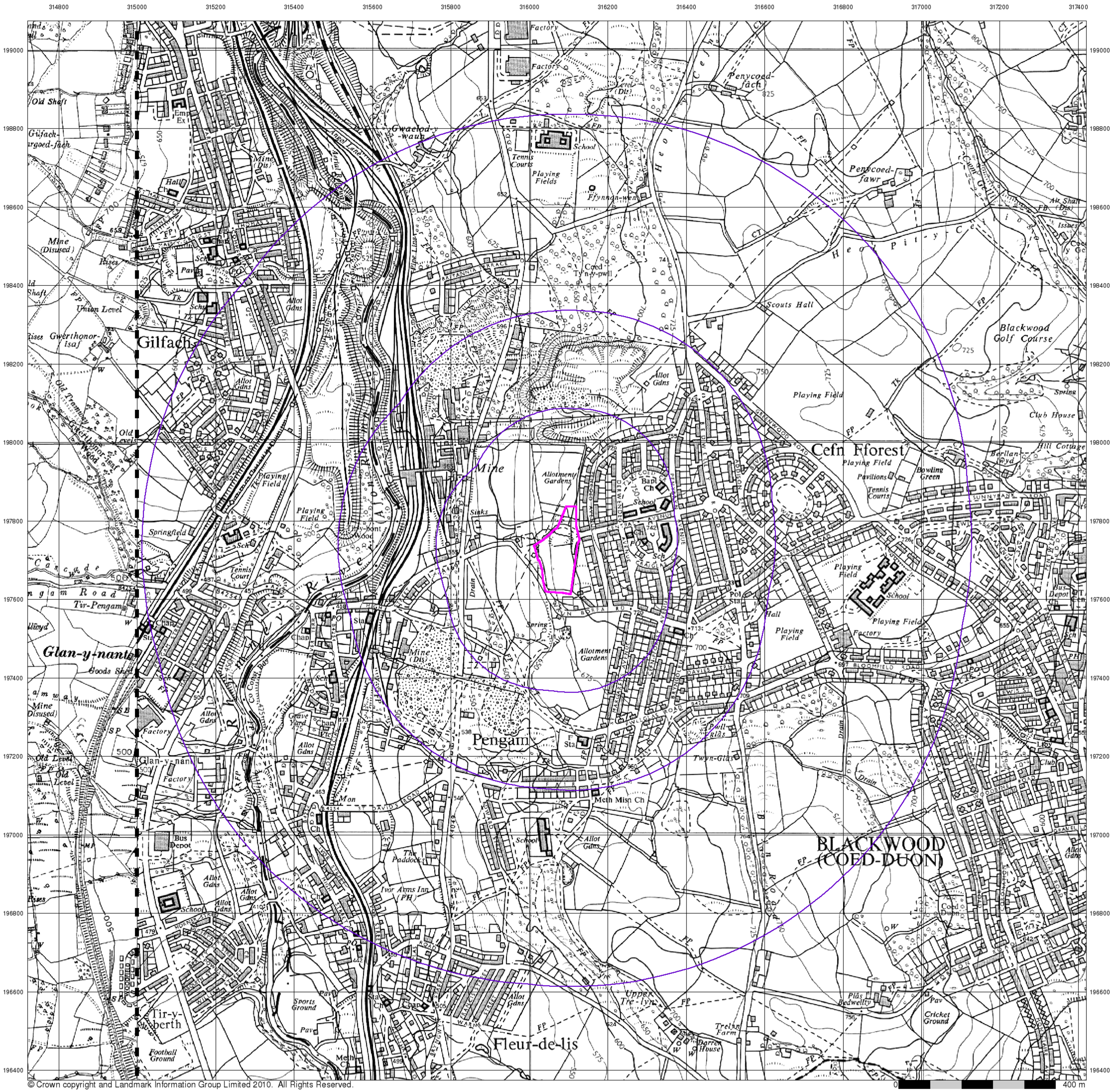
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Ordnance Survey Plan

Published 1960 - 1965

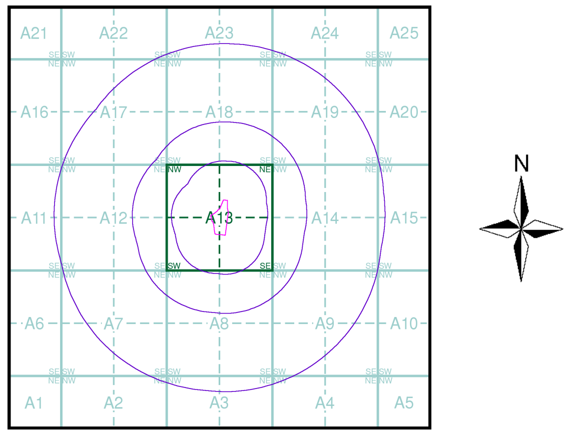
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Map Name(s) and Date(s)

ST19NW	ST19NE
1960	1965
1:10,560	1:10,560

Historical Map - Slice A



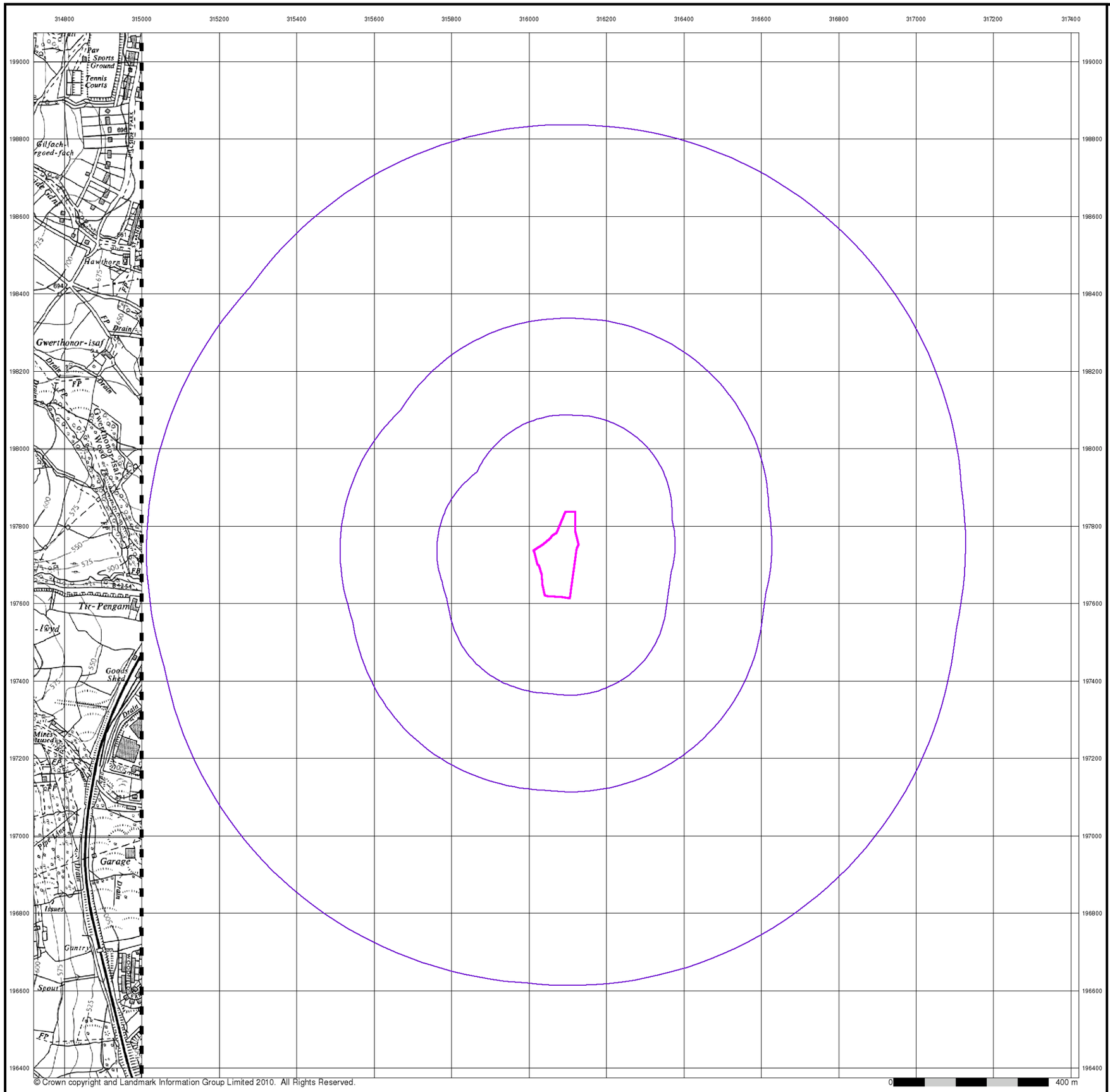
Order Details

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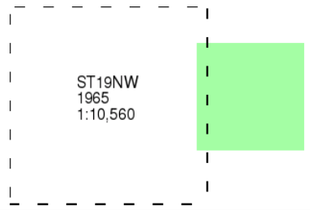
Ordnance Survey Plan

Published 1965

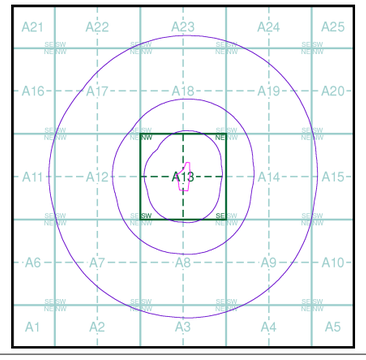
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

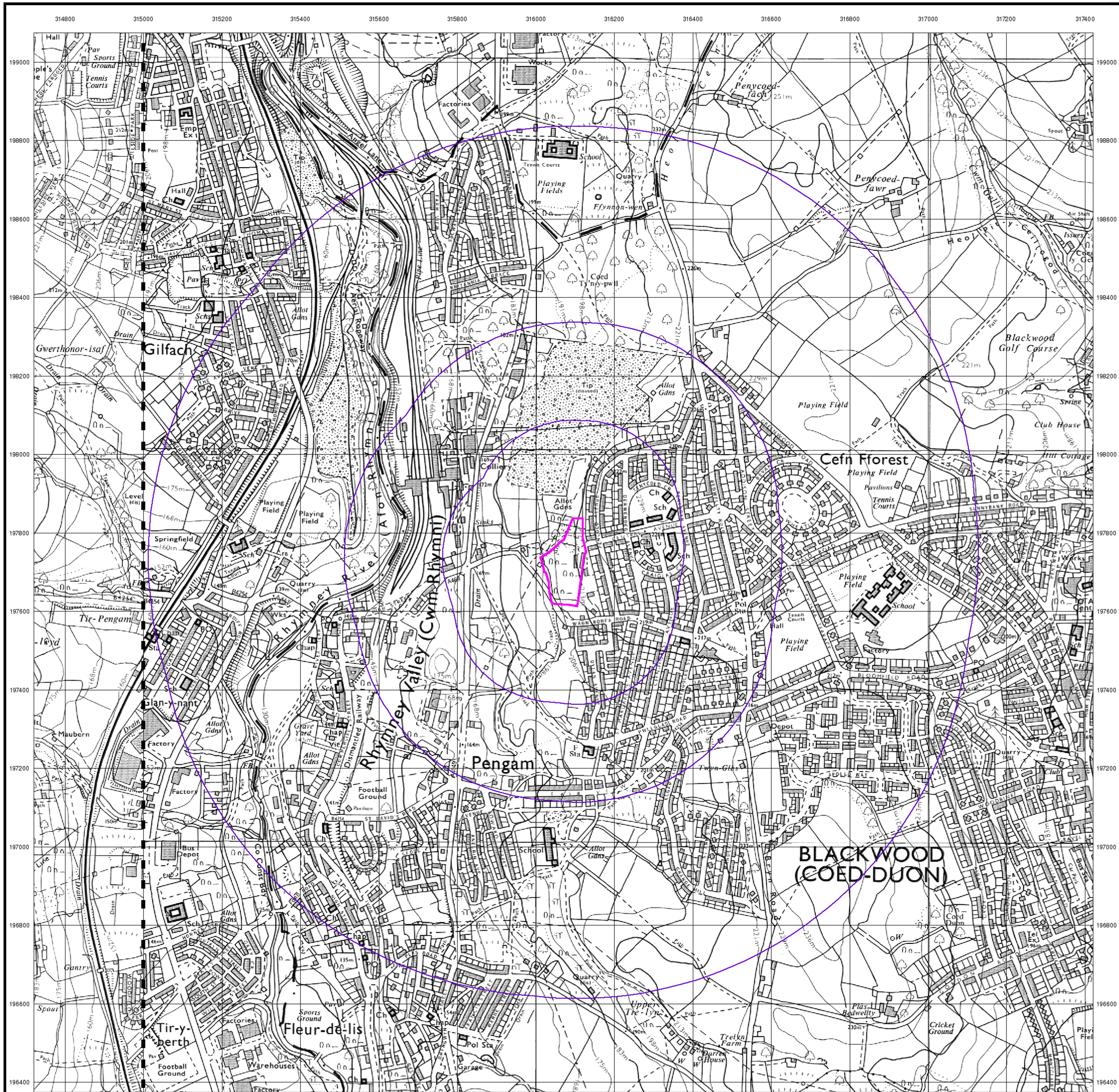
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Search Buffer (m):	1000

Site Details

Site at 316100, 197720

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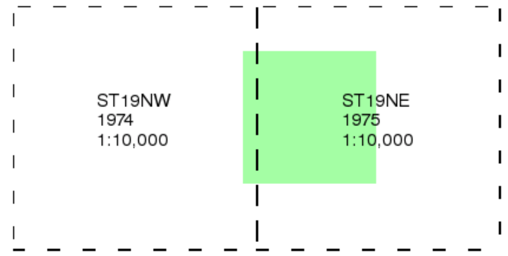
Ordnance Survey Plan

Published 1974 - 1975

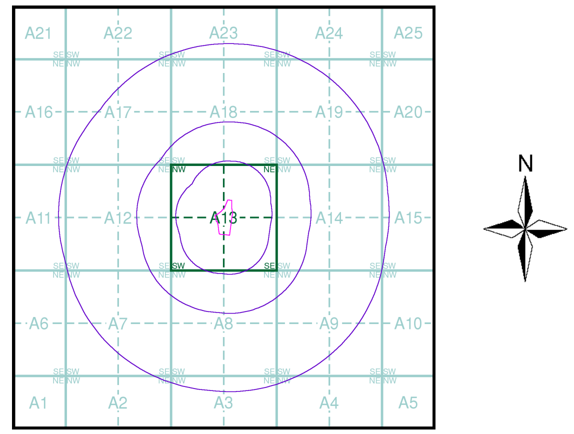
Source map scale - 1:10,000

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

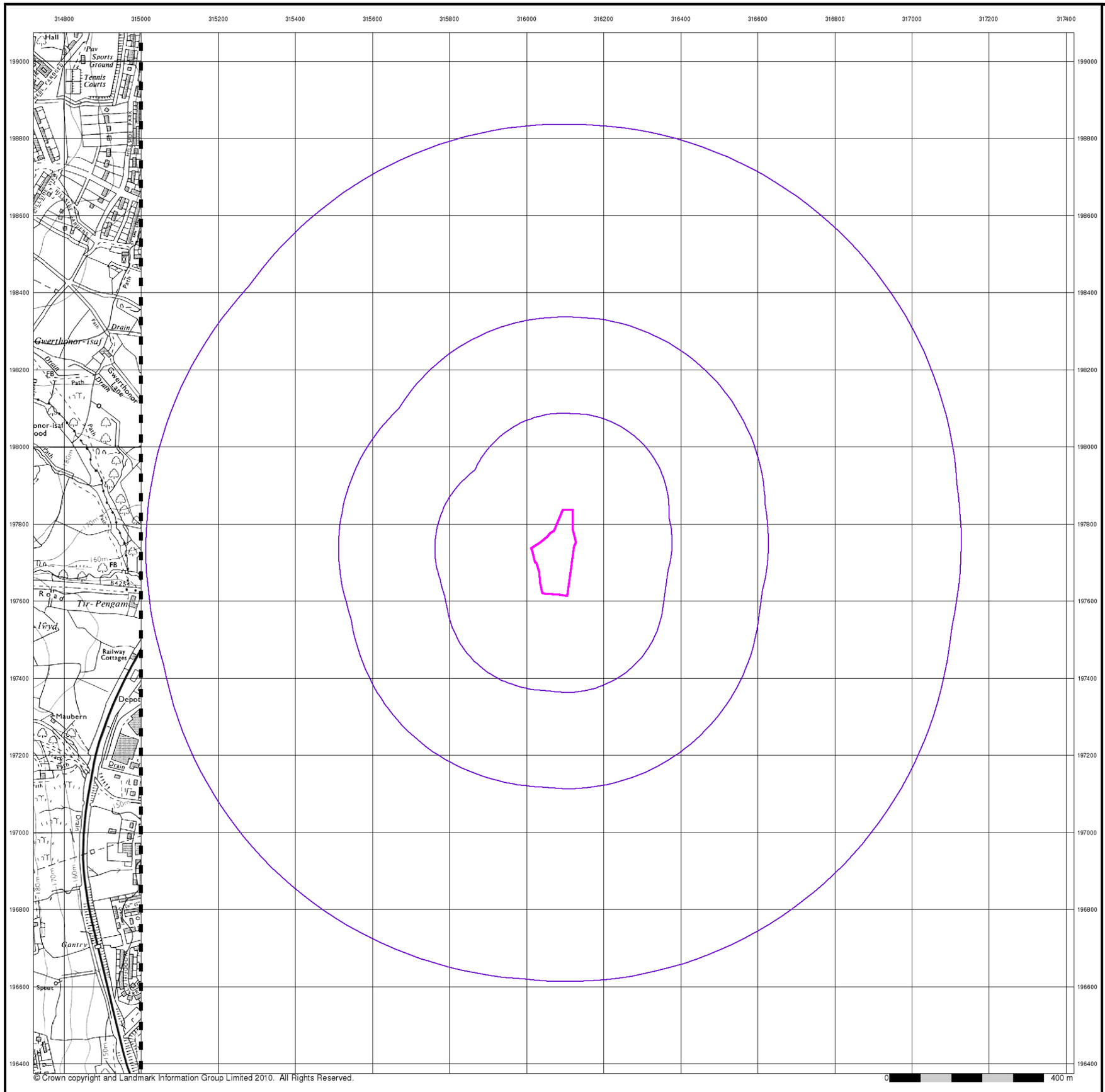
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Site Details

Site at 316100, 197720

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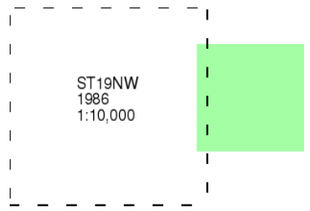
Ordnance Survey Plan

Published 1986

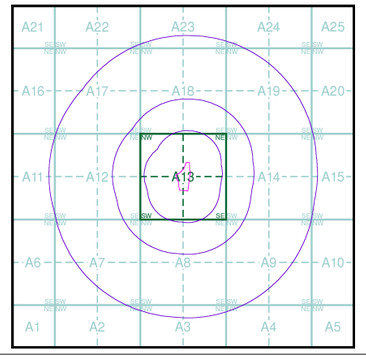
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	33043813_2_1
Customer Ref:	11230
National Grid Reference:	316080, 197720
Slice:	A
Site Area (Ha):	1.6
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Site Details

Site at 316100, 197720

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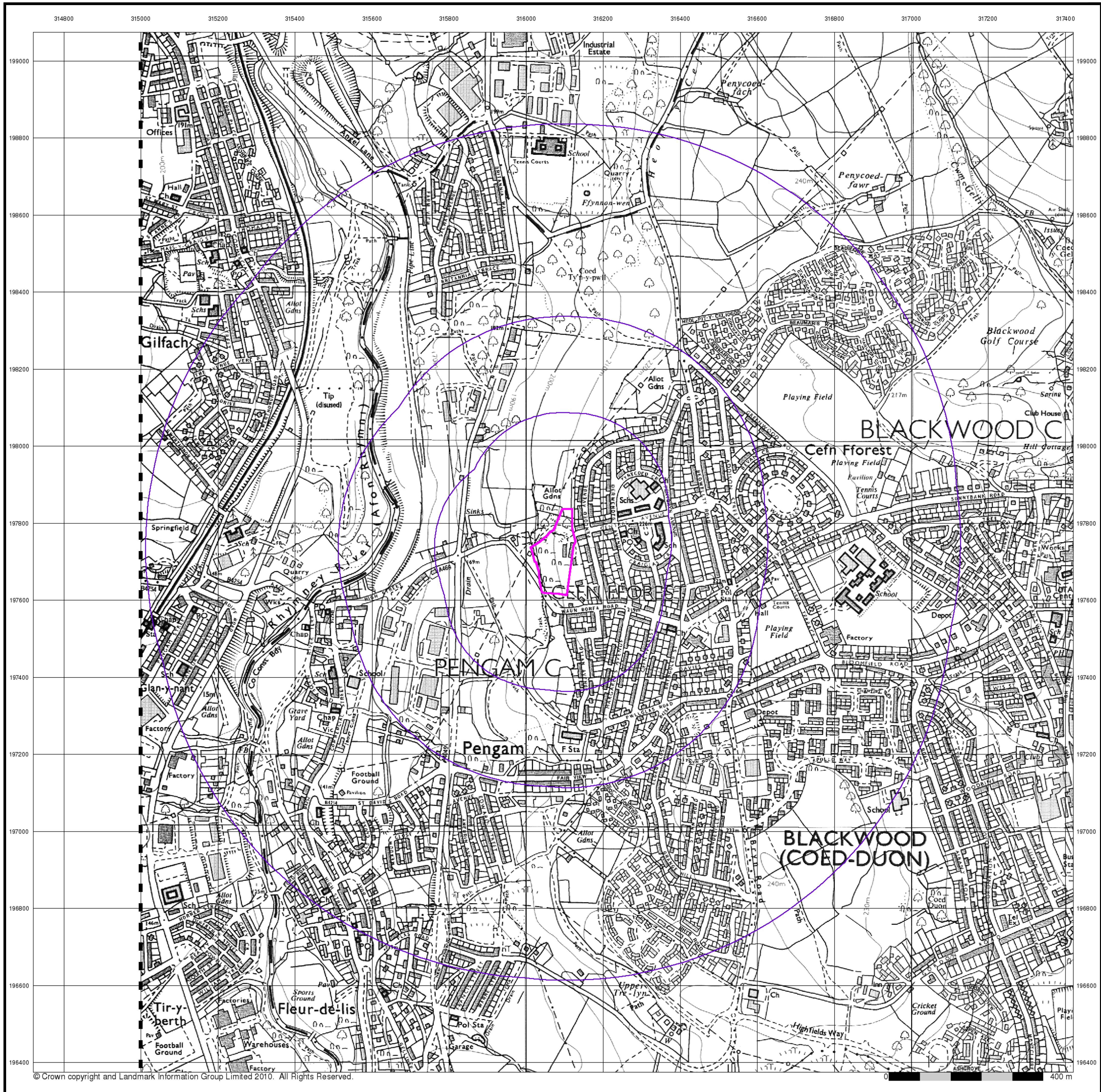
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Ordnance Survey Plan

Published 1995

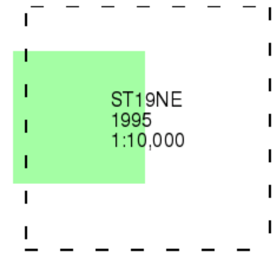
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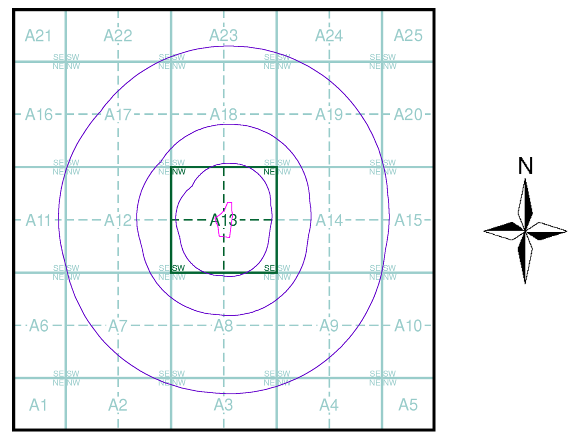


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Map Name(s) and Date(s)



Historical Map - Slice A



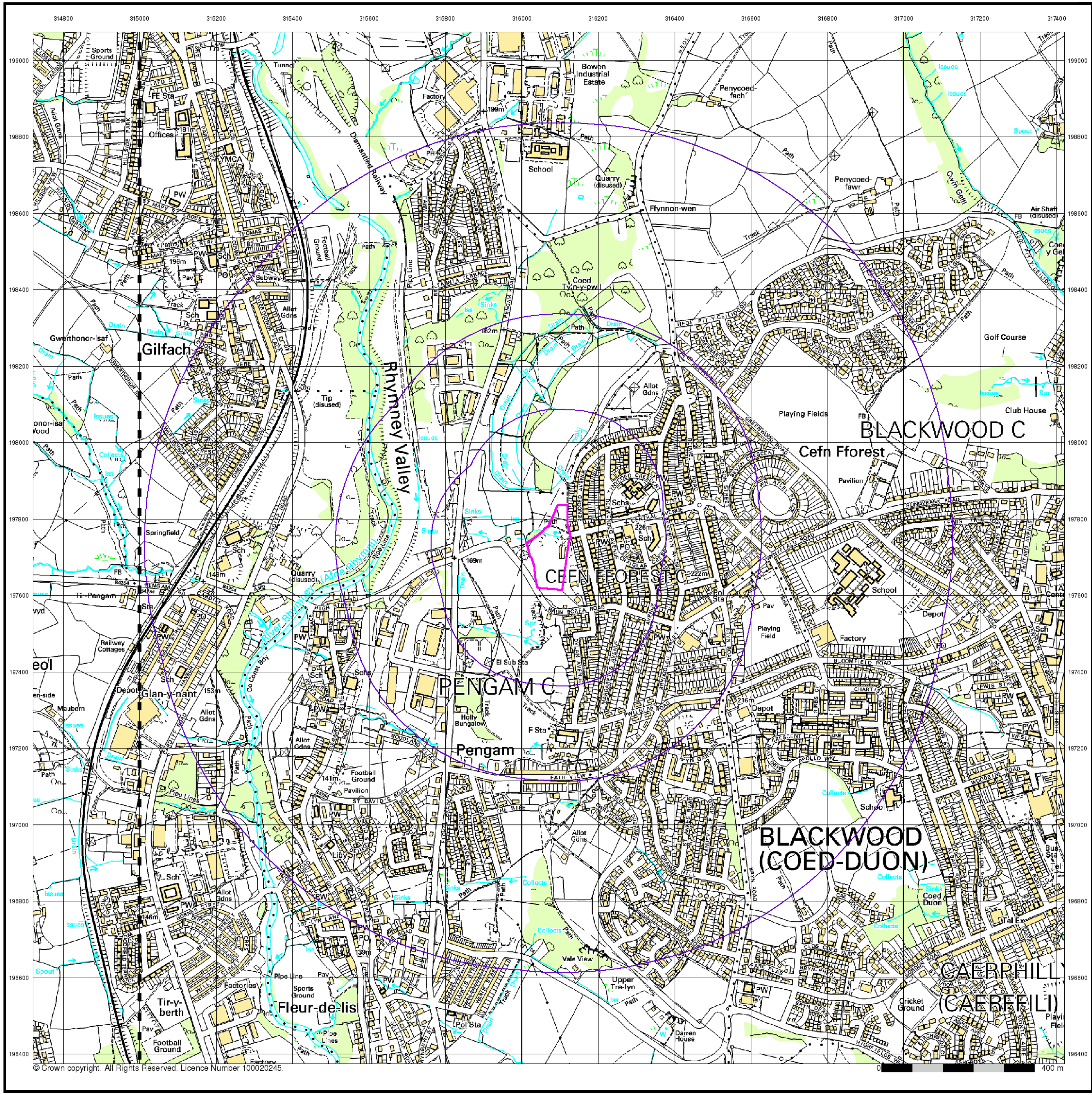
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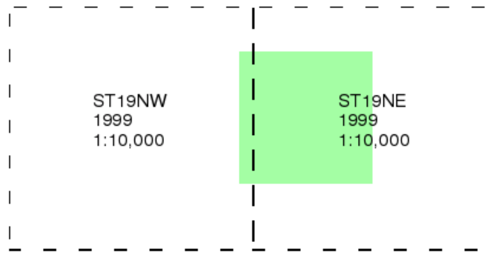
10k Raster Mapping

Published 1999

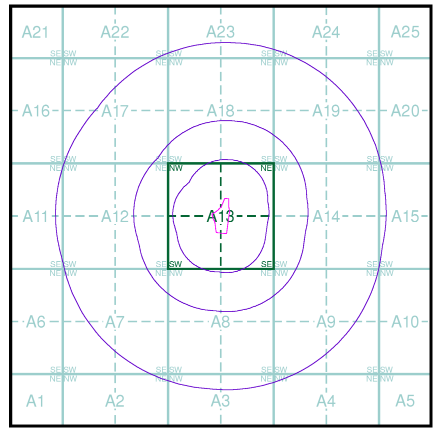
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



N

Order Details

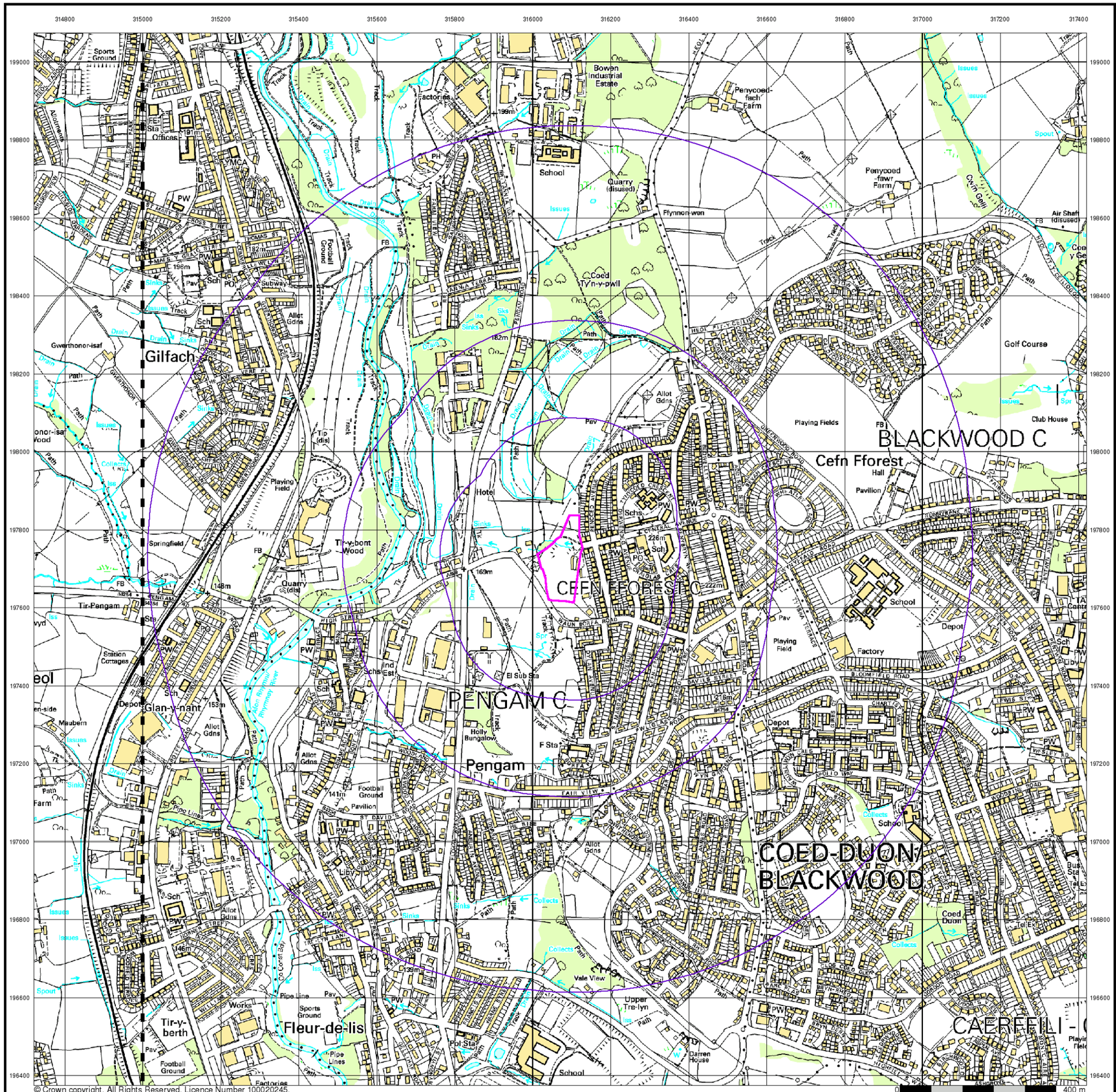
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Search Buffer (m): 1000

Site Details

Site at 316100, 197720

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10k Raster Mapping

Published 2006

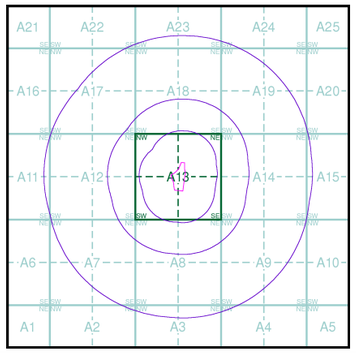
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Map Name(s) and Date(s)

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Historical Map - Slice A



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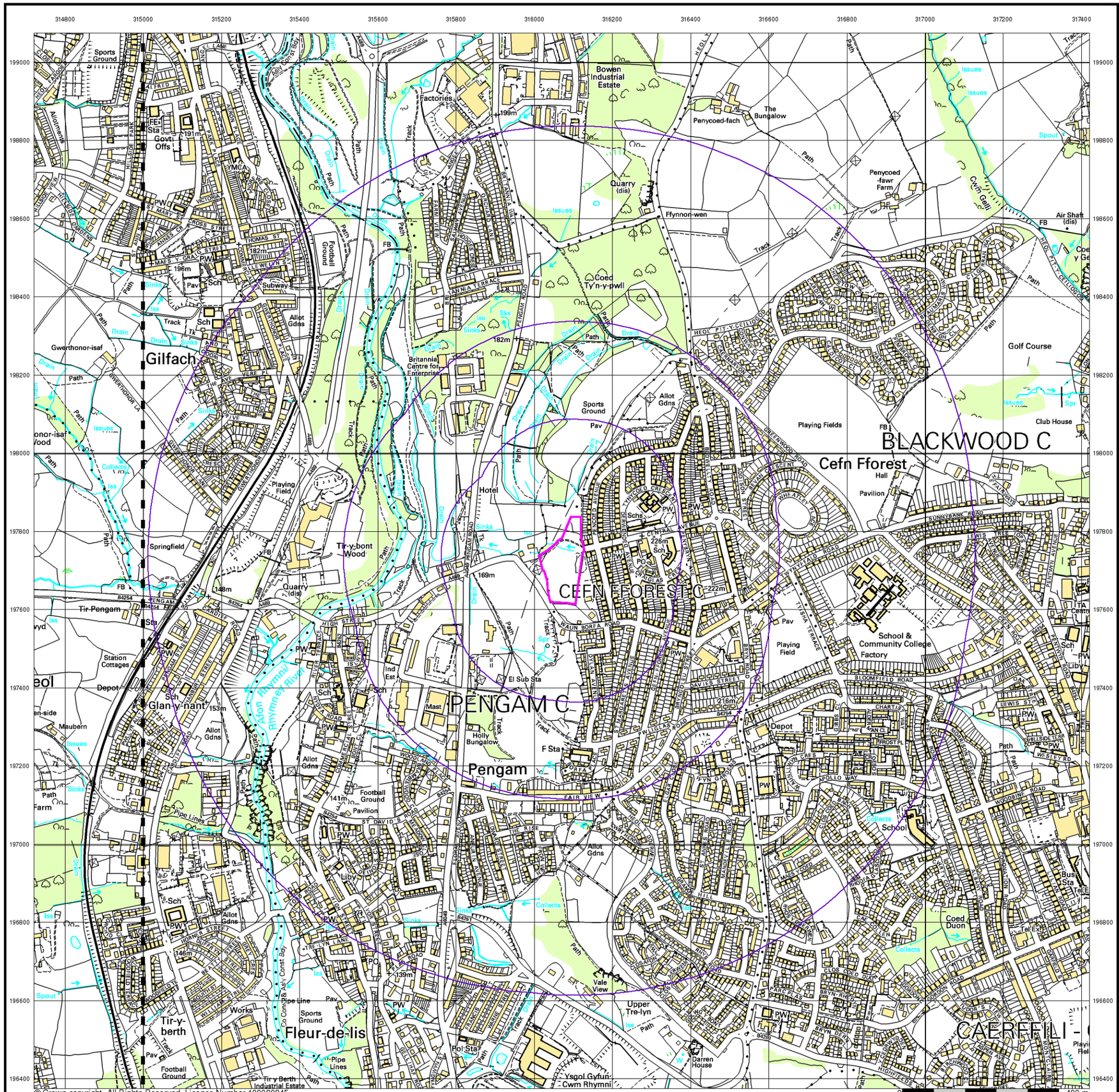
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Site Details

Site at 316100, 197720

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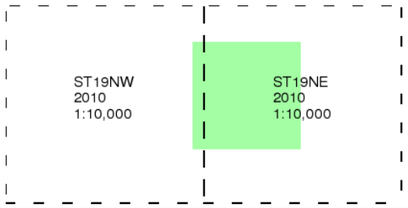
10k Raster Mapping

Published 2010

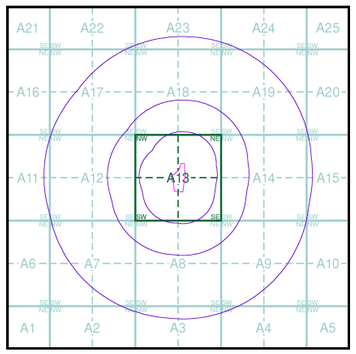
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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	33043813_2_1
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Search Buffer (m):	1000

Site Details

Site at 316100, 197720

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ANNEX B
Radon Report



Helen Brooke-Smith
Terra Firma (Wales) Ltd
5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7 HB

BR211 Radon Report:

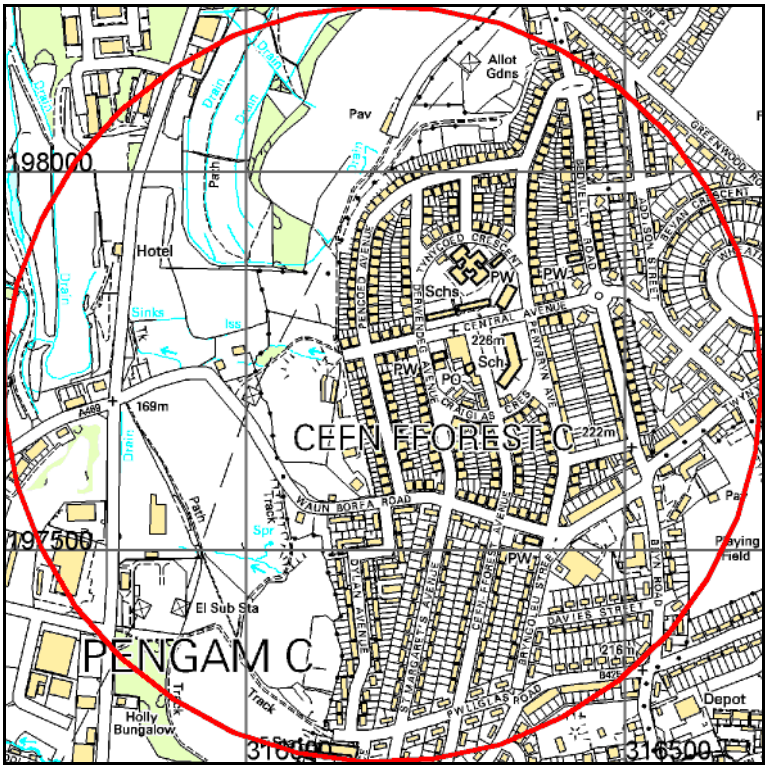
Advisory report on the requirement for radon protective measures in new buildings and extensions.

Report Id: *GR_201702/1*

Client reference: 11230

Location and extent of site

This report describes a site located at National Grid Reference 316181, 197720. 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.



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Scale: 1:10 000 (1cm = 100 m)

Search area indicated in red

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BR211 Radon Report

This is an advisory report on the requirement for radon protective measures in new buildings and extensions.

Requirement for radon protective measures
The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2007 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

The BGS is not able to provide advice on the technical specifications of 'basic' and 'full' radon protective measures. This information is detailed in **BRE Report BR211 :Radon: Protective measures for new buildings** which may be purchased from **brebookshop.com.** BR211 offers guidance on the technical solutions that are required to satisfy Building Regulations requirements. Summary guidance is available on the web at: http://www.bre.co.uk/radon/protect.html.
If you require further information or guidance, you should contact your local authority building control officer or approved inspector.
Contact 020 7944 5758 or Email: partsac.br@communities.gsi.gov.uk for advice on the interpretation of guidance contained in BRE Report BR211 (2007).

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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, I H S Technical Indexes Ltd., Willoughby Road, Bracknell, Berkshire RG12 8DW. Tel: 01344 404407, Fax: 01344 714440, website: www.brebookshop.com

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Radon in existing buildings
Useful information is given in the following free publications which can be obtained by writing to:
Radon Studies, Radiation Protection Division, Health Protection Agency, Chilton, Didcot, Oxfordshire OX11 0RQ

Radon - A Householder's Guide
Radon - You Can Test for it
Radon - A Guide for Homebuyers and Sellers
Radon - A Guide to Reducing Levels in Your Home
Information in the booklets is also available on the DEFRA website at:
http://www.defra.gov.uk/environment/radioactivity/background/radon.htm

Householders are recommended to follow advice in **Radon - a householder's guide.** The guide outlines simple solutions for dealing with the radon problem depending on whether or not the home has been tested for radon. In radon affected homes, the problem of radon can usually be tackled with simple, effective and relatively inexpensive measures. These measures are comparable in cost to work such as damp-proofing and timber treatment. You can get practical advice about construction work to reduce radon levels from the Building Control Officer at your local council.

Is this property in a radon affected area – YES

The answer to the standard enquiry on house purchase known as **CON29 Standard Enquiry of Local Authority 3.13 Radon Gas: Location of the Property in a radon Affected Area is YES** this property is in a Radon Affected Area as defined by the Health Protection Agency (HPA).

The estimated probability of the property being above the Action Level for radon is: 3-5%.

In addition to the search area, the radon data includes a 75 metre zone around the site to allow for uncertainties in location data and geological line work.

The result informs you of the estimated probability that this particular property is above the Action Level for radon. This does not necessarily mean there is a radon problem in the property. The only way to determine whether it is above or below the Action Level is to carry out a radon measurement within the existing property.

Radon Affected Areas are designated by the HPA. They advise that radon gas should be measured in all properties within Radon Affected Areas.

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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 retested, and the that the results of re-testing confirmed the effectiveness of the measures.

For further information, advice about radon, its health risks and details of how to order the radon test, please contact the HPA Radon Helpline on 01235 822622 or go online at www.ukradon.org or write to Radon Studies at the Health Protection Agency, address above. You can obtain an information pack from the HPA free Radon answer phone on 0800 614529.

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- 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.
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Report issued by
BGS Enquiry Service

ANNEX C
Coal Authority Report

Issued by:
The Coal Authority, Mining Reports Office, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire NG18 4RG
ON-Line Service: www.groundstability.com - Phone: 0845 762 6848 - DX 716176 MANSFIELD 5

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DEVON,
EX2 7HY

Person dealing with this matter:	**Louise Tipper**
Our reference:	**00050299-10**
Your reference:	33043813
Electronic Ref:	EME_00014911570001_005
RRUID:	005.00014911570001
Date of your enquiry:	**11 November 2010**
Date we received your enquiry:	**11 November 2010**
Date of issue:	**12 November 2010**

This report is for the property described in the address below and the attached plan.

Non-Residential Coal and Brine Report

Site Off, Waun Borfa Road, Pengam, Vale Of Glamorgan

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	Yes
Brine Compensation District	No

Information from the Coal Authority

Underground Coal Mining

Past

The property is in the likely zone of influence from workings in 7 seams of coal at 30m to 770m depth, and last worked in 1971.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

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The property is not in an area for which a licence has been granted to remove coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

Coal-mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast Coal Mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal-mining subsidence

The Coal Authority has not received a damage notice or claim for the property since 1 January 1984. There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The 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

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of Support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

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

Working Facilities Orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to Owners of Former Copyhold Land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/ former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

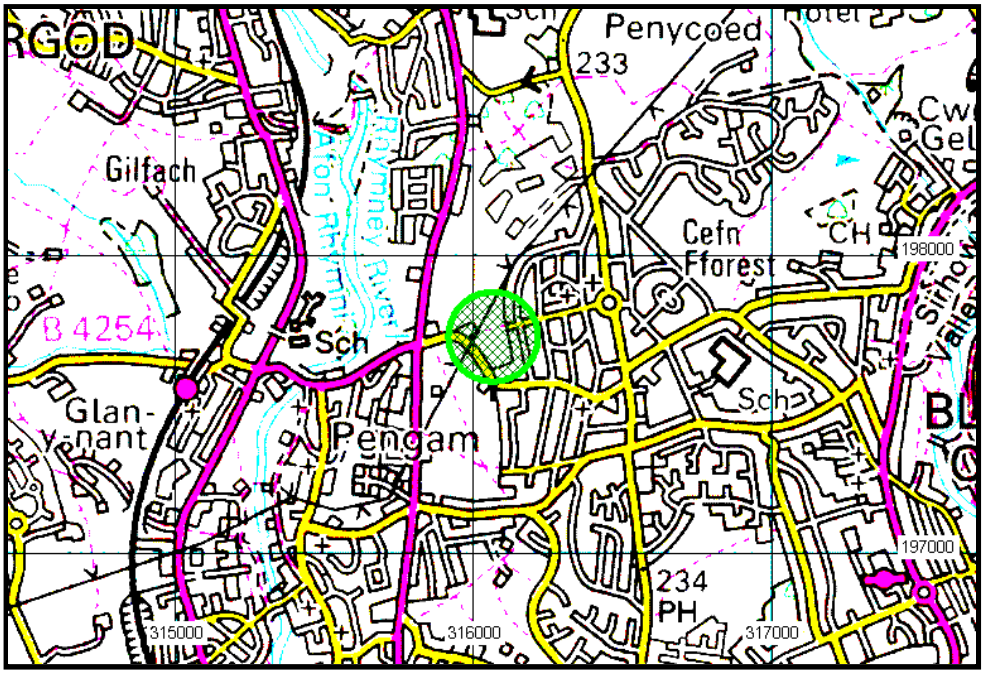
Additional remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The report is compliant with Home Information Pack requirements.

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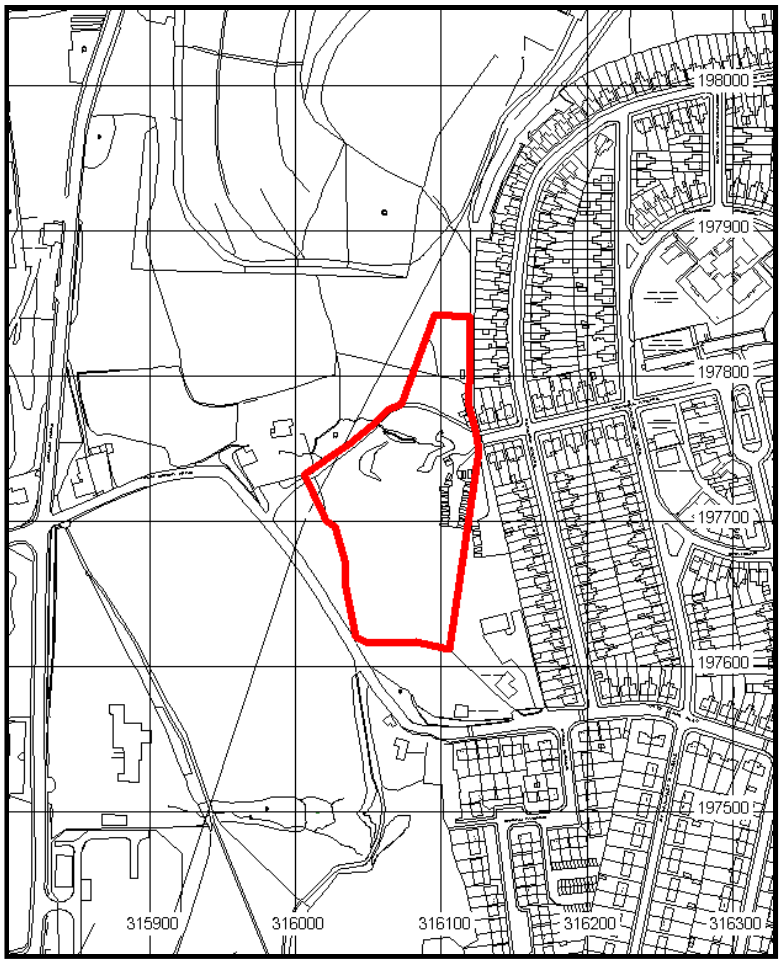
Location map

Approximate
position
of property



Enquiry boundary

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Key

Approximate position of enquiry boundary shown

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ANNEX D
Risk Assessment Definitions

The contaminated land regime is set out in Part 2A of the Environmental Protection Act (EPA) 1990 and was introduced on the 1st April 2000 in England and 1st July 2001 in Wales. A similar regime was introduced in Scotland on 14th July 2000.

Part 2A was introduced to achieve three overreaching objectives:

(a) To identify and remove unacceptable risks to human health and the environment.
(b) To seek to ensure that contaminated land is made suitable for its current use.
(c) To ensure that the burdens faced by individuals, companies and society as a whole are proportionate, manageable and compatible with the principles of sustainable development.

Under Part 2A the statutory definition of 'contaminated land' is:

"any land which appears to the local authority in whose area it is situated, to be in such a condition, by reason of substances in, on, or under the land, that:

(a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
(b) Pollution of controlled waters is being, or is likely to be, caused."

Under Part 2A, for land to be classified as 'Contaminated Land' there must be one or more contaminant, pathway, receptor linkages, known as the '**Pollutant Linkage**'. A pollutant linkage requires three essential elements:

(a) A **CONTAMINANT** (SOURCE) – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters.
(b) A **RECEPTOR** – something which could be adversely affected by a contaminant.
(c) A **PATHWAY** – a route by which a receptor is or might be exposed to or affected by a contaminant.

The term 'Risk' is widely used in different contexts and situations, but a prescriptive definition is given by the Guidelines for Environmental Risk Assessment and Management (DEFRA *et al*, 2000):

'Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'.

Model Procedures for the Management of Land Contamination – Contamination Land Report 11 (2004) defines a 'Hazard' as

'*a property or situation that in particular circumstances could lead to harm'.*

A framework for qualitative risk assessment is provided in CIRIA publication C552 Contaminated Land Risk Assessment – A Guide to Good Practice (2001). The method requires an assessment of the magnitude of the probability of the risk occurring and the magnitude of the potential consequence. Classifications of consequences and probability, levels and descriptions of risk have been devised from the above publication and are defined in the following sections.

Classification of Consequence

Table A Classification of Consequence	
Classification	**Definition**
Severe	• Short term (acute) risk to human health likely to result in significant harm • Short term risk to controlled waters • Catastrophic damage to buildings/structures • Short term risk to an ecosystem or organism within the particular ecosystem
Medium	• Chronic damage to human health (long term risk) • Pollution of a sensitive water resource • A significant change in an ecosystem or organism within the ecosystem
Mild	• Pollution of non-sensitive water resources • Significant damage to buildings/structures • Damage to sensitive buildings/structure/services or the environment
Negligible	• Harm (not necessarily significant) which may result in financial loss • Non-permanent health effects to humans (easily prevented by PPE for example) • Easily repairable effects of structural (building) damage

Classification of Probability

Table B Classification of Probability	
Classification	**Definition**
High Likelihood	• There is a complete pollution linkage, and an event appears very likely to occur in the short term and is inevitable in the long term. • Evidence of harm to the receptor
Likely	• There is a complete pollution linkage which means that is it probable that an event will occur. • The event is not inevitable but possible in short term and likely in the long term
Low Likelihood	• There is a complete pollution linkage and circumstances are possible under which an event could occur. • It is not certain that an event will occur in the long term, and it is less likely to occur in the short term
Unlikely	• There is a complete pollution linkage, but circumstances are such that it is improbable that an event would occur even in the long term

Risk Assessment Matrix

By comparing the consequences of a risk and the probability of the risk of a pollution linkage, the likely risk category can be determined as shown in **Table C** below.

Table C Risk Assessment Matrix

Increasing acceptability →		Consequence			
		Severe	**Medium**	**Mild**	**Negligible**
Probability	**High Likelihood**	High risk	High risk	Medium risk	Low risk
	Likely	High risk	Medium risk	Low risk	Near zero risk
	Low Likelihood	Medium risk	Low risk	Low risk	Near zero risk
	Unlikely	Low risk	Near zero risk	Near zero risk	Near zero risk

Description of Risks and Likely Actions

High Risk
There is a high probability that severe harm could arise to a receptor, or there is evidence that a receptor is currently being severely harmed. The risk if realised is likely to result in liability, and urgent investigation or remediation will be required.

Medium Risk
It is probable that harm will arise to a receptor. However, it is relatively unlikely that such harm would be severe, or if harm does occur the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk
It is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Near Zero Risk
There is a very low risk of harm to the receptor. In the event of harm being realised the harm is not likely to be severe.

ANNEX E
Trial Pit Logs

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Trialpit No
TP01
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth: 2.50m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			Soft to firm, dark brown, very slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine roots.
			0.70			Stiff to very stiff, orange brown, sandy gravelly CLAY. Fine to coarse, subangular to subrounded gravels and common cobbles of sandstone.
			2.20			Medium dense to dense, grey brown, slightly clayey SAND and GRAVELS. Fine to coarse, angular to rounded gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			2.50			Weathered, grey green, SANDSTONE.
						Trialpit Complete at 2.50 m

Remarks:

Groundwater: No groundwater encountered

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP02
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 1.70m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			Soft to firm, dark brown, very slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine roots.
						Medium dense to dense, grey brown, slightly clayey SAND and GRAVELS. Fine to coarse, angular to rounded gravels and common cobbles of sandstone. Sand is fine to coarse.
			1.65			Weathered, grey green, SANDSTONE.
			1.70			Trialpit Complete at 1.70 m

Remarks:

Groundwater: No groundwater encountered.

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Trialpit No
TP03
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 2.16m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			Soft to firm, dark brown, very slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine roots.
						Medium dense, orange, clayey gravelly SAND. Fine to coarse, subangular to subrounded gravels of sandstone. Sand is fine to coarse.
			0.90			Medium dense to dense, grey brown, clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse grained. Contains large patches of very stiff, grey brown mottled, CLAY.
			2.10			Weathered, grey green, SANDSTONE.
			2.16			Trialpit Complete at 2.16 m

Remarks:

Groundwater: No groundwater encountered.

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Trialpit No
TP04
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 2.00m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Medium dense, orange brown, very clayey SAND and GRAVEL. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine to large roots.
			0.30			Very stiff, orange and grey mottled, gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine roots.
			1.20			Medium dense to dense, grey brown, slightly clayey very sandy GRAVELS and COBBLES. Fine to coarse, angular to subrounded, tabular gravels, cobbles and occasional small boulder of sandstone.
			1.90			Weathered, grey green, SANDSTONE.
			2.00			Trialpit Complete at 2.00 m

Remarks:

Groundwater: No groundwater encountered.

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Trialpit No
TP05
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 2.30m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			Soft to firm, dark brown, slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone.
						Medium dense, orange brown, slightly clayey SAND and GRAVEL. Fine to coarse, subangular to subrounded gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			0.90			Medium dense to dense, grey brown, slightly clayey SAND and GRAVEL. Fine to coarse, subangular to subrounded gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			2.25			Weathered, grey green, SANDSTONE.
			2.30			Trialpit Complete at 2.30 m

1
2
3
4

Remarks:

Groundwater: No groundwater encountered.

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HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP06
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 2.50m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Soft to firm, dark brown, slightly gravelly CLAY. Fine to coarse, subangular gravels of sandstone. Many fine to medium roots.
			0.20			Medium dense, orange brown, slightly clayey, very gravelly SAND. Fine to coarse, angular to subrounded gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			0.80			Medium dense to dense, grey brown, slightly clayey SAND and GRAVEL. Fine to coarse, subangular to subrounded gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			2.40			Weathered, grey green, SANDSTONE.
			2.50			Trialpit Complete at 2.50 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP07
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 3.25m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Soft to firm, dark brown, slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Contains rare glass fragments. Many fine to medium roots.
			0.25			Medium dense, orange brown, slightly clayey gravelly SAND. Fine to coarse, subangular to subrounded gravels and common cobbles of sandstone. Sand is fine to coarse.
			0.80			Medium dense to dense, grey brown, slightly clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels, cobbles and occasional boulders of sandstone. Sand is fine to coarse grained.
			3.10			Weathered, grey green, SANDSTONE.
			3.25			Trialpit Complete at 3.25 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP08
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 2.75m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			Soft to firm, dark brown, slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine to medium roots.
						Medium dense, orange, slightly clayey gravelly SAND. Fine to coarse, subangular to subrounded gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			0.70			Medium dense to dense, grey brown, SAND and GRAVEL. Fine to coarse, subangular to subrounded gravel of sandstone. Sand is fine to coarse grained.
			2.70			Weathered, grey green, SANDSTONE.
			2.75			Trialpit Complete at 2.75 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP09
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 30/06/2011
Location: Cefn Fforest		Dimensions: - Depth 2.70m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Soft, dark brown, slightly sandy gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine to medium roots.
			0.20			Medium dense, orange brown, slightly clayey gravelly SAND. Fine to coarse, subangular to subrounded gravels and occasional cobble of sandstone. Sand is fine to coarse.
			0.80			Medium dense to dense, grey brown, very clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			2.60			Weathered, grey green, SANDSTONE.
			2.70			Trialpit Complete at 2.70 m

Remarks:

Groundwater: No groundwater encountered.

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HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP10
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 2.30m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.15			Firm, dark brown, slightly sandy slightly gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse. Many fine to medium roots.
						Medium dense, orange brown, slightly clayey very gravelly SAND. Fine to coarse, angular to subrounded, gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			0.60			Medium dense to dense, grey brown, slightly clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels and cobbles with occasional boulder of sandstone. Sand is fine to coarse grained.
			2.10			Weathered, grey green, SANDSTONE.
			2.30			Trialpit Complete at 2.30 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP11
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 2.80m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Soft to firm, dark brown, slightly sandy slightly gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse. Many fine to large roots.
			0.25			Medium dense, orange brown, slightly clayey gravelly SAND. Fine to coarse, angular to subrounded, gravels and common cobbles of sandstone. Sand is fine to coarse grained.
			1.00			Medium dense to dense, grey brown, very slightly clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels and cobbles with occasional boulder of sandstone. Sand is fine to coarse grained.
			2.60			Weathered, grey green, SANDSTONE.
			2.80			Trialpit Complete at 2.80 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP12
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.90m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			Soft to firm, dark brown, slightly sandy slightly gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse. Many fine to medium roots.
						Medium dense, orange brown, slightly clayey gravelly SAND. Fine to coarse, angular to subrounded, gravels and cobbles with occasional boulder of sandstone. Sand is fine to coarse grained.
			1.10			Medium dense to dense, grey brown, very slightly clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels and cobbles of sandstone. Sand is fine to coarse grained.
			1.80			Weathered, grey green, SANDSTONE.
			1.90			Trialpit Complete at 1.90 m

Remarks:

Groundwater: No groundwater encountered.

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HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP13N
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 0.95m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			Soft, dark brown, slightly sandy slightly gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse. Many fine to medium roots.
						Medium dense, orange brown, clayey gravelly SAND. Fine to coarse, angular to subrounded, gravels and cobbles of sandstone. Sand is fine to coarse grained.
			0.90			Weathered, grey green, SANDSTONE.
			0.95			Trialpit Complete at 0.95 m

Remarks: TP13N relates to the Northern half of trial pit 13 which is split into two logs due to variable conditions found along the length of the pit.

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bd 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP13S
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 2.00m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			Soft, dark brown, slightly sandy slightly gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse. Many fine to medium roots.
						Medium dense, orange brown, clayey gravelly SAND. Fine to coarse, angular to subrounded, gravels and cobbles of sandstone. Sand is fint to coarse grained.
			0.90			Medium dense to dense, grey brown, very slightly clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels and cobbles of sandstone. Sand is fine to coarse grained.
			1.90			Weathered, grey green, SANDSTONE.
			2.00			Trialpit Complete at 2.00 m

1
2
3
4

Remarks: TP13S relates to the Southern half of trial pit 13 which is split into two logs due to variable conditions found along the length of the pit.

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP14
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.10m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Soft to firm, dark brown to dark grey, slightly, gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone.
			0.25			Medium dense, orange brown, slightly clayey gravelly SAND. Fine to coarse, angular to subrounded, gravels and cobbles with occasional boulder of sandstone. Sand is fine to coarse grained.
			1.00			Weathered, grey green, SANDSTONE.
			1.10			Trialpit Complete at 1.10 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP15
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.50m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Soft, dark brown to dark grey, slightly, gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Fine to medium roots.
			0.20			Medium dense, orange brown, very clayey gravelly SAND. Fine to coarse, subangular to subrounded gravels, cobbles and occasional boulder of sandstone. Sand is fine to coarse grained.
			1.30			Weathered, grey green, SANDSTONE.
			1.50			Trialpit Complete at 1.50 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP16
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 3.30m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			MADE GROUND: Soft, dark brown, slightly gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Many fine to medium roots.
						MADE GROUND: Lense of loose, dark grey, sandy CLAY. Sand is fine to coarse. Contains glass bottles, ceramic and plastic.
			0.40			Firm, brown, sandy gravelly CLAY. Fine to coarse, angular to subrounded gravels, cobbles and occaional boulder of sandstone.
			3.00			Stiff to hard, grey with orange mottling in places, slightly gravelly CLAY. Fine to coarse, angular to subrounded gravels of mudstone.
			3.20			Weathered, grey, fossiliferous (plants), MUDSTONE.
			3.30			Trialpit Complete at 3.30 m

Remarks: End trial pit as excavator is out of reach.

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP17
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.10m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			Soft to firn, brown, slightly sandy gravelly CLAY. Fine to coarse, angular to subrounded gravels and cobbles of sandstone.
						Firm, orange brown, very sandy gravelly CLAY. Fine to coarse, angular to subrounded gravels and common cobbles of sandstone.
			1.05			Weathered, grey green, SANDSTONE.
			1.10			Trialpit Complete at 1.10 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP18
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 3.60m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: Soft, dark grey, CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Contains glass, metal road pin and brick.
			0.40			MADE GROUND: Soft to firm, orange brown, slightly sandy gravelly CLAY. Fine to coarse, angular to subrounded of sandstone.
			3.10			MADE GROUND: Loose to medium dense, black, ashy, clayey SAND and GRAVEL. Dominatly fine, aungular gravels of mudstone and coal. Sand is fine to coarse grained. Contains glass, coal, ceramic items and slag.
			3.60			Trialpit Complete at 3.60 m

1
2
3
4

Remarks: End trial pit as excavator is out of reach.

Groundwater: No groundwater encountered.

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HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP19
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 2.30m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: Soft, dark grey, slightly sandy gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Contains plstic bag, ceramic tile and cup, slate roof tiles, coal and brick. Fine to medium roots.
			2.20			Weathered, grey green, SANDSTONE.
			2.30			Trialpit Complete at 2.30 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP20
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.00m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: Soft, dark grey to black, sandy gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Contains occasional metal, plastic and ceramic.
			0.25			Medium dense to dense, orange brown, clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse grained.
			0.85			Weathered, grey green, SANDSTONE.
			1.00			Trialpit Complete at 1.00 m

Remarks:

Groundwater: No groundwater encountered.

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HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP21
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.70m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: Tarmac
			0.15			MADE GROUND: Firm, dark grey to black, slightly sandy gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Contains brick and glass.
			0.50			Firm, orange brown, very sandy gravelly CLAY. Fine to coarse, angular to subrounded gravels cobbles and occasional boulder of sandstone.
			1.50			Weathered, grey green, SANDSTONE.
			1.70			Trialpit Complete at 1.70 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP22
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.40m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: Soft to firm, dark grey to black, slightly sandy gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Contains plastic, metal and brick.
			0.25			Medium dense, grey brown, clayey SAND and GRAVELS. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse grained.
			1.20			Weathered, grey green, SANDSTONE.
			1.40			Trialpit Complete at 1.40 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP23
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: - Level: -	Date: 01/07/2011
Location: Cefn Fforest		Dimensions: - Depth 1.20m	Scale: 1:25
Client: Mr V. Perry			Logged By: ADB

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: Soft, dark brown, gravelly CLAY. Fine to coarse, angular to subrounded gravels of sandstone. Contains brick and ceramic fragments.
			0.20			Medium dense to dense, orange brown, very clayey SAND and GRAVEL. Fine to coarse, angular to subrounded gravels of sandstone. Sand is fine to coarse grained.
			1.00			Weathered, grey green, SANDSTONE.
			1.20			Trialpit Complete at 1.20 m

Remarks:

Groundwater: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Trialpit Log v2 dated 27th Nov 03

ANNEX F
Borehole Logs

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Borehole No
WS01
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: -	Hole Type: MP
Location: Cefn Fforest		Level: -	Scale: 1:50
Client: Mr P. Perry		Dates: 19/01/2012	Logged By: ADB

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		1.00	CPT	5/226mm 226mm - Abandoned				Loose, black/dark grey, ashy clayey GRAVEL. Fine to coarse, angular to subrounded gravels of sandstone and mudstone. Contains brick, glass, ceramic, pottery, slag and coal.
					1.60			Firm, brown with grey, sandy gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone.
		2.00	CPT	50/40mm 40mm - Abandoned	2.00			End of Borehole at 2.02 m
			Type	Results				

Remarks: No groundwater encountered.

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HoleBASE III (Bld 426.48) Standard Borehole Log v2 dated 27th Nov 03

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Borehole No **WS02** Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: -	Hole Type: MP
Location: Cefn Fforest		Level: -	Scale: 1:50
Client: Mr P. Perry		Dates: 19/01/2012	Logged By: ADB

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
								MADE GROUND: Soft, dark grey to brown, slightly ashy gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone and mudstone. Contains glass and brick. Fine to medium roots.
		1.00	CPT	N=6 N=6 (1,1,1,2,1,2)	0.90			MADE GROUND: Soft, dark grey to black, ashy gravelly CLAY. Fine to coarse, subangular to subrounded gravels of mudstone and sandstone. Contains brick, glass, concrete and coal.
		2.00	CPT	N=5 N=5 (1,0,1,1,1,2)	1.80			Soft, brown, very slightly gravelly CLAY. Fine to coarse, subangular gravels of sandstone.
		3.00	CPT	N=3 N=3 (1,0,1,0,1,1)	2.90			Soft, light grey brown, slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Common plant material.
		4.00	CPT	N=13 N=13 (3,3,4,4,3,2)	4.60			Firm becoming stiff, tan brown to grey, gravelly CLAY. Fine to coarse, angular greavles of mudstone. Weathered Mudstone Bedrock.
		5.00	CPT	50/295mm 295mm (6,7,8,10,14,18)	5.00			End of Borehole at 5.00 m
			Type	Results				

Remarks: No groundwater encountered.

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HoleBASE III (Bld 426.48) Standard Borehole Log v2 dated 27th Nov 03

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Borehole No
WS03
Sheet 1 of 1

Project Name: Land Off Central Avenue	Project No.: 11230	Co-ords: -	Hole Type: MP
Location: Cefn Fforest		Level: -	Scale: 1:50
Client: Mr P. Perry		Dates: 19/01/2012	Logged By: ADB

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.20			Grass over, soft, brown, slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Many fine roots.
					0.60			Soft to firm, brown, slightly gravelly CLAY. Fine to coarse, subangular to subrounded gravels of sandstone. Fine roots.
		1.00	CPT	N=26 N=26 (10,11,9,7,5,5)	1.20			Medium dense to dense, grey and brown, slightly clayey SAND and GRAVEL. Fine to coarse, subangular to subrounded gravels of sandstone.
		2.00	CPT	N=35 N=35 (5,5,7,7,10,11)	2.00			Stiff to very stiff, light grey, gravelly CLAY. Fine to coarse, subangular gravels of mudstone and sandstone.
								End of Borehole at 2.00 m
			Type	Results				

Remarks: No groundwater encountered.

AGS

HoleBASE III (Bld 426.48) Standard Borehole Log v2 dated 27th Nov 03

ANNEX G
Laboratory Chemical Test Results

Analytical Services
Torrington Avenue,
Coventry, CV4 9GU

T: +44 (0)24 7642 1213
F: +44 (0)24 7685 6575

www.stsanalytical.com

Mr Beattie
Terra Firma
5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff CF23 7HB

25 July 2011

Test Report: COV/789372/2011

Dear Mr Beattie

Analysis of your sample(s) submitted on 04 July 2011 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using Severn Trent Services and we look forward to receiving your next samples.

Yours Sincerely,

Signed:

Name: J. Fell

Title: Chemistry Operations Manager

No. 1314
No. 4398

Certificate No. GB97/10269
Environmental Management Systems

Certificate No. FS 67435

Certificate No. OHS 542058

Severn Trent Services Analytical Services is a trading name of Severn Trent Laboratories Limited.
This communication has been sent to you by Severn Trent Laboratories Ltd. Registered in England and Wales. Registration No.2148934.
Registered Office: Severn Trent Centre, 2 St. John's Street, Coventry, CV1 2LZ

Report Summary

1314
1229
0897
4409

SEVERN TRENT SERVICES

Mr Alan Beattie
Terra Firma
5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7HB

Date of Issue: **25 July 2011**

Report Number: **COV/789372/2011** Issue **1**

Job Description: Quote 16894

Job Location: 11230 Cefn Fforest

Number of Samples included in this report: **12**

Job Received: **04 July 2011**

Number of Test Results included in this report: **420**

Analysis Commenced: **05 July 2011**

Signed:

Name: **J. Fell** Date: **25 July 2011**

Title: **Chemistry Operations Manager**

Severn Trent Services was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

MCERTS accreditation refers to analysis carried out at our Coventry site only.
Analysis carried out on air-dried and ground test portion of the sample(s), unless otherwise stated. Air drying is carried out at not greater than 30 degrees C. Samples are not preserved on site, unless otherwise stated.
All results are reported on an air-dried basis following removal of stones.

Severn Trent Services Analytical Services is a trading name of Severn Trent Laboratories Limited. This communication has been sent to you by Severn Trent Laboratories Limited. Registered in England and Wales. Registration No. 2148934. Registered Office: Severn Trent Centre, 2 St. John's Street, Coventry, CV1 2LZ

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Certificate of Analysis

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SEVERN TRENT SERVICES

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471443** Sample **1** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP01 @ 0.90m**
Visual Description: **Brown loam with many stones/occassional organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones NG Method	50	%	07/07/2011		N	Cov	Stones
Moisture content at 30C	8.2	%	07/07/2011		N	Cov	33A
Arsenic as As, dry weight	9.0	mg/kg	15/07/2011		M	Cov	30/30C
Cadmium as Cd, dry weight	<0.20	mg/kg	14/07/2011		M	Cov	30
Hexavalent Chromium as dw	0.19	mg/kg	12/07/2011		N	Cov	30B
Chromium (III)	15	mg/kg	14/07/2011		N	Cov	30
Copper as Cu, dry weight	5.2	mg/kg	14/07/2011		M	Cov	30
Lead as Pb, dry weight	6.3	mg/kg	14/07/2011		M	Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	15/07/2011		M	Cov	30C
Nickel as Ni, dry weight	23	mg/kg	14/07/2011		M	Cov	30
Selenium as Se, dry weight	0.73	mg/kg	15/07/2011		M	Cov	30C
Zinc as Zn, dry weight	73	mg/kg	14/07/2011		M	Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M	Cov	14
Organic Matter	1.6	%	11/07/2011		Y	Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M	Cov	40A
Sulphate, Total as SO4	0.066	%	12/07/2011		M	Cov	45
pH	5.3	pH units	15/07/2011		Y	Cov	39
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M	Cov	307

Analyst Comments for 12471443: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

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SEVERN TRENT SERVICES

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471444** Sample **2** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP02 @ 0.40m**
Visual Description: **Brown loam with many stones/occassional organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones NG Method	26	%	07/07/2011		N	Cov	Stones
Moisture content at 30C	12	%	07/07/2011		N	Cov	33A
Arsenic as As, dry weight	10	mg/kg	15/07/2011		M	Cov	30/30C
Cadmium as Cd, dry weight	<0.20	mg/kg	14/07/2011		M	Cov	30
Hexavalent Chromium as dw	0.26	mg/kg	12/07/2011		N	Cov	30B
Chromium (III)	17	mg/kg	14/07/2011		N	Cov	30
Copper as Cu, dry weight	<5.0	mg/kg	14/07/2011		M	Cov	30
Lead as Pb, dry weight	6.6	mg/kg	14/07/2011		M	Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	15/07/2011		M	Cov	30C
Nickel as Ni, dry weight	22	mg/kg	14/07/2011		M	Cov	30
Selenium as Se, dry weight	0.77	mg/kg	15/07/2011		M	Cov	30C
Zinc as Zn, dry weight	53	mg/kg	14/07/2011		M	Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M	Cov	14
Organic Matter	5.6	%	11/07/2011		Y	Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M	Cov	40A
Sulphate, Total as SO4	0.068	%	12/07/2011		M	Cov	45
pH	4.9	pH units	15/07/2011		Y	Cov	39
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M	Cov	307

Analyst Comments for 12471444: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

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SEVERN TRENT SERVICES

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471445** Sample **3** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP04 @ 0.50m**
Visual Description: **Brown clay with occassional stones and occassional organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones NG Method	1.8	%	07/07/2011		N	Cov	Stones
Moisture content at 30C	12	%	07/07/2011		N	Cov	33A
Arsenic as As, dry weight	9.4	mg/kg	15/07/2011		M	Cov	30/30C
Cadmium as Cd, dry weight	<0.20	mg/kg	14/07/2011		M	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	13/07/2011		N	Cov	30B
Chromium (III)	20	mg/kg	14/07/2011		N	Cov	30
Copper as Cu, dry weight	21	mg/kg	14/07/2011		M	Cov	30
Lead as Pb, dry weight	8.7	mg/kg	14/07/2011		M	Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	15/07/2011		M	Cov	30C
Nickel as Ni, dry weight	34	mg/kg	14/07/2011		M	Cov	30
Selenium as Se, dry weight	0.58	mg/kg	15/07/2011		M	Cov	30C
Zinc as Zn, dry weight	79	mg/kg	14/07/2011		M	Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M	Cov	14
Organic Matter	1.0	%	11/07/2011		Y	Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M	Cov	40A
Sulphate, Total as SO4	<0.024	%	12/07/2011		M	Cov	45
pH	6.1	pH units	15/07/2011		Y	Cov	39
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M	Cov	307

Analyst Comments for 12471445: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471446** Sample **4** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP05 @ 0.80m**
Visual Description: **Brown loam with many stones/occassional organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones NG Method	31	%	07/07/2011		N	Cov	Stones
Moisture content at 30C	14	%	07/07/2011		N	Cov	33A
Arsenic as As, dry weight	7.2	mg/kg	15/07/2011		M	Cov	30/30C
Cadmium as Cd, dry weight	<0.20	mg/kg	14/07/2011		M	Cov	30
Hexavalent Chromium as dw	0.16	mg/kg	13/07/2011		N	Cov	30B
Chromium (III)	12	mg/kg	14/07/2011		N	Cov	30
Copper as Cu, dry weight	<5.0	mg/kg	14/07/2011		M	Cov	30
Lead as Pb, dry weight	7.0	mg/kg	14/07/2011		M	Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	15/07/2011		M	Cov	30C
Nickel as Ni, dry weight	16	mg/kg	14/07/2011		M	Cov	30
Selenium as Se, dry weight	1.1	mg/kg	15/07/2011		M	Cov	30C
Zinc as Zn, dry weight	57	mg/kg	14/07/2011		M	Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M	Cov	14
Organic Matter	3.3	%	11/07/2011		Y	Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M	Cov	40A
Sulphate, Total as SO4	0.026	%	12/07/2011		M	Cov	45
pH	4.9	pH units	15/07/2011		Y	Cov	39
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M	Cov	307

Analyst Comments for 12471446: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471447** Sample **5** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP08 @ 0.30m**
Visual Description: **Brown loam with many stones/occassional organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones NG Method	31	%	07/07/2011		N	Cov	Stones
Moisture content at 30C	12	%	07/07/2011		N	Cov	33A
Arsenic as As, dry weight	8.3	mg/kg	15/07/2011		M	Cov	30/30C
Cadmium as Cd, dry weight	<0.20	mg/kg	14/07/2011		M	Cov	30
Hexavalent Chromium as dw	0.14	mg/kg	13/07/2011		N	Cov	30B
Chromium (III)	13	mg/kg	14/07/2011		N	Cov	30
Copper as Cu, dry weight	6.0	mg/kg	14/07/2011		M	Cov	30
Lead as Pb, dry weight	7.8	mg/kg	14/07/2011		M	Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	15/07/2011		M	Cov	30C
Nickel as Ni, dry weight	20	mg/kg	14/07/2011		M	Cov	30
Selenium as Se, dry weight	1.0	mg/kg	15/07/2011		M	Cov	30C
Zinc as Zn, dry weight	83	mg/kg	14/07/2011		M	Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M	Cov	14
Organic Matter	1.8	%	11/07/2011		Y	Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M	Cov	40A
Sulphate, Total as SO4	<0.024	%	12/07/2011		M	Cov	45
pH	4.8	pH units	15/07/2011		Y	Cov	39
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M	Cov	307

Analyst Comments for 12471447: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

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SEVERN TRENT SERVICES

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471448** Sample **6** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP09 @ 0.10m**
Visual Description: **Brown loam with many stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Stones NG Method	39	%	07/07/2011		N	Cov	Stones
Moisture content at 30C	14	%	07/07/2011		N	Cov	33A
Arsenic as As, dry weight	18	mg/kg	15/07/2011		M	Cov	30/30C
Cadmium as Cd, dry weight	<0.20	mg/kg	14/07/2011		M	Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	13/07/2011		N	Cov	30B
Chromium (III)	11	mg/kg	14/07/2011		N	Cov	30
Copper as Cu, dry weight	14	mg/kg	14/07/2011		M	Cov	30
Lead as Pb, dry weight	28	mg/kg	14/07/2011		M	Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	15/07/2011		M	Cov	30C
Nickel as Ni, dry weight	7.1	mg/kg	14/07/2011		M	Cov	30
Selenium as Se, dry weight	1.1	mg/kg	15/07/2011		M	Cov	30C
Zinc as Zn, dry weight	730	mg/kg	14/07/2011		M	Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M	Cov	14
Organic Matter	4.7	%	11/07/2011		Y	Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M	Cov	40A
Sulphate, Total as SO4	<0.024	%	12/07/2011		M	Cov	45
pH	4.8	pH units	15/07/2011		Y	Cov	39
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M	Cov	307

Analyst Comments for 12471448: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471449** Sample **7** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP14 @ 0.20m**
Visual Description: **Brown loam with many stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Stones NG Method	37	%	07/07/2011		N Cov	Stones
Moisture content at 30C	14	%	07/07/2011		N Cov	33A
Arsenic as As, dry weight	15	mg/kg	18/07/2011		M Cov	30/30C
Cadmium as Cd, dry weight	0.37	mg/kg	14/07/2011		M Cov	30
Hexavalent Chromium as dw	0.14	mg/kg	13/07/2011		N Cov	30B
Chromium (III)	11	mg/kg	14/07/2011		N Cov	30
Copper as Cu, dry weight	24	mg/kg	14/07/2011		M Cov	30
Lead as Pb, dry weight	51	mg/kg	14/07/2011		M Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	18/07/2011		M Cov	30C
Nickel as Ni, dry weight	11	mg/kg	14/07/2011		M Cov	30
Selenium as Se, dry weight	0.88	mg/kg	18/07/2011		M Cov	30C
Zinc as Zn, dry weight	84	mg/kg	14/07/2011		M Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M Cov	14
Organic Matter	5.1	%	11/07/2011		Y Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M Cov	40A
Sulphate, Total as SO4	<0.024	%	12/07/2011		M Cov	45
pH	6.1	pH units	15/07/2011		Y Cov	39
VPH >C5 - C6, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
VPH >C6 - C8, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aliphatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aliphatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C35, aliphatic	15	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aliphatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aliphatic	15	mg/kg	25/07/2011		Y Cov	304/317EPH
VPH >C5- C7, aromatic	<0.012	mg/kg	25/07/2011		M Cov	304
VPH >C7 - C8, aromatic	<0.012	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aromatic	<0.12	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aromatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aromatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C21, aromatic	5.9	mg/kg	19/07/2011		M Cov	317EPH
EPH >C21 - C35, aromatic	23	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aromatic	8.3	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aromatic	37	mg/kg	25/07/2011		Y Cov	304/317EPH
EPH >C5 - C44, Total	52	mg/kg	25/07/2011		M Cov	304/317EPH
Naphthalene	0.30	mg/kg	15/07/2011		N Cov	307
Acenaphthylene	<0.10	mg/kg	15/07/2011		M Cov	307

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471449** Sample **7** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP14 @ 0.20m**
Visual Description: **Brown loam with many stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Acenaphthene	<0.10	mg/kg	15/07/2011		M Cov	307
Fluorene	<0.10	mg/kg	15/07/2011		M Cov	307
Phenanthrene	0.53	mg/kg	15/07/2011		M Cov	307
Anthracene	0.17	mg/kg	15/07/2011		M Cov	307
Fluoranthene	1.2	mg/kg	15/07/2011		M Cov	307
Pyrene	0.96	mg/kg	15/07/2011		M Cov	307
Benzo(a)anthracene	0.79	mg/kg	15/07/2011		M Cov	307
Chrysene	0.99	mg/kg	15/07/2011		M Cov	307
Benzo(b)fluoranthene	1.1	mg/kg	15/07/2011		M Cov	307
Benzo(k)fluoranthene	0.51	mg/kg	15/07/2011		M Cov	307
Benzo(a)pyrene	0.79	mg/kg	15/07/2011		M Cov	307
Dibenz(a,h)anthracene	0.14	mg/kg	15/07/2011		M Cov	307
Benzo(g,h,i)perylene	0.64	mg/kg	15/07/2011		M Cov	307
Indeno(1,2,3-c,d)pyrene	0.64	mg/kg	15/07/2011		M Cov	307
PAH, Total of 16 EPA	8.7	mg/kg	15/07/2011		M Cov	307

Analyst Comments for 12471449: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

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SEVERN TRENT SERVICES

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471450** Sample **8** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP17 @ 1.00m**
Visual Description: **Brown loam with many stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Stones NG Method	33	%	07/07/2011		N Cov	Stones
Moisture content at 30C	13	%	07/07/2011		N Cov	33A
Arsenic as As, dry weight	9.3	mg/kg	18/07/2011		M Cov	30/30C
Cadmium as Cd, dry weight	0.26	mg/kg	14/07/2011		M Cov	30
Hexavalent Chromium as dw	0.16	mg/kg	13/07/2011		N Cov	30B
Chromium (III)	13	mg/kg	14/07/2011		N Cov	30
Copper as Cu, dry weight	9.0	mg/kg	14/07/2011		M Cov	30
Lead as Pb, dry weight	19	mg/kg	14/07/2011		M Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	18/07/2011		M Cov	30C
Nickel as Ni, dry weight	21	mg/kg	14/07/2011		M Cov	30
Selenium as Se, dry weight	0.76	mg/kg	18/07/2011		M Cov	30C
Zinc as Zn, dry weight	68	mg/kg	14/07/2011		M Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M Cov	14
Organic Matter	3.3	%	11/07/2011		Y Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	08/07/2011		M Cov	40A
Sulphate, Total as SO4	<0.024	%	12/07/2011		M Cov	45
pH	6.1	pH units	15/07/2011		Y Cov	39
VPH >C5 - C6, aliphatic	<0.11	mg/kg	21/07/2011		M Cov	304
VPH >C6 - C8, aliphatic	<0.11	mg/kg	21/07/2011		M Cov	304
VPH >C8 - C10, aliphatic	<0.11	mg/kg	21/07/2011		M Cov	304
EPH >C10 - C12, aliphatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aliphatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C35, aliphatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aliphatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aliphatic	<5.7	mg/kg	21/07/2011		Y Cov	304/317EPH
VPH >C5- C7, aromatic	<0.011	mg/kg	21/07/2011		M Cov	304
VPH >C7 - C8, aromatic	<0.011	mg/kg	21/07/2011		M Cov	304
VPH >C8 - C10, aromatic	<0.11	mg/kg	21/07/2011		M Cov	304
EPH >C10 - C12, aromatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aromatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C21, aromatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C21 - C35, aromatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aromatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aromatic	<5.7	mg/kg	21/07/2011		Y Cov	304/317EPH
EPH >C5 - C44, Total	<5.7	mg/kg	21/07/2011		M Cov	304/317EPH
Naphthalene	<0.10	mg/kg	15/07/2011		N Cov	307
Acenaphthylene	<0.10	mg/kg	15/07/2011		M Cov	307

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471450** Sample **8** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP17 @ 1.00m**
Visual Description: **Brown loam with many stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Acenaphthene	<0.10	mg/kg	15/07/2011		M Cov	307
Fluorene	<0.10	mg/kg	15/07/2011		M Cov	307
Phenanthrene	<0.10	mg/kg	15/07/2011		M Cov	307
Anthracene	<0.10	mg/kg	15/07/2011		M Cov	307
Fluoranthene	0.14	mg/kg	15/07/2011		M Cov	307
Pyrene	0.11	mg/kg	15/07/2011		M Cov	307
Benzo(a)anthracene	<0.10	mg/kg	15/07/2011		M Cov	307
Chrysene	<0.10	mg/kg	15/07/2011		M Cov	307
Benzo(b)fluoranthene	<0.10	mg/kg	15/07/2011		M Cov	307
Benzo(k)fluoranthene	<0.10	mg/kg	15/07/2011		M Cov	307
Benzo(a)pyrene	<0.10	mg/kg	15/07/2011		M Cov	307
Dibenz(a,h)anthracene	<0.10	mg/kg	15/07/2011		M Cov	307
Benzo(g,h,i)perylene	<0.10	mg/kg	15/07/2011		M Cov	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	15/07/2011		M Cov	307
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M Cov	307

Analyst Comments for 12471450: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471451** Sample **9** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP18 @ 0.30m**
Visual Description: **Black loam with may stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Stones NG Method	16	%	07/07/2011		N Cov	Stones
Moisture content at 30C	18	%	07/07/2011		N Cov	33A
Arsenic as As, dry weight	23	mg/kg	18/07/2011		M Cov	30/30C
Cadmium as Cd, dry weight	0.73	mg/kg	14/07/2011		M Cov	30
Hexavalent Chromium as dw	0.34	mg/kg	13/07/2011		N Cov	30B
Chromium (III)	13	mg/kg	14/07/2011		N Cov	30
Copper as Cu, dry weight	170	mg/kg	14/07/2011		M Cov	30
Lead as Pb, dry weight	110	mg/kg	14/07/2011		M Cov	30
Mercury as Hg, dry weight	0.36	mg/kg	18/07/2011		M Cov	30C
Nickel as Ni, dry weight	26	mg/kg	14/07/2011		M Cov	30
Selenium as Se, dry weight	1.1	mg/kg	18/07/2011		M Cov	30C
Zinc as Zn, dry weight	330	mg/kg	14/07/2011		M Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M Cov	14
Organic Matter	11	%	11/07/2011		Y Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	12/07/2011		M Cov	40A
Sulphate, Total as SO4	0.054	%	12/07/2011		M Cov	45
pH	7.1	pH units	15/07/2011		Y Cov	39
VPH >C5 - C6, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
VPH >C6 - C8, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aliphatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aliphatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C35, aliphatic	23	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aliphatic	4.0	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aliphatic	27	mg/kg	25/07/2011		Y Cov	304/317EPH
VPH >C5- C7, aromatic	<0.012	mg/kg	25/07/2011		M Cov	304
VPH >C7 - C8, aromatic	<0.012	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aromatic	<0.12	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aromatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aromatic	7.8	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C21, aromatic	21	mg/kg	19/07/2011		M Cov	317EPH
EPH >C21 - C35, aromatic	100	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aromatic	30	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aromatic	160	mg/kg	25/07/2011		Y Cov	304/317EPH
EPH >C5 - C44, Total	180	mg/kg	25/07/2011		M Cov	304/317EPH
Naphthalene	1.0	mg/kg	15/07/2011		N Cov	307
Acenaphthylene	<0.10	mg/kg	15/07/2011		M Cov	307

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471451** Sample **9** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP18 @ 0.30m**
Visual Description: **Black loam with may stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Acenaphthene	0.44	mg/kg	15/07/2011		M Cov	307
Fluorene	0.19	mg/kg	15/07/2011		M Cov	307
Phenanthrene	2.9	mg/kg	15/07/2011		M Cov	307
Anthracene	1.1	mg/kg	15/07/2011		M Cov	307
Fluoranthene	6.5	mg/kg	15/07/2011		M Cov	307
Pyrene	5.1	mg/kg	15/07/2011		M Cov	307
Benzo(a)anthracene	3.7	mg/kg	15/07/2011		M Cov	307
Chrysene	4.0	mg/kg	15/07/2011		M Cov	307
Benzo(b)fluoranthene	3.2	mg/kg	15/07/2011		M Cov	307
Benzo(k)fluoranthene	1.6	mg/kg	15/07/2011		M Cov	307
Benzo(a)pyrene	3.2	mg/kg	15/07/2011		M Cov	307
Dibenz(a,h)anthracene	0.41	mg/kg	15/07/2011		M Cov	307
Benzo(g,h,i)perylene	2.0	mg/kg	15/07/2011		M Cov	307
Indeno(1,2,3-c,d)pyrene	2.1	mg/kg	15/07/2011		M Cov	307
PAH, Total of 16 EPA	38	mg/kg	15/07/2011		M Cov	307

Analyst Comments for 12471451: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

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SEVERN TRENT SERVICES

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471452** Sample **10** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP19 @ 0.60m**
Visual Description: **Black loam with many stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Stones NG Method	33	%	07/07/2011		N Cov	Stones
Moisture content at 30C	19	%	07/07/2011		N Cov	33A
Arsenic as As, dry weight	37	mg/kg	18/07/2011		M Cov	30/30C
Cadmium as Cd, dry weight	0.56	mg/kg	14/07/2011		M Cov	30
Hexavalent Chromium as dw	0.37	mg/kg	13/07/2011		N Cov	30B
Chromium (III)	9.1	mg/kg	14/07/2011		N Cov	30
Copper as Cu, dry weight	110	mg/kg	14/07/2011		M Cov	30
Lead as Pb, dry weight	87	mg/kg	14/07/2011		M Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	18/07/2011		M Cov	30C
Nickel as Ni, dry weight	26	mg/kg	14/07/2011		M Cov	30
Selenium as Se, dry weight	1.2	mg/kg	18/07/2011		M Cov	30C
Zinc as Zn, dry weight	150	mg/kg	14/07/2011		M Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M Cov	14
Organic Matter	16	%	11/07/2011		Y Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	12/07/2011		M Cov	40A
Sulphate, Total as SO4	0.061	%	12/07/2011		M Cov	45
pH	6.4	pH units	15/07/2011		Y Cov	39
VPH >C5 - C6, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
VPH >C6 - C8, aliphatic	<0.12	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aliphatic	0.12	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aliphatic	<1.2	mg/kg	22/07/2011		M Cov	317EPH
EPH >C12 - C16, aliphatic	<1.2	mg/kg	22/07/2011		M Cov	317EPH
EPH >C16 - C35, aliphatic	25	mg/kg	22/07/2011		M Cov	317EPH
EPH >C35 - C44, aliphatic	7.0	mg/kg	22/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aliphatic	32	mg/kg	25/07/2011		Y Cov	304/317EPH
VPH >C5- C7, aromatic	<0.012	mg/kg	25/07/2011		M Cov	304
VPH >C7 - C8, aromatic	<0.012	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aromatic	<0.12	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aromatic	<1.2	mg/kg	22/07/2011		M Cov	317EPH
EPH >C12 - C16, aromatic	<1.2	mg/kg	22/07/2011		M Cov	317EPH
EPH >C16 - C21, aromatic	14	mg/kg	22/07/2011		M Cov	317EPH
EPH >C21 - C35, aromatic	68	mg/kg	22/07/2011		M Cov	317EPH
EPH >C35 - C44, aromatic	22	mg/kg	22/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aromatic	100	mg/kg	25/07/2011		Y Cov	304/317EPH
EPH >C5 - C44, Total	140	mg/kg	25/07/2011		M Cov	304/317EPH
Naphthalene	2.0	mg/kg	15/07/2011		N Cov	307
Acenaphthylene	<0.10	mg/kg	15/07/2011		M Cov	307

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471452** Sample **10** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP19 @ 0.60m**
Visual Description: **Black loam with many stones and some organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Acenaphthene	0.22	mg/kg	15/07/2011		M Cov	307
Fluorene	0.27	mg/kg	15/07/2011		M Cov	307
Phenanthrene	5.5	mg/kg	15/07/2011		M Cov	307
Anthracene	1.6	mg/kg	15/07/2011		M Cov	307
Fluoranthene	9.7	mg/kg	15/07/2011		M Cov	307
Pyrene	7.4	mg/kg	15/07/2011		M Cov	307
Benzo(a)anthracene	4.5	mg/kg	15/07/2011		M Cov	307
Chrysene	4.5	mg/kg	15/07/2011		M Cov	307
Benzo(b)fluoranthene	3.3	mg/kg	15/07/2011		M Cov	307
Benzo(k)fluoranthene	1.8	mg/kg	15/07/2011		M Cov	307
Benzo(a)pyrene	3.7	mg/kg	15/07/2011		M Cov	307
Dibenz(a,h)anthracene	0.41	mg/kg	15/07/2011		M Cov	307
Benzo(g,h,i)perylene	2.0	mg/kg	15/07/2011		M Cov	307
Indeno(1,2,3-c,d)pyrene	2.2	mg/kg	15/07/2011		M Cov	307
PAH, Total of 16 EPA	49	mg/kg	15/07/2011		M Cov	307

Analyst Comments for 12471452: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471453** Sample **11** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP22 @ 0.20m**
Visual Description: **Brown loam with many stones and occassional organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Stones NG Method	35	%	07/07/2011		N Cov	Stones
Moisture content at 30C	12	%	07/07/2011		N Cov	33A
Arsenic as As, dry weight	14	mg/kg	18/07/2011		M Cov	30/30C
Cadmium as Cd, dry weight	0.52	mg/kg	14/07/2011		M Cov	30
Hexavalent Chromium as dw	<0.10	mg/kg	13/07/2011		N Cov	30B
Chromium (III)	8.7	mg/kg	14/07/2011		N Cov	30
Copper as Cu, dry weight	49	mg/kg	14/07/2011		M Cov	30
Lead as Pb, dry weight	92	mg/kg	14/07/2011		M Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	18/07/2011		M Cov	30C
Nickel as Ni, dry weight	15	mg/kg	14/07/2011		M Cov	30
Selenium as Se, dry weight	0.69	mg/kg	18/07/2011		M Cov	30C
Zinc as Zn, dry weight	150	mg/kg	14/07/2011		M Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M Cov	14
Organic Matter	12	%	11/07/2011		Y Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	12/07/2011		M Cov	40A
Sulphate, Total as SO4	<0.024	%	12/07/2011		M Cov	45
pH	7.2	pH units	18/07/2011		Y Cov	39
VPH >C5 - C6, aliphatic	<0.11	mg/kg	25/07/2011		M Cov	304
VPH >C6 - C8, aliphatic	<0.11	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aliphatic	<0.11	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aliphatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aliphatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C35, aliphatic	64	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aliphatic	16	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aliphatic	80	mg/kg	25/07/2011		Y Cov	304/317EPH
VPH >C5- C7, aromatic	<0.011	mg/kg	25/07/2011		M Cov	304
VPH >C7 - C8, aromatic	<0.011	mg/kg	25/07/2011		M Cov	304
VPH >C8 - C10, aromatic	<0.11	mg/kg	25/07/2011		M Cov	304
EPH >C10 - C12, aromatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aromatic	<1.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C21, aromatic	13	mg/kg	19/07/2011		M Cov	317EPH
EPH >C21 - C35, aromatic	63	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aromatic	28	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aromatic	100	mg/kg	25/07/2011		Y Cov	304/317EPH
EPH >C5 - C44, Total	180	mg/kg	25/07/2011		M Cov	304/317EPH
Naphthalene	0.52	mg/kg	15/07/2011		N Cov	307
Acenaphthylene	<0.10	mg/kg	15/07/2011		M Cov	307

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Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471453** Sample **11** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP22 @ 0.20m**
Visual Description: **Brown loam with many stones and occassional organic matter.**
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Acenaphthene	<0.10	mg/kg	15/07/2011		M Cov	307
Fluorene	<0.10	mg/kg	15/07/2011		M Cov	307
Phenanthrene	1.3	mg/kg	15/07/2011		M Cov	307
Anthracene	0.39	mg/kg	15/07/2011		M Cov	307
Fluoranthene	2.5	mg/kg	15/07/2011		M Cov	307
Pyrene	2.1	mg/kg	15/07/2011		M Cov	307
Benzo(a)anthracene	1.5	mg/kg	15/07/2011		M Cov	307
Chrysene	1.6	mg/kg	15/07/2011		M Cov	307
Benzo(b)fluoranthene	1.5	mg/kg	15/07/2011		M Cov	307
Benzo(k)fluoranthene	0.74	mg/kg	15/07/2011		M Cov	307
Benzo(a)pyrene	1.2	mg/kg	15/07/2011		M Cov	307
Dibenz(a,h)anthracene	0.19	mg/kg	15/07/2011		M Cov	307
Benzo(g,h,i)perylene	0.97	mg/kg	15/07/2011		M Cov	307
Indeno(1,2,3-c,d)pyrene	1.0	mg/kg	15/07/2011		M Cov	307
PAH, Total of 16 EPA	15	mg/kg	15/07/2011		M Cov	307

Analyst Comments for 12471453: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
1229
0897
4409

SEVERN TRENT SERVICES

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471454** Sample **12** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP23 @ 0.80m**
Visual Description:
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Stones NG Method	7.8	%	07/07/2011		N Cov	Stones
Moisture content at 30C	16	%	07/07/2011		N Cov	33A
Arsenic as As, dry weight	8.1	mg/kg	18/07/2011		M Cov	30/30C
Cadmium as Cd, dry weight	0.23	mg/kg	14/07/2011		M Cov	30
Hexavalent Chromium as dw	0.24	mg/kg	13/07/2011		N Cov	30B
Chromium (III)	14	mg/kg	14/07/2011		N Cov	30
Copper as Cu, dry weight	11	mg/kg	14/07/2011		M Cov	30
Lead as Pb, dry weight	27	mg/kg	14/07/2011		M Cov	30
Mercury as Hg, dry weight	<0.35	mg/kg	18/07/2011		M Cov	30C
Nickel as Ni, dry weight	24	mg/kg	14/07/2011		M Cov	30
Selenium as Se, dry weight	0.95	mg/kg	18/07/2011		M Cov	30C
Zinc as Zn, dry weight	93	mg/kg	14/07/2011		M Cov	30
Cyanide, Total	<2.5	mg/kg	08/07/2011		M Cov	14
Organic Matter	2.6	%	11/07/2011		Y Cov	36
Monohydric Phenols,Total Dist.	<0.75	mg/kg	12/07/2011		M Cov	40A
Sulphate, Total as SO4	<0.024	%	12/07/2011		M Cov	45
pH	6.9	pH units	18/07/2011		Y Cov	39
VPH >C5 - C6, aliphatic	<0.12	mg/kg	21/07/2011		M Cov	304
VPH >C6 - C8, aliphatic	<0.12	mg/kg	21/07/2011		M Cov	304
VPH >C8 - C10, aliphatic	<0.12	mg/kg	21/07/2011		M Cov	304
EPH >C10 - C12, aliphatic	3.1	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aliphatic	25	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C35, aliphatic	880	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aliphatic	260	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aliphatic	1200	mg/kg	21/07/2011		Y Cov	304/317EPH
VPH >C5- C7, aromatic	<0.012	mg/kg	21/07/2011		M Cov	304
VPH >C7 - C8, aromatic	<0.012	mg/kg	21/07/2011		M Cov	304
VPH >C8 - C10, aromatic	<0.12	mg/kg	21/07/2011		M Cov	304
EPH >C10 - C12, aromatic	<1.2	mg/kg	19/07/2011		M Cov	317EPH
EPH >C12 - C16, aromatic	21	mg/kg	19/07/2011		M Cov	317EPH
EPH >C16 - C21, aromatic	90	mg/kg	19/07/2011		M Cov	317EPH
EPH >C21 - C35, aromatic	710	mg/kg	19/07/2011		M Cov	317EPH
EPH >C35 - C44, aromatic	420	mg/kg	19/07/2011		M Cov	317EPH
EPH >C5 - C44, Total aromatic	1200	mg/kg	21/07/2011		Y Cov	304/317EPH
EPH >C5 - C44, Total	2400	mg/kg	21/07/2011		M Cov	304/317EPH
Naphthalene	<0.10	mg/kg	15/07/2011		N Cov	307
Acenaphthylene	<0.10	mg/kg	15/07/2011		M Cov	307

Certificate of Analysis

1314
1229
0897
4409

Matrix: **Soil**

Report Number: **COV/789372/2011** Issue **1**
Laboratory Number: **12471454** Sample **12** of **12**
Sample Source: **Terra Firma**
Sample Point Description: **Terra Firma Wales**
Sample Description: **TP23 @ 0.80m**
Visual Description:
Sample Date: Sample Time: Sample Received: **04 July 2011**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation		Method
Acenaphthene	<0.10	mg/kg	15/07/2011		M	Cov	307
Fluorene	<0.10	mg/kg	15/07/2011		M	Cov	307
Phenanthrene	<0.10	mg/kg	15/07/2011		M	Cov	307
Anthracene	<0.10	mg/kg	15/07/2011		M	Cov	307
Fluoranthene	0.16	mg/kg	15/07/2011		M	Cov	307
Pyrene	0.11	mg/kg	15/07/2011		M	Cov	307
Benzo(a)anthracene	<0.10	mg/kg	15/07/2011		M	Cov	307
Chrysene	0.11	mg/kg	15/07/2011		M	Cov	307
Benzo(b)fluoranthene	0.12	mg/kg	15/07/2011		M	Cov	307
Benzo(k)fluoranthene	<0.10	mg/kg	15/07/2011		M	Cov	307
Benzo(a)pyrene	<0.10	mg/kg	15/07/2011		M	Cov	307
Dibenz(a,h)anthracene	<0.10	mg/kg	15/07/2011		M	Cov	307
Benzo(g,h,i)perylene	<0.10	mg/kg	15/07/2011		M	Cov	307
Indeno(1,2,3-c,d)pyrene	0.11	mg/kg	15/07/2011		M	Cov	307
PAH, Total of 16 EPA	<1.0	mg/kg	15/07/2011		M	Cov	307

Analyst Comments for 12471454: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS.
Analysed at: Brd = Bridgend, Cov = Coventry, Rea = Reading, Run = Runcorn, S = Subcontracted, Wak = Wakefield.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Signed:

Name: **J. Fell** Date: **25 July 2011**

Title: **Chemistry Operations Manager**

SEVERN TRENT SERVICES

DETERMINAND COMMENTS FOR REPORT COV/789372/2011 ISSUE 1

Date of Issue : 25 July 2011

Sample No	Description	Determinand	Comments

Signed: 

Name: **J. Fell** Date: **25 July 2011**

Title: **Chemistry Operations Manager**

METHOD COMMENTS FOR REPORT COV/789372/2011 Issue 1

Date of Issue :**25 July 2011**

Method	Statement
14	The cyanides in the sample are determined in two stages. The free cyanide is liberated by heating with pH 4 buffer and the resulting gas collected in sodium hydroxide solution. Complex cyanide is liberated using phosphoric acid under the same conditions. the two portions of sodium hydroxide are then analysed for cyanide content using a discrete autoanalyser. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
30	Metals are extracted from land samples by boiling with hydrochloric/nitric acids (3:1 ratio). The measurement of metal concentrations is determined directly on an ICP-OES at defined wavelengths. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
30/30C	Metals are extracted from land samples by boiling with hydrochloric/nitric acids (3:1 ratio). For the measurement of metal concentrations is determined on an ICP-OES at defined wavelengths. Where a result is 25mg/kg or above results are obtained directly. Otherwise results are obtained via hydride generation. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
304	The method employs the use of Headspace extraction of the volatile hydrocarbons from as received soil samples using a commercial headspace sampler followed by gas chromatograph (GC). The effluent from the chromatographic column is split between a flame ionisation detector (FID) for the determination or total VPH and a mass selective detector (MSD) for the determination or aromatic volatile hydrocarbons. This analysis is carried out on an as received portion of sample.
304/317EPH	Headspace extraction of the compounds from the sample using a commercial headspace sampler followed by separation and quantitative determination of the compounds using gas chromatography with flame ionisation detection/Soil samples are extracted with hexane. The extracts are separated into aliphatic and aromatic fractions using silica solid phase extraction cartridges. The fractionated extracts are then analysed by capillary gas chromatography with flame ionisation detection (GC-FID). This analysis is carried out on an as received portion of sample.
307	PAHs are extracted from land samples using acetone. The samples are shaken mechanically and then centrifuged. An aliquot of the supernatant liquid is then transferred to a separate vial and analysed by HPLC using a variable wavelength programme. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
30B	Hexavalent chromium is extracted from land samples using dilute hydrochloric acid. The extract is shaken and then filtered. The measurement of chromium in the filtrate is then determined directly by ICP-OES at a defined wavelength. This analysis is carried out on an air dried sample, ground to pass a 212um sieve.
30C	Metals are extracted from land samples by boiling with hydrochloric/nitric acid (3:1 ratio). The measurement of metal concentrations is determined by means of hydride generation / atomic vapour on an ICP-OES at defined wavelengths. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
317EPH	A known amount of soil, with a surrogate spike added, is shaken and sonicated in an extraction vial containing hexane and acetone. Water is added to the sample and then centrifuged; a test portion of the resulting hexane layer is transferred to a 2ml vial. The extract can then be analysed by FC-FID. Frationation is done by solid phase extraction using an unmodified silica column. This analysis is carried out on an as received portion of sample.
33A	Moisture Content is the weight difference between an as received sample and the air dried sample at 30 degrees C.
36	This method determines the percentage, by dry mass, of natural organic matter present in soil. This analysis is carried out on an air dried sample, ground to pass a 212um sieve.
39	The test is carried out by extraction using deionised water with agitation. The pH of this suspension is read directly from an electronic pH meter. This analysis is carried out on an air dried sample, ground to pass a 212um sieve.
40A	This method determines steam distillable phenolic compounds in land materials. Phenol is extracted from air dried soil using steam distillation. The pH adjusted distillate is measured colorimetrically at a defined wavelength. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
45	The sulphates are extracted from land samples using boiling hydrochloric acid solution. After cooling and filtration the determination of sulphate is obtained from an aliquot of solution, via a turbidimetric measurement. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
Stones	The percentage weight of the stones that are naturally occurring and are greater than 10mm in diameter of the total weight of sample.

Certificate of Analysis

2139

Date: 27/01/2012

Certificate Number: 12-58784

Client:	Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB
Our Reference:	12-58784
Client Reference:	11230
Contract Title:	Cefn Florest
Description:	2 soil samples
Date Received:	26 January 2012
Date Started:	26 January 2012
Date Completed:	27 January 2012
Test Procedures:	Asbestos Analysis (DETS 082)
Notes:	Observations and interpretations are outside the scope of UKAS accreditation
Approved By:	Paul Woodbridge, Senior Operations Manager

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.

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • Fax 01207 582444 • email: info@dets.co.uk • www.dets.co.uk

Information in Support of the Analytical Results

Analysis

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425um sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample.

Key

*	Denotes test not included in laboratory scope of accreditation
#	Denotes test that holds MCERTS accreditation, however, MCERTS accreditation is only implied if the report carries the MCERTS logo
$	Denotes tests completed by an approved subcontractor
I/S	Denotes insufficient sample to carry out test
U/S	Denotes that the sample is not suitable for testing

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

Summary of Asbestos Analysis
Soil Samples

Our Ref: 12-58784
Client Ref: 11230
Contract Title: Cefn Florest

Lab No	Sample Ref	Material Type*	Result	Comment	Analyst
385525	WS01 0.50	Soil	NAD	None	Colin Patrick
385526	WS02 1.00	Soil	NAD	None	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. NAD = No Asbestos Detected. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETS 082 using polarised light microscopy in accordance with HSG248 and documented in-house methods. 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'.

ANNEX H
Soakaway Calculation Sheets

terrafirma
Terra Firma (Wales) Limited
Wharfedale Road, Pentwyn
Cardiff
CF23 7HB
Tel: 029 20 375 354
Fax: 029 20 735 433
Email: info@terrafirmawales.co.uk

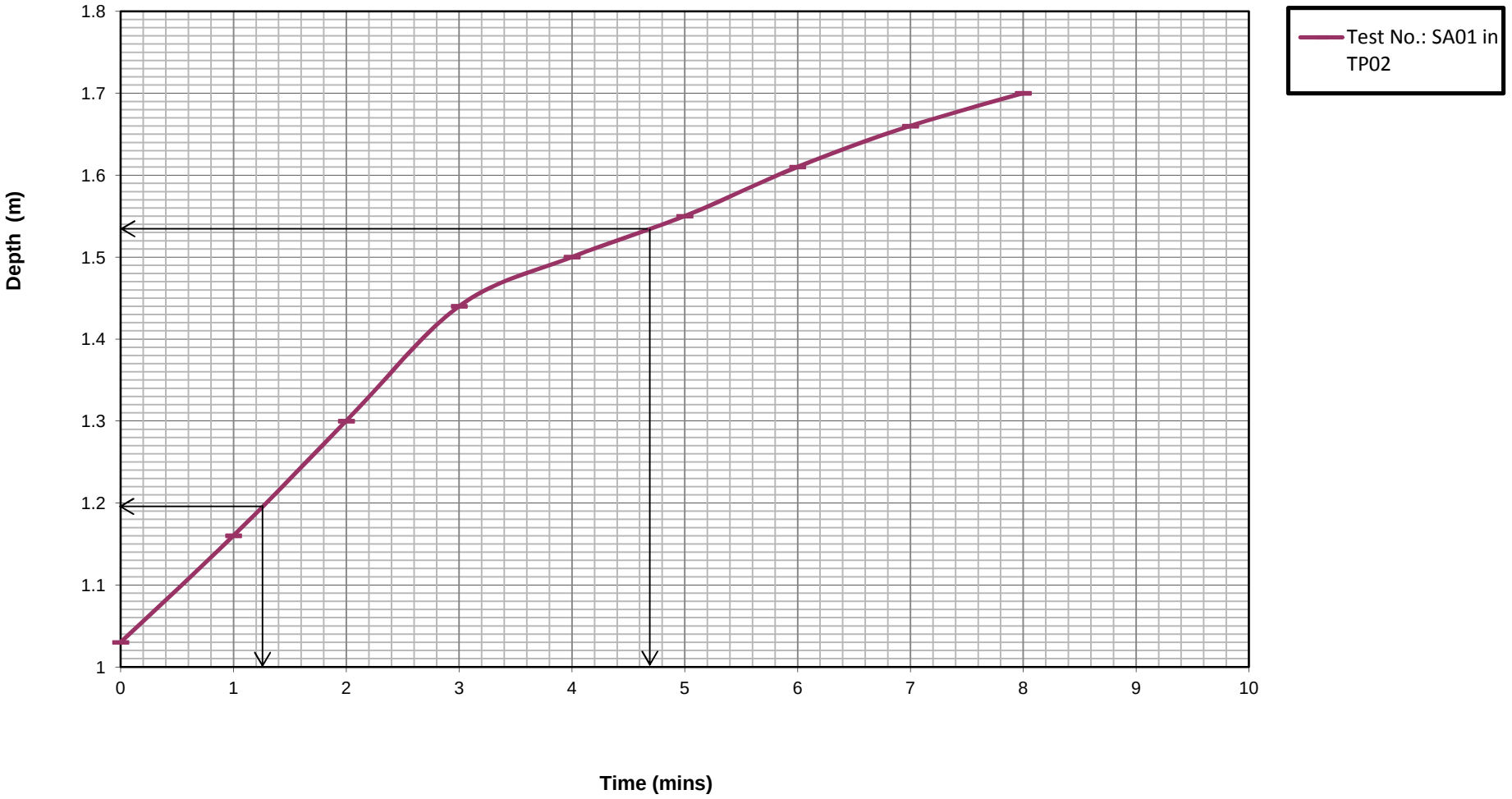
Site Name: Cefn Fforest, Blackwood
Number: 11230
Date Undertaken: 30.06.11
Test No.: SA01 in TP02

	Depth to Water (m)	Time (Mins)
(effective depth - 100%)	1.03	0
	1.16	1
	1.3	2
	1.44	3
	1.5	4
	1.55	5
	1.61	6
	1.66	7
(effective depth - 0%)	1.70	8

Length of Trial Pit (m)	2.20	
Width of Trial Pit (m)	0.70	
Depth of Trial Pit (m)	1.70	
Effective Storage Depth (m)	0.67	
Vp25	1.1975	
Vp75	1.5325	
Vp75-25	0.516	
50% effective depth (m)	0.335	
Mean Surface area ap50 (m2)	3.483	
Time for 25% **Outflow** (t_{p25})	1	**From Graph**
Time for 75% **Outflow** (t_{p75})	5	**From Graph**
tp75 - 25	4	
Soil Infiltration Rate (m/s)	**0.000617164**	

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BRE Digest 365- September 1991'
This worksheet can be used to determine soil infiltration rates from trial pit field measurements
Worksheet options are identified by a green background

Soil Infiltration Measurements - SA01 in TP02



terrafirma
Terra Firma (Wales) Limited
Wharfedale Road, Pentwyn
Cardiff
CF23 7HB
Tel: 029 20 375 354
Fax: 029 20 735 433
Email: info@terrafirmawales.co.uk

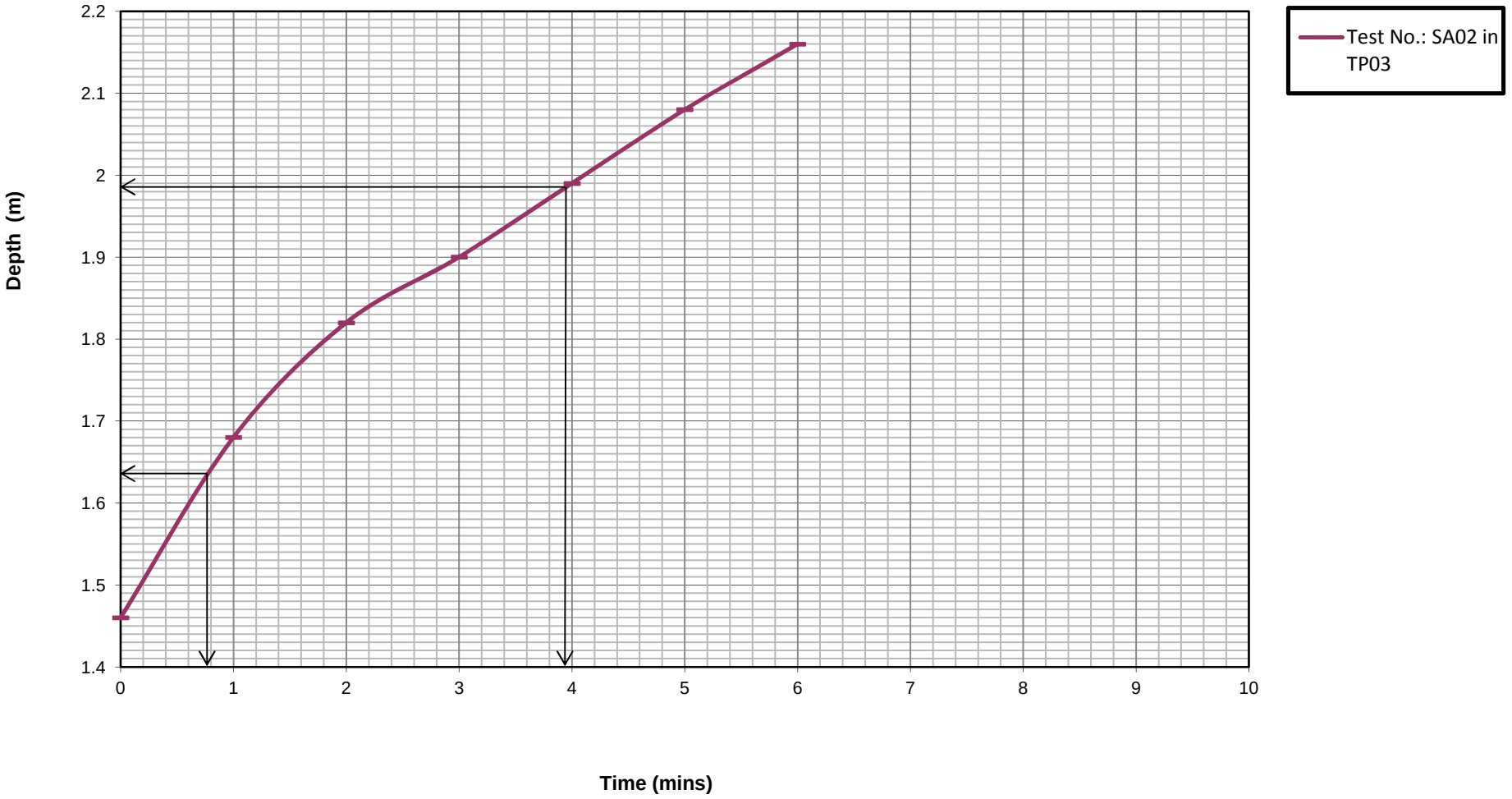
Site Name: Cefn Fforest, Blackwood
Number: 11230
Date Undertaken: 30.06.11
Test No.: SA02 in TP03

	Depth to Water (m)	Time (Mins)
(effective depth - 100%)	1.46	0
	1.68	1
	1.82	2
	1.9	3
	1.99	4
	2.08	5
(effective depth - 0%)	2.16	6

Length of Trial Pit (m)	2.40	
Width of Trial Pit (m)	0.70	
Depth of Trial Pit (m)	2.16	
Effective Storage Depth (m)	0.7	
Vp25	1.6350	
Vp75	1.9850	
Vp75-25	0.588	
50% effective depth (m)	0.350	
Mean Surface area ap50 (m2)	3.850	
Time for 25% **Outflow** (t_{p25})	1	**From Graph**
Time for 75% **Outflow** (t_{p75})	4	**From Graph**
tp75 - 25	3	
Soil Infiltration Rate (m/s)	**0.000848485**	

Soil Infiltration Worksheet: This worksheet has been produced in combination with the document 'BRE Digest 365- September 1991'
This worksheet can be used to determine soil infiltration rates from trial pit field measurements
Worksheet options are identified by a green background

Soil Infiltration Measurements - SA01 in TP02

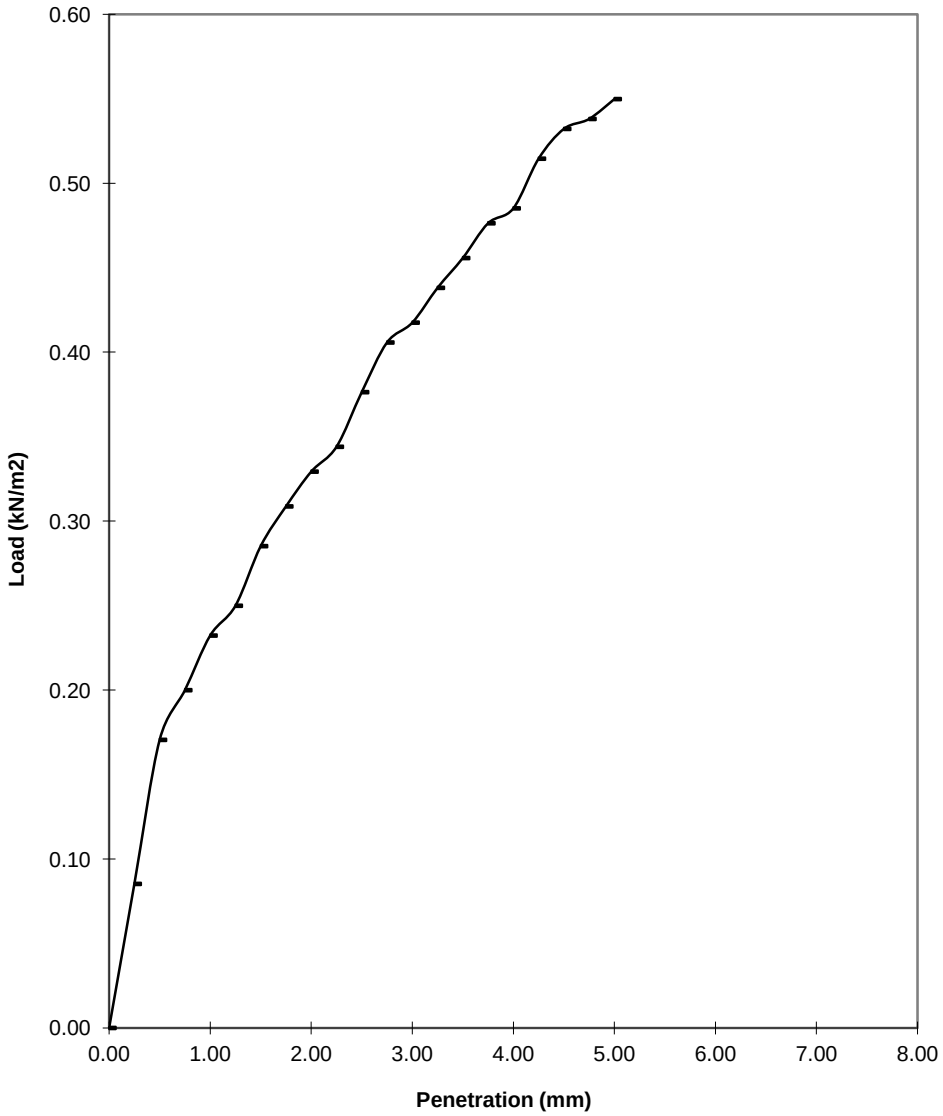


ANNEX I
CBR Test Results

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	29	0.09
0.50	58	0.17
0.75	68	0.20
1.00	79	0.23
1.25	85	0.25
1.50	97	0.29
1.75	105	0.31
2.00	112	0.33
2.25	117	0.34
2.50	128	0.38
2.75	138	0.41
3.00	142	0.42
3.25	149	0.44
3.50	155	0.46
3.75	162	0.48
4.00	165	0.49
4.25	175	0.51
4.50	181	0.53
4.75	183	0.54
5.00	187	0.55
5.25		
5.50		
5.75		
6.00		
6.25		
6.50		
6.75		
7.00		
7.25		
7.50		



Test Depth: 0.20m.	Soil Description: Soft to firm sandy CLAY	CBR at 2.50mm: 2.84 %
Mass of Split Rings: 5kg		CBR at 5.00mm: 2.75 %
PR Factor: 2.94 N/Div		**CBR Value: 2.84 %**
		Checked By: NPJ

REMARKS:

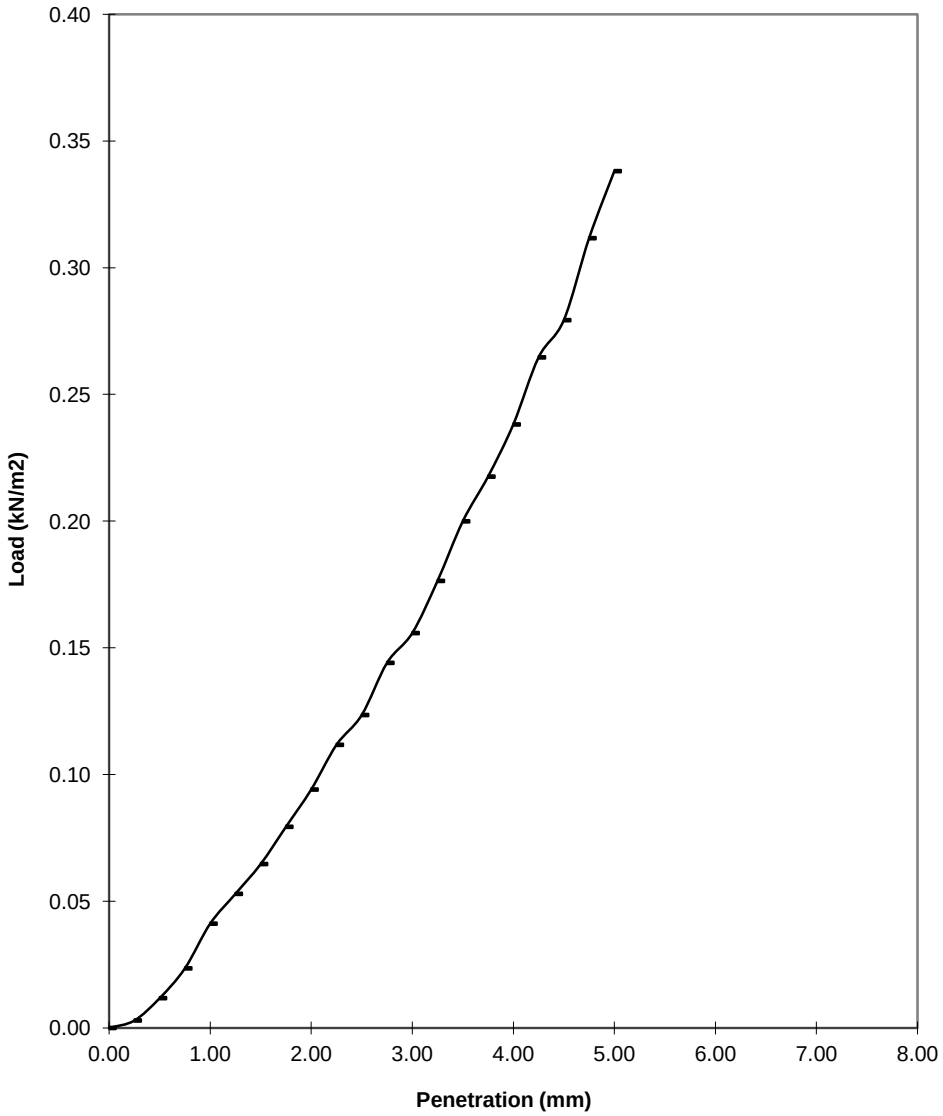
Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT: Cefn Fforest	DATE: 14.08.13
	TEST REFERENCE: CBR 1

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	1	0.00
0.50	4	0.01
0.75	8	0.02
1.00	14	0.04
1.25	18	0.05
1.50	22	0.06
1.75	27	0.08
2.00	32	0.09
2.25	38	0.11
2.50	42	0.12
2.75	49	0.14
3.00	53	0.16
3.25	60	0.18
3.50	68	0.20
3.75	74	0.22
4.00	81	0.24
4.25	90	0.26
4.50	95	0.28
4.75	106	0.31
5.00	115	0.34
5.25		
5.50		
5.75		
6.00		
6.25		
6.50		
6.75		
7.00		
7.25		
7.50		



Test Depth: 0.20m.	Soil Description: Soft sandy CLAY	CBR at 2.50mm: 0.93 %
Mass of Split Rings: 5kg		CBR at 5.00mm: 1.69 %
PR Factor: 2.94 N/Div		**CBR Value: 1.69 %**
		Checked By: NPJ

REMARKS:

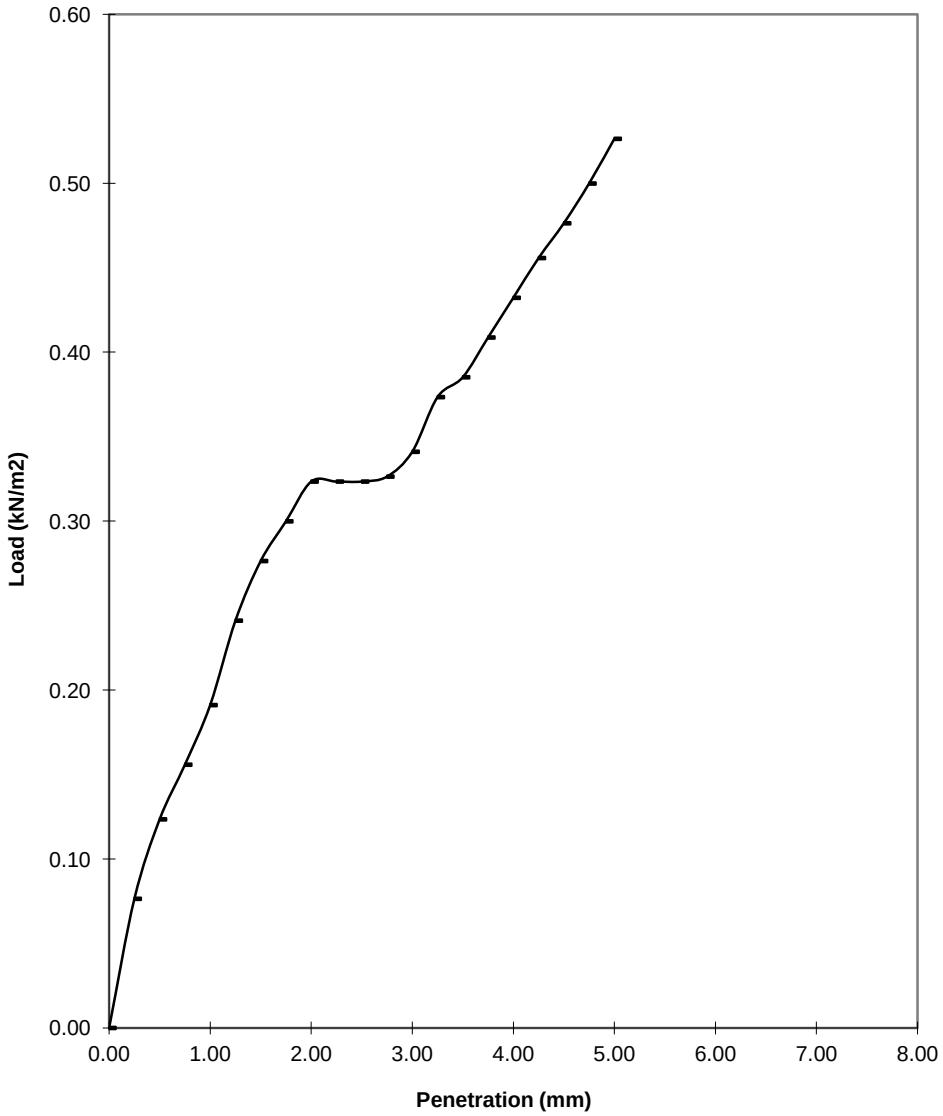
Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT: Cefn Fforest	DATE: 14.08.13
	TEST REFERENCE: CBR 2

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	26	0.08
0.50	42	0.12
0.75	53	0.16
1.00	65	0.19
1.25	82	0.24
1.50	94	0.28
1.75	102	0.30
2.00	110	0.32
2.25	110	0.32
2.50	110	0.32
2.75	111	0.33
3.00	116	0.34
3.25	127	0.37
3.50	131	0.39
3.75	139	0.41
4.00	147	0.43
4.25	155	0.46
4.50	162	0.48
4.75	170	0.50
5.00	179	0.53
5.25		
5.50		
5.75		
6.00		
6.25		
6.50		
6.75		
7.00		
7.25		
7.50		



Test Depth: 0.25m.	Soil Description: Soft to firm sandy CLAY	CBR at 2.50mm: 2.44 %
Mass of Split Rings: 5kg		CBR at 5.00mm: 2.64 %
PR Factor: 2.94 N/Div		**CBR Value: 2.64 %**
		Checked By: NPJ

REMARKS:

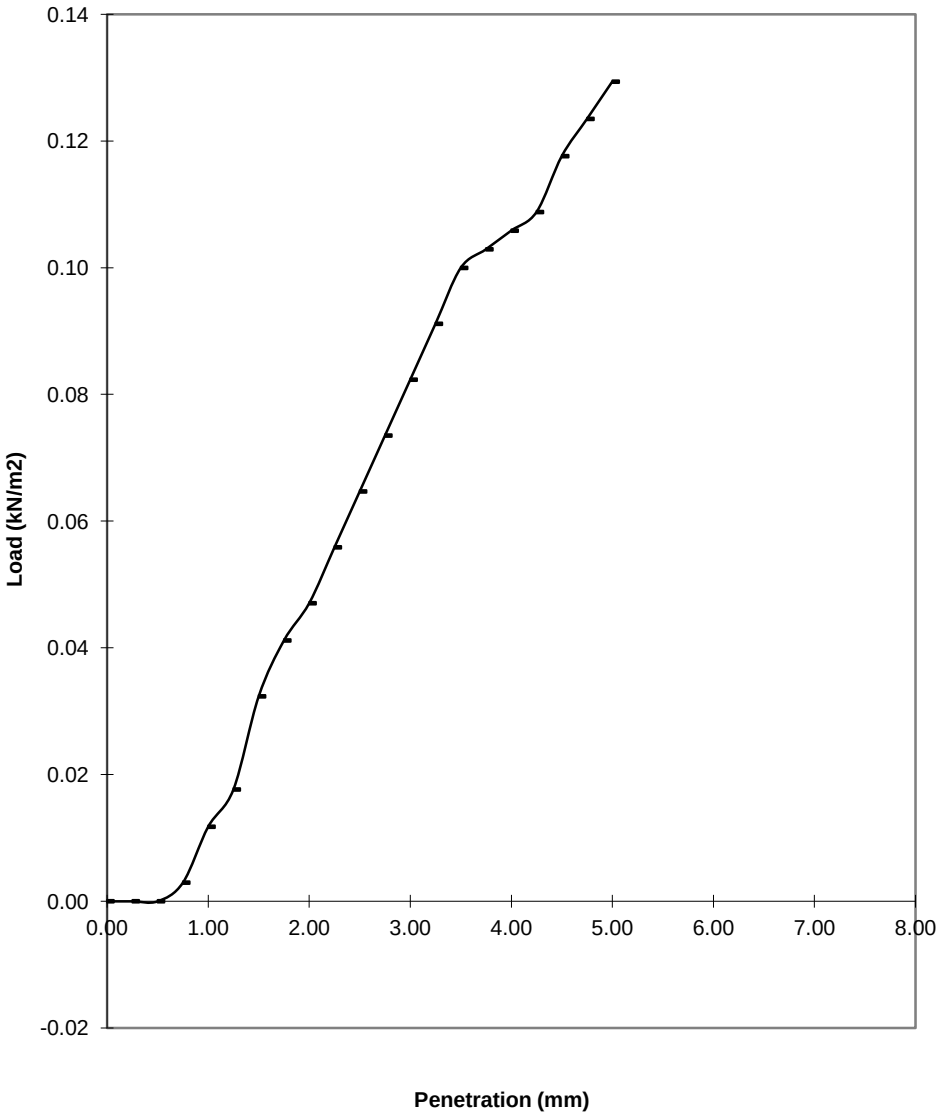
Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT: Cefn Fforest	DATE: 14.08.13
	TEST REFERENCE: CBR 3

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	0	0.00
0.50	0	0.00
0.75	1	0.00
1.00	4	0.01
1.25	6	0.02
1.50	11	0.03
1.75	14	0.04
2.00	16	0.05
2.25	19	0.06
2.50	22	0.06
2.75	25	0.07
3.00	28	0.08
3.25	31	0.09
3.50	34	0.10
3.75	35	0.10
4.00	36	0.11
4.25	37	0.11
4.50	40	0.12
4.75	42	0.12
5.00	44	0.13
5.25		
5.50		
5.75		
6.00		
6.25		
6.50		
6.75		
7.00		
7.25		
7.50		



Test Depth: 0.40m.

Soil Description:
Black ash and demolition rubble

Mass of Split Rings: 5kg

PR Factor: 2.94 N/Div

CBR at 2.50mm: 0.49 %

CBR at 5.00mm: 0.65 %

CBR Value: 0.65 %

Checked By: NPJ

REMARKS:

Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT:
Cefn Fforest

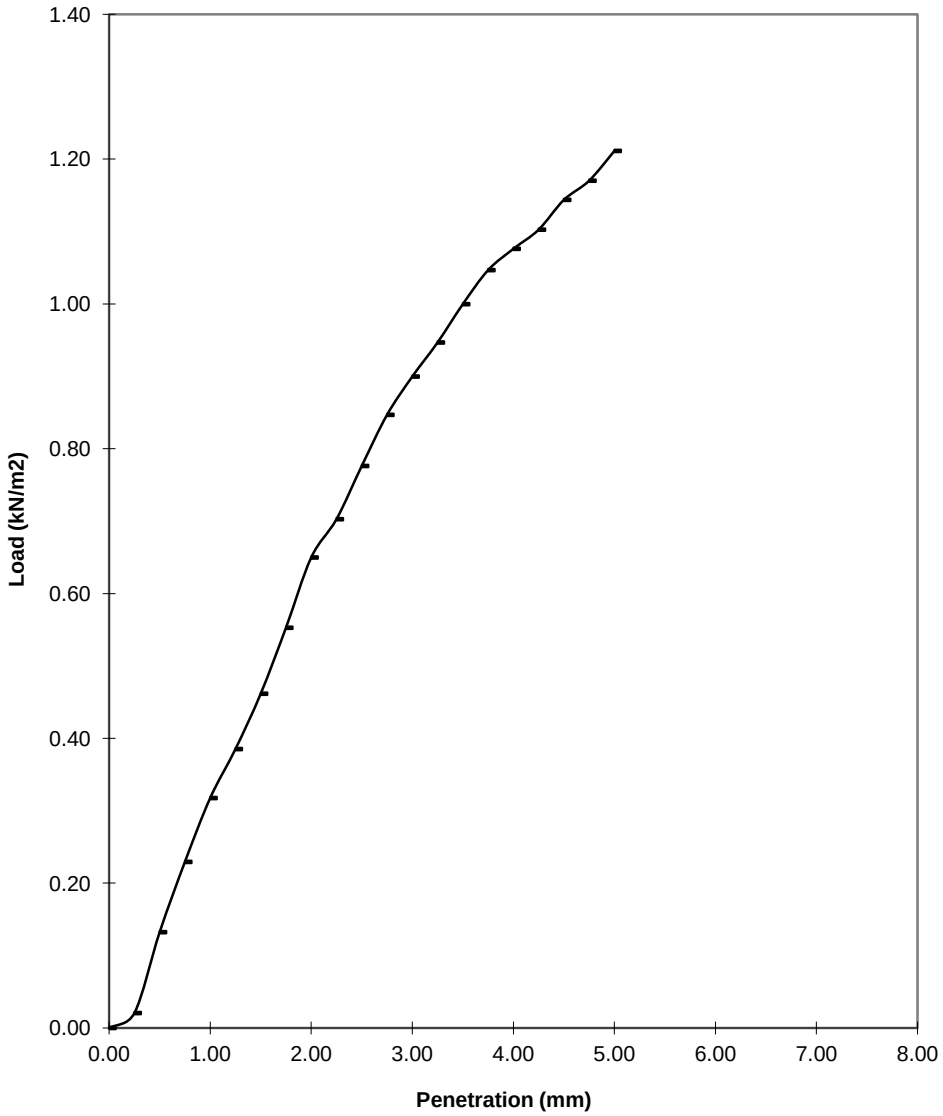
DATE: 14.08.13

TEST REFERENCE: CBR 4

SOUTHERN GROUND TESTING

IN SITU CBR TEST

PENETRATION (mm)	PR READING (divs)	LOAD (KN)
0.00	0	0.00
0.25	7	0.02
0.50	45	0.13
0.75	78	0.23
1.00	108	0.32
1.25	131	0.39
1.50	157	0.46
1.75	188	0.55
2.00	221	0.65
2.25	239	0.70
2.50	264	0.78
2.75	288	0.85
3.00	306	0.90
3.25	322	0.95
3.50	340	1.00
3.75	356	1.05
4.00	366	1.08
4.25	375	1.10
4.50	389	1.14
4.75	398	1.17
5.00	412	1.21
5.25		
5.50		
5.75		
6.00		
6.25		
6.50		
6.75		
7.00		
7.25		
7.50		



Test Depth: 0.25m.	Soil Description: Black ash and demolition rubble	CBR at 2.50mm: 5.86 %
Mass of Split Rings: 5kg		CBR at 5.00mm: 6.07 %
PR Factor: 2.94 N/Div		**CBR Value: 6.07 %**
		Checked By: NPJ

REMARKS:

Carried out in accordance with BS1377: Part 9: 1990, Test 4.3

CONTRACT: Cefn Fforest	DATE: 14.08.13
	TEST REFERENCE: CBR 5

ANNEX J
Soil Plasticity Test Results

Laboratory Report

LABORATORY TESTING SERVICES LIMITED

Contract Number: 12948

Client's Reference: 11230-12 PO 6651

Report Date: 20-07-2011

Client Name: Terrafirma Wales Ltd
5 Deryn Court,
Wharfedale Road,
Pentwyn,
Cardiff,
CF23 7HB

Contract Title: Cefn Fforest

For the attention of: Alan Beattie

Date Received: 06-07-2011
Date Commenced: 06-07-2011
Date Completed: 20-07-2011

Test Description	Quantity	Checked	Approved
4 Point Liquid & Plastic Limit BS1377:1990 2/4.3&5.3 *	3		
Moisture Content BS1377:1990 2/3.2 *	3		

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - Denotes test included in laboratory scope of accreditation**
- Denotes test carried out by approved contractor

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 in full, without the prior written approval of the laboratory.

Approved Signatories:
D V Edwards (Managing Director), Paul Evans (Technical Manager), E Sharp (Technical Co-Ordinator).

Hole Number	Sample Number	Type	Depth	Description of Sample*
TP04			0.50	Brown gravelly silty CLAY.
TP17			1.00	Brown gravelly silty CLAY.
TP18			2.00	Brown gravelly silty CLAY.

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory

20/7/11

Checked by **Date**

20/7/11

Approved by **Date**

LABORATORY TESTING SERVICES LIMITED

11230-Cefn Fforest

Contract No.: 12948-060711
Client ref: 6651

Summary of Soil Classification Tests

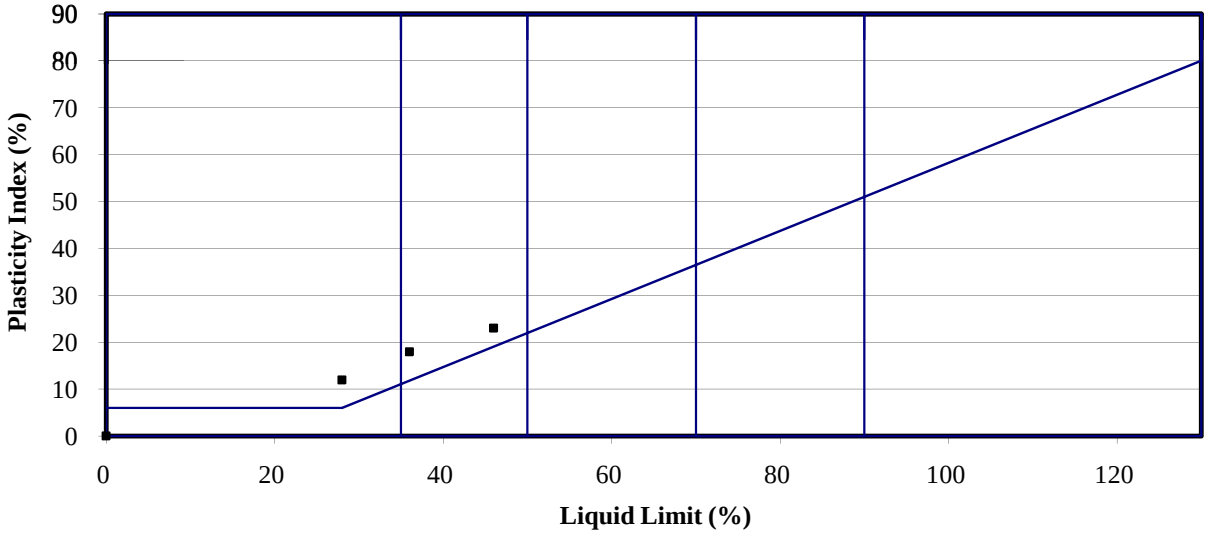
BS 1377:Part 2:1990

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
TP04		0.50	18	28	16	12	95	CL Low Plasticity
TP17		1.00	20	36	18	18	85	CI Intermediate Plasticity
TP18		2.00	28	46	23	23	85	CI Intermediate Plasticity

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

BS 5930:1999



20/07/11 — Checked by Date

20/07/11 — Approved by Date

LABORATORY TESTING SERVICES LIMITED

11230-Cefn Fforest

Contract No.: 12948-060711

Client Ref No: 6651

UKAS TESTING 2788

ANNEX K
Drain Trace Photos



Surface drain on the northern side of Central Avenue and pipe work in manhole. (Arrow indicates direction of flow)



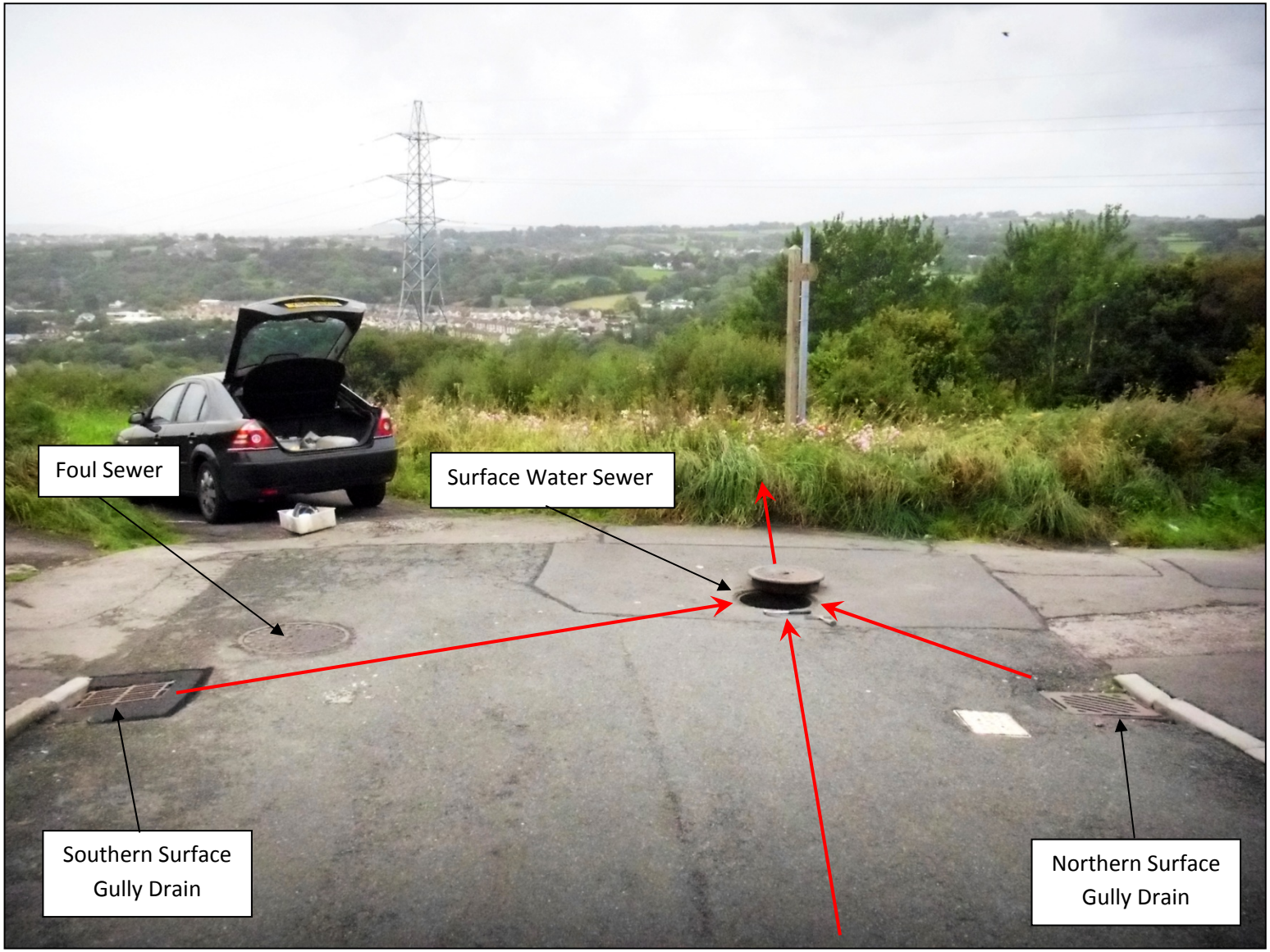
Surface drain on the southern side of Central Avenue and pipe work in manhole. (Arrow indicates direction of flow)



Pipe in the base of the surface water man hole on Central Avenue
(Arrow indicates direction of flow)



Pipe on the site discharging water stained by the red tracing dye
that was placed in the surface water man hole on Central Avenue.



The surface water drainage system at the western end of Central Avenue. Red arrows show the direction of flow of the surface water. The site boundary is end of the road/start of the vegetation.

ANNEX L
Ground Gas Monitoring Results

TERRA FIRMA (WALES) LIMITED

In-situ Gas Monitoring Results – 1st Round

Site: Cefn Fforest
Date Monitored: 02/02/2012
Barometric Pressure: 1009
Weather: Cold with sunny spells
Job No: **11230-1**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Methane (CH_4) Gas(%)	Oxygen O_2 (%)	Carbon dioxide CO_2 (%)	Flow (litres/hour)
WS01	1	0.1	19.1	2.5	0.0
WS02	1	0.1	18.5	2.7	0.0
WS03	1	0.1	20.8	1.3	0.0

Notes:

1 Gas Measuring Instrument: GA2000
2 LEL = Lower Explosive Limit
3 N/D Not detected

TERRA FIRMA (WALES) LIMITED

In-situ Gas Monitoring Results – 2nd Round

Site: Cefn Fforest
Date Monitored: 21/02/2012
Barometric Pressure: 1002
Weather: Cloud with light rain
Job No: **11230-1**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Methane (CH_4) Gas(%)	Oxygen O_2 (%)	Carbon dioxide CO_2 (%)	Flow (litres/hour)
WS01	-	N/D	19.4	2.0	0.0
WS02	-	N/D	20.4	0.8	0.0
WS03	-	N/D	19.7	1.6	0.0

Notes:

4 Gas Measuring Instrument: GA2000
5 LEL = Lower Explosive Limit
6 N/D Not detected

TERRA FIRMA (WALES) LIMITED

In-situ Gas Monitoring Results – 3rd Round

Site: Cefn Fforest
Date Monitored: 29/02/2012
Barometric Pressure: 998
Weather: Sunny with patchy cloud
Job No: **11230-1**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Methane (CH_4) Gas(%)	Oxygen O_2 (%)	Carbon dioxide CO_2 (%)	Flow (litres/hour)
WS01	-	N/D	19.2	1.9	0.0
WS02	-	N/D	19.9	0.8	0.0
WS03	-	N/D	19.1	1.6	0.0

Notes:

7 Gas Measuring Instrument: GA2000
8 LEL = Lower Explosive Limit
9 N/D Not detected

TERRA FIRMA (WALES) LIMITED

In-situ Gas Monitoring Results – 4th Round

Site: Cefn Fforest
Date Monitored: 14/03/2012
Barometric Pressure: 1005
Weather: Overcast
Job No: **11230-1**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Methane (CH_4) Gas(%)	Oxygen O_2 (%)	Carbon dioxide CO_2 (%)	Flow (litres/hour)
WS01	-	0.1	18.5	2.3	0.0
WS02	-	0.1	18.5	1.6	0.0
WS03	-	0.1	18.2	2.5	0.0

Notes:

10 Gas Measuring Instrument: GA2000
11 LEL = Lower Explosive Limit
12 N/D Not detected

TERRA FIRMA (WALES) LIMITED

In-situ Gas Monitoring Results – 5th Round

Site: Cefn Fforest
Date Monitored: 28/03/2012
Barometric Pressure: 1007
Weather: Sunny
Job No: **11230-1**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Methane (CH_4) Gas(%)	Oxygen O_2 (%)	Carbon dioxide CO_2 (%)	Flow (litres/hour)
WS01	-	N/D	19.2	1.5	0.1
WS02	-	N/D	19.6	0.8	0.0
WS03	-	N/D	20.1	N/D	0.1

Notes:

13 Gas Measuring Instrument: GA2000
14 LEL = Lower Explosive Limit
15 N/D Not detected

TERRA FIRMA (WALES) LIMITED

In-situ Gas Monitoring Results – 6th Round

Site: Cefn Fforest
Date Monitored: 16/04/2012
Barometric Pressure: 996
Weather: Sunny spells
Job No: **11230-1**

Gas Monitoring Well Number	Methane (CH_4) LEL(%)	Methane (CH_4) Gas(%)	Oxygen O_2 (%)	Carbon dioxide CO_2 (%)	Flow (litres/hour)
WS01	-	N/D	19.2	1.9	0.0
WS02	-	N/D	19.1	1.3	0.0
WS03	-	N/D	19.8	1.6	0.0

Notes:

16 Gas Measuring Instrument: GA2000
17 LEL = Lower Explosive Limit
18 N/D Not detected

DRAWINGS



North

terrafirma

Job Number:

11230

Job Title:

Cefn Forest, Blackwood

Drawing Title:

Proposed Site Layout

Drawing Number:

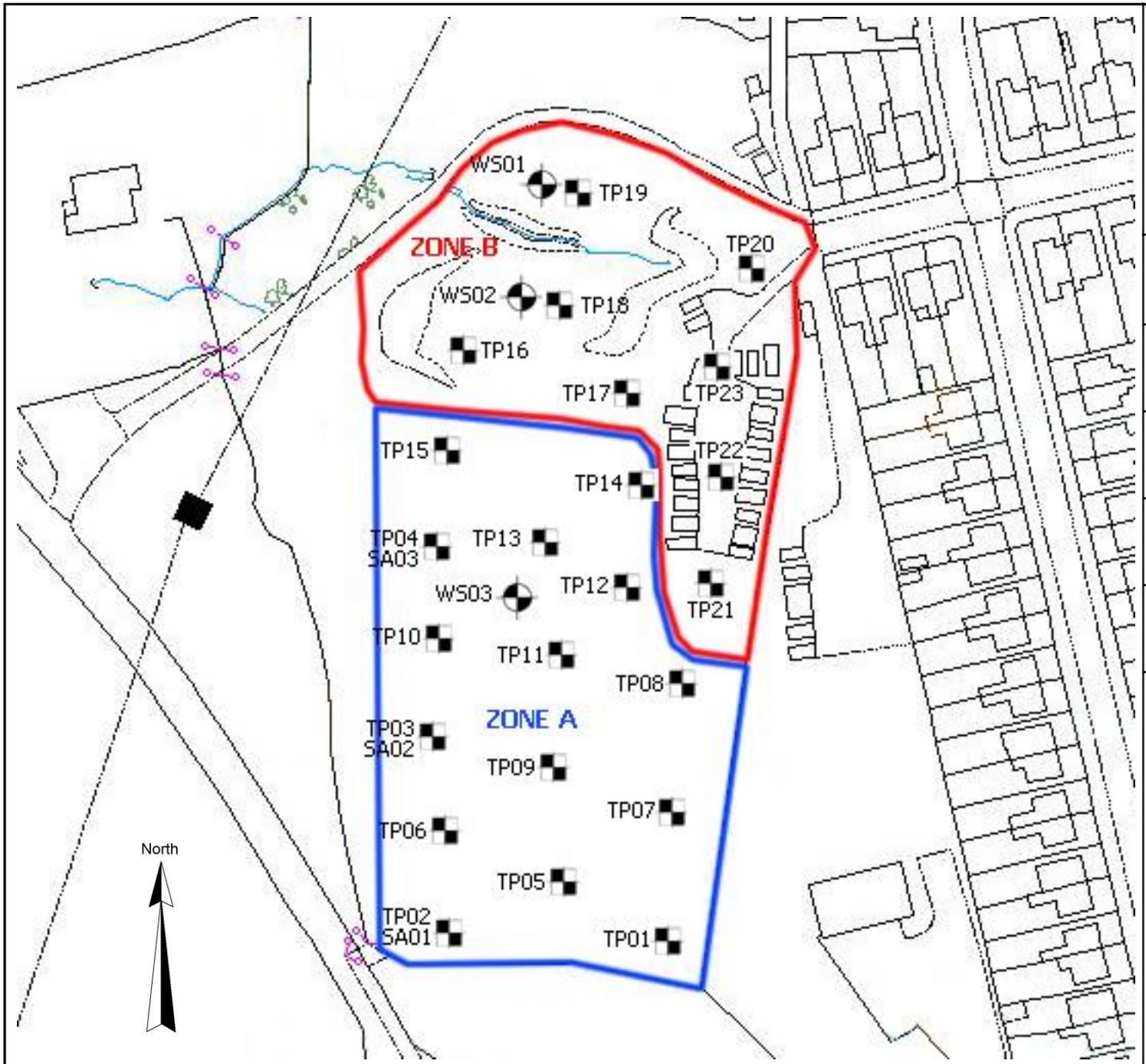
01

Scale:

Not To Scale

Legend:

TP23 Position of machine excavated trial pit



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Job Number:
11230-1

Job Title:
Cefn Fforest, Blackwood

Drawing Title:
Current Site Layout

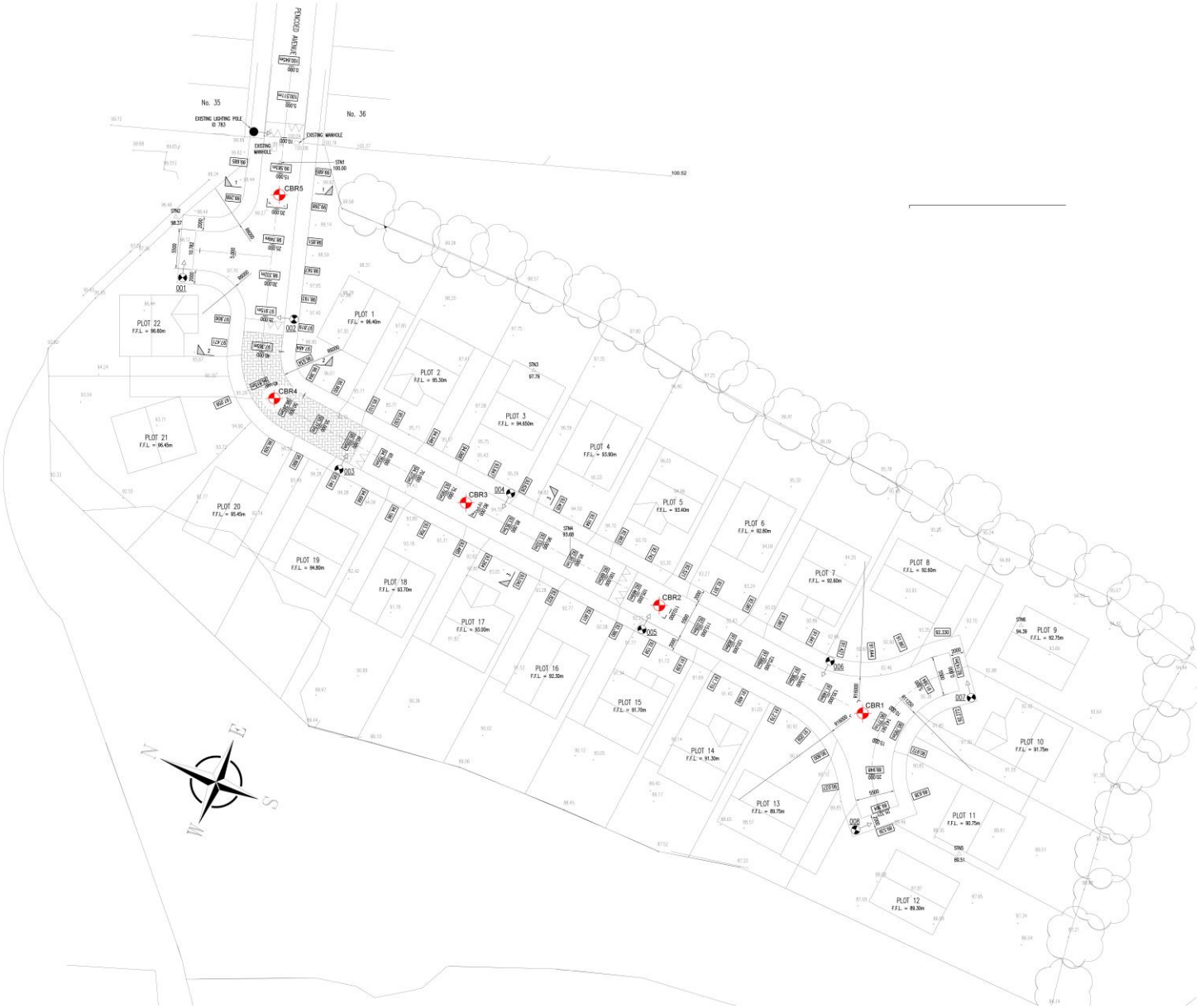
Drawing Number:
02

Scale:
Not To Scale

Legend:

TP23 Position of machine excavated trial pit

WS03 Position of mini percussive borehole



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Job Number:	11230-4
Job Title:	Cefn Fforest, Blackwood
Drawing Title:	CBR Locations
Drawing Number:	03
Scale:	Not To Scale

Legend:

CBR1 — Approximate position of CBR test



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