

**Barratt Homes South Wales**

**Land Adjacent to Llantwit Major By-Pass,  
Boverton**

**Site Investigation Report**

11344/GNS/14/SI

**CLIENT:** Barratt Homes South Wales

**PROJECT:** Land Adjacent to Llantwit Major By-Pass,  
Boverton

**TITLE:** Site Investigation Report

**JOB NO:** 11344

**DOCUMENT REF:** 11344/GNS/14/SI

Revision	Purpose Description	Originated	Reviewed	Authorised	Date
0	Final	GNS	JJ	HP	May' 14

Geotechnical Engineers:

Intégral Géotechnique (Wales) Limited  
Integral House  
7 Beddau Way  
Castlegate Business Park  
Caerphilly  
CF83 2AX

Tel: 029 2080 7991  
Fax: 029 2086 2176

# CONTENTS

## **1.0 INTRODUCTION**

- 1.1 General
- 1.2 Proposed Development
- 1.3 Scope of Works
- 1.4 Limitations

## **2.0 THE SITE**

- 2.1 Site Location and Description
- 2.2 Site Operations
- 2.3 Surrounding Land Use
- 2.4 Available Site Investigation Data

## **3.0 SITE HISTORY**

## **4.0 SITE ENVIRONMENTAL SETTING**

- 4.1 Physical Setting
- 4.2 Geology
- 4.3 Radon
- 4.4 Hydrology, Hydrogeology & Flood Risk
- 4.5 Landfill Sites
- 4.6 Potential Contamination
- 4.7 Other Environmental Issues

## **5.0 PRELIMINARY CONCEPTUAL SITE MODEL**

- 5.1 Risk Assessment Framework
- 5.2 CLEA Framework
- 5.3 Conceptual Model Framework
- 5.4 Critical Sensitive Receptor – Human Health
- 5.5 Critical Sensitive Receptor – Controlled Waters
- 5.6 Potential Contaminant Sources
- 5.7 Potential Exposure Pathways
- 5.8 Summary of Conceptual Exposure Model

## **6.0 THE SITE INVESTIGATION**

- 6.1 Fieldworks
- 6.2 Field Observations
- 6.3 Laboratory Chemical Testing
- 6.4 Laboratory Physical Testing

## **CONTENTS (CONTINUED)**

### **7.0 GROUND CONDITIONS**

### **8.0 CONTAMINATION**

- 8.1 Averaging Areas
- 8.2 Soil Contamination

### **9.0 REVISED CONCEPTUAL EXPOSURE MODEL**

### **10.0 RISK ASSESSMENT**

- 10.1 Methodology
- 10.2 Source-Pathway-Receptor-Model
- 10.3 Human Health Risk Assessment
- 10.4 Risks to Vegetation
- 10.5 Groundwater Risk Assessment
- 10.6 Ground Gas Risk Assessment
- 10.7 Risks to Buildings and Materials Durability
- 10.8 Spoil Disposal
- 10.9 Uncertainties

### **11.0 ENGINEERING CONSIDERATIONS & RECOMMENDATIONS**

- 11.1 Details of Proposed Development
- 11.2 Site Preparation
- 11.3 Foundations and Floor Slabs
- 11.4 Excavations and Formations
- 11.5 Access Roads and Car Parking Areas
- 11.6 Drainage

### **APPENDICES**

- Appendix A Envirocheck Report
- Appendix B BGS Radon Report
- Appendix C Trial Pit Logs
- Appendix D Soil Infiltration Test Results
- Appendix E Laboratory Chemical Test Results (Soils)
- Appendix F Summary of Chemical Results – Topsoil

### **FIGURES**

- Figure 1 Site Location
- Figure 2 Site Plan

## **1.0 INTRODUCTION**

### **1.1 GENERAL**

Barratt Homes are proposing to develop a 'Greenfield' site on the outskirts of Boverton, in the Vale of Glamorgan, for residential end-use.

Intégral Géotechnique (Wales) Limited have been appointed as the Geotechnical Engineers to undertake a desk study and site investigation to enable a geotechnical and geoenvironmental appraisal of the site and provide a basis for design.

This report presents the findings of the desk study and the site investigation and gives recommendations for the design of foundations, floor slabs and other geotechnical and geoenvironmental aspects of the project.

### **1.2 PROPOSED DEVELOPMENT**

The site is currently being considered for acquisition. Any proposed development is considered likely to be residential.

### **1.3 SCOPE OF WORKS**

The work instructed included a desk study of available information, site reconnaissance and an intrusive investigation. This was followed by laboratory testing and geotechnical and geoenvironmental reporting.

The desk study comprised a review of:

- An Envirocheck Report obtained for the site;
- Historical Ordnance Survey maps covering the site, included within the Envirocheck Report;
- A British Geological Survey (BGS) radon report for the site
- Geological maps of the area and the online database provided by the BGS
- The Natural Resources Wales groundwater vulnerability map and aquifer database for the area.

### 1.3 SCOPE OF WORKS (CONTINUED)

The desk study and site walkover was used to make an initial assessment of the site and to design an investigation to be carried out by Intégral Géotechnique. The site investigation was designed in accordance with BS5930:1999, the Code of Practice for Site Investigations, BS10175:2011, the Code Of Practice For Investigation Of Potentially Contaminated Sites, and 'Development of Land Affected by Contamination: A Guide for Developers' prepared by Welsh Local Government Association (WLGA)/Environment Agency Wales (EAW) Land Contamination Working Group, 2012.

The site investigation included:

- An intrusive investigation carried out on 8<sup>th</sup> May 2014 comprising eleven mechanically excavated trial pits
- Sampling of soil for laboratory chemical and physical testing, and
- Repeat-cycle soakaway testing within four of the excavated trial pits.

### 1.4 LIMITATIONS

This document is intended to be a working document for further development in discussion with all concerned including the Local Planning Authority, Natural Resources Wales and the NHBC, as appropriate.

"Contamination" is taken throughout the report to mean the "presence of one or more potentially harmful substances as a result of human activity". The use of the term in this way does not imply that harm is being or might be caused by the contamination. It should be noted that "contamination" can have different meanings under different regulatory regimes, for example, planning, building control and Part IIA of the Environmental Protection Act 1990. Naturally elevated concentrations of potentially harmful substances may also be of concern and the significance of any that may be found is also evaluated in this report.

It is important to recognise that there may be areas of contamination that have not been found, or that contaminants are present at concentrations above those that have been found. It is also important to recognise that contamination may be localised and that no investigation, however comprehensive, is capable of finding such occurrences other than by chance.

It should also be noted that vertical and lateral variations in ground conditions could be present between trial pit locations.

**1.4 LIMITATIONS** (CONTINUED)

This report has been prepared for the use of Barratt Homes South Wales and their advisors, and should not be passed on to others without the express consent of Intégral Géotechnique (Wales) Limited.

## **2.0 THE SITE**

### **2.1 SITE LOCATION AND DESCRIPTION**

The site is located on the outskirts of the village of Boverton in the Vale of Glamorgan at National Grid Reference 298680 168560, see Figure 1.

The site is roughly rectangular in shape, comprising two overgrown fields occupying an area of approximately 1.8Ha. The vast majority of the site area is undeveloped; however there is a small collection of derelict outbuildings situated in the north of the site.

The majority of the site area is situated on generally level ground, however, the ground does locally slope downhill towards an access track situated in the northern most extent of the site.

The boundaries of the site are defined by The Vale of Glamorgan Railway Line to the northeast, the B4265 (Llantwit Major By-Pass) to the southwest, a road coming off the B4265 to the northwest, and mature hedgerows and trees backing onto an undeveloped field to the southeast of the site.

The entire site is surrounded by overgrown mature hedgerows and trees.

Access to the site is gained via a small sloping access ramp coming off the road running along the north western site boundary.

Boverton Brook is located some 15 to 30m to the north of the site.

### **2.2 SITE OPERATIONS**

The site comprises a number of undeveloped fields separated by overgrown hedgerows and trees. A small collection of derelict outbuildings is situated in the north of the site.

### **2.3 SURROUNDING LAND USE**

The site is located on the outskirts of the village of Boverton within an area of primarily residential and agricultural land use.

Barracks associated with RAF St Athan are situated immediately to the north of the railway line running along the north eastern site boundary.



## **2.4 AVAILABLE SITE INVESTIGATION DATA**

No previous site investigation data has been made available.

### 3.0 SITE HISTORY

The recent history of the site has been traced with the aid of 1:2,500, 1:10,000 and 1:10,560 scale Historical Ordnance Survey maps obtained from an Envirocheck Report, a copy of which is included in Appendix A.

The earliest map in our possession is dated 1877 (1:2,500 scale) and showed the site and the majority of the surrounding area comprised two undeveloped open fields. A track/road was indicated to pass along the northern most boundary of the site. Boverton Brook was recorded to the north of the site some 30m distant. An old lime kiln and associated quarry was recorded some 175m to the north of the site. The village of Boverton was shown approximately 100m to the southwest of the site.

Between 1885 and 1889, the Vale of Glamorgan Railway Line had been constructed immediately adjacent to the northeast of the site. The railway line sits on an embankment to the north of the site, but as the railway line passes along the sites north-eastern and eastern boundary it slopes down into a cut. Boverton Brook was indicated to cross beneath the railway line (presumably culverted) just to the north of the site. A footpath was indicated to pass through the north-western edge of the site.

The map dated circa 1943 recorded little change on site. By this date an artesian well and pump house had been constructed just to the north of Boverton Brook recorded to the north of the site.

The site and the surrounding area remained largely unchanged up until sometime between 1964 and 1974. By this time the village of Boverton had been extended and the RAF St Athan military base had been constructed to the northeast of the site. The majority of the buildings associated with the military base within the vicinity of the site were residential in nature.

By 1979 the Llanwit Major By-Pass had been constructed adjoining the western boundary of the site. The By-pass was situated within a cut and orientated in a north-west to south-east direction. By 1981, a small sloped access track had been constructed into the northern edge of the site.

By 2006 some small outbuildings (farm buildings) had been constructed in the northern extremes of the site.

The site and the surrounding area have remained largely unchanged to the present day.

## 4.0 SITE ENVIRONMENTAL SETTING

### 4.1 PHYSICAL SETTING

The site is Greenfield and situated between the Llantwit Major By-Pass and a railway line at between approximately 40m and 48m AOD, with the site falling gently to the north.

### 4.2 GEOLOGY

The 1:50,000 scale geological map (Sheet 262) of the area indicates that the site is underlain by rocks of the Porthkerry Formation, belonging to the Lower Lias Limestone Series of Jurassic age. These rocks typically comprise interbedded limestone and mudstone. The solid strata are generally sub-horizontally bedded.

Porthkerry Formation can be locally susceptible to dissolution.

The geological map indicates that no superficial deposits are situated on the site area.

A thin veneer of topsoil should be anticipated across the site area.

Given the historical nature of the site, a significant thickness of made ground would not be anticipated.

A summary of the anticipated geological succession is given below in Table 1.

<b>Table 1 : Summary of Anticipated Site Geology</b>		
<b>Geological unit</b>	<b>Horizon</b>	<b>Description</b>
Recent	Topsoil	Poorly consolidated silt clays with roots and rootlets. Organic rich.
Jurassic	Porthkerry Formation	Interbedded limestone and mudstone. Deposits of weathered materials comprising clay with cobbles near surface.

### 4.3 RADON

A BGS radon report has been obtained for the site and a copy included in Appendix B. The report indicates that basic radon protective measures are required for the site.

#### **4.4 HYDROLOGY, HYDROGEOLOGY AND FLOOD RISK**

Boverton Brook is located some 15m to the north of the site. The Brook flows in a south-western direction. Llanmaes Brook flows into Boverton Brook some 150m to the north-east of the site. Boverton Brook becomes Hoddnant when passing through the village of Boverton, to the south-west of the site.

The Environment Agency groundwater vulnerability map and aquifer database classifies the bedrock beneath the site as a Secondary 'A' Aquifer. Secondary 'A' Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

There are no superficial soils beneath the site; hence no classification for superficial soils is applied.

Given the anticipated ground conditions, no perched water body is anticipated.

The Envirocheck report indicates that there are no recorded discharge consents within 500m of the site, and only two within 1km. The nearest discharge consent is recorded some 773m to the north-east of the site and operated by Kelda Water Services (Estates) Limited. The discharge is located at Royal Air Force (West Camp) St Atha, St Athan Nr Barry, where trade effluent is discharged into Boverton Brook.

The Envirocheck Report states that there are no groundwater abstractions within 500m of the site.

It is important to note, however, that an artesian well and pumping station is recorded on ordnance survey and historical maps to be located some 30m to the north of the site. The abstraction rate from the well is probably of such a volume that it does not require registration.

Tables 2 and 3 present a summary of the hydrological features and key hydrogeological nature of the site.

**4.4 HYDROLOGY, HYDROGEOLOGY AND FLOOD RISK (CONTINUED)**

Feature	Distance from site	Flow	Classification	Abstraction	Discharge
Boverton Brook	15m north of the site	Southwest	Not known	No	Hoddnant
Llanmaes Brook	Approximately 150m north-east	South	Not known	No	Boverton Brook
Surface run-off	On site	Flows into site surface	N/A	No	Not known

Geological Unit	Aquifer Classification	Aquifer Characteristics	Source Protection Zone	Groundwater Abstractions
Topsoil	Not classified	Highly variable permeability and porosity. Likely to be in hydraulic continuity with underlying solid strata	No	None
Porthkerry Formation	Secondary A Aquifer	Variable permeability limestones and mudstones. Fracture permeability is the likely control of flow rates.	No	None with 500m of the site

The soils have been classified as having a high leachate potential. Soils of high leaching potential are coarse textured or moderately shallow soils which readily transmit non absorbed pollutants and liquid discharges but which have some ability to attenuate absorbed pollutants because of their large clay or organic matter contents.

The Environment Agency Flood Risk Map as presented within the Envirocheck Report in Appendix A indicates that the site is not at risk from flooding from rivers or sea. The Natural Resources Wales flood map for planning indicates that flood zone 3 designated land encroaches to the site boundary but does not cross into the site at the site's northern tip.

#### 4.5 LANDFILL SITES

The Envirocheck report indicates that there are no active Local Authority, BGS or Environment Agency registered landfill sites within 1km of the site.

Furthermore, the Envirocheck Report indicates that there are no historical landfill sites within 1km of the site.

#### 4.6 POTENTIAL CONTAMINATION

The various activities in the vicinity of the site which may have resulted in ground or water resource contamination on this site are listed below in Tables 4 and 5. Reference to Department of the Environment Industry Profiles has been made and a summary of the potential contaminants can be found in the tables.

<b>Table 4: Potential Contaminants</b>		
<b>Land Use: Green Field</b>		
<b>Material/Process</b>	<b>Contamination/Hazard</b>	<b>Evidence</b>
Agricultural land	No potential contaminants	Historical Maps

#### **Existing Uses**

The site remains as undeveloped open fields, currently used for agricultural purposes.

#### **Adjacent Site Uses**

<b>Table 5 : Potential Contaminants : Adjacent Site Uses</b>		
<b>Potential Contamination Source</b>	<b>Boundary</b>	<b>Associated Contaminants and Hazards</b>
Agricultural	Northern, western and southern	No Potential Contaminants
Railway Line	Eastern boundary	No potential contaminants as the vast majority of the railway line is situated in a deep cut and below the level of the subject site

#### **4.7 OTHER ENVIRONMENTAL ISSUES**

The Envirocheck Report indicates that there have been no pollution incidents to controlled waters recorded on site and there have been no enforcement or prohibition notices on site. However, there has been a single pollution incident to controlled waters within 250m of the site.

The nearest incident was recorded some 221m to the west of the site. The pollutant was unknown. The incident was classified as a category 3 incident, which is minor.

There have been no substantiated pollution incidents registered on site or within 500m of the site.

There have been no recorded prosecutions related to authorised processes on site but one recorded within 1km of the site boundary.

## 5.0 PRELIMINARY CONCEPTUAL SITE MODEL

### 5.1 RISK ASSESSMENT FRAMEWORK

In order to be consistent with current UK government policies and legislation, it is necessary to identify, make decisions on, and take appropriate action to deal with land contamination, in accordance with the procedures specified in the Environment Agency document 'Model Procedures for the Management of Land Contamination CLR-11' (Environment Agency 2004).

The risk assessment process is designed to provide a reasoned, structured and pragmatic mechanism for the identification of any potential human health and controlled waters risks associated with land contamination and where necessary to develop a robust remediation strategy to ensure protection of the sensitive receptors (human health of future residents, controlled waters, etc).

In accordance with the CLR-11 framework, risk is defined as:

'a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequence of the occurrence'.

The three essential elements to any risk are defined by CLR-11 as follows:

- A contaminant, or hazard, which is in, on, or under the land and has the potential to cause harm (Source)
- A means by which a receptor can be exposed to, or affected by a contaminant or hazard (Pathway)
- A receptor, i.e. something which could be adversely affected by a contaminant or hazard, such as human health or groundwater (Receptor).

In order for there to be a potential risk, all three of the above elements must be present. If there is a source of contamination and a receptor (for example a resident or site user), then there is only a potential risk if there is a pathway linking the two. Such an active pathway is known as a relevant pollutant linkage. It is possible for the same contaminant to be linked to a receptor via a number of pathways, and hence it is important that all relevant pollutant linkages, to both human health and controlled waters, are separately identified on a site in order that a comprehensive conceptual model can be formed and ultimately a robust remediation strategy designed.



## 5.2 CLEA FRAMEWORK

The DEFRA/Environment Agency CLEA Model 2002, including the technical background, generic conceptual models and model parameters, and the Soil Guideline Values derived from this model, were withdrawn in August 2008. The model parameters and generic conceptual models were reviewed and the technical background updated to incorporate the results of additional research. The withdrawn reports were replaced by the following documents:

- Human Health Toxicological Assessment of Contaminants in Soil (Science Report Final SC050021/SR2)
- Updated Technical Background to the CLEA Model (Science Report Final SC050021/SR3)

The new documents published have formed the basis of the new CLEA model (Version 1.06), which has now been adopted by regulators and consultants.

At the time of writing, there are only limited official Soil Guideline Values available for use as Tier 1 soil screening values (arsenic, cadmium, nickel, mercury (elemental, inorganic, and methyl), selenium, phenol and BTEX compounds). Atkins have updated their ATRISK<sup>soil</sup> screening values in line with the new CLEA guidance. Land Quality Management (LQM), in conjunction with the Chartered Institute for Environmental Health (CIEH), have revised their Generic Assessment Criteria for Human Health Risk Assessment in line with recent changes to the CLEA methodology and have published a new set of guideline values. Both Atkins ATRISK<sup>soil</sup> and LQM/CIEH have derived screening criteria in line with current UK guidance.

We have reviewed both sets of values and intend to use the most appropriate assessment criteria as Tier 1 screening values until additional official screening criteria are published. Where a published SGV is available, and considered appropriate, this will be used in the first instance.

## 5.3 CONCEPTUAL MODEL FRAMEWORK

The preliminary stage of the risk assessment process is to develop and define a conceptual site model, based on the desk study and any existing site investigation data. This is used to establish any potential contaminant sources, identify existing and future receptors and assess if there are any potentially active pathways by which a potential risk may be present.

### **5.3 CONCEPTUAL MODEL FRAMEWORK (CONTINUED)**

The preliminary conceptual site model will be developed and refined as site specific data is gathered, such as actual ground conditions and chemical data, resulting in a more robust conceptual understanding of the site.

### **5.4 CRITICAL SENSITIVE RECEPTOR – HUMAN HEALTH**

The proposed redevelopment of the site is for a residential end use. Therefore, the critical sensitive receptor from a human health perspective is an on site residential receptor.

In accordance with CLEA guidance for a standard CLEA residential scenario, the critical sensitive receptor for a residential end use risk assessment is a female child, with exposure from 0 to 6 years.

The standard residential end use conceptual model defined by CLEA is assumed to be suitable for the purposes of this assessment.

### **5.5 CRITICAL SENSITIVE RECEPTOR – CONTROLLED WATERS**

Based on the proposed redevelopment of the site for a residential end use, and the findings of the desk study, the critical sensitive receptor from a controlled water perspective is groundwater within the Secondary 'A' Aquifer of the Porthkerry Formation beneath the site.

By considering groundwater as the critical sensitive receptor for controlled waters, the groundwater/hydrogeological risk assessment will also be protective of Boverton Brook to the north of the site.

### **5.6 POTENTIAL CONTAMINANT SOURCES**

Given the historical and current uses of the site (agricultural land), there is very limited potential for on-site contamination to have occurred. However, consideration should be given to a range of general determinants

## 5.6 POTENTIAL CONTAMINANT SOURCES (CONTINUED)

The potential types of contaminants of concern are listed below:

- Metals, semi-metals, and inorganics within the shallow topsoil/shallow groundwater
- Polyaromatic hydrocarbons (PAH) within the shallow topsoil/shallow groundwater
- Asbestos within the shallow soils within the vicinity of the former farm/out buildings

## 5.7 POTENTIAL EXPOSURE PATHWAYS

Potential exposure pathways for the critical receptors (both human health and controlled waters) are listed below:

- Dermal contact with soil and/or soil derived dust
- Ingestion of soil and/or soil attached to home-grown produce
- Ingestion of home-grown produce
- Inhalation of soil derived dust
- Leaching of contaminants from made ground to groundwater
- Transportation of contaminants within groundwater.

In addition, the following exposure pathways have also been considered:

- Ground gas generation and migration
- Building materials durability.

## 5.8 SUMMARY OF CONCEPTUAL EXPOSURE MODEL

A preliminary conceptual exposure model has been developed for the site. This is based on the findings of the desk study, historical review and site walk over and includes all potential sources, pathways and receptors that may be present on site. Those that have been identified as being potentially active require further investigation in the form of sampling and testing of soils and groundwater, followed by appropriate risk assessment.

The preliminary conceptual exposure model will be reviewed and refined following the completion of the site works and laboratory testing.

## 5.8 SUMMARY OF CONCEPTUAL EXPOSURE MODEL (CONTINUED\_)

The preliminary conceptual exposure model is presented below in Table 6.

Source		Receptor	Pathway	Potentially Active Pathway?
Origin	Contaminant			
Topsoil derived from agricultural uses	Metals, semi-metals, non-metals and PAH Asbestos local to the existing outbuildings	Resident – human health	Dermal Contact with made ground/dust	✓
			Ingestion of soil and/or soil attached to home-grown produce	✓
			Ingestion of home-grown produce	✓
			Inhalation of dust	✓
			Inhalation of vapours – indoor/outdoor	✓
	Metals, semi-metals, inorganics and PAH	Groundwater quality	Leaching from made ground	✓
Metals, semi-metals, inorganics and PAH	Surface water quality	Transportation within groundwater	✓	
Natural ground	Sulphates and sulphides	Building Materials Durability	Direct contact	✓
Ground Gas – organic, gas producing materials	Methane, carbon dioxide	Human health	Accumulation of gases in confined spaces, and/or migration off site, leading to asphyxiation, or risk of explosion	✓

## **6.0 THE SITE INVESTIGATION**

### **6.1 FIELDWORKS**

A site investigation was designed in accordance with BS5930:1999, the Code of Practice for Site Investigations, BS10175:2011, the Code of Practice for Investigation of Potentially Contaminated Sites, and 'Land Contamination: A Guide for Developers' prepared by Welsh Local Government Association (WLGA)/Environment Agency Wales (EAW) Land Contamination Working Group, July 2006.

The site investigation was also designed to provide information to support and refine the preliminary conceptual site model/conceptual exposure model.

An investigation comprising eleven machine excavated trial pits (utilising a JCB 3CX backhoe excavator) and three soil infiltration tests was carried out during May 2014. The trial pits were located across the site and excavated to a maximum depth of 1.3m below existing ground level. The purpose of the trial pits was to prove the shallow ground conditions and allow an assessment of the most appropriate foundation type for the proposed development. The trial pits were backfilled following the excavation process, with no pits left open and unattended for any length of time.

Representative soil samples were taken from the trial pits for laboratory chemical and physical testing and placed in the appropriate sample containers deemed suitable for the testing required.

It is important to note that all of the trial pit excavations were terminated on suspected limestone bed rock strata, and that no further penetration was possible with the JCB 3CX excavator.

A soil infiltration test was undertaken at four trial pit locations (TP1, TP3, TP6 and TP10). Water was added to the pit at a rapid rate using a using a 2000 gallon agricultural tanker and 4 inch hose. The rate of water infiltration was monitored over time.

The fieldworks were supervised by a qualified Geotechnical Engineer from Intégral Géotechnique (Wales) Limited who also logged the trial pits, monitored the soil infiltration tests, and prepared their detailed engineering logs in accordance with the requirements of BS5930: 1999.

The approximate locations of the trial pits are shown on Figure 2, while their logs are presented in Appendix C. The results of the soil infiltration tests are presented in Appendix D.

## 6.2 FIELD OBSERVATIONS

No visual or olfactory evidence of any contamination was observed during the excavation of the trial pits.

## 6.3 LABORATORY CHEMICAL TESTING

Representative soil samples were taken from the trial pits across the site, stored at the appropriate temperature and dispatched to the laboratories of i2 analytical for laboratory chemical testing within 24 hours.

The samples were tested for a range of contaminants that reflects the historical use of the site, the findings of the desk study and the preliminary conceptual site model/conceptual exposure model. A list of the soil testing carried out is given below:

Beryllium	Cadmium
Total Chromium	Hexavalent Chromium (VI)
Copper	Lead
Mercury	Nickel
Vanadium	Zinc
Arsenic	Boron
Selenium	Elemental Sulphur
Total Cyanide	Total Sulphate
Sulphide	Water Soluble Sulphate
pH	Monohydric Phenol
Polyaromatic Hydrocarbons (PAH)	Asbestos

The results of all the soil testing are presented in Appendix E

## 6.4 LABORATORY PHYSICAL TESTING

Three samples of the natural soils were issued for the following classification tests where appropriate.

- Atterberg testing and the determination of soil plasticity and moisture content.
- pH and soluble sulphate testing on selected soil samples

We are currently awaiting the results of the scheduled physical testing and will provide these results upon receipt of the data.

## 7.0 GROUND CONDITIONS

Geologically, the ground conditions comprise a thin veneer of topsoil over the solid strata of the Porthkerry Formation.

A summary of the ground conditions encountered across the site is presented below in Table 7.

TABLE 7 : SUMMARY OF GROUND CONDITIONS		
Depth (m)		Stratum
From	To	
0.0	0.1/0.3	TOPSOIL: comprising grey brown, silty CLAY with many roots and rootlets.
0.1/0.3	0.5/0.8	Soft to firm, orange brown, slightly silty CLAY with occasional gravel of fine, medium and coarse angular limestone. The deposit was only identified in TP2, TP8 and TP10.
0.2/0.8	0.7/1.3	SUSPECTED WEATHERED LIMESTONE: Dense, orange brown and grey, slightly clayey GRAVEL and COBBLES with frequent boulders of angular and tabular limestone.

Topsoil was recorded at each trial pit location to typically 0.1m to 0.3m depth and comprised silty organic rich clay with frequent rootlets.

The topsoil was underlain by a mantle of natural clay described as soft to firm with occasional angular gravel of limestone in TP2, TP8 and TP10. Elsewhere the topsoil was directly underlain by dense gravel and cobbles of angular limestone, which were proven to a maximum depth of 1.3m below existing ground level.

Slow progress of excavation was made when encountering the natural gravel and cobbles or suspected solid strata of the limestone. All of the trial pits terminated on suspected natural limestone, with no further excavation progress possible.

All of the trial pits remained dry during excavation and for a short period afterwards

Generally the sides of the trial pits remained stable in the short term, although some instability was associated with cobble and boulder removal.

## 7.0 GROUND CONDITIONS (CONTINUED)

The groundwater conditions are based on observations made at the time of the fieldwork. It should be noted that groundwater levels may vary due to seasonal and other effects.

Soil infiltration tests were undertaken in four of the trial pits at locations excavated across the site. Multiple cycles were carried out where infiltration rates were fast enough to allow it within the time constraints. Soil infiltration calculations are included in Appendix E and the test locations are shown on Figure 2.

A summary of the test results is shown below:

Summary of Soil Infiltration Test Results				
Location	Drainage Stratum	Soil Infiltration Rate (m/s)		
		Over 100% Effective Depth	Over Measured Depth	Over 75-25% Effective Depth
TP1 (test 1)	Suspected Bedrock	$2.5 \times 10^{-5}$	$2.81 \times 10^{-5}$	<b><math>4.10 \times 10^{-5}</math></b>
TP1 (test 2)	Suspected Bedrock	$2.51 \times 10^{-5}$	$2.90 \times 10^{-5}$	<b><math>4.04 \times 10^{-5}</math></b>
TP1 (test 3)	Suspected Bedrock	$2.93 \times 10^{-5}$	$4.37 \times 10^{-5}$	<b><math>4.17 \times 10^{-5}</math></b>
TP3 (test 1)	Suspected Bedrock	$9.86 \times 10^{-6}$	$1.33 \times 10^{-5}$	<b><math>1.52 \times 10^{-5}</math></b>
TP6 (test 1)	Suspected Bedrock	$1.85 \times 10^{-5}$	$2.08 \times 10^{-5}$	<b><math>2.47 \times 10^{-5}</math></b>
TP6 (test 2)	Suspected Bedrock	$1.56 \times 10^{-5}$	$2.27 \times 10^{-5}$	<b><math>2.44 \times 10^{-5}</math></b>
TP10 (test 1)	Suspected Bedrock	$2.77 \times 10^{-5}$	$3.65 \times 10^{-5}$	<b><math>5.19 \times 10^{-5}</math></b>

It should be noted that it was only possible to carry out fully BRE 365 compliant testing in one of the four locations. If it should be proposed to use soakaways for this site, then more extensive follow-up tests will be required and should fully comply with BRE 365, in order to confirm the suitability of the site and to satisfy the Local Authority. These tests will be required at the proposed locations of soakaways.



## **8.0 CONTAMINATION**

### **8.1 AVERAGING AREAS**

In order to assess the laboratory test results reliably and in context, the data have been grouped into an averaging area. An averaging area (or area of interest) is that area of soil to which a receptor is exposed or which otherwise contributes to the creation of hazardous conditions. This may be an area of historical industrial usage, a soil type, or a specific proposed end use.

In the case of this analysis, the averaging area has been determined according to soil type, topsoil.

### **8.2 SOIL CONTAMINATION**

As detailed in Section 5.2, the DEFRA/Environment Agency CLEA Model 2002, including the technical background, generic conceptual models and model parameters, and the Soil Guideline Values derived from this model, were withdrawn in August 2008. This included the withdrawal of R&D Publication CLR 7 which detailed the statistical approach to be adopted at the time for assessing site wide contamination. Subsequent to the withdrawal of this document, CL:AIRE (Contaminated Land: Applications in Real Environments) has published a document entitled 'Guidance on Comparing Soil Contamination Data with a Critical Concentration', 2008. The CL:AIRE document includes guidelines on the use of various statistical methods to assess the soil contamination concentrations, either conducted in the context of the land use planning system or Part 2A of the Environmental Protection Act 1990.

The published Soil Guideline Values for arsenic, cadmium, mercury, nickel, selenium, phenol and BTEX compounds have been adopted as critical concentrations against which soil contaminant concentrations can be compared. In the absence of additional published SGVs, the Soil Screening Values (SSVs) derived by Atkins ATRISK<sup>soil</sup> for a residential with home grown produce end use and the Generic Assessment Criteria (GAC's) derived by Land Quality Management (LQM)/Chartered Institute of Environmental Health (CIEH) have been adopted.

Since the results of the testing indicate total organic carbon content (TOC) in the range of 2.0% to 3.9% (average 2.5%), the results have been compared to the respective guidelines, where applicable, for 2.5% soil organic matter content.

The soil test results for topsoil have been summarised and are shown in Appendix F.

## **8.2 SOIL CONTAMINATION** (CONTINUED)

### **8.2.1 Topsoil**

The results of the laboratory testing indicate that all of the analysed chemical elements or compounds are present at concentrations below the appropriate thresholds, with the exception of total chromium.

Total chromium has been detected at concentrations of up to 29mg/kg. The critical concentration currently used is 4.3mg/kg (LQM). Total chromium is not derived solely from the more toxic hexavalent form of chromium. The maximum concentration of hexavalent chromium of <4.0mg/kg is below the 4.3mg/kg value adopted.

None of the samples screened for asbestos recorded a positive identification.

### **8.2.2 In-situ Natural Ground**

No visual or olfactory evidence of contamination of the in-situ natural ground was identified during the excavation of the trial pits. At the time of writing this report no samples of natural ground had been tested. It is considered likely that concentrations of determinands within the natural ground are likely to be naturally occurring and as such, the natural ground poses no significant threat to human health or the environment.

### 9.0 REVISED CONCEPTUAL EXPOSURE MODEL

The preliminary conceptual exposure model has been reviewed and revised to reflect the findings of the site investigation and the results of the laboratory testing of soils, soil leachate, groundwater and gas monitoring. Pathways identified as a relevant pollutant linkage require appropriate risk assessment or mitigation measures (see Section 10).

Table 8: Revised Conceptual Exposure Model						
Source		Receptor	Pathway	Preliminary Active Pathway? (see Sect. 5.8)	Relevant Pollutant Linkage	Justification/ Mitigation
Origin	Contaminant					
Topsoil derived from agricultural uses	Metals, semi-metals, non-metals, PAH and asbestos	Resident – human health	Dermal Contact with made ground/dust	✓	X	No elevated concentrations of determinants identified
			Ingestion of soil and/or soil attached to home-grown produce	✓	X	
			Ingestion of home-grown produce	✓	X	
			Inhalation of dust	✓	X	
			Inhalation of vapours – indoor/outdoor	✓	X	No sufficiently volatile contaminants identified.
	Metals, semi-metals, inorganics and PAHs	Groundwater quality	Leaching from made ground	✓	X	Total contaminant concentrations recorded would suggest that no source of potential contamination exists on site.
Metals, semi-metals, inorganics and PAHs	Surface water quality	Transportation within groundwater	✓	X	Total contaminant concentrations recorded would suggest that no source of potential contamination exists on site.	

**9.0 REVISED CONCEPTUAL EXPOSURE MODEL (CONTINUED)**

Source		Receptor	Pathway	Preliminary Active Pathway?	Relevant Pollutant Linkage	Justification/ Mitigation
Origin	Contaminant					
Natural ground	Sulphates and sulphides	Building Materials Durability	Direct contact	✓	✓	Building materials will be in contact with made ground – risk assess
Ground Gas – organic, gas producing materials	Methane, carbon dioxide	Human health	Accumulation of gases in confined spaces, and/or migration off site, leading to asphyxiation, or risk of explosion	✓	X	No landfill sites are in influencing distance of the site which would indicate that the risk of ground gases affecting the subject site is low.

## **10.0 RISK ASSESSMENT**

### **10.1 METHODOLOGY**

The risk of pollution, health effects or environmental harm occurring as a result of ground contamination is dependent upon three principal factors:

- The scale of the contamination sources;
- The presence of sensitive “receptors”, eg Humans: health of the general public, site occupiers, redevelopment workers. Environment: flora, fauna, etc;
- The existence of migration pathways by which contaminants can reach the sensitive receptors.

This section assesses each of these factors in order to evaluate the overall level of risk and potential harm to receptors. The receptor may be human, a water resource, an eco-system or construction materials. Pathways connecting a perceived hazard to a receptor are referred to as exposure pathways.

The sources of contamination and the links connecting the hazards to the sensitive receptors will represent the basis for the risk assessment.

### **10.2 SOURCE-PATHWAY-RECEPTOR MODEL**

The preliminary conceptual site model was based on the findings of the desk study. This was later reviewed and refined according to the findings of the site investigation, allowing for the ground conditions encountered and the results of laboratory testing of soil and groundwater. Any pathways considered to be inactive were removed from the model and all remaining potentially active pathways require risk assessment.

The pathways shown as potentially active in the Revised Conceptual Site Model in Section 9.0 above have been assessed below.

### **10.3 HUMAN HEALTH RISK ASSESSMENT**

#### **10.3.1 *Site in its Present Condition***

The site does not pose any risks to casual visitors or trespassers.

### **10.3 HUMAN HEALTH RISK ASSESSMENT** (CONTINUED)

#### **10.3.2 Future Site Users**

As to be expected the contamination test results and investigation observations have not identified any significant contamination on site. The only contaminant identified on site is total chromium.

Elevated total chromium concentrations were identified in all three samples analysed. However, it is highly unlikely that the total chromium concentrations will be derived from the more toxic hexavalent form of chromium. Confirmatory laboratory analysis of hexavalent chromium concentrations may be required.

Based on the analysis undertaken to date and the historical and present usage of the site, it is considered that the site does not require any formal remediation measures with regards to the protection of site end-users.

Laboratory analysis has indicated that the existing topsoil should be suitable for re-use on site. Further laboratory analysis may be required to satisfy the Local Authority.

With future site development works involving the excavation and removal of the made ground, there would be a risk to workers from contaminants in the soils and also the groundwater if it is encountered. Appropriate measures are therefore recommended for works involving the made ground materials which are known to be present beneath the site.

All excavations should be regularly checked for safe atmospheres.

Normal good hygiene practices should be adequate to protect the health and safety of redevelopment workers, and should include:

- Minimum handling of materials;
- Washing of hands prior to all meal breaks, which should be taken in a designated clean area;
- The use of standard protective clothing such as boots and overalls and gloves, where considered relevant.

In dry weather, inhalation of dust and gases should be avoided preferably by the use of dust suppression techniques to minimise fugitive emissions and minimisation of exposed materials at any particular time.

**10.3 HUMAN HEALTH RISK ASSESSMENT** (CONTINUED)

Additionally, a system should be established by which any 'unusual' materials that may be encountered are reported rapidly to the site management, so that the appropriate action may be taken, following specialist advice if necessary. An unusual material may be identified on site by colour, odour or physical nature.

Reference should be made to the Health and Safety Executive document "Protection of Workers and the General Public during the development of contaminated land" for detailed guidance on these matters.

**10.4 RISKS TO VEGETATION**

No phytotoxic metals are present at problematic levels. No remediation is required to promote plant growth. The sub soils and topsoil at the site are suitable for use in domestic gardens.

**10.5 GROUNDWATER RISK ASSESSMENT**

No significant sources of contamination have been identified on site. When considering this and the long term agricultural use of the site only, the groundwater regime and additional controlled waters are not considered to be at risk from past or current site activities.

**10.6 GROUND GAS RISK ASSESSMENT**

No biodegradable or potentially gas generating organic materials were observed within any of the trial pit excavations. Furthermore, given the historical nature of the site and the lack of any landfill sites within 1.0km of the site, it is considered that the vast majority of the site is at a low risk from ground gases.

Basic radon protective measures are required on site.

## **10.7 RISKS TO BUILDINGS AND MATERIALS DURABILITY**

### **10.7.1 Concrete Classification**

A summary of the laboratory chemical test results for the chemicals monohydric phenol, sulphur, total sulphate, water soluble sulphate, sulphide and pH, which may adversely affect the durability of building materials is presented in Appendix F

Evidence to date does not indicate any specifically aggressive conditions, but it would be reasonable to expect a degree of sulphate and acidic aggressiveness from the made ground.

In accordance with BRE Digest SD1:2005 and adopting the assessment procedure specified therein for Greenfield sites, the laboratory chemical test results indicate a characteristic value (taking the mean of the highest 20% of the test results) for water soluble sulphate within the topsoil and natural soils of 45mg/l.

Using Table C1 of BRE Digest SD1:2005, this characteristic value corresponds to Design Sulphate Class DS-1.

The groundwater regime of the site has been assessed as 'mobile' and a characteristic pH value within the topsoil and natural soils of 5.9 has been determined (adopting the mean of the lowest 20% of the test results). The Design Sulphate Class has been modified to give a site ACEC class of AC-1 for concrete structures constructed within the natural soils

### **10.7.2 Water Services**

Given the nature of the site it is unlikely that water pipes will require protection from any contamination within the ground. Reference should however be made to UKWIR Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, document No. 10/WM/03/21. The final design and selection of the pipe and associated backfill should be agreed with the appropriate Regulator prior to installation.

In order to comply with the UKWIR guidance, specific sampling and testing along the actual line of the proposed water supply route may need to be carried out once this has been established.



## **10.8 SPOIL DISPOSAL**

Under the Landfill Regulations (2002) all spoil materials should be classified if they require disposal to a landfill facility. To determine the appropriate type of landfill site, there will need to be a characterisation of the materials in relation to the Waste regulations.

It is envisaged that any topsoil deposits will be re-used with soft landscaped and garden areas of the development.

The natural soils are tentatively classified as inert.

It is recommended that a sustainable development strategy is adopted which reduces to a practicable minimum the need for export of waste to a licensed tip.

In order to minimise the potential for off-site disposal, the materials generated during the earthworks should be segregated and examined, with appropriate chemical testing as necessary, to enable the materials to be sorted or treated, with the resultant benefit of potentially generating re-use rather than disposal.

Excavated materials generated by the development may be considered as waste and subject to waste controls. Any re-use of excavated materials on-site should be undertaken in accordance with current waste and environmental legislation (e.g. Waste Framework Directive) and which may require the production of an approved Materials Management Plan (MMP) prepared in accordance with the CL:AIRE Code of Practice.

## **10.9 UNCERTAINTIES**

It is important to recognise that there may be areas of contamination within the site that have not been found or that contaminants may be present at concentrations above those that have been found. It is also important to recognise that contamination may be localised and that no investigation, however comprehensive, is capable of finding such occurrences, other than by chance.

## **11.0 ENGINEERING CONSIDERATIONS AND RECOMMENDATIONS**

### **11.1 DETAILS OF PROPOSED DEVELOPMENT**

We understand the site is to be developed for low rise 2/3 storey residential housing complete with gardens and landscaped areas.

### **11.2 SITE PREPARATION**

Allowances should be made for the demolition and clearance of the derelict out buildings at the north of the site. Intrusive asbestos surveys should be undertaken. Asbestos soft strip and disposal should be undertaken by a licensed contractor, if required.

The topsoil, comprising soft, brown, silty clay with roots and rootlets, (typically 0.1/0.3m thick), should be removed from beneath the proposed buildings and access roads. These excavated materials will be unacceptable as structural fill and should be used in landscaped areas and gardens, with any surplus materials being removed from site. Chemical analysis may be required to confirm that these materials are fit for re-use within the site or for export of any surplus to other sites.

Any buried services running within the site should be traced and either disconnected and removed or diverted prior to site works commencing. Any diversionary works should be carried out under the supervision of, and to the specification of, the appropriate statutory authorities.

There are many mature trees/hedges along the edges of the site, and also through the site. Allowances should therefore be made for the removal of any associated roots that may become exposed in any proposed nearby earthworks and foundation excavations. Any such works should be conducted in accordance with the code of practice recommended by the National House Building Council (NHBC). All protection orders relating to existing vegetation/ecology should be adhered to during the development of the site.

Some cut and fill works may be required in the steeper parts of the site.

If any fill is to be placed onto an existing sloping area, then the original ground should be adequately cut and benched, in order to prevent the possibility of slippage at the interface between the new fill and the original ground.

## **11.2 SITE PREPARATION** (CONTINUED)

Any cut and/or fill slopes should be no steeper than 1v in 2h. Cut off drains should be provided at the top and French drains at the bottom of any cut and/or fill slopes. In areas of cut and/or fill, the slopes should be topsoiled and seeded with grass, in order to minimise any future maintenance problems caused by surface water run-offs.

If site excavated materials are to be used as fill, then any generated limestone cobbles/boulders may need to be processed/crushed to appropriate sizes, typically <125mm particle size.

Some surface water and groundwater management will be required in order to ensure the protection to the earthworks and materials.

Allowances should also be made for encountering and having to deal with shallow rock or dense cobbles and boulders within the proposed depths of the drainage excavations. More powerful excavating machinery and/or breaking equipment may be required to excavate into the bedrock or dense cobbles and boulders.

## **11.3 FOUNDATIONS AND FLOOR SLABS**

On the basis of the desk study research and trial pitting investigations, it is considered that the site should not be affected by significant solution cavities/features and that the ground encountered at shallow depths is generally capable of supporting a traditional two storey dwelling on conventional mass concrete strip foundations and ground bearing floor slabs.

Given the possibility of small solution features being present, it is recommended that special care is taken during the excavation and construction of the foundations, floor slabs and drainage works, to ensure that rainwater does not become ponded and lead to concentrated discharges of water in to the underlying ground.

Conventional mass concrete strip footings, as described above, can therefore be used and founded within the dense gravel and cobbles of limestone, or the limestone bedrock. The depths to these founding materials are likely to vary between approximately 0.1m and 0.8m below the existing ground levels. Typically foundation depths will be between 0.75m – 0.9m below existing ground level.

Deeper foundation depths may be required where the founding horizons may need to be taken down below any root systems.

### 11.3 FOUNDATIONS AND FLOOR SLABS (CONTINUED)

The foundation formations should be kept to a minimum depth of 0.75 to 0.90m below finished ground levels, in order to protect them from the effects of frost heave and/or thermal shrinkage.

At the above depths an allowable bearing pressure of 100kN/m<sup>2</sup> could be used for design purposes when founding in the dense gravel and cobbles and up to 200kN/m<sup>2</sup> within the more competent limestone bedrock. At this intensity of loading, the total settlements should not exceed 20mm, and any angular distortions caused by differential movements should be less than 1:750.

Ideally footings should be founded on similar strata throughout to reduce the risk of differential settlement. Any foundation bearing on a combination of differing bearing strata should be locally reinforced with mesh fabric over the change in strata.

Allowances should be made for overbreaks in the sides of the excavations and for their possible backfilling either with granular materials or mass concrete.

We are currently awaiting the results of laboratory classification analysis, but given the physical description of the soils/rocks recorded on site, it is considered that the natural gravel and cobbles of the solid strata are non-shrinkable

Therefore, given the shallow depth of weathered bedrock, it is envisaged that the great majority of footings will bear directly onto dense gravel and cobbles or bedrock. These are likely non-shrinkable strata and footings need not be deepened further.

Provided that the site preparation works are adhered to, the floor slabs could be designed as ground bearing, in-situ suspended or beam and block at the design engineer's discretion.

If clay deposits are encountered within the influencing zone of trees then these should be excavated to the interface with the non-shrinkable gravel and cobbles and bedrock strata.

Basic radon protective measures are required at the site.

It should be noted that in order to comply with the requirements of the National House Building Council (NHBC) for ground bearing floor slabs, the thickness of made ground/fill materials at any point beneath the slab should not exceed 600mm, if it does, the floor slabs should be designed and constructed as suspended.

### **11.3 FOUNDATIONS AND FLOOR SLABS** (CONTINUED)

If weathered rocks are encountered at shallow depths within the excavations then, in order to minimise any differential settlements, individual buildings or blocks of buildings should be founded entirely within gravels and cobbles, or within the weathered rocks.

It is recommended that a careful inspection is made of the foundation and floor slab formations, and that contingencies are allowed for the possible presence of localised solution features and, therefore, deeper foundations. Any encountered soft materials/voids should be excavated and replaced/plugged with mass concrete.

It is also recommended that the excavation for, and construction of the foundations and floor slabs are completed quickly, in order to avoid ponding of surface water and possible concentrated discharges of water into the ground at these locations.

### **11.4 EXCAVATIONS AND FORMATIONS**

On the basis of the trial pitting findings, excavations deeper than 1.0m deep typically will encounter hard dig and rock break conditions. It may therefore become necessary to employ larger tracked machines and/or breaking equipment in these areas, if deeper excavations are required.

From the site investigation findings, the excavations are unlikely to encounter significant groundwater inflows. Any groundwater inflows/seepages are likely to be slight and these together with any rainfall infiltrations should be dealt with by conventional pumping techniques.

The sides of excavations deeper than 1.0m should be supported by planking and strutting, or temporarily battered at gradients of typically 30 degrees.

The exposed formations within the in-situ materials will be extremely susceptible to damage; softening and deterioration by wet weather and site traffic. They should therefore be protected by blinding concrete or a 100mm thick layer of hardcore immediately after exposure.

## 11.5 ACCESS ROADS AND CAR PARKING AREAS

There are likely to be variations in the strength of the materials at the access road formation levels and therefore a California Bearing Ratio (CBR) value of between 2% and 5% can then be used for designed purposes. This value of CBR could be significantly increased to much greater than 5% if the pavement formations are within the dense gravel and cobbles or limestone rocks, or within well compacted granular materials.

After proof rolling, the pavement formations, any 'soft spots/areas' should be removed and replaced with well-compacted imported granular materials. Department of Transport (DTp) Type 1 Sub-Base, or similar approved, could be used and should be compacted in layers in accordance with the current DTp Specification for Highway Works.

All deposits should be considered frost susceptible.

It should be noted that the Local Highway Authority may insist that field CBR tests should be carried out to confirm the above recommendations. Allowances should therefore be made for carrying out such tests and any further works which the local authority may require as a result of these tests.

## 11.6 DRAINAGE

As discussed previously, shallow rock may be present beneath parts of the site and, therefore, locally difficult hard dig/rock break conditions may be encountered in the drainage excavations. Given the possible presence of solution features, it is recommended that all the drainage works are constructed properly and such that there will be no risk of uncontrolled leakages into the surrounding soils and rocks.

The results of the initial soakaway tests indicate that the deposits on site are of moderate infiltration potential across the majority of the site. The natural shallow deposits beneath the majority of the site are therefore considered suitable for conventional soakaways at this time.

It should be noted that the strength of the underlying limestone limited the depth of excavation and consequently the depth of the soil infiltration.

Prior to undertaking detailed design, it is strongly recommended that full size soil infiltrations tests are undertaken at the locations of proposed soakaways locations and depths. Deeper excavations may be required into the limestone bedrock strata, and consequently the infiltration rates may differ from those previously reported. The tests should fully conform to the recommendations of BRE 365.

**11.6 DRAINAGE** (CONTINUED)

The further testing should be carried out at the specific location and depths of the proposed soakaway features. It should be noted that the natural solid strata of the Porthkerry Formation is potentially susceptible to dissolution from rainwater infiltration. It is recommended that any soakaways are located a minimum of 10.0m from buildings.

## **APPENDIX A**

### **ENVIROCHECK REPORT**



## Envirocheck<sup>®</sup> Report:

### Datasheet

#### Order Details:

**Order Number:**

55615989\_1\_1

**Customer Reference:**

11344/JJ

**National Grid Reference:**

298680, 168560

**Slice:**

A

**Site Area (Ha):**

1.84

**Search Buffer (m):**

1000

#### Site Details:

Boverton

Llantwit Major

#### Client Details:

MR H Pritchard

Integral Geotechnique

Integral House

7 Beddau Way

Castlegate Business Park

Caerphilly

CF83 2AX

<b>Report Section</b>	<b>Page Number</b>
<b>Summary</b>	-
<b>Agency &amp; Hydrological</b>	<b>1</b>
<b>Waste</b>	<b>6</b>
<b>Hazardous Substances</b>	-
<b>Geological</b>	<b>7</b>
<b>Industrial Land Use</b>	<b>12</b>
<b>Sensitive Land Use</b>	-
<b>Data Currency</b>	<b>13</b>
<b>Data Suppliers</b>	<b>17</b>
<b>Useful Contacts</b>	<b>18</b>

#### **Introduction**

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

#### **Copyright Notice**

© Landmark Information Group Limited 2014. The Copyright on the information and data and its format as contained in this Envirocheck® Report ("Report") is the property of Landmark Information Group Limited ("Landmark") and several other Data Providers, including (but not limited to) Ordnance Survey, British Geological Survey, the Environment Agency and Natural England, and must not be reproduced in whole or in part by photocopying or any other method. The Report is supplied under Landmark's Terms and Conditions accepted by the Customer. A copy of Landmark's Terms and Conditions can be found with the Index Map for this report. Additional copies of the Report may be obtained from Landmark, subject to Landmark's charges in force from time to time. The Copyright, design rights and any other intellectual rights shall remain the exclusive property of Landmark and /or other Data providers, whose Copyright material has been included in this Report.

#### **Natural England Copyright Notice**

Site of Special Scientific Interest, National Nature Reserve, Ramsar, Special Protection Area, Special Conservation Area, Marine Nature Reserve data (derived from Ordnance Survey 1:10000 raster) is provided by, and used with the permission of, Natural England who retain the copyright and Intellectual Property Rights for the data.

#### **Ove Arup Copyright Notice**

The Data provided in this report was obtained on Licence from Ove Arup & Partners Limited (for further information, contact mining.review@arup.com). No reproduction or further use of such Data is to be made without the prior written consent of Ove Arup & Partners Limited. The information and data supplied in the product are derived from publicly available records and other third party sources and neither Ove Arup & Partners nor Landmark warrant the accuracy or completeness of such information or data.

#### **Peter Brett Associates Copyright Notice**

The cavity data presented has been extracted from the PBA enhanced version of the original DEFRA national cavity databases. PBA/DEFRA retain the copyright & intellectual property rights in the data. Whilst all reasonable efforts are made to check that the information contained in the cavity databases is accurate we do not warrant that the data is complete or error free. The information is based upon our own researches and those collated from a number of external sources and is continually being augmented and updated by PBA. In no event shall PBA/DEFRA or Landmark be liable for any loss or damage including, without limitation, indirect or consequential loss or damage arising from the use of this data.

#### **Radon Potential dataset Copyright Notice**

Information supplied from a joint dataset compiled by The British Geological Survey and Public Health England.

#### **Report Version v47.0**

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
<b>Agency &amp; Hydrological</b>					
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 1				2
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 1		Yes		
Pollution Incidents to Controlled Waters	pg 1		1	5	4
Prosecutions Relating to Authorised Processes					
Prosecutions Relating to Controlled Waters					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register	pg 3				1
Water Abstractions	pg 3				1 (*1)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 3	Yes	n/a	n/a	n/a
Bedrock Aquifer Designations	pg 3	Yes	n/a	n/a	n/a
Superficial Aquifer Designations			n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences	pg 3	Yes	Yes	n/a	n/a
Flooding from Rivers or Sea without Defences	pg 4	Yes		n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
Detailed River Network Lines	pg 4		Yes		n/a
Detailed River Network Offline Drainage	pg 5		Yes		n/a

<b>Data Type</b>	<b>Page Number</b>	<b>On Site</b>	<b>0 to 250m</b>	<b>251 to 500m</b>	<b>501 to 1000m (*up to 2000m)</b>
<b>Waste</b>					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Recorded Landfill Sites					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
<b>Hazardous Substances</b>					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					
<b>Geological</b>					
BGS 1:625,000 Solid Geology	pg 7	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 7	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 10			1	2
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
Brine Compensation Area			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain				n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 10	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 11		Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards	pg 11		Yes	n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 11	Yes		n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 11		Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 11		Yes	n/a	n/a
Radon Potential - Radon Affected Areas	pg 11	Yes	n/a	n/a	n/a
Radon Potential - Radon Protection Measures	pg 11	Yes	n/a	n/a	n/a

<b>Data Type</b>	<b>Page Number</b>	<b>On Site</b>	<b>0 to 250m</b>	<b>251 to 500m</b>	<b>501 to 1000m (*up to 2000m)</b>
<b>Industrial Land Use</b>					
Contemporary Trade Directory Entries	pg 12		1	4	2
Fuel Station Entries					
<b>Sensitive Land Use</b>					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest					
Special Areas of Conservation					
Special Protection Areas					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	<p><b>Discharge Consents</b></p> <p>Operator: Kelda Water Services (Estates) Limited  Property Type: Support Services - Air Transport  Location: Royal Air Force (West Camp) St Atha, St Athan Nr Barry  Authority: Environment Agency, Welsh Region  Catchment Area: Hood Nant  Reference: BP0263701  Permit Version: 1  Effective Date: 30th November 1996  Issued Date: 30th November 1996  Revocation Date: 30th November 2011  Discharge Type: Trade Effluent  Discharge: Freshwater Stream/River  Environment:  Receiving Water: Boverton Brook  <b>Status: Surrendered under EPR 2010</b>  Positional Accuracy: Located by supplier to within 100m</p>	A19SW (NE)	773	1	299200 169200
2	<p><b>Discharge Consents</b></p> <p>Operator: Air Ministry Works,  Property Type: Undefined Or Other  Location: Raf Station Station St Athan, Raf Station St Athan, Cardiff  Authority: Environment Agency, Welsh Region  Catchment Area: Not Given  Reference: Ba1006201  Permit Version: 1  Effective Date: 4th July 1955  Issued Date: 4th July 1955  Revocation Date: 16th February 1996  Discharge Type: Unspecified  Discharge: Freshwater Stream/River  Environment:  Receiving Water: Boverton Brook  <b>Status: Consent expired</b>  Positional Accuracy: Located by supplier to within 100m</p>	A19NE (NE)	980	1	299400 169300
	<p><b>Nearest Surface Water Feature</b></p>	A13NW (NW)	15	-	298579 168675
3	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given  Location: Location Description Not Available  Authority: Environment Agency, Welsh Region  Pollutant: Unknown  Note: Not Supplied  Incident Date: 5th April 1995  Incident Reference: 23867  Catchment Area: Not Given  Receiving Water: Not Given  Cause of Incident: Unknown  Incident Severity: Category 3 - Minor Incident  Positional Accuracy: Located by supplier to within 100m</p>	A13SW (W)	221	1	298350 168550
4	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given  Location: Boverton Village  Authority: Environment Agency, Welsh Region  Pollutant: Unknown  Note: Not Supplied  Incident Date: 19th January 1997  Incident Reference: 30997  Catchment Area: Not Given  Receiving Water: Not Given  Cause of Incident: Unknown  Incident Severity: Category 3 - Minor Incident  Positional Accuracy: Located by supplier to within 100m</p>	A12SE (W)	287	1	298300 168500
4	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given  Location: In Boverton Village  Authority: Environment Agency, Welsh Region  Pollutant: Unknown  Note: Not Supplied  Incident Date: 19th January 1997  Incident Reference: 30997  Catchment Area: Not Given  Receiving Water: Not Given  Cause of Incident: Unknown  Incident Severity: Category 3 - Minor Incident  Positional Accuracy: Located by supplier to within 100m</p>	A12SE (W)	289	1	298300 168495

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given            Location: Location Description Not Available            Authority: Environment Agency, Welsh Region            Pollutant: Miscellaneous - Vehicle Washings And De Waxing            Note: Not Supplied            Incident Date: 25th July 1996            Incident Reference: 29314            Catchment Area: Not Given            Receiving Water: Not Given            Cause of Incident: Unknown            Incident Severity: Category 3 - Minor Incident            Positional Accuracy: Located by supplier to within 100m</p>	A12SE (W)	399	1	298200 168450
5	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given            Location: Down Stream Of Footbridge, LLANTWIT MAJOR            Authority: Environment Agency, Welsh Region            Pollutant: Chemicals - Alkali            Note: Not Supplied            Incident Date: 19th August 1995            Incident Reference: 25474            Catchment Area: Not Given            Receiving Water: Not Given            Cause of Incident: Unknown            Incident Severity: Category 2 - Significant Incident            Positional Accuracy: Located by supplier to within 100m</p>	A12SE (W)	423	1	298200 168400
6	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Domestic/Residential            Location: LLANTWIT MAJOR            Authority: Environment Agency, Welsh Region            Pollutant: Crude Sewage            Note: Not Supplied            Incident Date: 26th January 1995            Incident Reference: 22495            Catchment Area: Not Given            Receiving Water: Not Given            Cause of Incident: Unknown            Incident Severity: Category 3 - Minor Incident            Positional Accuracy: Located by supplier to within 100m</p>	A12NE (W)	407	1	298150 168600
7	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given            Location: Location Description Not Available            Authority: Environment Agency, Welsh Region            Pollutant: Algae            Note: Natural Causes            Incident Date: 21st April 1995            Incident Reference: 23810            Catchment Area: Not Given            Receiving Water: Not Given            Cause of Incident: Natural Causes            Incident Severity: Category 3 - Minor Incident            Positional Accuracy: Located by supplier to within 100m</p>	A12SE (W)	584	1	298000 168450
8	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given            Location: Emanating From A Pipe, Close To Lonsdale House, Turkey Street            Authority: Environment Agency, Welsh Region            Pollutant: Crude Sewage            Note: Not Supplied            Incident Date: 14th April 1997            Incident Reference: 32003            Catchment Area: Not Given            Receiving Water: Not Given            Cause of Incident: Unknown            Incident Severity: Category 3 - Minor Incident            Positional Accuracy: Unknown</p>	A17NE (NW)	862	1	298000 169300
9	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Water Company Sewage: Sewerage            Location: Church, LLANMAES            Authority: Environment Agency, Welsh Region            Pollutant: Agricultural: Carcasses            Note: Weather            Incident Date: 12th November 1994            Incident Reference: 21776            Catchment Area: Not Given            Receiving Water: Not Given            Cause of Incident: Overflow            Incident Severity: Category 2 - Significant Incident            Positional Accuracy: Located by supplier to within 100m</p>	A17NE (NW)	953	1	298050 169450

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
10	<p><b>Pollution Incidents to Controlled Waters</b></p> <p>Property Type: Not Given            Location: Adjacent To Mill Lay Lane            Authority: Environment Agency, Welsh Region            Pollutant: Oils - Diesel (Including Agricultural)            Note: Not Supplied            Incident Date: 18th December 1996            Incident Reference: 30744            Catchment Area: Not Given            Receiving Water: Not Given            Cause of Incident: Unknown            Incident Severity: Category 3 - Minor Incident            Positional Accuracy: Located by supplier to within 100m</p>	A11SE (W)	983	1	297600 168400
11	<p><b>Substantiated Pollution Incident Register</b></p> <p>Authority: Environment Agency Wales, South East Area            Incident Date: 4th August 2011            Incident Reference: 910139            Water Impact: Category 2 - Significant Incident            Air Impact: Category 4 - No Impact            Land Impact: Category 3 - Minor Incident            Positional Accuracy: Located by supplier to within 10m            Pollutant: Organic Chemicals/Products: Surfactants And Detergents</p>	A19SW (NE)	774	1	299253 169156
12	<p><b>Water Abstractions</b></p> <p>Operator: Welsh Assembly Government            Licence Number: 21/58/21/0029            Permit Version: 1            Location: Raf St Athans 1            Authority: Environment Agency, Welsh Region            Abstraction: Environmental: Pollution Remediation            Abstraction Type: Water may be abstracted from any point within an area            Source: Groundwater            Daily Rate (m3): Not Supplied            Yearly Rate (m3): Not Supplied            Details: Not Supplied            Authorised Start: 01 January            Authorised End: 31 December            Permit Start Date: 20th November 2007            Permit End Date: Not Supplied            Positional Accuracy: Located by supplier to within 10m</p>	A19SW (NE)	682	1	299233 169044
	<p><b>Water Abstractions</b></p> <p>Operator: Welsh Assembly Government            Licence Number: 21/58/21/0029            Permit Version: 1            Location: Raf St Athans 4            Authority: Environment Agency, Welsh Region            Abstraction: Environmental: Pollution Remediation            Abstraction Type: Water may be abstracted from any point within an area            Source: Groundwater            Daily Rate (m3): Not Supplied            Yearly Rate (m3): Not Supplied            Details: Not Supplied            Authorised Start: 01 January            Authorised End: 31 December            Permit Start Date: 20th November 2007            Permit End Date: Not Supplied            Positional Accuracy: Located by supplier to within 10m</p>	A10SW (SE)	1363	1	299968 167802
	<p><b>Groundwater Vulnerability</b></p> <p>Soil Classification: Soils of High Leaching Potential (H3)- Coarse textured or moderately shallow soils which readily transmit non-absorbed pollutants and liquid discharges but which have some ability to attenuate absorbed pollutants because of their large clay or organic matter contents            Map Sheet: Sheet 36 Mid Glamorgan            Scale: 1:100,000</p>	A13NE (NE)	0	1	298676 168560
	<p><b>Drift Deposits</b></p> <p>None</p>				
	<p><b>Bedrock Aquifer Designations</b></p> <p>Aquifer Desination: Secondary Aquifer - A</p>	A13NE (NE)	0	2	298676 168560
	<p><b>Superficial Aquifer Designations</b></p> <p>No Data Available</p>				
	<p><b>Extreme Flooding from Rivers or Sea without Defences</b></p> <p>Type: Extent of Extreme Flooding from Rivers or Sea without Defences            Flood Plain Type: Fluvial Models            Boundary Accuracy: As Supplied</p>	A13NW (N)	0	1	298634 168681



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<b>Extreme Flooding from Rivers or Sea without Defences</b> Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A13NW (N)	0	1	298634 168681
	<b>Extreme Flooding from Rivers or Sea without Defences</b> Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A13NW (N)	0	1	298634 168681
	<b>Extreme Flooding from Rivers or Sea without Defences</b> Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A13NW (N)	0	1	298634 168681
	<b>Extreme Flooding from Rivers or Sea without Defences</b> Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models and Fluvial Events Boundary Accuracy: As Supplied	A12SE (W)	243	1	298331 168533
	<b>Extreme Flooding from Rivers or Sea without Defences</b> Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models and Fluvial Events Boundary Accuracy: As Supplied	A12SE (W)	243	1	298331 168533
	<b>Flooding from Rivers or Sea without Defences</b> Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A13NW (N)	0	1	298632 168684
	<b>Areas Benefiting from Flood Defences</b> None				
	<b>Flood Water Storage Areas</b> None				
	<b>Flood Defences</b> None				
13	<b>Detailed River Network Lines</b> River Type: Primary River River Name: Hoddnant Hydrographic Area: D008 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Flood Risk Management Indicative/Statutory Main River Management Status: Water Course: HODNANT Name: Water Course: 3975 Reference:	A13NW (NW)	17	1	298577 168676
14	<b>Detailed River Network Lines</b> River Type: Primary River River Name: Llanmaes Brook Hydrographic Area: D008 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Flood Risk Management Indicative/Statutory Main River Management Status: Water Course: LLANMAES BROOK Name: Water Course: 3972 Reference:	A13NE (N)	150	1	298705 168779
15	<b>Detailed River Network Lines</b> River Type: Primary River River Name: Boverton Brook Hydrographic Area: D008 River Flow Type: Primary Flow Path River Surface Level: Surface Drain Feature: Not a Drain Flood Risk: Flood Risk Management Indicative/Statutory Main River Management Status: Water Course: BOVERTON BROOK Name: Water Course: 3974 Reference:	A13NE (N)	150	1	298705 168779

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
16	<b>Detailed River Network Offline Drainage</b> River Type: Tertiary River Hydrographic Area: D008	A13NW (NW)	38	1	298593 168703

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<b>Local Authority Landfill Coverage</b> Name: Vale Of Glamorgan County Borough Council - Has supplied landfill data		0	4	298676 168560

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<b>BGS 1:625,000 Solid Geology</b> Description: Lower Lias	A13NE (NE)	0	2	298676 168560
	<b>BGS Estimated Soil Chemistry</b> Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NE)	0	3	298676 168560
	<b>BGS Estimated Soil Chemistry</b> Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (N)	139	3	298670 168784
	<b>BGS Estimated Soil Chemistry</b> Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (E)	210	3	299000 168560
	<b>BGS Estimated Soil Chemistry</b> Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 20 - 40 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SE (N)	335	3	298676 169000
	<b>BGS Estimated Soil Chemistry</b> Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A12SE (W)	404	3	298199 168441
	<b>BGS Estimated Soil Chemistry</b> Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SE (NE)	426	3	298877 169000

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 20 - 40 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A8NE (S)	447	3	298676 168000
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 60 - 90 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A18SW (NW)	457	3	298416 169087
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 20 - 40 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A18SE (NE)	472	3	298959 169000
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 20 - 40 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A18SE (NE)	494	3	299000 169000
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 20 - 40 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A8NE (SE)	504	3	299000 168000
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 60 - 90 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A18SE (NE)	533	3	299000 169046

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 20 - 40 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A12NE (W)	555	3	298000 168560
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 60 - 90 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A12SE (W)	608	3	298000 168384
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 20 - 40 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A17SE (NW)	663	3	298000 169000
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 40 - 60 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A17SE (NW)	671	3	298224 169227
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 20 - 40 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A7NE (SW)	838	3	298000 168000
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 40 - 60 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A7SE (SW)	893	3	298070 167865

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 40 - 60 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A7SE (SW)	946	3	298000 167857
	<p><b>BGS Estimated Soil Chemistry</b></p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Soil Sample Type: Sediment</p> <p>Arsenic &lt;15 mg/kg</p> <p>Concentration:</p> <p>Cadmium &lt;1.8 mg/kg</p> <p>Concentration:</p> <p>Chromium 40 - 60 mg/kg</p> <p>Concentration:</p> <p>Lead Concentration: &lt;150 mg/kg</p> <p>Nickel 15 - 30 mg/kg</p> <p>Concentration:</p>	A17NE (NW)	952	3	298000 169414
17	<p><b>BGS Recorded Mineral Sites</b></p> <p>Site Name: Parwg</p> <p>Location: , Boverton, Llantwit Major, South Glamorgan</p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Reference: 161228</p> <p>Type: Opencast</p> <p><b>Status: Ceased</b></p> <p>Operator: Unknown Operator</p> <p>Operator Location: Unknown Operator</p> <p>Periodic Type: Jurassic</p> <p>Geology: Porthkerry Member</p> <p>Commodity: Limestone</p> <p>Positional Accuracy: Located by supplier to within 10m</p>	A18SW (NW)	297	2	298506 168950
18	<p><b>BGS Recorded Mineral Sites</b></p> <p>Site Name: Great Farm</p> <p>Location: , Llanmaes, Cowbridge, South Glamorgan</p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Reference: 161126</p> <p>Type: Opencast</p> <p><b>Status: Ceased</b></p> <p>Operator: Unknown Operator</p> <p>Operator Location: Unknown Operator</p> <p>Periodic Type: Jurassic</p> <p>Geology: Porthkerry Member</p> <p>Commodity: Limestone</p> <p>Positional Accuracy: Located by supplier to within 10m</p>	A18NE (N)	671	2	298939 169245
19	<p><b>BGS Recorded Mineral Sites</b></p> <p>Site Name: Boverton Place</p> <p>Location: , Boverton, Llantwit Major, South Glamorgan</p> <p>Source: British Geological Survey, National Geoscience Information Service</p> <p>Reference: 161231</p> <p>Type: Opencast</p> <p><b>Status: Ceased</b></p> <p>Operator: Unknown Operator</p> <p>Operator Location: Unknown Operator</p> <p>Periodic Type: Jurassic</p> <p>Geology: Porthkerry Member</p> <p>Commodity: Limestone</p> <p>Positional Accuracy: Located by supplier to within 10m</p>	A7SE (SW)	947	2	298029 167829
	<p><b>BGS Measured Urban Soil Chemistry</b></p> <p>No data available</p>				
	<p><b>BGS Urban Soil Chemistry Averages</b></p> <p>No data available</p>				
	<p><b>Coal Mining Affected Areas</b></p> <p>In an area that might not be affected by coal mining</p>				
	<p><b>Non Coal Mining Areas of Great Britain</b></p> <p>No Hazard</p>				
	<p><b>Potential for Collapsible Ground Stability Hazards</b></p> <p>Hazard Potential: Very Low</p> <p>Source: British Geological Survey, National Geoscience Information Service</p>	A13NE (NE)	0	2	298676 168560

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	<b>Potential for Collapsible Ground Stability Hazards</b> Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	139	2	298669 168784
	<b>Potential for Compressible Ground Stability Hazards</b> Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	2	298676 168560
	<b>Potential for Compressible Ground Stability Hazards</b> Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	139	2	298669 168784
	<b>Potential for Ground Dissolution Stability Hazards</b> Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	2	298676 168560
	<b>Potential for Ground Dissolution Stability Hazards</b> Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	139	2	298669 168784
	<b>Potential for Landslide Ground Stability Hazards</b> Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	2	298676 168560
	<b>Potential for Running Sand Ground Stability Hazards</b> Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	2	298676 168560
	<b>Potential for Running Sand Ground Stability Hazards</b> Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	139	2	298669 168784
	<b>Potential for Shrinking or Swelling Clay Ground Stability Hazards</b> Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	2	298676 168560
	<b>Potential for Shrinking or Swelling Clay Ground Stability Hazards</b> Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	139	2	298669 168784
	<b>Radon Potential - Radon Protection Measures</b> Protection Measure: Basic radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	2	298676 168560
	<b>Radon Potential - Radon Affected Areas</b> Affected Area: The property is in an intermediate probability radon area, as between 5 and 10% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	0	2	298676 168560



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
20	<p><b>Contemporary Trade Directory Entries</b></p> <p>Name: Shuttershade            Location: 47, Church Meadow, Boverton, Llantwit Major, South Glamorgan, CF61 2AT            Classification: Blinds, Awnings &amp; Canopies  <b>Status: Active</b>            Positional Accuracy: Automatically positioned to the address</p>	A13NE (E)	39	-	298779 168585
21	<p><b>Contemporary Trade Directory Entries</b></p> <p>Name: C D S Products Ltd            Location: The Gatehouse, Boverton Park Drive, Boverton, Llantwit Major, South Glamorgan, CF61 1YN            Classification: Manufacturers  <b>Status: Inactive</b>            Positional Accuracy: Automatically positioned to the address</p>	A13SW (SW)	272	-	298398 168404
22	<p><b>Contemporary Trade Directory Entries</b></p> <p>Name: Independent Phoenix Trader            Location: Harding Cl, Boverton, Llantwit Major, South Glamorgan, CF61 1GX            Classification: Greeting Card Publishers &amp; Wholesalers  <b>Status: Active</b>            Positional Accuracy: Manually positioned within the geographical locality</p>	A12NE (W)	272	-	298290 168689
23	<p><b>Contemporary Trade Directory Entries</b></p> <p>Name: Goodrem-Nicholson Wales            Location: Llantwit Rd, St. Athan, Barry, South Glamorgan, CF62 4LZ            Classification: Freight Forwarders  <b>Status: Active</b>            Positional Accuracy: Manually positioned within the geographical locality</p>	A14SW (SE)	426	-	299154 168270
24	<p><b>Contemporary Trade Directory Entries</b></p> <p>Name: Spick &amp; Span            Location: 38, Cardigan Crescent, Boverton, Llantwit Major, South Glamorgan, CF61 2GP            Classification: Cleaning Services - Domestic  <b>Status: Active</b>            Positional Accuracy: Automatically positioned to the address</p>	A12NE (NW)	464	-	298147 168858
25	<p><b>Contemporary Trade Directory Entries</b></p> <p>Name: Dustbusters Cleaning Services            Location: 14, Cardigan Crescent, Boverton, Llantwit Major, South Glamorgan, CF61 2GP            Classification: Cleaning Services - Domestic  <b>Status: Inactive</b>            Positional Accuracy: Automatically positioned to the address</p>	A12NE (W)	521	-	298052 168770
26	<p><b>Contemporary Trade Directory Entries</b></p> <p>Name: The Flutterby Studio            Location: 18, Boverton Court, Boverton, Llantwit Major, South Glamorgan, CF61 1UJ            Classification: Jewellery Manufacturers &amp; Repairers  <b>Status: Inactive</b>            Positional Accuracy: Automatically positioned to the address</p>	A12NW (W)	589	-	297967 168604













<b>Agency &amp; Hydrological</b>	<b>Version</b>	<b>Update Cycle</b>
<b>Contaminated Land Register Entries and Notices</b> Vale Of Glamorgan County Borough Council - Environmental Health Department	April 2014	Annual Rolling Update
<b>Discharge Consents</b> Environment Agency - Welsh Region	February 2014	Quarterly
<b>Enforcement and Prohibition Notices</b> Environment Agency - Welsh Region	March 2013	As notified
<b>Integrated Pollution Controls</b> Environment Agency - Welsh Region	October 2008	Not Applicable
<b>Integrated Pollution Prevention And Control</b> Environment Agency - Welsh Region	February 2014	Quarterly
<b>Local Authority Integrated Pollution Prevention And Control</b> Vale Of Glamorgan County Borough Council - Environmental Health Department	November 2012	Annual Rolling Update
<b>Local Authority Pollution Prevention and Controls</b> Vale Of Glamorgan County Borough Council - Environmental Health Department	November 2012	Annual Rolling Update
<b>Local Authority Pollution Prevention and Control Enforcements</b> Vale Of Glamorgan County Borough Council - Environmental Health Department	November 2012	Annual Rolling Update
<b>Nearest Surface Water Feature</b> Ordnance Survey	July 2012	Quarterly
<b>Pollution Incidents to Controlled Waters</b> Environment Agency - Welsh Region	December 1998	Not Applicable
<b>Prosecutions Relating to Authorised Processes</b> Environment Agency - Welsh Region	March 2013	As notified
<b>Prosecutions Relating to Controlled Waters</b> Environment Agency - Welsh Region	March 2013	As notified
<b>Registered Radioactive Substances</b> Environment Agency - Welsh Region	February 2014	Quarterly
<b>River Quality</b> Environment Agency - Head Office	November 2001	Not Applicable
<b>River Quality Biology Sampling Points</b> Environment Agency - Head Office	July 2012	Annually
<b>River Quality Chemistry Sampling Points</b> Environment Agency - Head Office	July 2012	Annually
<b>Substantiated Pollution Incident Register</b> Environment Agency Wales - South East Area	February 2014	Quarterly
<b>Water Abstractions</b> Environment Agency - Welsh Region	December 2014	Quarterly
<b>Water Industry Act Referrals</b> Environment Agency - Welsh Region	February 2014	Quarterly
<b>Groundwater Vulnerability</b> Environment Agency - Head Office	January 2011	Not Applicable
<b>Drift Deposits</b> Environment Agency - Head Office	January 1999	Not Applicable
<b>Bedrock Aquifer Designations</b> British Geological Survey - National Geoscience Information Service	October 2012	Annually
<b>Superficial Aquifer Designations</b> British Geological Survey - National Geoscience Information Service	October 2012	Annually
<b>Source Protection Zones</b> Environment Agency - Head Office	December 2014	Quarterly
<b>Extreme Flooding from Rivers or Sea without Defences</b> Environment Agency - Head Office	February 2014	Quarterly

<b>Agency &amp; Hydrological</b>	<b>Version</b>	<b>Update Cycle</b>
<b>Flooding from Rivers or Sea without Defences</b> Environment Agency - Head Office	February 2014	Quarterly
<b>Areas Benefiting from Flood Defences</b> Environment Agency - Head Office	February 2014	Quarterly
<b>Flood Water Storage Areas</b> Environment Agency - Head Office	February 2014	Quarterly
<b>Flood Defences</b> Environment Agency - Head Office	February 2014	Quarterly
<b>Detailed River Network Lines</b> Environment Agency - Head Office	March 2012	Annually
<b>Detailed River Network Offline Drainage</b> Environment Agency - Head Office	March 2012	Annually
<b>Waste</b>	<b>Version</b>	<b>Update Cycle</b>
<b>BGS Recorded Landfill Sites</b> British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
<b>Historical Landfill Sites</b> Environment Agency - South East Region - Kent & South London Area Environment Agency - South East Region - North East Thames Area Environment Agency - South East Region - Solent & South Downs Area Environment Agency - South East Region - West Thames Area Environment Agency Wales - South East Area	February 2014 February 2014 February 2014 February 2014 February 2014	Quarterly Quarterly Quarterly Quarterly Quarterly
<b>Integrated Pollution Control Registered Waste Sites</b> Environment Agency - Welsh Region	October 2008	Not Applicable
<b>Licensed Waste Management Facilities (Landfill Boundaries)</b> Environment Agency - South East Region - Kent & South London Area Environment Agency - South East Region - North East Thames Area Environment Agency - South East Region - Solent & South Downs Area Environment Agency - South East Region - West Thames Area Environment Agency Wales - South East Area	February 2014 February 2014 February 2014 February 2014 February 2014	Quarterly Quarterly Quarterly Quarterly Quarterly
<b>Licensed Waste Management Facilities (Locations)</b> Environment Agency Wales - South East Area	February 2014	Quarterly
<b>Local Authority Landfill Coverage</b> Vale Of Glamorgan County Borough Council	May 2000	Not Applicable
<b>Local Authority Recorded Landfill Sites</b> Vale Of Glamorgan County Borough Council	May 2000	Not Applicable
<b>Registered Landfill Sites</b> Environment Agency Wales - South East Area	March 2003	Not Applicable
<b>Registered Waste Transfer Sites</b> Environment Agency Wales - South East Area	March 2003	Not Applicable
<b>Registered Waste Treatment or Disposal Sites</b> Environment Agency Wales - South East Area	March 2003	Not Applicable

<b>Hazardous Substances</b>	<b>Version</b>	<b>Update Cycle</b>
<b>Control of Major Accident Hazards Sites (COMAH)</b> Health and Safety Executive	March 2014	Bi-Annually
<b>Explosive Sites</b> Health and Safety Executive	November 2013	Bi-Annually
<b>Notification of Installations Handling Hazardous Substances (NIHHS)</b> Health and Safety Executive	November 2000	Not Applicable
<b>Planning Hazardous Substance Enforcements</b> Vale Of Glamorgan County Borough Council - Planning Department	January 2013	Annual Rolling Update
<b>Planning Hazardous Substance Consents</b> Vale Of Glamorgan County Borough Council - Planning Department	January 2013	Annual Rolling Update
<b>Geological</b>	<b>Version</b>	<b>Update Cycle</b>
<b>BGS 1:625,000 Solid Geology</b> British Geological Survey - National Geoscience Information Service	August 1996	Not Applicable
<b>BGS Estimated Soil Chemistry</b> British Geological Survey - National Geoscience Information Service	January 2010	Variable
<b>BGS Recorded Mineral Sites</b> British Geological Survey - National Geoscience Information Service	April 2014	Bi-Annually
<b>Coal Mining Affected Areas</b> The Coal Authority - Mining Report Service	December 2013	As notified
<b>Mining Instability</b> Ove Arup & Partners	October 2000	Not Applicable
<b>Non Coal Mining Areas of Great Britain</b> British Geological Survey - National Geoscience Information Service	February 2011	Not Applicable
<b>Potential for Collapsible Ground Stability Hazards</b> British Geological Survey - National Geoscience Information Service	October 2013	As notified
<b>Potential for Compressible Ground Stability Hazards</b> British Geological Survey - National Geoscience Information Service	October 2013	As notified
<b>Potential for Ground Dissolution Stability Hazards</b> British Geological Survey - National Geoscience Information Service	October 2013	As notified
<b>Potential for Landslide Ground Stability Hazards</b> British Geological Survey - National Geoscience Information Service	October 2013	As notified
<b>Potential for Running Sand Ground Stability Hazards</b> British Geological Survey - National Geoscience Information Service	October 2013	As notified
<b>Potential for Shrinking or Swelling Clay Ground Stability Hazards</b> British Geological Survey - National Geoscience Information Service	October 2013	As notified
<b>Radon Potential - Radon Affected Areas</b> British Geological Survey - National Geoscience Information Service	July 2011	As notified
<b>Radon Potential - Radon Protection Measures</b> British Geological Survey - National Geoscience Information Service	July 2011	As notified
<b>Industrial Land Use</b>	<b>Version</b>	<b>Update Cycle</b>
<b>Contemporary Trade Directory Entries</b> Thomson Directories	February 2014	Quarterly
<b>Fuel Station Entries</b> Catalist Ltd - Experian	March 2014	Quarterly

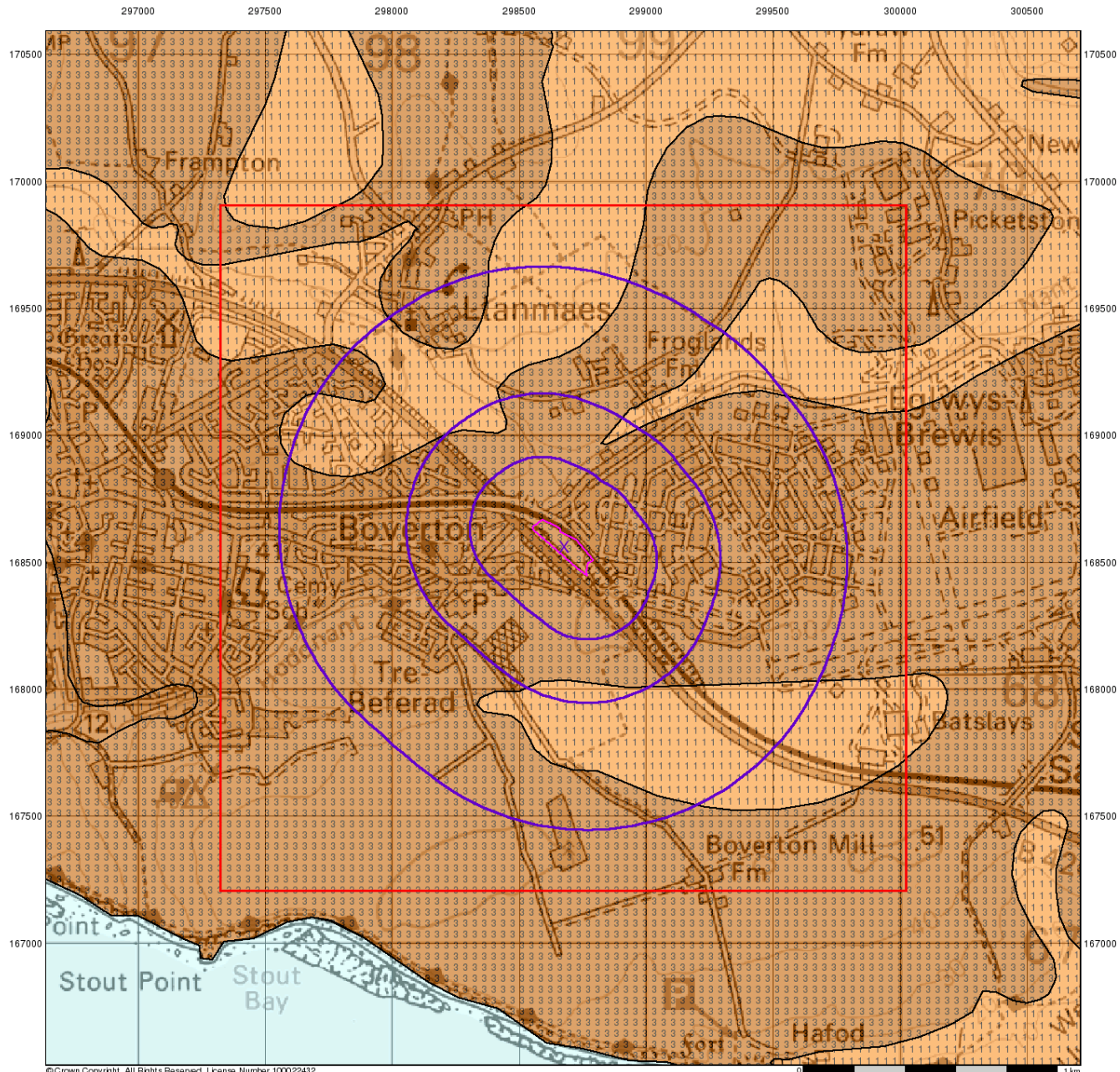
<b>Sensitive Land Use</b>	<b>Version</b>	<b>Update Cycle</b>
<b>Areas of Outstanding Natural Beauty</b> Natural Resources Wales (NRW) - formerly CCW	March 2014	Bi-Annually
<b>Environmentally Sensitive Areas</b> The National Assembly for Wales - GI Services (Department of Planning & Countryside)	August 2008	Annually
<b>Forest Parks</b> Forestry Commission	April 1997	Not Applicable
<b>Local Nature Reserves</b> Vale Of Glamorgan County Borough Council	March 2014	Bi-Annually
<b>Marine Nature Reserves</b> Natural Resources Wales (NRW) - formerly CCW	March 2014	Bi-Annually
<b>National Nature Reserves</b> Natural Resources Wales (NRW) - formerly CCW	January 2014	Bi-Annually
<b>Nitrate Sensitive Areas</b> Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	February 2012	Not Applicable
<b>Nitrate Vulnerable Zones</b> The National Assembly for Wales - GI Services (Department of Planning & Countryside)	October 2005	Annually
<b>Ramsar Sites</b> Natural Resources Wales (NRW) - formerly CCW	March 2014	Bi-Annually
<b>Sites of Special Scientific Interest</b> Natural Resources Wales (NRW) - formerly CCW	May 2013	Bi-Annually
<b>Special Areas of Conservation</b> Natural Resources Wales (NRW) - formerly CCW	March 2014	Bi-Annually
<b>Special Protection Areas</b> Natural Resources Wales (NRW) - formerly CCW	March 2014	Bi-Annually

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	 <p><b>British Geological Survey</b> NATURAL ENVIRONMENT RESEARCH COUNCIL</p>
Centre for Ecology and Hydrology	 <p><b>Centre for Ecology &amp; Hydrology</b> NATURAL ENVIRONMENT RESEARCH COUNCIL</p>
Countryside Council for Wales	 <p>CYNGOR CEFN GWLAD CYMRU COUNTRYSIDE COUNCIL FOR WALES</p>
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Contact	Name and Address	Contact Details
1	<b>Environment Agency - National Customer Contact Centre (NCCC)</b> PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
2	<b>British Geological Survey - Enquiry Service</b> British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
3	<b>Landmark Information Group Limited</b> Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmark.co.uk Website: www.landmarkinfo.co.uk
4	<b>Vale Of Glamorgan County Borough Council</b> Civic Offices, Holton Road, Barry, South Glamorgan, CF63 4RU	Telephone: 01446 700111 Fax: 01446 745566 Website: www.valeofglamorgan.gov.uk
-	<b>Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards</b> Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	<b>Landmark Information Group Limited</b> Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / SEPA have a charging policy in place for enquiries.



© Crown Copyright. All Rights Reserved. License Number 100022432.

# Intégral Géotechnique

## Groundwater Vulnerability

### General

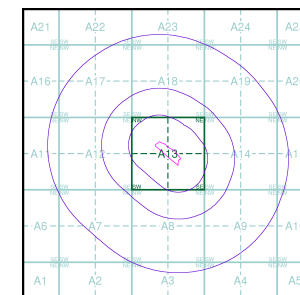
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

### Agency and Hydrological

#### Geological Classes

- |   |   |                            |
|---|---|----------------------------|
| <p><b>Major Aquifer (Highly Permeable)</b></p> <p><b>Minor Aquifer (Variably Permeable)</b></p> <p><b>Non Aquifer (Negligibly Permeable)</b></p> <p><b>Water or Sea</b></p> <p><b>Drift Deposit</b></p> | <p> High (H) 1, 2, 3, U</p> <p> Intermediate (I) 1, 2</p> <p> Low</p> <p> High (H) 1, 2, 3, U</p> <p> Intermediate (I) 1, 2</p> <p> Low</p> <p></p> <p></p> <p></p> | <p><b>Soil Classes</b></p> |
|---|---|----------------------------|

### Site Sensitivity Context Map - Slice A



### Order Details

Order Number: 55615989\_1\_1  
 Customer Ref: 11344/LJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

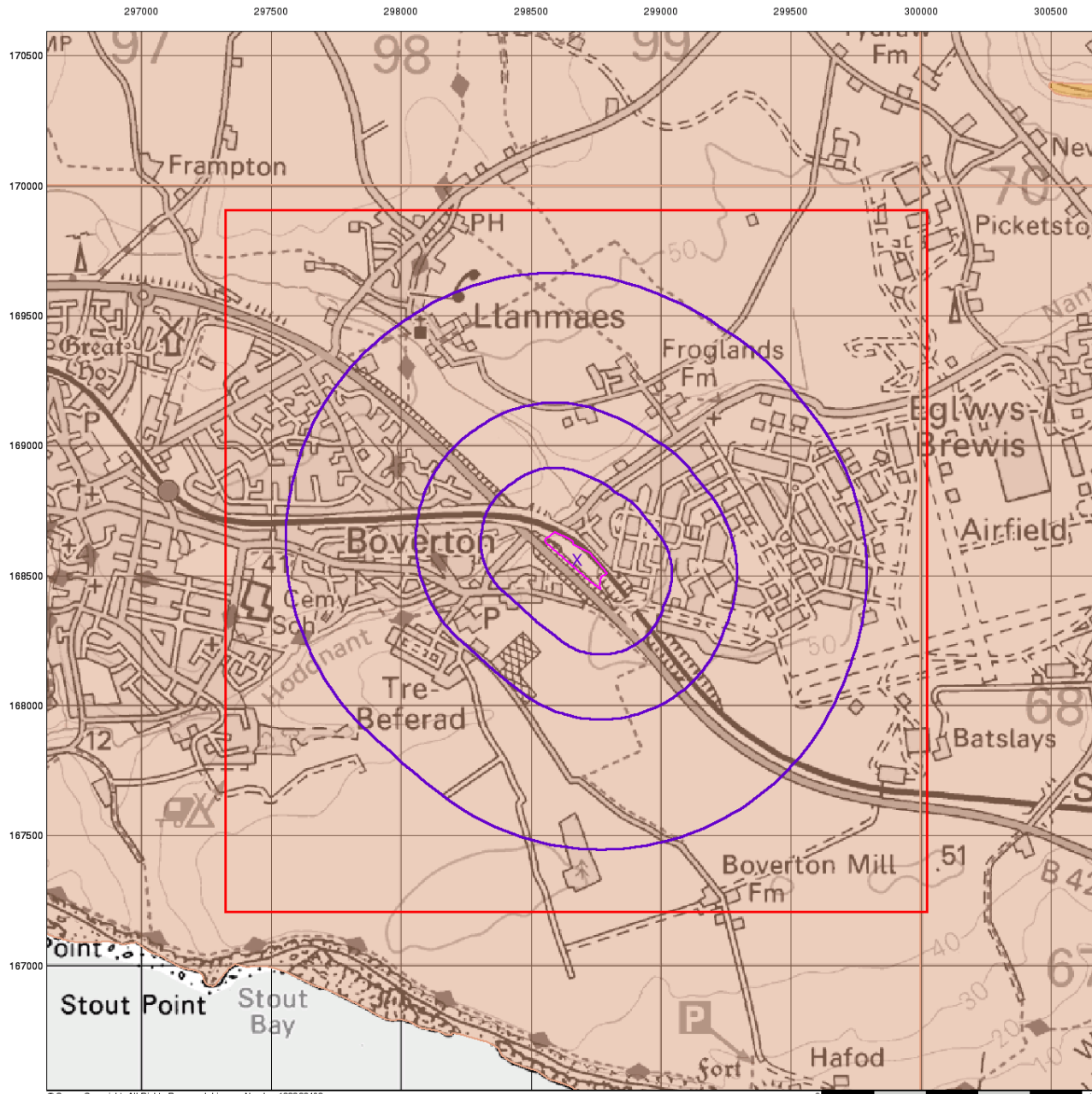
### Site Details

Boverton, Llantwit Major



Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk





© Crown Copyright. All Rights Reserved. License Number 100022432.

# Intégral Géotechnique

## Bedrock Aquifer Designation

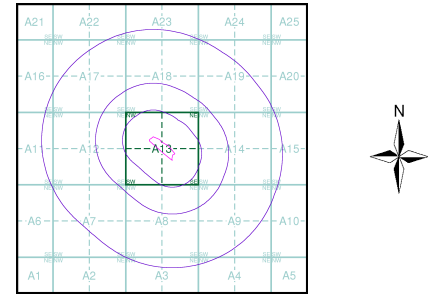
- General**
- Specified Site
  - Specified Buffer(s)
  - Bearing Reference Point
  - Slice
  - Map ID

### Agency and Hydrological

#### Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

### Site Sensitivity Context Map - Slice A



### Order Details

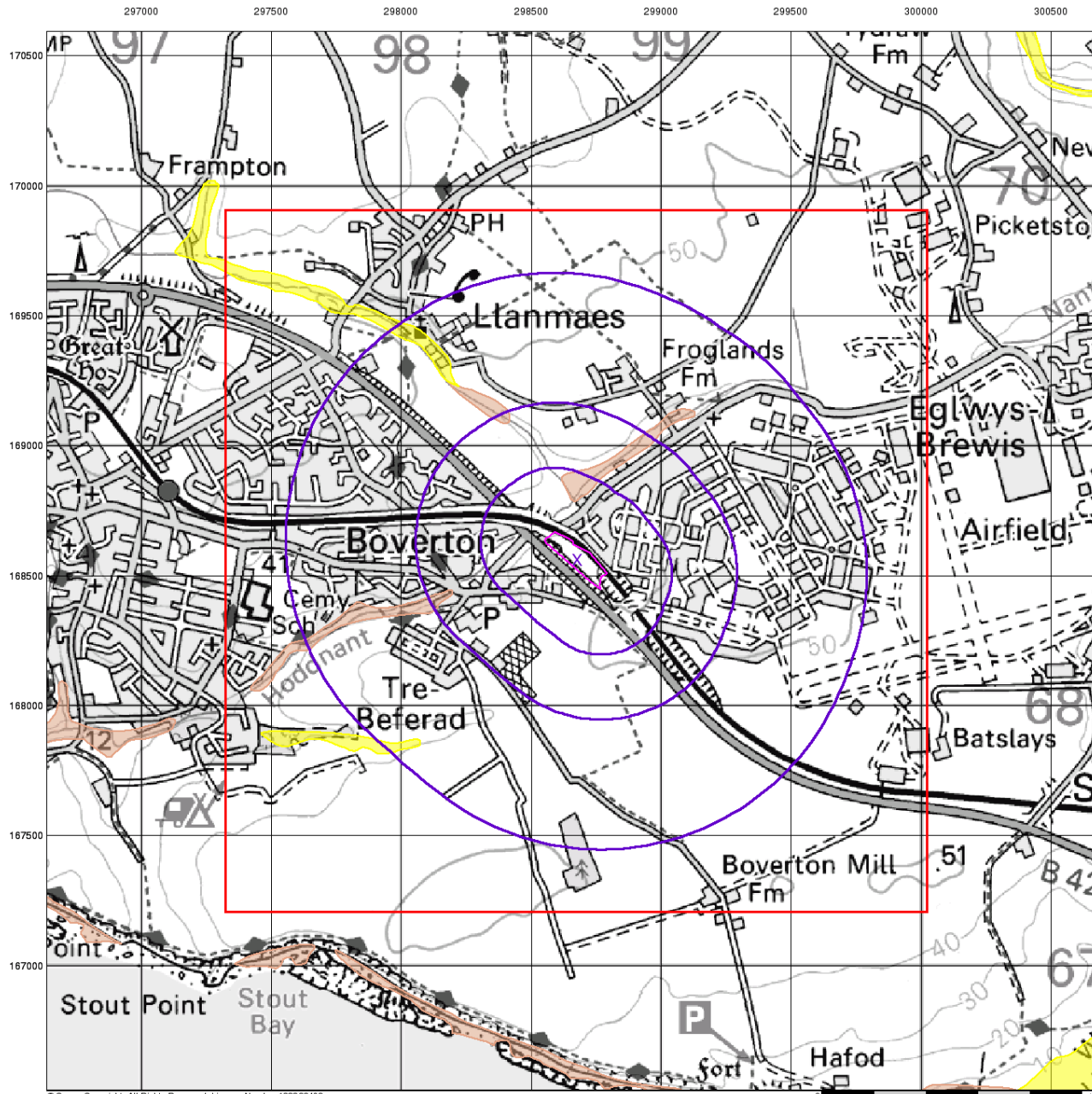
Order Number: 55615989\_1\_1  
 Customer Ref: 11344/LJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

### Site Details

Boverton, Llantwit Major

**Landmark**  
Information Group

Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk



© Crown Copyright. All Rights Reserved. License Number 100022432.

# Intégral Géotechnique

## Superficial Aquifer Designation

### General

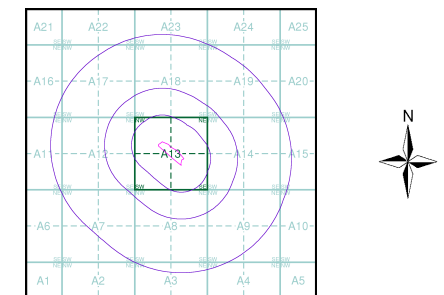
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

### Agency and Hydrological

#### Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

### Site Sensitivity Context Map - Slice A



### Order Details

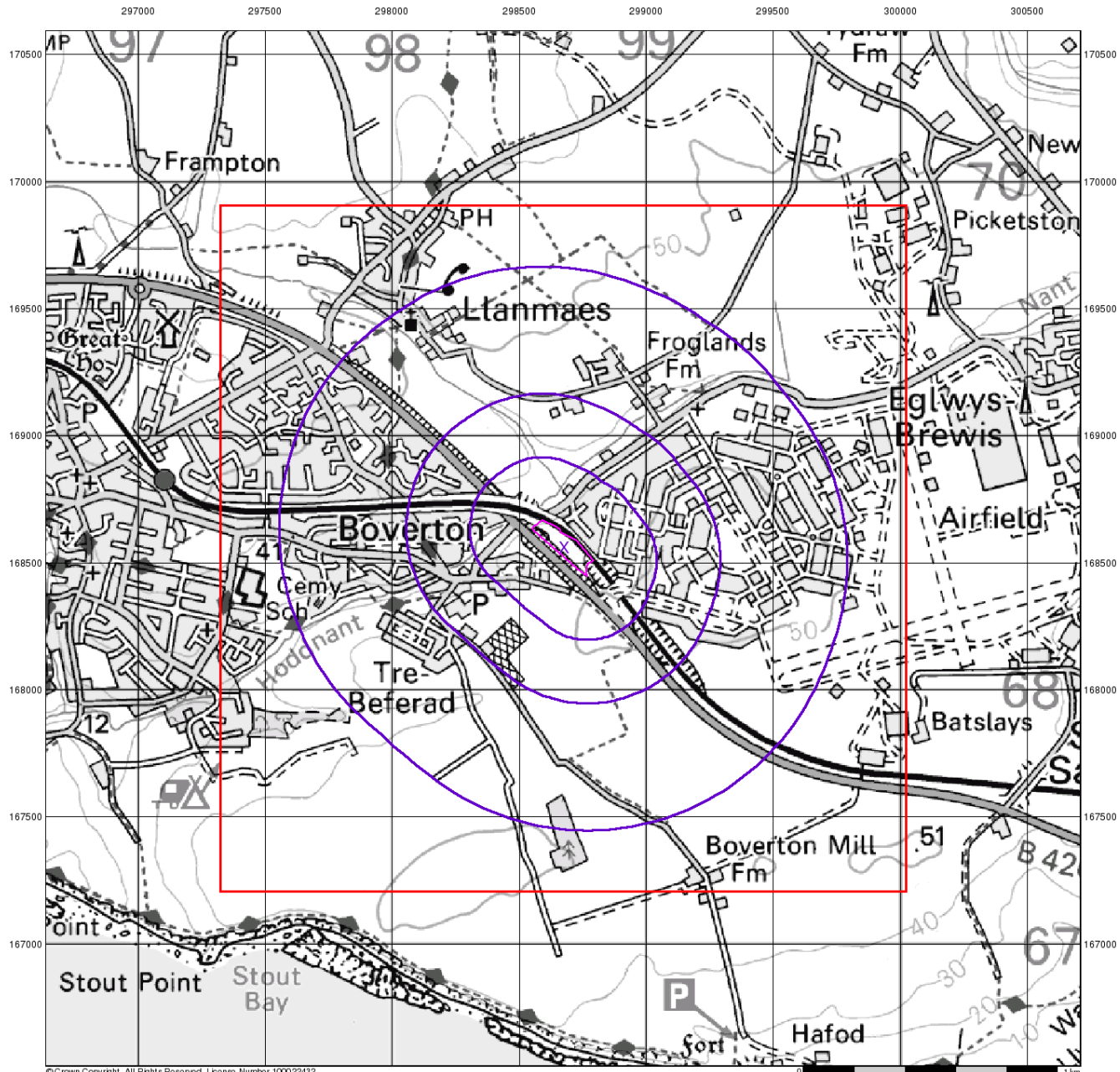
Order Number: 55615989\_1\_1  
 Customer Ref: 11344/LJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

### Site Details

Boverton, Llantwit Major



Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk



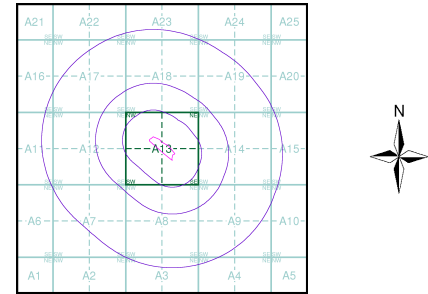
© Crown Copyright. All Rights Reserved. License Number 100022432.

# Intégral Géotechnique

## Source Protection Zones

- General**
- ◆ Specified Site
  - Specified Buffer(s)
  - ✕ Bearing Reference Point
  - Slice
  - Map ID
- Agency and Hydrological**
- Source Protection Zone I
  - Source Protection Zone II
  - Source Protection Zone III
  - Zone of Special Interest
  - Source Protection Zone Borehole

### Site Sensitivity Context Map - Slice A



### Order Details

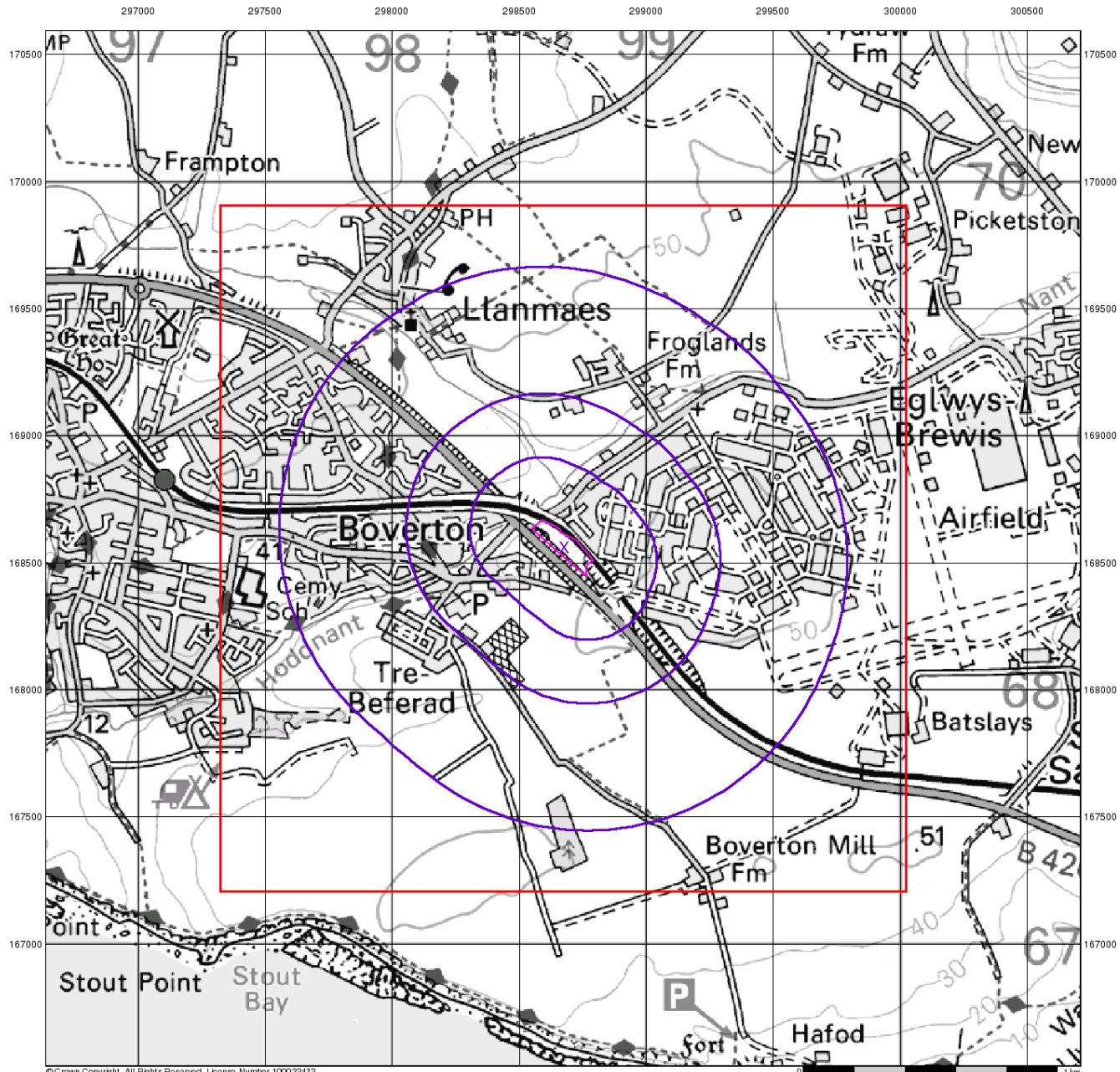
Order Number: 55615989\_1\_1  
 Customer Ref: 11344/LJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

### Site Details

Boverton, Llantwit Major

**Landmark**  
Information Group

Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk



© Crown Copyright. All Rights Reserved. License Number 100022432.

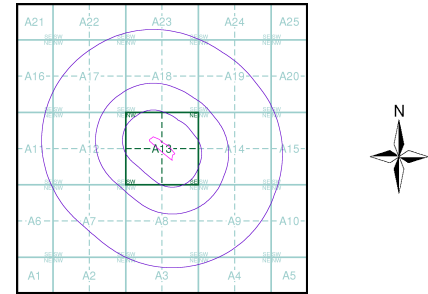
# Intégral Géotechnique

## Sensitive Land Uses

- General**
- Specified Site
  - Specified Buffer(s)
  - Bearing Reference Point
  - Slice
  - Map ID

- Sensitive Land Uses**
- Area of Adopted Green Belt
  - Area of Unadopted Green Belt
  - Area of Outstanding Natural Beauty
  - Environmentally Sensitive Area
  - Forest Park
  - Local Nature Reserve
  - Marine Nature Reserve
  - National Nature Reserve
  - National Park
  - Nitrate Sensitive Area
  - Nitrate Vulnerable Zone
  - Ramsar Site
  - Site of Special Scientific Interest
  - Special Area of Conservation
  - Special Protection Area

### Site Sensitivity Context Map - Slice A



**Order Details**

Order Number: 55615989\_1\_1  
 Customer Ref: 11344/LJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

**Site Details**  
 Boverton, Llantwit Major

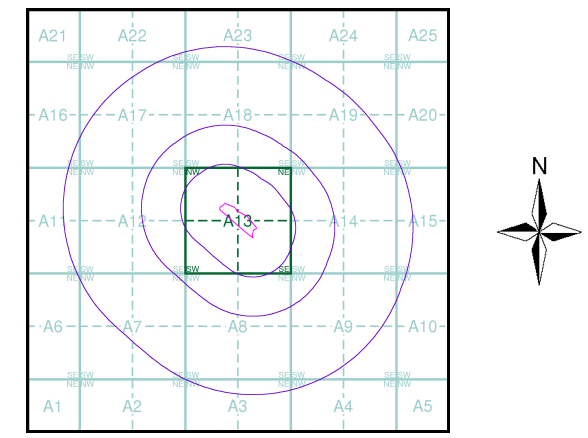
**Landmark**  
 Information Group

Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk

# Intégral Géotechnique

- General**
- Specified Site
  - Specified Buffer(s)
  - Bearing Reference Point
  - Map ID
  - Several of Type at Location
- Agency and Hydrological**
- Contaminated Land Register Entry or Notice (Location)
  - Contaminated Land Register Entry or Notice
  - Discharge Consent
  - Enforcement or Prohibition Notice
  - Integrated Pollution Control
  - Integrated Pollution Prevention Control
  - Local Authority Integrated Pollution Prevention and Control
  - Local Authority Pollution Prevention and Control
  - Local Authority Pollution Prevention and Control Enforcement
  - Pollution Incident to Controlled Waters
  - Prosecution Relating to Authorised Processes
  - Prosecution Relating to Controlled Waters
  - Registered Radioactive Substance
  - River Network or Water Feature
  - River Quality Sampling Point
  - Substantiated Pollution Incident Register
  - Water Abstraction
  - Water Industry Act Referral
- Waste**
- BGS Recorded Landfill Site (Location)
  - BGS Recorded Landfill Site
  - EA Historic Landfill (Buffered Point)
  - EA Historic Landfill (Polygon)
  - Integrated Pollution Control Registered Waste Site
  - Licensed Waste Management Facility (Landfill Boundary)
  - Licensed Waste Management Facility (Location)
  - Local Authority Recorded Landfill Site (Location)
  - Local Authority Recorded Landfill Site
  - Registered Landfill Site
  - Registered Landfill Site (Location)
  - Registered Landfill Site (Point Buffered to 100m)
  - Registered Landfill Site (Point Buffered to 250m)
  - Registered Waste Transfer Site (Location)
  - Registered Waste Transfer Site
  - Registered Waste Treatment or Disposal Site (Location)
  - Registered Waste Treatment or Disposal Site
- Hazardous Substances**
- COMAH Site
  - Explosive Site
  - NIHHS Site
  - Planning Hazardous Substance Consent
  - Planning Hazardous Substance Enforcement
- Geological**
- BGS Recorded Mineral Site
- Industrial Land Use**
- Contemporary Trade Directory Entry
  - Fuel Station Entry

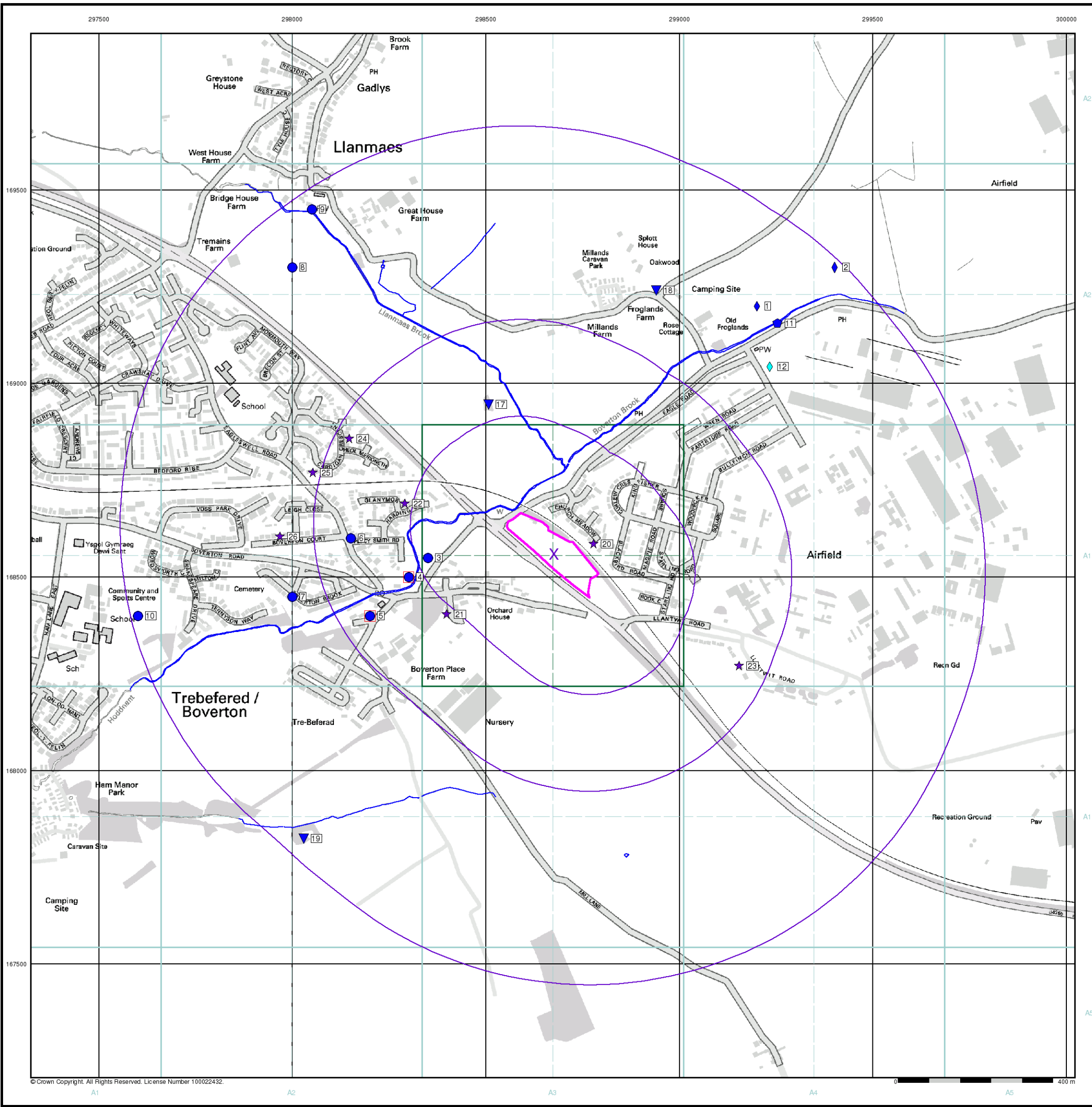
## Site Sensitivity Map - Slice A



**Order Details**

Order Number: 55615989\_1\_1  
 Customer Ref: 11344/JJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

**Site Details**  
 Boverton, Llantwit Major








© Crown Copyright. All Rights Reserved. License Number 100022432.

# Intégral Géotechnique

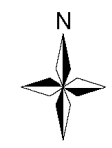
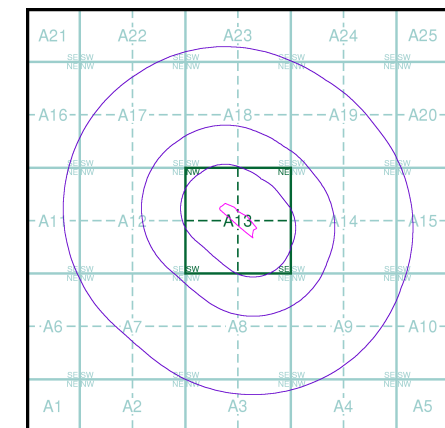
## General

-  Specified Site
-  Specified Buffer(s)
-  Bearing Reference Point

## Agency and Hydrological (Flood)

-  Extreme Flooding from Rivers or Sea without Defences (Zone 2)
-  Flooding from Rivers or Sea without Defences (Zone 3)
-  Area Benefiting from Flood Defence
-  Flood Water Storage Areas
-  Flood Defence

## Flood Map - Slice A



## Order Details

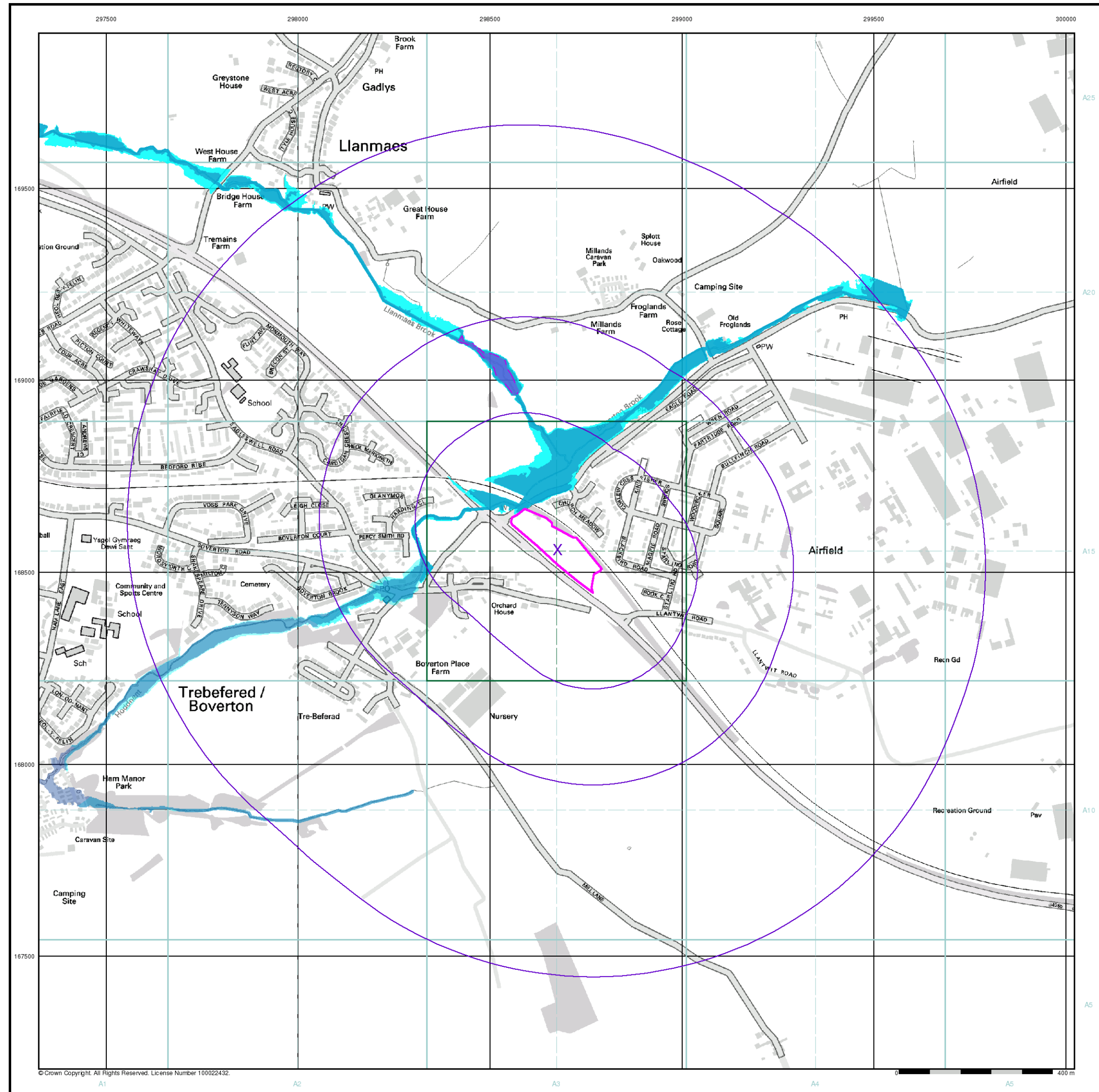
Order Number: 55615989\_1\_1  
 Customer Ref: 11344/JJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

## Site Details

Boverton, Llantwit Major



Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk



© Crown Copyright. All Rights Reserved. License Number 100022432.

### General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

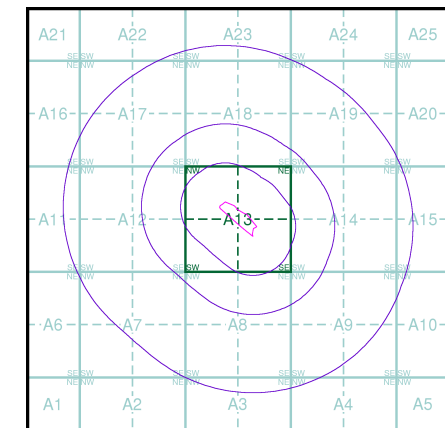
### Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of [www.envirocheck.co.uk](http://www.envirocheck.co.uk).

### Borehole Map - Slice A

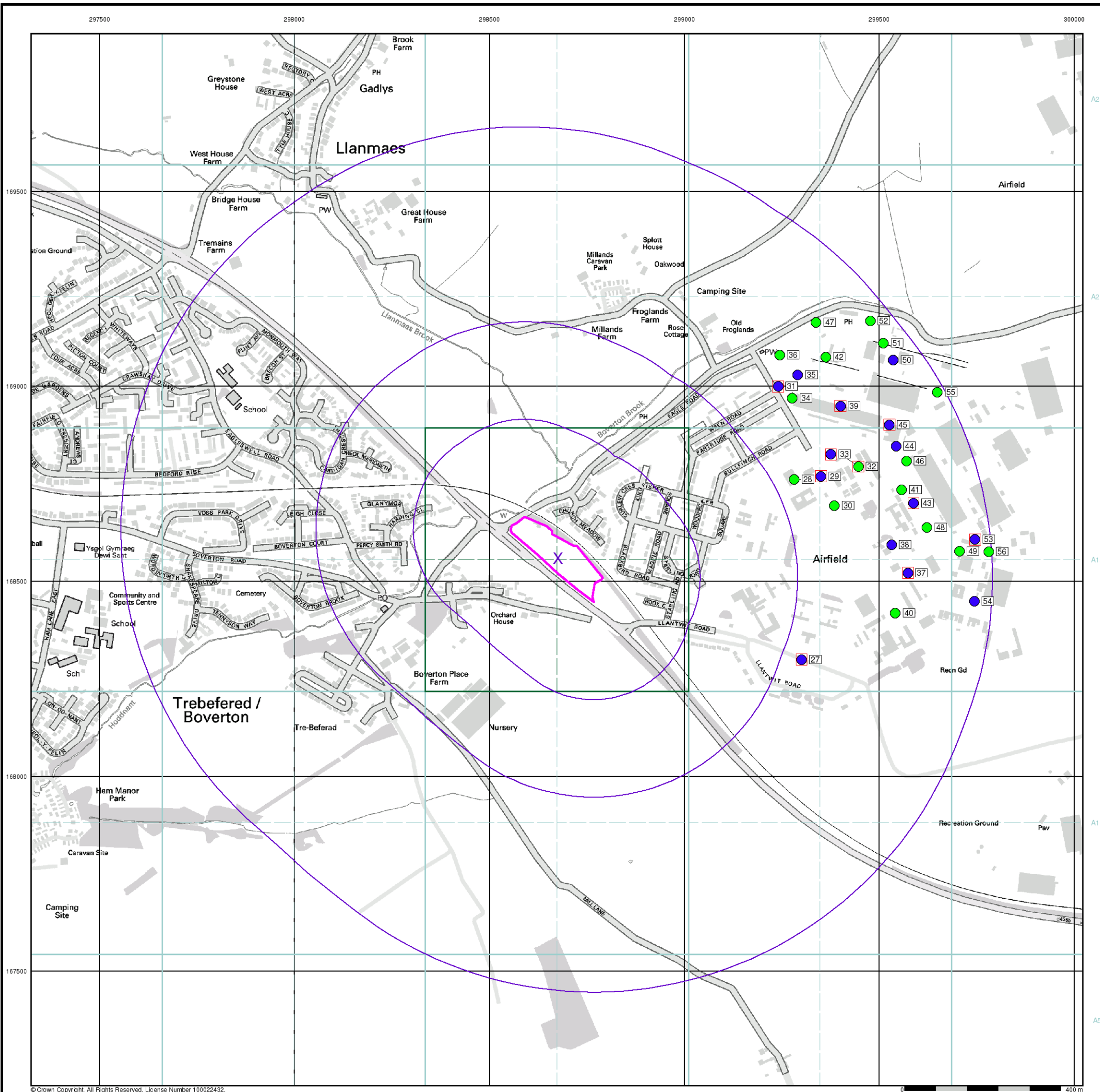


### Order Details

Order Number: 55615989\_1\_1  
 Customer Ref: 11344/JJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

### Site Details

Boverton, Llantwit Major



# Intégral Géotechnique

## General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

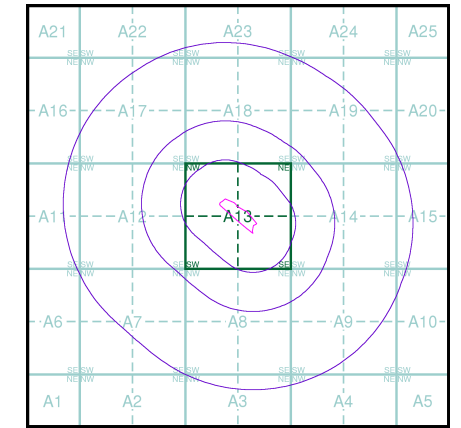
## EA Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

## Contours (height in metres)

- Standard Contour 105
- Index Contour 100
- 167.3 Spot Height
- 45.8 Air Height

## EA Detailed River Network Map - Slice A



## Order Details

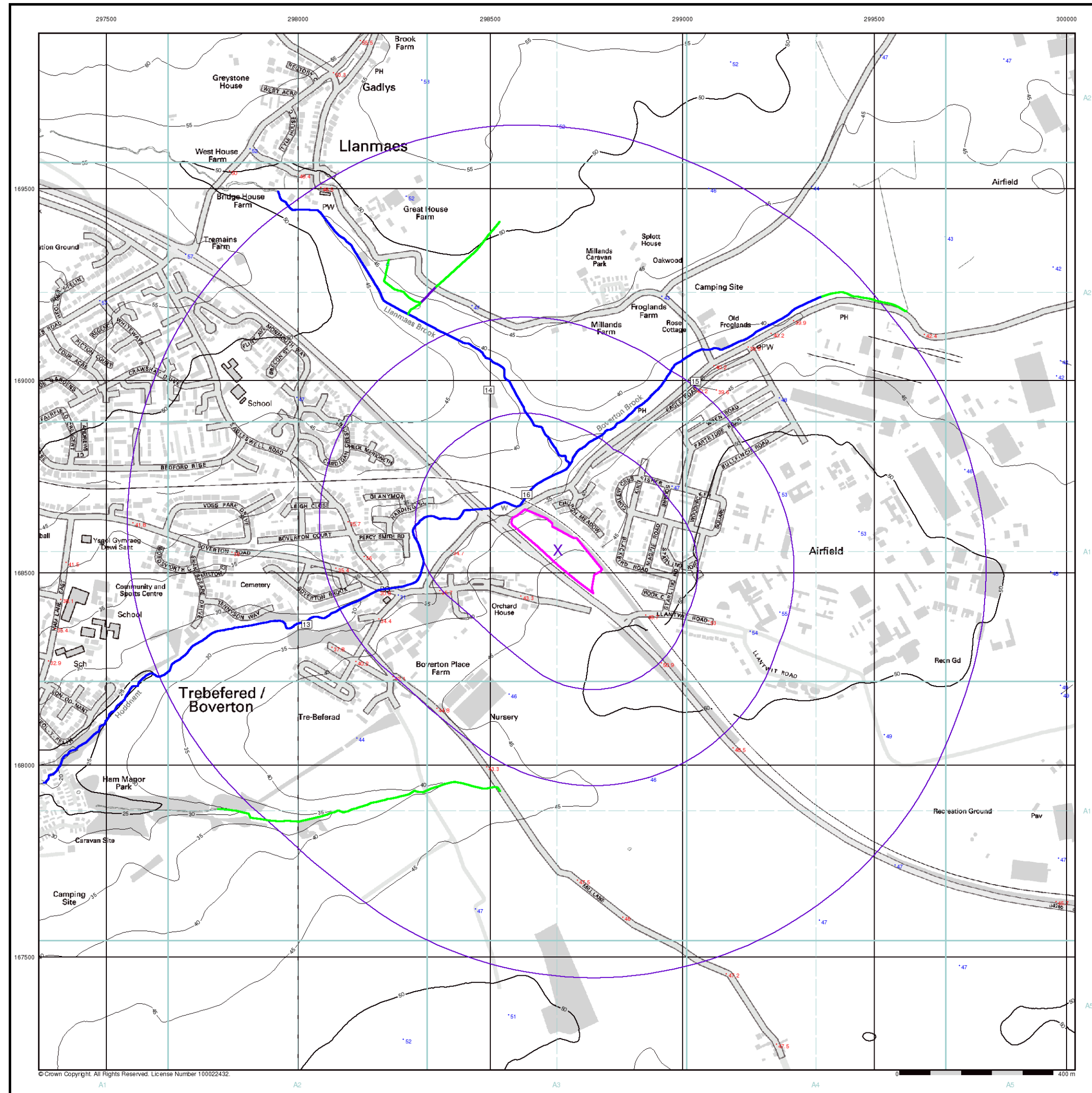
Order Number: 55615989\_1\_1  
 Customer Ref: 11344/JJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

## Site Details

Boverton, Llantwit Major



Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk



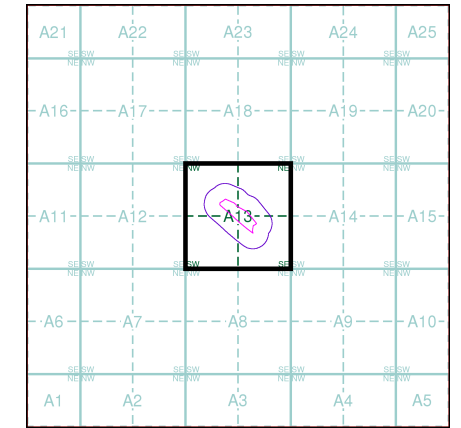
© Crown Copyright. All Rights Reserved. License Number 100022432.



# Intégral Géotechnique

- General**
- Specified Site
  - Specified Buffer(s)
  - Bearing Reference Point
  - Map ID
  - Several of Type at Location
- Agency and Hydrological**
- Contaminated Land Register Entry or Notice (Location)
  - Contaminated Land Register Entry or Notice
  - Discharge Consent
  - Enforcement or Prohibition Notice
  - Integrated Pollution Control
  - Integrated Pollution Prevention Control
  - Local Authority Integrated Pollution Prevention and Control
  - Local Authority Pollution Prevention and Control
  - Local Authority Pollution Prevention and Control Enforcement
  - Pollution Incident to Controlled Waters
  - Prosecution Relating to Authorised Processes
  - Prosecution Relating to Controlled Waters
  - Registered Radioactive Substance
  - River Network or Water Feature
  - River Quality Sampling Point
  - Substantiated Pollution Incident Register
  - Water Abstraction
  - Water Industry Act Referral
- Waste**
- BGS Recorded Landfill Site (Location)
  - BGS Recorded Landfill Site
  - EA Historic Landfill (Buffered Point)
  - EA Historic Landfill (Polygon)
  - Integrated Pollution Control Registered Waste Site
  - Licensed Waste Management Facility (Landfill Boundary)
  - Licensed Waste Management Facility (Location)
  - Local Authority Recorded Landfill Site (Location)
  - Local Authority Recorded Landfill Site
  - Registered Landfill Site
  - Registered Landfill Site (Location)
  - Registered Landfill Site (Point Buffered to 100m)
  - Registered Landfill Site (Point Buffered to 250m)
  - Registered Waste Transfer Site (Location)
  - Registered Waste Transfer Site
  - Registered Waste Treatment or Disposal Site (Location)
  - Registered Waste Treatment or Disposal Site
- Hazardous Substances**
- COMAH Site
  - Explosive Site
  - NIHHS Site
  - Planning Hazardous Substance Consent
  - Planning Hazardous Substance Enforcement
- Geological**
- BGS Recorded Mineral Site
- Industrial Land Use**
- Contemporary Trade Directory Entry
  - Fuel Station Entry

## Site Sensitivity Map - Segment A13



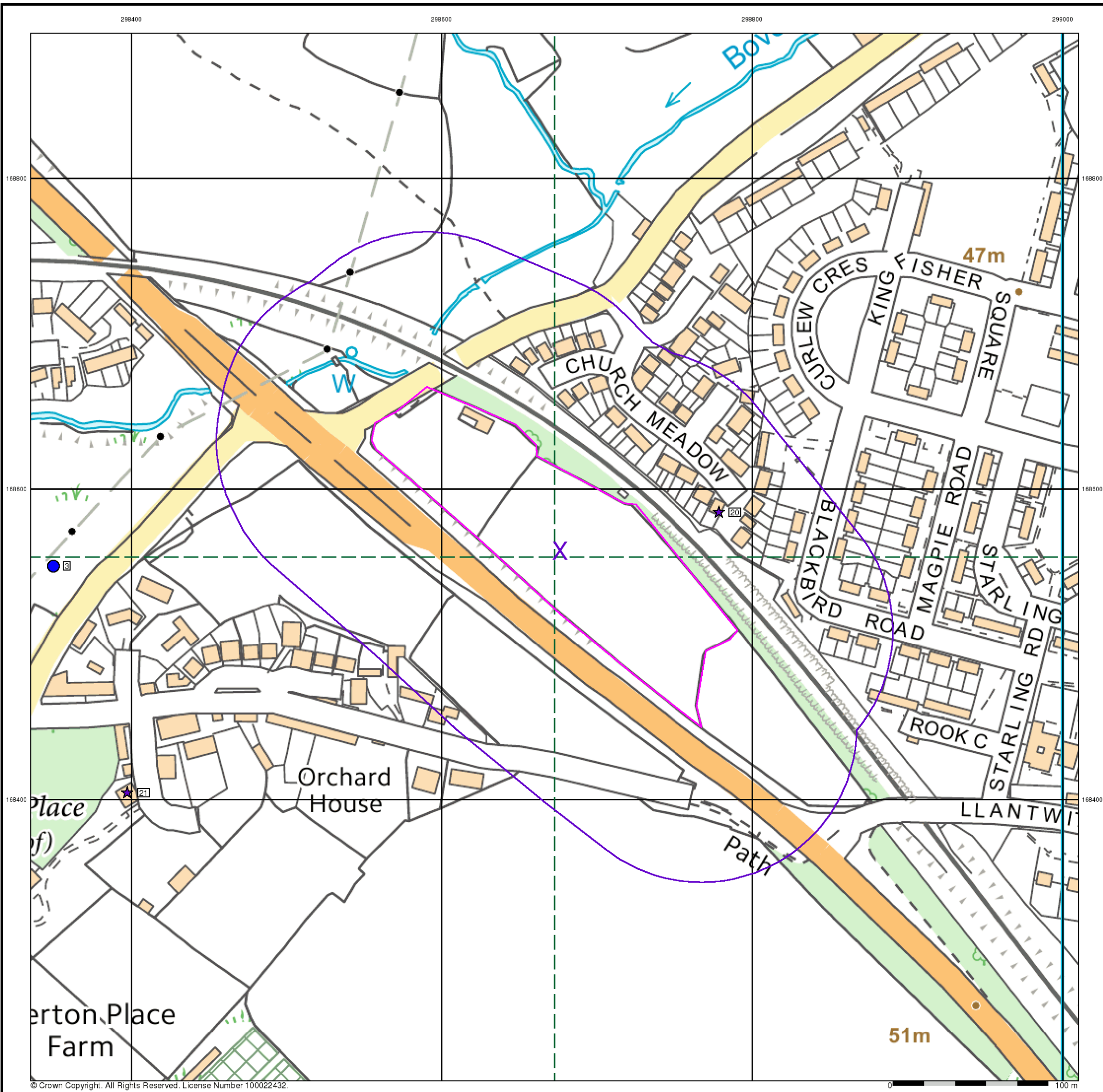
**Order Details**

Order Number: 55615989\_1\_1  
 Customer Ref: 11344/JJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84

**Site Details**  
 Boverton, Llantwit Major

**Landmark**  
 Information Group

Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk



© Crown Copyright. All Rights Reserved. License Number 100022432.

# 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
- Minor Roads
- 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
- County Borough Boundary (England)
- County Burgh Boundary (Scotland)
- 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
- Glasshouse
- Sloping Masonry
- Pylon
- Electricity Transmission Line
- Pole
- Cutting
- Embankment
- Standard Gauge Multiple Track
- 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
- Civil Parish
- BP, BS Boundary Post or Stone
- Ch Church
- CH Club House
- F E Sta Fire Engine Station
- FB Foot Bridge
- Fn Fountain
- GP Guide Post
- MP Mile Post
- MS Mile Stone
- Pol Sta Police Station
- PO Post Office
- PC Public Convenience
- PH Public House
- SB Signal Box
- Spr Spring
- TCB Telephone Call Box
- TCP Telephone Call Post
- W Well

## 1:10,000 Raster Mapping

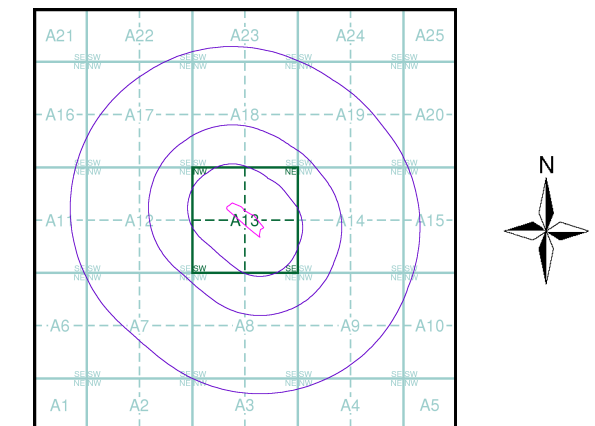
- Gravel Pit
- Rock
- Boulders
- Shingle
- Sand
- Slopes
- General detail
- Overhead detail
- Multi-track railway
- County boundary (England only)
- District, Unitary, Metropolitan, London Borough boundary
- Area of wooded vegetation
- Non-coniferous trees (scattered)
- Coniferous trees (scattered)
-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

# Intégral Géotechnique

## Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Glamorganshire	1:10,560	1885	2
Glamorganshire	1:10,560	1900	3
Glamorganshire	1:10,560	1921	4
Historical Aerial Photography Glamorganshire	1:10,560	1947	5
Glamorganshire	1:10,560	1951	6
Ordnance Survey Plan	1:10,000	1964	7
Ordnance Survey Plan	1:10,000	1969	8
Ordnance Survey Plan	1:10,000	1974 - 1975	9
Ordnance Survey Plan	1:10,000	1983 - 1984	10
Ordnance Survey Plan	1:10,000	1990	11
10K Raster Mapping	1:10,000	2006	12
VectorMap Local	1:10,000	2014	13

## Historical Map - Slice A



## Order Details

Order Number: 55615989\_1\_1  
 Customer Ref: 11344/JJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

## Site Details

Boverton, Llantwit Major



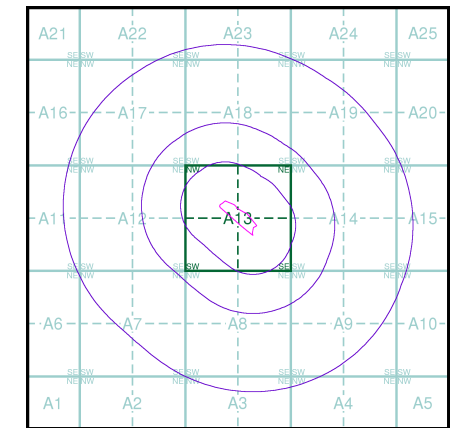
Tel: 0844 844 9952  
 Fax: 0844 844 9951  
 Web: www.envirocheck.co.uk

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)**

04500
1885
1:10,560
04900
1885
1:10,560

**Historical Map - Slice A**



**Order Details**

Order Number: 55615989\_1\_1  
 Customer Ref: 11344/JJ  
 National Grid Reference: 298680, 168560  
 Slice: A  
 Site Area (Ha): 1.84  
 Search Buffer (m): 1000

**Site Details**

Boverton, Llantwit Major

