**Bloor Homes Western** 

# Land South of Banbury Rise, Banbury

# **Site Investigation Report**

12692/FG/21/SI



CLIENT:	Bloor Homes Western
PROJECT:	Land South of Banbury Rise, Banbury
TITLE:	Site Investigation Report
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### **1.0** INTRODUCTION

#### 1.1 GENERAL

Bloor Homes Western are proposing to residential development a site at Land South of Banbury Rise, Banbury.

Intégral Géotechnique (Wales) Limited have been appointed as the Geotechnical Engineers to undertake an intrusive 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 intrusive site investigation and gives recommendations for the design of foundations, floor slabs and other geotechnical and geoenvironmental aspects of the project.

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#### **1.2 PROPOSED DEVELOPMENT**

The proposed development will comprise the construction of low-rise residential housing, emergency, public and cycle access roads, designated carparking areas and soft landscaped areas and gardens.

A concept master plan provided by Pegasus Design and referenced P20-1853 (option 1) dated 5<sup>th</sup> August 2020 details the envisaged layout of the site development.

### 1.3 SCOPE OF WORKS

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

### 1.3 SCOPE OF WORKS (CONTINUED)

The desk study comprised a review of:

- An Envirocheck Report obtained for the site
- Old Ordnance Survey maps covering the site, included within the Envirocheck Report
- A Radon Report obtained from the British Geological Survey
- Geological maps of the area provided by the British Geological Survey and the online BGS database
- The Environment Agency groundwater vulnerability map and aquifer database for the area

The desk study information 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 BS 5930:2015+A1:2020, the Code of Practice for Site Investigations, BS10175:2011+A2:2017, the code of practice for investigation of potentially contaminated sites.

The site investigation included:

- An intrusive investigation carried out on the 27<sup>th</sup> and 28<sup>th</sup> September 2021 comprising 18 No. machine excavated trial pits and 12 No. windowless sample holes
- Indicative BRE 365 compliant soil infiltration testing was also undertaken at six trial pit locations (TP1, TP2, TP3, TP10, TP12 and TP18).
- Sampling of soil/fill for laboratory chemical and physical testing

### 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, The Environment Agency and the NHBC as appropriate.

### **1.4** LIMITATIONS (CONTINUED)

"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 have been found is also evaluated in this report.

The site is located over solid geological strata that are known to contain elevated concentrations of metalliferous contaminants owing to the chemistry of the lithology. This chemical signature may also be reflected in the overlying weathered soils and topsoil.

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 changes in ground conditions may be present between exploratory hole locations, even over short distances.

# 2.0 THE SITE

#### 2.1 SITE LOCATION AND DESCRIPTION

The site is located at the western extent of Banbury Town, approximately 2km west of Banbury Town centre, at an approximate National Grid Reference of 443390, 240190, see Figure 1.

The site is irregular in shape and occupies an area of approximately 14ha. The boundaries of the site are defined by Bloor Homes Western residential development site to the north, residential housing and allotments along Dover Avenue, Thornbury Rise and Balmoral Avenue to the east and pastural and agricultural fields to the south and west. A site plan is presented in Figure 2.

The site is situated on rolling ground from an approximate elevation of 150m AOD to the north, rising some 5m in elevation to 155m AOD to the south, before dropping again to 152m AOD in the very southwest corner. Some of the site has been re-profiled for agricultural purposes. There are currently no buildings within the site boundary. The site was not in use at the time of investigation. It appeared that any crops previously present on site had been harvested.

The site has been divided into Land Parcel A and Land Parcel B.

Land Parcel A is the northernmost field of the site and has an approximate area of 7ha and an approximate elevation of 151m AOD, dipping some 3m to the northeast and rising some 1-2m to the west and south.

Land Parcel B is the southernmost field of the site and has an approximate area of 6.5ha and an approximate elevation of 156m AOD, rising to a locally topographic high of 164m AOD in the southeast corner and dropping some 2-4m to the northwest and south.

Although not situated on site, there is one main building complex centred between Land Parcels A and B to the west of the site, approximately 1.6ha in area, known as Withycombe Farm. The access road to Withycombe Farm is via a single-track lane that runs southward from the A422 Stratford Road approximately 1.5km to the north, along Land Parcel A's western boundary.

#### 2.1 SITE LOCATION AND DESCRIPTION (CONTINUED)

There are multiple footpaths that run along the site's perimeter. The majority of which stem from various access points along the site's eastern boundary and adjoining residential area. Two access points are in the northeast and southeast corners of Land Parcel A which then run westwards toward the Withycombe Farm access road. Another two access points originate in Land Parcel B from the northeast and southeast corners, running westward towards the opposite sides of the field.

There are no known active services underlying the site. The closest active service runs from the west into Withycombe Farm, beyond the site's boundary.

The sites boundaries are generally defined by post and wire fencing, hedgerows and intermittent mature and semi mature predominantly deciduous trees.

The site surface was laid to exposed soil and stubble associated with past crops. There was evidence to suggest the site had recently been drilled for an arable crop, possibly winter wheat.

No invasive plant species were identified on site, but their presence cannot be discounted, particularly in the densely vegetated areas of the peripheral areas of the site.

There was some evidence of very localised fly tipping on the extreme south-eastern corner of the site. This material included loose brick, timber and some hardened plaster.

#### 2.2 SITE OPERATIONS

No operations were active at the site during the fieldworks. There was evidence to suggest the site had recently been drilled for an arable crop, possibly winter wheat.

#### 2.3 SURROUNDING LAND USE

The surrounding land area consisted of agricultural land used for the cultivation of crops to the south and west. To the east residential land extends for over 2km with an allotment garden being placed adjacent to Land Parcel B. To the north there are groundworks being undertaken for the adjoining development, with a number of soil stockpiles being located close to the northernmost boundary of the site.

### 2.4 AVAILABLE SITE INVESTIGATION DATA

We are not aware of any third-party site investigation data available for the site.

# 2.5 CONSULTATIONS WITH REGULATORS

The regulators have not been consulted at this stage.

# 3.0 SITE HISTORY

The recent history of the site has been traced with the aid of an Envirocheck Report, a copy of which is included in Appendix B. The Envirocheck Report includes the following scaled historical maps:

Map Scale	Dates
1:2,500	1882, 1900, 1922, 1973, 1983, 1984, 1990, 1993,
1:1,250	1967, 1971, 1983, 1977-1990, 1990, 1993,
1:10,560	1887, 1900, 1923, 1938, 1948
1:10,000	1950, 1968, 1980-1983, 1992-1995, 1999, 2006, 2021

The earliest evidence of the site's history is shown on the 1882 historical maps where the site is entirely undeveloped and divided into three separate field parcels by existing fence lines and hedgerows. Withycombe Farm was present bordering the central western area of the site and appears to have an orchard on its southern side. The site and entire surrounding area within 250m were generally sparsely developed with hedgerows separating agricultural land into various field parcels. A suspected pond feature was recorded some 20m to the south of the south-western corner of the site. Withycombe Covert (a forested area) was recorded to the west of the site some 100m distant. A well was recorded to the south of the site's southern boundary approximately 170m distant. A road running east to west was recorded approximately 375m to the south. A brick and drainpipe works and associated clay pit and kilns were recorded some 500m to the south-east of the site adjacent to the existing road.

The map dated circa 1900 recorded little change on site or within the surrounding area, although a footpath was shown leading from Withycombe Farm through the northern site area and along the field boundary and a small building had been constructed within the central western area of the site where access is made from the northern field parcel into the southern field. The brick and drainpipe sites and kilns were no longer recorded 500m to the south-east. The clay pit associated with the works was labelled as an old clay pit. The road to the south some 375m to the south was labelled as Broughton Road by this date.

By 1923 a pumping house was recorded adjacent to Withycombe Covert to the west of the site. There was little change on site.

# 3.0 SITE HISTORY (CONTINUED)

The aerial photograph dated 1948 recorded some minor disturbance within the northwestern extremes of the site and around the pond feature some 20m off the site's southern boundary.

The 1955 historical map recorded no discernible change on site. A covered reservoir had been constructed to the east of the southern boundary of site some 300m distant.

By 1968, although there was little recorded change on site. The small buildings previously indicated at the site within the central western area had been demolished by this time. The land to the east bordering the site had undergone significant residential development with the construction of numerous houses and infrastructure. This residential development continued through the 1970's, whereby circa 1980 to 1983 the land to the east of the site was completely built out for residential housing. The small building on site had been demolished and removed by 1980. Sometime between 1955 and 1968, the pond feature previously recorded to the south of the site had been infilled.

The site has not changed significantly from the 1970's. Residential development to the north of the site was indicated on the map dated circa 1921.

### 4.0 SITE ENVIRONMENTAL SETTING

#### 4.1 PHYSICAL SETTING

The site is located on the western outskirts of the town of Banbury. Sor Brook flows southward approximately 750m west of the site.

The site is both flat and gently undulating in profile and generally falls from a maximum elevation of 161m AOD in the south-eastern corner of Land Parcel B to 148m AOD at the north-eastern end of Land Parcel A. The profile then falls to approximately 151m AOD to the southwestern corner of the site in Land Parcel B. The north-western corner of the site is generally lower lying relative to the site at 152m AOD.

#### 4.2 GEOLOGY

The 1:50,000 scale geological map and BGS online database of the area indicates most of the site to lie on the Marlstone Rock Formation, of Jurassic age. Which predominantly comprises of sandy, shell-fragment and ooidal ferruginous limestone interbedded with ferruginous calcareous sandstone. There are also intermittent ferruginous mudstone beds.

The 1:50,000 scale geological maps also indicate the south and south-eastern corner of Land Parcel B is crosscut by an inferred fault trending north-east to southwest. As a result of this faulting the geology of the southern end of Land Parcel B varies from the remainder of the site. The Northampton Sands Formation, the Horsehay Sand Formation, the Chipping Norton Limestone Formation and the Whitby Mudstone Formation are indicated to potentially out crop across the south-eastern area of the site, all over a relatively short lateral distance.

There are no superficial deposits recorded on the site.

No significant made ground is expected however there may be made ground locally across the site.

# 4.2 GEOLOGY (CONTINUED)

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

Tat	Table 1: Summary of Anticipated Site Geology			
Geological unit	Horizon	Description		
Recent	Topsoil/subsoil and possible localised areas of made/disturbed ground	Various materials		
Middle Jurassic	Horsehay Sands Formation	Unbedded to weakly bedded and cross-bedded, pale grey and brown to off-white, medium- to fine-grained, quartzose sand, locally cemented into calcareous or weakly ferruginous sandstone with thin dark grey mudstone and siltstone beds in places, rootlets and lignitic debris common, shells and shell debris very rare.		
Middle Jurassic	Chipping Norton Limestone Formation	Limestone, off-white to pale brown fine- to medium- grained ooidal and coated peloidal grainstone, with common fine burrows, medium- to coarse-grained shell debris and flakes of greenish grey mudstone and dark lignite and minor amounts of fine-grained sand. Thick-bedded and cross-bedded or massive, weathering to flaggy or platy. Thin shell-detrital and ooidal marl and mudstone intercalations in places.		
Middle Jurassic	Northampton Sands	Sandy, berthierine-ooidal and sideritic ironstone, greenish grey where fresh, weathering to brown limonitic sandstone, typically displaying a box-stone structure. The uppermost beds are generally more or less ferruginous sandstone. The unit includes lenses of mudstone and limestone in places.		

### 4.2 GEOLOGY (CONTINUED)

Table 1:	Summary of Antici	pated Site Geology (Continued)
Early Jurassic	Whitby Mudstone Formation	Medium and dark grey fossiliferous mudstone and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine-grained calcareous sandstone beds; dense, smooth argillaceous limestone nodules very common at some horizons; phosphatic nodules at some levels. Nodular and fossiliferous limestones occur at the base in some areas
Early Jurassic	Marlstone Rock Formation	Sandy, shell-fragmental and ooidal ferruginous limestone interbedded with ferruginous calcareous sandstone, and generally subordinate ferruginous mudstone beds. The iron content is berthierine altering to siderite.

### 4.3 RADON

Information with regard to Radon Protective Measures is provided within the Envirocheck Report and the BGS Report as presented in Appendix B. It states that the site is within an high probability area, as 10% to 30% of properties are above action level, and that therefore full radon protective measures would be necessary in the construction of new buildings within the site.

#### 4.4 MINING

The Envirocheck report indicates that the site is not in an area at risk of underground mining.

### 4.5 HYDROLOGY, HYDROGEOLOGY AND FLOOD RISK

A minor watercourse flows to the southwest of the site some 293m distance before joining the Sor Brook which flows south approximately 750m west of the site boundary. OS water Network Lines map indicate the minor watercourse to be an unnamed water feature.

The Environment Agency groundwater vulnerability map and aquifer database classifies the bedrock beneath the site under several different designations.

The whole of land parcel A and northern and western areas of Land Parcel B are classified 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 aquifers formerly classified as minor aquifers

The central southern limit of Land Parcel B is classified as Unproductive Strata. Unproductive Strata are rocks with very low permeability that have negligible significance for water supply or baseflow to rivers, lakes and wetlands.

The south-eastern corner of Land Parcel B is classified as a Principal Aquifer. Principal Aquifers are layers of rock that have high intergranular and/or fracture permeability allowing them to provide a high level of water storage. In addition to this they may support water and important baseflow to rivers on a strategic scale. This principal aquifer classification is designated where the Chipping Norton Limestone Formation is indicated to underlie the site area.

It is considered possible that the existing site drainage (possible land drains) and agricultural furrows could act as a pathway for potential surface contaminants.

There are no recorded discharge consents within 1km of the site boundary.

The Envirocheck Report states that there are 3 groundwater abstractions within 1000m of the site. All of which are approximately 566m south of the site. The water abstractions are operated by Mr N Morris and located at the 'Banbury Self Pick' for general agriculture use with direct spray irrigation.

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

Table 2: Summary of Site Hydrology					
Feature	Distance from site	Flow	Classification	Abstraction	Discharge
Unnamed water feature	Approximately 293m southwest of the site	west	Inland River	No	Sor Brook
Sor Brook	750m west of the site	South	Not known	No	Not known
Surface run- off	On site	Flows into site drainage	N/A	No	Not known
Site Drainage	On site	Not known	N/A	No	Not known

Table 3: Summary of Site Hydrogeology				
Geological Unit	Aquifer Classification	Aquifer Characteristics	Source Protection Zone	Groundwater Abstractions
Topsoil	Not classified	Likely moderate permeability with high organic content for water absorption	No	None
Marlstone Rock formation	Secondary A Aquifer	Variable permeability ferruginous sandstones and shelly limestones. Permeability likely controlled by fractures	No	None
Northampton Sands Formation	Secondary A Aquifer	Variable permeability sandy sideritic ironstone. Higher permeability in weathered/ fractures zones.	No	None
Horsehay Sand Formation	Secondary A Aquifer	Unbedded to weakly bedded and cross-bedded, pale grey and brown to off-white, medium- to fine- grained, quartzose sand, locally cemented into calcareous or weakly ferruginous sandstone with thin dark grey mudstone and siltstone beds in places Higher permeability in weathered/ fractures zones.	No	None

	Table 3: Summary of Site Hydrogeology (Continued)			
Whitby Mudstone Formation	Unproductive Strata	Low permeability medium and dark grey fossiliferous mudstone and siltstone, laminated and bituminous in part, with thin siltstone or silty mudstone beds and rare fine- grained calcareous sandstone beds.	No	None
Chipping Norton Limestone Formation	Principal Aquifer	High permeability fine to medium grained ooidal and coated peloidal grainstone. Permeability likely controlled by fractures.	No	None

The Groundwater Vulnerability map of the area indicates the Principal bedrock aquifer to have a high vulnerability. The pollutant speed is intermediate with well-connected fractures.

The Groundwater Vulnerability map of the area indicates the Secondary A bedrock aquifer to have a high vulnerability. The pollutant speed is intermediate with well-connected fractures.

The Groundwater Vulnerability map of the area indicates the Unproductive aquifer to have a low vulnerability. The pollutant speed is intermediate with well-connected fractures.

The Envirocheck report indicates that some geological units beneath the site are designated as having a soluble rock risk with the risk being quantified as significant, although problems associated with this solubility are considered unlikely. This significant risk is likely associated with the Chipping Norton Limestone Formation in the south of the site.

The Natural Resources Wales Flood Risk Map as presented within the Envirocheck Report indicates that the site is not at risk to extreme flooding from rivers or sea without defences.

The Natural Resources Wales Surface Water Flood Risk map as presented within the Envirocheck Report indicates that the site has limited potential for flooding.

The BGS Groundwater Flooding Susceptibility Map indicates the western area of the site to have potential for groundwater flooding to occur at surface. It also indicates that the eastern area has potential for groundwater flooding of property situated below ground level.

## 4.6 LANDFILL SITES

There is one recorded historical landfill recorded within 1000m of the site and located at Broughton Road, Banbury approximately 463m southeast of the site. The specified waste is registered as deposited waste including inert and industrial waste.

There is one recorded Local Authority recorded landfill site recorded within 1000m of the site. Located at Broughton Road, Banbury approximately 421m to the east. The specified waste is registered as fly tipping.

The Envirocheck report also identifies two locations of potentially infilled land. The first is located 496m to the southeast where a former, pit, quarry etc has been infilled.

The second is located 32m to the southwest where a pond was infilled. The waste type is not specified. This location corresponds with that of an historical pond identified on historical maps of the area

### 4.7 POTENTIAL CONTAMINATION

#### **Previous Uses**

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.

### 4.7 **POTENTIAL CONTAMINATION** (CONTINUED)

Table 4: Potential Contaminants				
Land Use: Agricultural use				
Material/Process	Contamination/Hazard	Evidence		
Agricultural land with localised small building located within central western area	Metals, Semi metals, PAHs, asbestos and pesticides, herbicides and fertiliser	Historical Maps		
Demolition of small isolated building within central western site area	Metals, Semi metals, PAHs, asbestos	Historical Maps		

### **Existing Uses**

The only site operation still in use are seasonal agricultural processes of cultivating and harvesting crops. No site operations were in use at the time of the fieldworks.

### Adjacent Site Uses

Table 5: Potential Contaminants: Adjacent Site Uses			
Potential Contamination Source	Boundary	Associated Contaminants and Hazards	
Residential	Northern and eastern (northern under development)	No Potential Contaminants	
Agricultural	Western and Southern	No Potential Contaminants	

### 4.8 OTHER ENVIRONMENTAL ISSUES

No environmentally sensitive land has been identified on or within 500m of the site.

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.

The Envirocheck Sensitive Land report states the site lies in a Nitrate Vulnerable Zone.

There have been no recorded prosecutions related to authorised processes on site or within 500m 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, assess, estimate, evaluate, and take appropriate action to deal with land contamination, in accordance with the procedures specified in the Environment Agency guidance Land Contamination Risk Management (LCRM) published in October 2020. This replaces the now withdrawn '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 LCRM, the term 'land contamination' is defined as:

- All land affected by contamination land that might have contamination present which may, or may or may not, meet the statutory definition of contaminated land,
- Land determined as contaminated land under Part 2A of the Environmental Protection Act 1990.

LCRM provides a tiered approach to risk assessment, comprising a preliminary risk assessment (including the development of an initial conceptual site model), a generic quantitative risk assessment and a detailed quantitative risk assessment. For each tier of risk assessment, the following steps must be followed:

- 1. Identify the hazard establish contaminant sources,
- Assess the hazard use a source-pathway-receptor linkage approach to determine if there is potential for unacceptable risk,
- Estimate the risk predict what degree of harm or pollution may result and how likely it is to occur, and
- 4. Evaluate the risk decide whether a risk is unacceptable.

LCRM also provides definitions of the following terms:

 Hazard – a property or situation that in particular circumstances could lead to harm or pollution,

### 5.1 RISK ASSESSMENT FRAMEWORK (CONTINUED)

- Risk a combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence,
- Risk assessment the formal process of identifying, assessing and evaluating the health and environmental risks that may be associated with a hazard,
- Risk management the formal process to identify, assess and determine the risks, and to select and take action to mitigate them.

The three essential elements to any risk are defined by LCRM as follows:

- A contaminant, or pollutant, that is in, on, or under the land and that has the potential to cause harm, or pollution (Source)
- A route by which a receptor is, or could be affected by a contaminant (Pathway)
- A receptor, i.e. something that could be adversely affected by a contaminant, for example a person, controlled waters, an organism, an ecosystem, or Part 2A receptors such as buildings, crops or animals (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.

Current practice during Generic Quantitative Risk Assessment of land affected by contamination is to use generic soil screening values based on the appropriate proposed end use. These usually comprise risk based Soil Guideline values (SGVs) or Generic Assessment Criteria (GACs) derived by the Environment Agency's Contaminated Land Exposure Assessment Model (CLEA). The SGVs and the supporting technical guidance were developed in order to assist in the assessment of long term risk to human health from the exposure to contaminated soils.

Revised Statutory Guidance, published in 2012, to support Part 2A of the Environmental Protection Act 1990, introduced a new four category system for classifying land under Part 2A. Category 1 includes land where the level of risk is clearly unacceptable, and Category 4 includes land where the level of risk posed is considered to be acceptably low. Under Part 2A, land would be determined as contaminated if it falls within Categories 1 or 2.

### 5.1 RISK ASSESSMENT FRAMEWORK (CONTINUED)

The revised Part 2A Statutory Guidance was accompanied by an Impact Assessment that identified a role for new 'Category 4 Screening Levels' (C4SLs) that would provide a simple test for determining when land is suitable for use and definitely not contaminated land. A Policy Companion Document including the C4SLs was published in March 2014 (England) and May 2014 (Wales).

The C4SLs have been based on the CLEA methodology and derived using the CLEA model, with modified toxicological and exposure parameters. To date, C4SLs have been released for six substances (arsenic, cadmium, chromium (VI), lead, benzo(a)pyrene and benzene).

The C4SLs have been derived on the assumption that where they exist, they will be used as generic screening criteria within generic quantitative risk assessment.

Following publication of the C4SLs, Land Quality Management (LQM), in conjunction with the Chartered Institute for Environmental Health (CIEH) released Suitable 4 Use Levels (S4ULs) in January 2015.

The S4ULs have been derived in accordance with UK legislation and using a modified version of the Environment Agency's CLEA software. As such, the S4ULs are based on the concept of minimal or tolerable risk as described in Human Health Toxicological Assessment of Contaminants in Soil (Science Report SR2, Environment Agency 2009a).

S4ULs have been derived for a wider number of substances.

In addition to the existing SGVs, C4SLs and S4ULs, Atkins ATRISK<sup>soil</sup> also provide a set of Soil Screening Values. These are currently intended to be used in conjunction with SGVs, although they intend to update these values in line with the C4SLs in due course.

We have reviewed all sets of values and intend to use the most appropriate assessment criteria as Tier 1 screening values in the first instance. Where a published S4UL is available, and considered appropriate, this will be used in the first instance.

#### 5.2 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.

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.

#### 5.3 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 S4UL/C4SL and CLEA guidance for a standard 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 S4UL/C4SL and CLEA is assumed to be suitable for the purposes of this assessment.

#### 5.4 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 Marlstone Rock Formation beds, at the southern boundary of the site.

By considering groundwater as the critical sensitive receptor for controlled waters, the groundwater/hydrogeological risk assessment will also be protective of the Sor Brook and unnamed river, both west of the site.

#### 5.5 POTENTIAL CONTAMINANT SOURCES

As identified in the desk study, since 1887 the site has been occupied by a farmhouse and outbuildings and agricultural fields. There is the possibility of localised made ground associated with the construction of the farm buildings and farm processes. There is also the potential for contamination associated with farm vehicles and machinery which may have been stored in the farm outbuildings. At this age there is the potential for asbestos containing material to be present in many of the construction materials stored and used on/ in the building fabric. Historic farming processes may have also left the undeveloped fields with residual levels of fertiliser, herbicides and pesticides.

The potential types of contaminants of concern are listed below:

- Metals, semi-metals, and inorganics within the shallow made ground/
- Polyaromatic hydrocarbons (PAH) within the shallow made ground
- Fertilisers, herbicides and pesticides within the topsoil
- Asbestos within the shallow topsoil, subsoils and any made ground

### 5.6 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
- Inhalation of vapours indoor and outdoor air
- 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.

### 5.7 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.

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

Table 6: Preliminary Conceptual Exposure Model						
Source		Decentor	Pothwov	Potentially Active		
Origin	Contaminant	Receptor	Falliway	Pathway?		
Made Ground of unknown origin and historical land uses (not anticipated to be widespread, localised areas possible) and topsoil	Metals, semi-metals, non-metals, PAHs, asbestos, fertilizers, pesticides and herbicides	Resident – human health	Dermal Contact with made ground/dust	4		
			Ingestion of soil and/or soil attached to home-grown produce	×		
			Ingestion of home-grown produce	$\checkmark$		
			Inhalation of dust	✓		
			Inhalation of vapours – indoor/outdoor	×		
	Metals, semi-metals, inorganics, PAHs and fertilizers, pesticides and herbicides	Groundwater quality	Leaching from made ground	×		
	Metals, semi-metals, inorganics, PAHs and fertilizers, pesticides and herbicides	Surface water quality	Transportation within groundwater			

# 6.0 THE SITE INVESTIGATION

#### 6.1 FIELDWORKS

A site investigation was designed in accordance with BS 5930:2015+A1:2020, the Code of Practice for Site Investigations, BS10175:2011+A2:2017, the Code of Practice for Investigation of Potentially Contaminated Sites.

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

An investigation comprising eighteen trial pits with six soil infiltration tests and twelve windowless sample holes was carried out on the 27<sup>th</sup> and 28<sup>th</sup> September 2021.

The trial pit excavations were undertaken using a JCB 3CX backhoe excavator and excavated to depths of between 1m and 3.5m below existing ground level. The trial pits were principally excavated to allow soil infiltration tests to be completed and to allow the shallow soil profile to be investigated. Near surface topsoil, subsoil and localised made ground samples were obtained for chemical and geotechnical analysis.

Indicative BRE 365 compliant soil infiltration testing was also undertaken at six trial pit locations (TP1, TP2, TP3, TP10, TP12 and TP18). Water was rapidly added to the trial pit using a tractor towed agricultural bowser and the fall in water level monitored over time. If the water dissipated rapidly enough for additional soil infiltration cycles to be completed, and there was enough water available, then repeat test cycles were completed.

Twelve windowless sample holes were drilled using a small, tracked competitor dart drilling rig to depths of between 1.0m and 4.0m below ground level.

In-situ standard penetration testing was taken at 1.0m intervals with the holes and at the sampling refusal depth. All of the windowless sample holes refused at shallow depths at the twelve locations drilled owing to the strength/density of the natural soils.

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

Strict protocols were adopted during this process to limit the cross contamination of samples.

### 6.1 FIELDWORKS (CONTINUED)

The fieldworks were supervised by a qualified Geotechnical Engineer from Intégral Géotechnique (Wales) Limited who also logged the trial pits and windowless sample holes and prepared their detailed engineering logs in accordance with the requirements of BS 5930:2015+A1:2020. The engineering logs provide descriptions of the materials encountered in accordance with BSEN ISO 14688-1 (2002) and 14689-1 (2003) for soils and rocks respectively.

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

### 6.2 FIELD OBSERVATIONS

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

Made ground was recorded local to TP12.

### 6.3 LABORATORY CHEMICAL TESTING

Representative samples of topsoil, made ground and subsoils 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:

Cadmium
Hexavalent Chromium (VI)
Lead
Nickel
Zinc
Boron
Elemental Sulphur
Total Sulphate
Water Soluble Sulphate
Monohydric Phenol
Asbestos

### 6.3 LABORATORY CHEMICAL TESTING (CONTINUED)

In addition to the above, selected near surface topsoil and subsoil samples from across the site were collected from the trial pits and analysed for bioaccessible arsenic.

The results of all the soil testing are presented in Appendices F and G.

## 6.4 LABORATORY GEOTECHNICAL TESTING

Six natural soil samples obtained from across the site were dispatched to the laboratories of Apex Testing Solutions, for analysis of moisture content, atterberg limits, particle size distribution by wet sieving, pH, and water-soluble sulphate content, in order to assess the engineering properties of the soils and to assess the required class of buried concrete.

The geotechnical test results are presented in Appendix H.

Samples of the more cohesive soils were scheduled for atterberg testing, whilst soils described as granular were generally scheduled for particle size distribution testing.

# 7.0 GROUND CONDITIONS

Detailed information regarding the shallow ground conditions was derived from the trial pits and windowless sample holes excavated and drilled across the site. The engineering logs should be read to get a detailed appraisal of the ground conditions at the site.

Geologically, the ground conditions generally comprise a veneer/mantle of topsoil over variably weathered natural solid strata of differing geological units. Localised made ground was encountered only local to TP12.

No superficial drift deposits have been recorded on site. This is commensurate with the geological maps of the area.

#### 7.1 TOPSOIL

Topsoil was recorded at each trial pit and windowless sample location and ranged in thickness between 0.15m and 0.5m. The topsoil varied in compositional constituents across the site.

Across Land Parcel A the topsoil generally comprised of a loose orange brown slightly silty gravelly organic rich sand, with some local areas of soft brown silty sandy gravelly organic rich clay within the central area. The gravels across the site consisted of fine to coarse angular and sub-angular ferruginous limestones and sandstones.

Across Land Parcel B the eastern and southern areas of topsoil consisted of soft brown silty slightly sandy slightly gravelly organic rich clay. The northern and western areas consisted of loose brown silty gravelly sands. The gravels across Land Parcel B generally consisted of fine to coarse sub-angular and sub-rounded ferruginous sandstone, crystalline ferruginous limestone and ferruginous mudstone.

#### 7.2 MADE GROUND

The made ground encountered at the site was limited to local areas where suspected reprofiling of the fields was observed. All made ground was encountered within the southern area of Land Parcel B within one trial pit. Trial Pit TP12 was situated within a locally low topography area, where the made ground extended from 0.3m to 1.9m below ground.

The made ground was described as a medium dense, brown, slightly silty slightly gravelly sand. The gravel was fine to course sub-angular sandstone, limestone with a rare anthropogenic component of brick and ash.

### 7.3 NATURAL SOILS AND BEDROCK

The weathered bedrock across Land Parcel A was predominantly granular with small, localised pockets of cohesive material. The weathered bedrock and consequent natural regolith were typically reflective of the underlying bedrock geology of the Marlstone Rock Formation.

Weathered bedrock was encountered at various depths within Land Parcel A. The weathered zone of bedrock was characterised by granular material appearing as cobbles and boulders occurring at depths ranging from 0.3m BGL to 1.8m BGL. Overlying these cobbles and boulders were granular materials with one location of cohesive material and one location of no regolith where the topsoil overlay the weathered bedrock in succession.

Locally to WS6, TP08 and TP09 the weathered bedrock was overlain by granular material predominantly composed of gravel. The gravel was fine to coarse blocky, sub-angular ferruginous sandstones characteristic of the underlying weathered bedrock.

Locally to WS2, WS3, WS4, TP01, TP04 and TP05 the weathered bedrock consisted of cobbles and boulders of blocky, angular and sub-angular ferruginous sandstone and limestone overlain by sand.

Localised horizons of clay were apparent throughout Land Parcel A and noted in WS7 and TP06. Despite the cohesive nature, gravels of sub-angular ferruginous material was still reflective of the Marlstone Rock Formation below.

The ground conditions across Land Parcel B differed to those in Land Parcel A, this being reflective of the multiple different lithologies beneath the existing topsoil deposits.

Trial Pit TP10 showed thinly bedded and fissile fossiliferous ferruginous interbedded mudstone and limestone. This weathered upwards to a stiff fissured cohesive material. At 1.6m BGL occasional lenses of sand were also seen. Similar descriptions were seen at TP11, TP14, and TP15 analogous with the Blue Lias Whitby Mudstone Formation. However, no specific weathered bedrock depths were encountered at these locations with the clay deposits extending to over 2.6m BGL.

The soils in TP12 were granular in nature and described as sand which graded into a poorly cemented sandstone below 3m BGL. This lithology is indicative of the Horshay Sands Formation.

### 7.3 NATURAL SOILS AND BEDROCK (CONTINUED)

At TP13 and TP16 the ground conditions were reflective of the Marlstone Rock Formation as coarse gravel and cobbles characterised by ferruginous sandstones and limestones were recorded within the pits.

Deposits of ferruginous sand with frequent gravels and cobbles of weak ferruginous sandstone were recorded within the western side of Land Parcel B. These iron rich sand deposits were representative of the Northampton Sands Formation.

It is important to note the variability in ground conditions and lithology in the southern area of the site which is reflective of the variable geology in this location.

Generally the natural soils and rocks were competent and either described as firm, firm to stiff and stiff or medium dense and dense, if granular.

Locally to WS04, WS07, WS08 and WS12 the weathered soil profile demonstrated some localised variation and softening/loosening which was reflected in the uncorrected N values recorded in the windowless sample holes. Uncorrected N values at these exploratory points ranged between 3 and 8 at 1.0m and 2.0m depth and generally coincided with a thickening of the weathered soils and the soils noted as being locally wet. All of the windowless sample holes refused on competent materials.

The geotechnical analysis undertaken on samples obtained on site indicated that the granular soils comprised a mixture of cobbles and boulders with gravel and some sand and fines.

The natural cohesive soils displayed a variable plasticity and consequential shrinkage potential which was a consequence of the underlying geology. Modified plasticity results on site for the near surface cohesive soils ranged between 16.8% and 52% indicating the soils to be of low and high shrinkage potential.

The granular soils would be considered non plastic.

### 7.4 GROUNDWATER

Groundwater was not recorded in any of the trial pit excavations or windowless sample holes. However, the soils were noted as wet and softened in WS07, WS08 and WS12.

#### 7.4 **GROUNDWATER** (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.

### 7.5 SOIL INFILTRATION TESTS

Soil infiltration tests were undertaken in trial pits TP1, TP2, TP3, TP10, TP12 and TP18.

The trial pits were excavated whereby they extended into the natural soils and rocks and water was then rapidly pumped into the trial pit excavation.

The results of the soil infiltration tests are variable and dependent on the nature of the underlying soils.

The results are summarised below.

Table 7 – Soil Infiltration Test Results				
Trial Pit Location	Soil Conditions	Calculated Infiltration rate (m/s)		
TP01	Granular soils - Sand, cobbles and boulders with mudstone at depth	7.8 x 10 <sup>-06</sup> - Result extrapolated		
TP02	Granular soils - Cobbles and boulders	2.5 x 10 <sup>-04</sup> , 1.5 x 10 <sup>-04</sup> , 1.3 x 10 <sup>-04</sup>		
TP03	Granular soils – Sand, gravel and cobbles	2.2 x 10 <sup>-04</sup> , 1.6 x 10 <sup>-04</sup> , 1.5 x 10 <sup>-04</sup>		
TP10	Cohesive soils – clay with mudstone and limestone at depth	Negligible infiltration		
TP12	Granular soils – silty, slightly gravelly sand	5.3 x 10 <sup>-06</sup> – Result extrapolated		
TP18	Rock – jointed limestone	2.6 x 10 <sup>-04</sup> , 2.2 x 10 <sup>-04</sup> , 2.4 x 10 <sup>-04</sup>		

It should be noted that this initial testing should only be regarded as indicative. 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.

Note that the percolation tests results are location and depth specific.

## 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 the proposed residential end use.

#### 8.2 SOIL CONTAMINATION

The Suitable 4 Use Levels (S4ULs) derived by LQM have been adopted as critical concentrations against which soil contaminant concentrations can be compared. In the absence of additional published S4ULs for lead and cyanide, Category 4 Screening Levels (C4SLs) published by DEFRA and Soil Screening Values (SSVs) derived by Atkins ATRISK<sup>soil</sup> for a residential with home grown produce end use has been adopted.

Since the results of the testing indicate total organic carbon content (TOC) in the range of 0.9% to 2.6%, the results have been compared to the respective guidelines, where applicable, for 1.0% soil organic matter content (SOM).

The soil test results for the topsoil, localised made ground and subsoils have been summarised and are shown in Appendix I.

#### 8.2.1 Topsoil

The results of the laboratory testing indicate that most of the analysed chemical elements or compounds are present at concentrations below the appropriate thresholds. However, the initial screening indicates exceedances of arsenic, beryllium and vanadium.

Arsenic was recorded at elevated concentrations in samples of topsoil analysed from TP03 at 0.1m, TP05 at 0.2m, TP10 at 0.1m and TP18 at 0.1m depth. The recorded concentrations of 110mg/kg, 110mg/kg, 87mg/kg and 120mg/kg exceed their respective S4UL screening value of 37mg/kg based on a residential with homegrown produce end use.

### 8.2 SOIL CONTAMINATION (CONTINUED)

Elevated concentrations of beryllium were recorded in samples of topsoil analysed from TP03 at 0.1m, TP05 at 0.2m, TP10 at 0.1m and TP18 at 0.1m depth. Concentrations were recorded at 5.0mg/kg, 5.0mg/kg, 2.6mg/kg and 5.1mg/kg from their respective samples which exceed their S4UL screening values of 1.7mg/kg based on a site end use of residential with homegrown produce.

Elevated concentrations of vanadium were recorded in topsoil samples analysed from TP03 at 0.1m, TP05 at 0.2m and TP18 at 0.1m depth. Concentrations were recorded at 510mg/kg, 510mg/kg and 490mg/kg respective to their sample locations. These values exceed their S4UL screening values of 410mg/kg based on residential with homegrown produce end use.

### 8.2.2 Made Ground (Local to TP12)

A single and isolated sample of made ground was obtained from TP12 at 0.6m depth. A single elevated arsenic concentration was recorded from this sample with the concentration of 53mg/kg exceeding the published S4UL value of 37mg/kg.

### 8.2.3 Natural Soils

Laboratory testing within the natural soils situated immediately beneath the topsoil at varied depths and showed that most of the analysed chemical elements or compounds are present at concentrations below the appropriate threshold values. However, exceptions are present as the initial screening shows exceedances of arsenic, beryllium, vanadium and one localised exceedance of nickel.

Arsenic was recorded at elevated concentrations in samples of natural soils analysed from TP01 at 0.5m, TP03 at 0.4m, TP4 at 0.5m, TP6 at 0.5m and TP11 at 0.2m depth. The recorded concentrations of 83mg/kg, 45mg/kg, 83mg/kg, 210mg/kg and 63mg/kg exceed their respective S4UL screening value of 37mg/kg based on a residential with homegrown produce end use.

Elevated concentrations of beryllium were recorded in samples of natural soil analysed from TP01 at 0.5m, TP03 at 0.4m, TP4 at 0.5m, TP6 at 0.5m and TP11 at 0.2m depth. Concentrations were recorded at 5.1mg/kg, 4.9mg/kg, 4.9mg/kg 4.0mg/kg and 2.1mg/kg from their respective samples which exceed their S4UL screening values of 1.7mg/kg based on a site end use of residential with homegrown produce.
#### 8.2 SOIL CONTAMINATION (CONTINUED)

Elevated concentrations of vanadium were recorded in natural soil samples analysed from TP01 at 0.5m, TP03 at 0.4m and TP04 at 0.5m depth. Concentrations were recorded at 550mg/kg, 550mg/kg and 510mg/kg respective to their sample locations. These values exceed their S4UL screening values of 410mg/kg based on residential with homegrown produce end use.

One localised elevation of nickel was recorded in the natural soil sample analysed from TP01 at 0.5m depth. The concentration was recorded as 140mg/kg which exceeded its S4UL screening value of 130mg/kg based on a site end use of residential with homegrown produce.

It is strongly evident that the elevated concentrations of determinants in the topsoil mirror those of the underlying natural soils, with the concentrations of arsenic, beryllium and vanadium in the topsoil seemingly derived from the underlying natural soils.

### 8.3 ARSENIC BIOACCESSIBILITY TESTING

Elevated concentrations of arsenic were recorded in both the topsoil and natural sub-soils beneath the site.

It is probable that these elevated arsenic concentrations represent the general background concentrations of arsenic within the soils of the Banbury area. The Banbury area is known for generally elevated background metalliferous contaminants in soils associated with underlying geology of the ferruginous Jurassic strata, particularly the Marlstone Rock Formation and the Northampton Sands Formation.

At this stage, in order to further assess the risk posed to future residential end users from the elevated concentrations of arsenic on the site, further laboratory testing comprising bio-available/bio-accessible arsenic testing has been undertaken on six shallow soil samples of topsoil and subsoil.

Analysis for beryllium, vanadium and nickel could be proposed in the future.

The bioavailability/bioaccessibility test simulates the effect of contaminated soil on the human digestive system and determines the percentage of arsenic within the sample that is in a form that is available for uptake into the human body.

#### 8.3 ARSENIC BIOACCESSIBILITY TESTING (CONTINUED)

If the bioaccessibility demonstrates that the available percentage of arsenic available for uptake in the human body is at concentrations such that there is no detriment to human health, then no remediation will be required on site with regards to arsenic.

The S4UL value for arsenic of 37mg/kg, derived from the CLEA v.1.071 model, assumes that 100% of the total arsenic concentration is in a form that is readily available for uptake into the human body via ingestion.

Therefore, bioaccessibility testing has been undertaken on four topsoil and two subsoil samples obtained from TP4, TP6, TP8, TP13, TP15 and TP17 across the site. The test simulates the effect of the stomach and the intestine on the soil and can determine the percentage of the total arsenic concentration that is readily available via ingestion.

A copy of the bioaccessibility testing results are enclosed in Appendix J and summarised below.

Table 8: Summary of Bioaccessible Results						
Sample	Total Arsenic Concentration (mg/kg)	Bioaccessible Fraction (%)				
TP4 at 0.05m (Topsoil)	120	4.2				
TP6 at 0.1m (Topsoil)	120	5.5				
TP8 at 0.1m (Topsoil)	290	2.5				
TP13 at 0.1m (Topsoil)	200	4.3				
TP15 at 0.5m (Subsoil)	92	7.1				
TP17 at 0.5m (Subsoil)	120	4.0				

A revised soil guideline value for arsenic has been derived using the CLEA v1.071 model, but for a revised bioaccessible fraction of 7.1% (assuming the worst case). A copy of the model settings and results are presented in Appendix J.

The results indicate a revised guideline value for arsenic of 263mg/kg.

### 8.3 ARSENIC BIOACCESSIBILITY TESTING (CONTINUED)

A single elevated arsenic concentration above the revised guideline concentration for arsenic was recorded from the topsoil at TP8 at 0.1m depth. The recorded concentration of 290mg/kg exceeded the revised guideline value of 263mg/kg.

Separate assessments could be required for beryllium, vanadium and nickel, although the clear model for beryllium assumes 100% of beryllium is absorbed via inhalation.

### 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).

	Tab	ole 9: Revise	d Conceptual Ex	posure Mo	del	
S	ource Contaminant	Receptor	Pathway	Preliminary Active Pathway? (see Sect. 5.8)	Relevant Pollutant Linkage	Justification/ Mitigation
Topsoil, subsoil and localised made	opsoil,Metals, semi- metals, non- humanResident – humancalisedmetals, PAHs, and asbestos ound to P12health	Dermal Contact with topsoil/made ground and natural soils/dust	~	$\checkmark$	Elevated concentrations of arsenic, beryllium, vanadium in the	
ground to TP12			Ingestion of soil and/or soil attached to home-grown produce	~	~	topsoil and natural soils plus single elevated nickel in the natural soils and a single
			Ingestion of home- grown produce	$\checkmark$	$\checkmark$	elevated arsenic concentration in
			Inhalation of dust	~	$\checkmark$	the made ground – risk assess.
			Inhalation of vapours – indoor/outdoor	~	Х	No sufficiently volatile contaminants identified.
	Metals, semi- metals, inorganics and PAHs	Groundwater quality	Leaching from made ground	~	X	Elevated concentrations of determinants thought to be representative of background concentrations in the natural soils, thus leachate generated will be within background levels

### 9.0 REVISED CONCEPTUAL EXPOSURE MODEL (CONTINUED)

Table 9: Revised Conceptual Exposure Model							
S Origin	ource Contaminant	Receptor	Pathway	Preliminary Active Pathway? (see Sect. 5.8)	Relevant Pollutant Linkage	Justification/ Mitigation	
Topsoil, subsoil and localised made ground to TP12	Metals, semi- metals, inorganics, PAHs and asbestos (topsoil and made ground)	Surface water quality	Transportation within groundwater		X	Elevated concentrations of determinants thought to be representative of background concentrations, thus leachate generated will be within background levels in the natural soils and thus the transport in groundwater of any naturally occurring contaminants will have a negligible	
						water quality.	

### 9.0 REVISED CONCEPTUAL EXPOSURE MODEL (CONTINUED)

Table 9: Revised Conceptual Exposure Model							
Source		Receptor	Pathway	Preliminary Active	Relevant Pollutant	Justification/ Mitigation	
Origin	Contaminant		,	Pathway?		0	
Made Ground	Metals, semi-	Building	Direct contact	~	$\checkmark$	Building	
of unknown	metals, non-	Materials				materials will	
origin and	metals, PAHs,	Durability				be in contact	
natural ground	pH and sulphates					with localised	
						made ground	
						and natural	
						soils – risk	
						assess	
Ground Gas –	Methane, carbon	Human health	Accumulation of	$\checkmark$	$\checkmark$	No significant	
organic, gas	dioxide		gases in			potential gas	
producing			confined spaces,			producing	
materials			and/or migration			materials	
			off site, leading			present on	
			to asphyxiation,			site. Potential	
			or risk of			off-site	
			explosion			sources of	
						ground gases	
						in the form of	
						historical	
						infilled ground	
						identified	
						within	
						influencing	
						distance of the	
						site – risk	
						assessment	
						required	

### **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", e.g. 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 ecosystem 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

The site investigation has revealed a potential risk to site end users from contact with arsenic, vanadium, beryllium and nickel within the topsoil and natural soils and rocks. This contamination will pose a risk to human health through exposure pathways including skin contact, ingestion of soil particles and the inhalation of dust particles.

The results of the contamination testing indicate all contaminant levels are below their respective guideline concentrations with the exception of arsenic, vanadium, beryllium and nickel. These determinants were elevated in both the topsoil and underlying solid geology across the site, which comprised the Marlstone Rock Formation, and to a lesser extent the Northampton Sands Formation, Horsehay Sand Formation, Whitby Mudstone Formation and Chipping Norton Limestone Formation.

With regards to the elevated determinants concentrations which exceed the published guideline values, the general approach would be to advise interventionist remedial work to remove the link between source (existing topsoil and subsoils) and the receptor (site end users). For mildly contaminated sites this would involve the removal of a significant thickness of contaminated soils and its replacement by a clean cover system (imported topsoil and subsoils) to break the link between contaminants and site end users.

It should be noted, however, that there was no evidence of any contaminative uses or anthropogenic practices that relate to the use of the site both present or in the historical context that would explain the elevated concentrations of arsenic, beryllium, vanadium and nickel. Made ground was locally present within TP12, but this single sample revealed a slightly elevated concentration of arsenic, again likely derived from reworked natural soils.

It is well documented that certain geological strata are naturally enriched in metals and metalloids often including, arsenic, vanadium, beryllium, nickel and often lead. The site lies in an area documented to have high levels of metal and metalloid bearing minerals which can degrade and weather producing high concentrations of arsenic, vanadium etc which become incorporated into surface soils. This is prevalent at this site and the theory is strongly reinforced by the fact that the concentrations of determinants in the natural soils and rocks mirror those in the overlying topsoil deposits, and to a lesser extent the localised made ground.

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

Reference to the publication "The solid Phase Distribution and Bioaccessibility of As, Cr and Ni in the Natural Ironstone Soils in the UK" – BGS NERC reveal ambient arsenic levels in the North Oxfordshire area to a range from 20 to 400mg/kg. The BGS publication also introduces the notion of mitigating the risk of exposure to heavy metals via ingestion of soil and plants by revising the total arsenic concentrations in the soil and substituting the bioaccessible fraction which is defined as the fraction that can be absorbed by the human intestinal tract.

Bioaccessible arsenic testing has been completed for the site, which has indicated that typically the arsenic is in a form that it is not readily available for absorption by the human gut.

It is therefore considered that the other naturally elevated determinants including beryllium, vanadium and nickel will have limited effect on end users at the site.

Prior to acquisition of the site, it is advised that a discussion is initiated with the Environmental Health Officer at the Local Authority in order to clarify their approach to naturally occurring metalliferous contaminants of this nature.

If it is not accepted that the existing topsoil can be re-used on site within proposed garden and landscaped areas, this material would have to be disposed of off-site.

There would then be a requirement to introduce clean imported capping soils into all garden and landscaped areas, with the thickness of this capping layer likely to be in the order of 600mm thick. This would sever the link between site end users and the naturally occurring elevated concentrations of arsenic, beryllium, vanadium and nickel.

#### 10.3.3 Construction Operatives and Ground Workers

With future site development works involving the excavation and removal of soils on site, there would be a risk to workers from contaminants in the soils. 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;

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

- 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.

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

As discussed previously, the contaminants identified on site will be naturally occurring and thus likely to pose little risk to proposed vegetation. A suitable growth medium will however, be required in proposed landscaped and garden areas. The source of this growing medium will depend on the discussions with the Local Authority and will either take the form of existing topsoil, or clean imported materials.

#### 10.5 GROUNDWATER RISK ASSESSMENT

Elevated concentrations of naturally occurring determinants including arsenic, beryllium, vanadium and nickel were identified in the topsoil and natural soils and rock on site. These determinants are naturally occurring and associated with the underlying geology.

Any leachate derived from these naturally elevated metals and semi metals will be within the levels of background concentrations and thus will have limited impact on the existing ground water regime and nearby surface water features.

Thus, the risk to controlled waters from these naturally occurring metals and semi metals will be low.

#### 10.6 GROUND GAS RISK ASSESSMENT

No significant made ground has been recorded on site that has the potential to generate ground gases. The natural geology, would also not generate significant concentrations of landfill type ground gases.

There are no active or historical landfill sites within 250m of the site.

It should be noted, however, that the Envirocheck report records the presence of infilled ground within close proximity to the site. The nearest such feature is an infilled pond recorded some 31m to the south of the site.

The risk of ground gases migrating from this potential off-site source of ground gases should be assessed by means of ground gas standpipes being installed on site and a period of ground gas monitoring and risk assessment being completed.

Full Radon protective measures will be required in all new buildings to be constructed 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 are presented in Appendix H and I

#### Made Ground (TP12)

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 localised made ground at TP12.

In accordance with BRE Digest SD1:2005 and adopting the assessment procedure specified therein for brownfield sites (local to TP12), the laboratory chemical test results indicate a characteristic value for water soluble sulphate within the made ground of 85mg/l.

Using Table C2 of BRE Digest SD1:2005, this characteristic value corresponds to Design Sulphate Class DS-1.

#### 10.7 RISKS TO BUILDINGS AND MATERIALS DURABILITY (CONTINUED)

The groundwater regime of the site has been assessed as 'mobile' and a characteristic pH value within the made ground of 8.1 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 localised made ground.

#### **Natural Soils**

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 natural soils.

In accordance with BRE Digest SD1:2005 and adopting the assessment procedure specified therein for Greenfield sites (areas removed from the made ground local to TP12), the laboratory chemical test results indicate a characteristic value for water soluble sulphate within the natural soils of 39mg/l.

Using Table C2 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 natural soils of 7.01 has been determined. The Design Sulphate Class has been modified to give a site ACEC class of AC-1s for concrete structures constructed within the natural soils.

#### 10.7.2 Water Services

No significant contamination has been identified on site, other than naturally occurring concentrations of arsenic, beryllium, vanadium and nickel. These determinants will have no impact on water pipes.

Reference should 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 WASTE 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 and which may require the production of an approved Materials Management Plan (MMP) prepared in accordance with the CL:AIRE Code of Practice.

It is recommended that a sustainable development strategy is adopted which reduces to a practicable minimum the generation of waste materials and the need for disposal to a licensed tip. Emphasis should be on recovery and re-use rather than disposal.

However, any waste or surplus materials that are generated will need to be classified in accordance with current EC regulations and Environment Agency guidance prior to disposal. It is the responsibility of the waste producer to classify the waste.

Based on the data obtained from the site investigation works, any waste materials comprising of the existing localised made ground are likely to be classified as non-hazardous. The existing natural ground is likely to be classified as non-hazardous but this would require further assessment prior to disposal of materials owing to the presence of naturally metalliferous determinants.

This classification is provisional and indicative of the likely waste classification based on the data obtained to date (including chemical composition, moisture content, etc.). It also assumes that the materials tested will be representative of future generated waste.

In order to minimise disposal, the materials generated should be segregated and examined, with appropriate testing as necessary, to enable the materials to be sorted or treated into lower classifications, with the resultant benefit of potentially generating re-use rather than disposal.

Once final waste sources and volumes are known, the waste stockpile to be disposed offsite will need to be classified in accordance with Environment Agency/Natural Resources Wales Waste Classification – Guidance on the Classification and Assessment of Waste Technical Guidance WM3 (2015). This is likely to require additional sampling and testing of the generated waste materials to provide an up to date current basis for classification.

Depending on the waste classification, waste acceptance criteria (WAC) testing may be required, in order to determine which class of landfill site the waste can be sent to.

#### 10.8 WASTE DISPOSAL (CONTINUED)

It is recommended that the results of the waste classification and any WAC test results are sent to the intended licensed waste operator prior to disposal in order to confirm their classification and acceptance.

### **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

The proposed development will comprise the construction of low-rise residential housing, emergency, public and cycle access roads, designated carparking areas and soft landscaped areas and gardens.

A concept master plan provided by Pegasus Design and referenced P20-1853 (option 1) dated 5<sup>th</sup> August 2020 details the envisaged layout of the site development.

#### **11.2 SITE PREPARATION**

Prior to the commencement of works on site, any buried services within the site should be traced and either disconnected and removed or diverted/protected. Any diversionary works should be carried out under the supervision of, and to the specification of the appropriate statutory authorities. All existing easements should be adhered to if services cannot be redirected.

The existing topsoil within the site 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 and assessment will be required to determine the appropriate use of these materials within the site, for export of any surplus to other sites, or for off-site disposal. Discussions with the Local Authority will be required, as the topsoil contains elevated concentrations of metalliferous contaminants including arsenic, beryllium, nickel and vanadium sourced from the underlying natural soils and rocks.

There are a large number of mature trees and hedgerows present within and along the sites boundaries. If some of these need to be cut down allowances should be made for the removal of any associated roots. The resultant voids from these activities should be cleaned out, benched and refilled with well compacted suitable granular material, laid and compacted in layers. Allowances should also 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.

#### 11.2 SITE PREPARATION (CONTINUED)

A cut and fill exercise may be required to reach the final development levels, particularly on the slopes within the southern area of the site. All fill materials will need to be adequately benched into cut slopes to maintain the stability of the slopes and prevent the potential for differential settlement. All fill materials will need to be placed and compacted in layers in accordance with Department of Transport (DTp) Specification for Highway Works. Appropriate drainage should be provided to all slopes.

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.

The reduced formation should be proof rolled to ensure that the reduced formation is compacted to a uniform standard. The reduced formation should be brought back up to the required engineering level with acceptable excavated materials. These should be placed in well compacted layers, in accordance with Department of Transport (DTp) Specification for Highway Works. Any soft spots identified during preparation works should be removed and backfilled with clean granular material in accordance with the DTp Specification for Highway Works.

If site excavated materials are to be used as fill, then any generated sandstone/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 be made for encountering springs or incidences of perched water within excavations.

Allowances should also be made for encountering and having to deal with dense gravel, cobbles and boulders and shallow rock within the proposed depths of the drainage excavations and any cut and fill earthworks. More powerful excavating machinery and/or breaking equipment will be required to excavate into the dense weathered rocks and break out bedrock where required.

#### 11.3 FOUNDATIONS AND FLOOR SLABS

Prior to finalising foundation design for all of the site, further works will be required in the vicinity of WS04, WS07, WS08 and WS12 to delineate the extent of the softened soils within these locations.

The following foundation recommendations should be reviewed once development layouts and final engineering levels are confirmed, and the recommended supplementary site investigation works have been completed.

The topsoil and any made ground deposits encountered at the site will be variable in physical nature. In their present state of compaction and due to the organic nature of the topsoil, these materials are not deemed suitable load bearing materials for the proposed development structures.

The site has been divided into Land Parcel A and Land Parcel B, based on the underlying geological conditions and consequently the proposed foundation types and requirements in these land parcels are detailed below.

#### Land Parcel A

The entirety of Land Parcel A is underlain by solid strata of the Marlstone Rock Formation. The soils and rocks in this land parcel principally comprised near surface weathered granular soils with localised pockets of clay.

In Land Parcel A we recommend the use of traditional strip/trench fill foundations

Foundations should extend through the topsoil and any near surface loose granular or soft cohesive soils and found in the naturally deposited medium dense sand and medium dense becoming dense gravel and cobbles and cobbles and boulders of the marlstone rock formation, or alternatively, found directly on the rock strata.

Owing to the presence of localised cohesive soils the foundation formations should be kept to a minimum depth of 0.9m below finished ground levels, in order to protect them from the effects of frost heave and/or thermal shrinkage. A limiting depth could be adopted when founding in the granular soils as these are considered non shrinkable. When encountering these soils or rocks, the foundations would not require further deepening.

No high shrinkage potential soils have been identified in Land Parcel A. Foundations in the first instance, should be designed based on medium shrinkage potential soils. Owing to the presence of localised clay soils.

An allowable bearing pressure of 100kN/m<sup>2</sup> could be used for design purposes when extending into the medium dense sand, gravel, gravel and cobbles or firm to stiff and stiff clay. At this intensity of loading, the total settlements should not exceed 25mm, and any angular distortions caused by differential movements should be less than 1:750. Foundations formed entirely on rock could adopt an allowable bearing pressure of 200kN/m<sup>2</sup>.

Any foundation bearing on a combination of differing bearing strata should be locally reinforced with mesh fabric over the change in strata, in order to minimise potential differential settlements.

The geotechnical analysis undertaken on samples obtained from Land Parcel A indicated that the granular soils comprised a mixture of cobbles and boulders with gravel and some sand and fines.

Given the variability in the ground conditions noted and the presence of variable shrinkable soils on site and existing vegetation, it is recommended that floor slabs are designed as suspended.

Full radon protection is required to ground floor slabs.

#### Land Parcel B

In the south of the site (Land Parcel B), the founding soils are much more variable with founding soils comprising firm and firm to stiff clays, medium dense sand and medium dense to dense gravel, cobbles and boulders of variable stratigraphic units.

In Land Parcel B we recommend the use of traditional strip/trench fill foundations

Foundations should extend through the topsoil and any near surface loose granular or soft cohesive soils and found in the naturally deposited medium dense sand and medium dense becoming dense gravel and cobbles and cobbles and boulders, firm and firm to stiff clay.

An allowable bearing pressure of 100kN/m<sup>2</sup> could be used for design purposes when extending into the medium dense sand, gravel, gravel and cobbles or firm to stiff and stiff clay. At this intensity of loading, the total settlements should not exceed 25mm, and any angular distortions caused by differential movements should be less than 1:750. Foundations formed entirely on rock could adopt an allowable bearing pressure of 200kN/m<sup>2</sup>.

The geology beneath the site is detailed in Section 4.3.

It is important to note this variable geology and the physical properties of the soils and rocks will have an influence on the depth of foundations and the requirement for any reinforcement.

The natural cohesive soils in Land Parcel B displayed a variable plasticity and shrinkage potential which was a consequence of the underlying geology. Modified plasticity results on site for the near surface cohesive soils ranged between 16.8% and 52% indicating the soils to be of low to high shrinkage potential.

Owing to the presence of cohesive soils, some of which are of a high shrinkage potential the foundation formations should be kept to a minimum depth of 1.0m below finished ground levels, in order to protect them from the effects of frost heave and/or thermal shrinkage.

Deeper foundation depths may become required in certain areas of the site, where the founding horizons are within cohesive soils and may therefore need to be taken down below any root systems associated with the hedgerows and trees within and around the site. For initial design purposes, foundations within Land Parcel B when in cohesive soils within the vicinity of trees and hedgerows will have to be deepened in accordance with NHBC standards for high shrinkage potential soils.

If it becomes uneconomical and impractical to form deep trench fill foundations within the vicinity of existing trees, consideration could be given to using piled foundations within tree influence zones. Deeper shell and auger boreholes would be required to provide detailed information for pile design in these areas.

This could be reviewed following development specific supplementary site investigation works and additional testing, particularly soil classification testing within close proximity to existing trees and vegetation.

A limiting depth could be adopted when founding in the granular soils as these are considered non shrinkable. When encountering these soils or rocks, the foundations would not require further deepening.

The granular soils would be considered non plastic.

Any foundation bearing on a combination of differing bearing strata should be locally reinforced with mesh fabric over the change in strata, in order to minimise potential differential settlements.

Allowances should be made for overbreak in the sides of the excavations and for their possible backfilling either with granular materials or mass concrete. The foundation depths adjacent to trees and hedgerows should be deepened accordingly in accordance with NHBC guidance.

Foundations may need to be locally deepened if any soft spots are encountered.

Given the variability in the ground conditions noted and the presence of variable shrinkable soils on site and existing vegetation, it is recommended that floor slabs are designed as suspended.

Full radon protection is required to ground floor slabs.

#### **Miscellaneous Ground Conditions**

In the vicinity of WS04, WS07, WS08 and WS12, at this stage, alternative foundations to traditional strip/trench fill foundations will be required. An allowance for the use of raft foundations in the vicinity of these windowless sample holes should be allowed for.

The soft materials beneath any proposed plots within the vicinity of the above windowless sample holes should be removed to a depth of 2.0m and the reduced formation proof rolled.

The reduced formation should be backfilled with engineering fill placed on controlled compacted layers in accordance with DTp Specification for Highway Works. Once complete geotechnical field testing should be carried out to validate the engineered fill and confirm the safe ground bearing pressure achieved.

A suitable bed of Type 1 sub-base or similar approved material should be laid on top of the re-engineered made ground/engineered fill, and again compacted and placed in a controlled manner compliant with the Specification for Highways Works.

The thickness of such materials should be determined by a suitable qualified structural engineer and will depend somewhat on the chosen design of the raft foundations.

For preliminary purposes, the proposed rafts should be designed to an allowable maximum bearing pressure of 50kN/m<sup>2</sup>, with an average pressure of less than 30kN/m<sup>2</sup>.

Subject to successful earthworks being carried out, at this intensity of loading, the total settlements should not exceed 25mm and any angular distortions caused by differential movements should be less than 1:750. Plate load tests and/or dynamic probing of the proposed formations will be required in order to confirm the adequacy of the earthworks, prior to constructing the rafts.

#### **11.4 EXCAVATIONS AND FORMATIONS**

On the basis of the trial pitting findings, excavations for foundations, service trenches or cuts are likely to encountered localised areas of hard dig and rock break conditions in many parts of the site. It is therefore likely that more powerful excavating machinery and/or breaking equipment in these areas will be required, in order to achieve the required excavation depths.

From the site investigation findings, the majority of 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.

Variable stability of trial pit sides was noted during the site investigation works, with instability noted in the natural soils associated with cobble and boulder removal. The sides of excavations deeper than 1.2m should be fully supported by trench boxes, or temporarily battered at gradients of typically 30°, if access is required.

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.

Perched groundwater should be anticipated in the vicinity of any existing buried structure/services i.e. drainages trenches/land drains etc.

It should be noted that groundwater levels can vary dependent of seasonal variations and other factors.

#### **11.4 EXCAVATIONS AND FORMATIONS (CONTINUED)**

Allowances should also be made for encountering springs and or running sand conditions particularly in the lower areas of the site.

#### 11.5 ACCESS ROADS AND CAR PARKING AREAS

Based on the findings of the trial pitting and windowless sampling, there are likely to be wide variations in the nature and strength of the in-situ materials at the access road and car parking formation levels.

Consequently, for design purposes, a range of California Bearing Ratio (CBR) values between 1.5% and 2.5% should be assumed for any near surface cohesive natural soils, but possibly greater than 5% where the natural in-situ granular soils are encountered.

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.

It should be noted that the Local Highway authority may insist that field CBR tests should be carried out in order 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.

The near surface cohesive natural soils should be considered frost susceptible.

Protection of formations from surface water and inclement weather will be required.

#### 11.6 DRAINAGE

Indicative soil infiltration tests were completed at six trial pit locations.

The trial pits were excavated whereby they extended into the natural soils and water was then rapidly pumped into the trial pit excavation.

The results of the soil infiltration tests have been calculated at a range of 2.6x10<sup>-04</sup>m/s to insufficient infiltration to calculate a soil infiltration rate.

#### **11.6 DRAINAGE** (CONTINUED)

As to be expected, negligible infiltration was recorded in that trial pit in which cohesive soils were encountered (TP10). At those locations where infiltration was recorded, the rates ranged between  $2.6 \times 10^{-04}$ m/s to  $5.3 \times 10^{-06}$ m/s. These rates were recorded in the granular soils and rocks.

The testing results are specific to the location and depth of the tests carried out.

Careful consideration will need to given to the locations of soakaways, the nature of the deposits in which water will be disposed of and the final levels of these soakaways relative to the development proposals.

It should be noted that the initial testing should only be regarded as indicative and representative of infiltration at the depth and location of the test.

If soakaways are proposed for this site, it is recommended that more extensive location and depth specific follow-up tests should be carried out and should fully comply with BRE 365, in order to confirm the suitability of the ground at the proposed soakaway locations.

It should also be noted that the local groundwater regime could fluctuate seasonally and therefore could affect the performance of any proposed soakaways.

Consequently, if possible, it may be prudent to monitor the groundwater levels during the wetter winter months.

### 11.7 RECOMMENDED FURTHER WORKS

It is recommended that the near surface soils are screened for pesticides and herbicides given the past and current usage of the site for growing crops.

It is also recommended that ground gas monitoring standpipes are installed on site and the ground gas regime monitored to assess the risks from nearby historically infilled ground (pond to the south).

The Local Authority Environmental Health Department and The Environment Agency should be consulted on the findings of the contaminated land assessment of this report prior to finalising the remediation requirements of the development.

### 11.7 RECOMMENDED FURTHER WORKS (CONTINUED)

Prior to finalising foundation design for all of the site, further works will be required in the vicinity of WS04, WS07, WS08 and WS12 to delineate the extent of the softened soils within these locations.

It would also be beneficial to undertake further geotechnical tests to delineate the extent of the high shrinkage potential soils in the south of the site, particularly given the proximity of mature and semi mature trees within this area. APPENDIX A

**ENVIROCHECK REPORT** 

# **Envirocheck® Report:**

## Datasheet

### **Order Details:**

Order Number: 284732938\_1\_1

Customer Reference: 12692/LP

National Grid Reference: 443390, 240190

Slice:

Site Area (Ha):

14.06 Search Buffer (m): 500

500

### Site Details:

Withycombe Farm Bretch Hill Banbury OX16 1JF

### **Client Details:**

MR H Pritchard Integral Geotechnique Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX



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#### 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.

Tor this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales 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 this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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#### Report Version v53.0

Data Type	Page Number	On Site	0 to 250m	251 to 500m (*up to 1000m)
Agency & Hydrological				
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes
Contaminated Land Register Entries and Notices				
Discharge Consents				
Prosecutions Relating to Controlled Waters			n/a	n/a
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				
Prosecutions Relating to Authorised Processes				
Registered Radioactive Substances				
River Quality				
River Quality Biology Sampling Points				
River Quality Chemistry Sampling Points				
Substantiated Pollution Incident Register				
Water Abstractions	pg 1			(*3)
Water Industry Act Referrals				
Groundwater Vulnerability Map	pg 2	Yes	n/a	n/a
Groundwater Vulnerability - Soluble Rock Risk	pg 4	2	n/a	n/a
Groundwater Vulnerability - Local Information			n/a	n/a
Bedrock Aquifer Designations	pg 4	Yes	n/a	n/a
Superficial Aquifer Designations			n/a	n/a
Source Protection Zones				
Extreme Flooding from Rivers or Sea without Defences				n/a
Flooding from Rivers or Sea without Defences				n/a
Areas Benefiting from Flood Defences				n/a
Flood Water Storage Areas				n/a
Flood Defences				n/a
OS Water Network Lines	pg 4			1

Data Type	Page Number	On Site	0 to 250m	251 to 500m (*up to 1000m)
Waste				
BGS Recorded Landfill Sites				
Historical Landfill Sites	pg 5			1
Integrated Pollution Control Registered Waste Sites				
Licensed Waste Management Facilities (Landfill Boundaries)				
Licensed Waste Management Facilities (Locations)				
Local Authority Landfill Coverage	pg 5	2	n/a	n/a
Local Authority Recorded Landfill Sites	pg 5			1
Potentially Infilled Land (Non-Water)	pg 5			1
Potentially Infilled Land (Water)	pg 5		1	
Registered Landfill Sites				
Registered Waste Transfer Sites				
Registered Waste Treatment or Disposal Sites				
Hazardous Substances				
Control of Major Accident Hazards Sites (COMAH)				
Explosive Sites				
Notification of Installations Handling Hazardous Substances (NIHHS)				
Planning Hazardous Substance Consents				
Planning Hazardous Substance Enforcements				

Data Type	Page Number	On Site	0 to 250m	251 to 500m (*up to 1000m)
Geological				
BGS 1:625,000 Solid Geology	pg 6	Yes	n/a	n/a
BGS Estimated Soil Chemistry	pg 6	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 8			2
BGS Urban Soil Chemistry				
BGS Urban Soil Chemistry Averages				
CBSCB Compensation District			n/a	n/a
Coal Mining Affected Areas			n/a	n/a
Mining Instability			n/a	n/a
Man-Made Mining Cavities				
Natural Cavities				
Non Coal Mining Areas of Great Britain				n/a
Potential for Collapsible Ground Stability Hazards	pg 8	Yes		n/a
Potential for Compressible Ground Stability Hazards				n/a
Potential for Ground Dissolution Stability Hazards	pg 8	Yes		n/a
Potential for Landslide Ground Stability Hazards	pg 9	Yes	Yes	n/a
Potential for Running Sand Ground Stability Hazards				n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 9	Yes	Yes	n/a
Radon Potential - Radon Affected Areas	pg 10	Yes	n/a	n/a
Radon Potential - Radon Protection Measures	pg 10	Yes	n/a	n/a
Industrial Land Use				
Contemporary Trade Directory Entries	pg 11		2	5
Fuel Station Entries				
Points of Interest - Commercial Services	pg 11			2
Points of Interest - Education and Health				
Points of Interest - Manufacturing and Production				
Points of Interest - Public Infrastructure	pg 11			1
Points of Interest - Recreational and Environmental	pg 11		2	5
Gas Pipelines				
Underground Electrical Cables				

Data Type	Page Number	On Site	0 to 250m	251 to 500m (*up to 1000m)
Sensitive Land Use				
Ancient Woodland				
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	pg 13	1		
Ramsar Sites				
Sites of Special Scientific Interest				
Special Areas of Conservation				
Special Protection Areas				
World Heritage Sites				



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8NW (NE)	0	1	443386 240194
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8NE (S)	0	1	443400 240000
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8NW (S)	0	1	443350 240000
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8SW (S)	82	1	443386 239850
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8SE (S)	311	1	443550 239650
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8SE (S)	325	1	443600 239650
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A14NW (NE)	333	1	443800 240600
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A14SW (NE)	379	1	443900 240450
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8SE (S)	420	1	443600 239550
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A14NW (NE)	444	1	443900 240650
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A8SE (SE)	457	1	443700 239550
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A7SE (SW)	483	1	442850 239650
	BGS Groundwater F	looding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	A9SW (SE)	485	1	443850 239600
	Nearest Surface Wa	ter Feature	A7NE (SW)	293	-	442953 239926
	Water Abstractions					
	Operator: Licence Number: Permit Version:	Mr N Morris 28/39/14/0299 103	A3NE (S)	566	2	443600 239400
	Authority: Abstraction: Abstraction: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised End: Permit Start Date: Permit End Date:	Banbury Self Pick, Broughton Road, Banbury, Oxon Environment Agency, Thames Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a single point Groundwater Not Supplied Banbury Self Pick, Broughton Road 01 March 31 October 12th June 2017 Not Supplied				
	Positional Accuracy:	Located by supplier to within 100m				

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions					
	Operator: Licence Number:	Banbury Self Pick 28/39/14/0299	A3NE (S)	566	2	443600 239400
	Authority: Abstraction: Abstraction Type: Source:	Banbury Self Pick, Broughton Road, Banbury, Oxon Environment Agency, Thames Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a single point Groundwater				
	Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised End:	Not Supplied Not Supplied Banbury Self Pick, Broughton Road 01 March 31 October				
	Permit Start Date: Permit End Date: Positional Accuracy:	13th March 2003 Not Supplied Located by supplier to within 100m				
	Water Abstractions					
	Operator: Licence Number: Permit Version:	Banbury Self Pick 28/39/14/0299 100	A3NE (S)	566	2	443600 239400
	Authority: Abstraction: Abstraction Type:	Environment Agency, Thames Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a single point				
	Source: Daily Rate (m3): Yearly Rate (m3): Details:	Groundwater 68 13636 Crouch Hill Farm, Broughton Road				
	Authorised Start: Authorised End: Permit Start Date: Permit End Date:	01 March 31 October 7th July 1986 Not Supplied				
	Positional Accuracy:	Located by supplier to within 100m				
	Groundwater Vulne	rability Map				
	Combined Classification:	Unproductive Aquifer (may have productive aquifer beneath)	A8NE (S)	0	3	443420 240019
	Combined Vulnerability:	Unproductive				
	Pollutant Speed: Bedrock Flow:	Well Connected Fractures				
	Dilution: Baseflow Index: Superficial	<300 mm/year >70% <90%				
	Patchiness: Superficial	<3m				
	Superficial Recharge:	No Data				
	Groundwater Vulne	rability Map				
	Combined Classification:	Principle Bedrock Aquifer - High Vulnerability	A8NE (SE)	0	3	443490 240074
	Combined Vulnerability: Combined Aquifer	High Productive Bedrock Aquifer, No Superficial Aquifer				
	Pollutant Speed: Bedrock Flow:	Intermediate Well Connected Fractures				
	Baseflow Index:	<300 mm/year >70%				
	Superficial Patchiness:	<90%				
	Superficial Thickness: Superficial	<sm No Data</sm 				
	Recharge:					

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Groundwater Vulne	rability Map				
	Combined	Secondary Bedrock Aquifer - High Vulnerability	A8NW	0	3	443386
	Classification: Combined	High	(NE)			240194
	Vulnerability:	Productive Rodrock Aquifer, No Superficial Aquifer				
	Pollutant Speed: Bedrock Flow:	Intermediate Well Connected Fractures				
	Dilution: Baseflow Index:	<300 mm/year >70%				
	Patchiness:	<90%				
	Superficial	<3m				
	Superficial Recharge:	No Data				
	Groundwater Vulne	erability Man				
	Combined	Principle Bedrock Aquifer - High Vulnerability	A8NE	0	3	443480
	Classification:		(SE)	-	-	240000
	Vulnerability:	Hign				
	Combined Aquifer: Pollutant Speed:	Productive Bedrock Aquifer, No Superficial Aquifer				
	Bedrock Flow:	Well Connected Fractures				
	Dilution:	<300 mm/year				
	Superficial	<90%				
	Patchiness:					
	Superficial Thickness:	<3m				
	Superficial	No Data				
	Recharge:					
	Groundwater Vulne	rability Map				
	Combined Classification:	Secondary Bedrock Aquifer - High Vulnerability	A8NE (S)	0	3	443420 240000
	Combined	High				
	Combined Aquifer:	Productive Bedrock Aquifer, No Superficial Aquifer				
	Bedrock Flow:	Well Connected Fractures				
	Dilution:	<300 mm/year				
	Superficial	40-70% <90%				
	Patchiness:					
	Superficial Thickness	<3m				
	Superficial	No Data				
	Recharge:					
	Groundwater Vulne	rability Map Secondary Bedrock Aquifer - High Vulnerability	Δενιν	0	3	443386
	Classification:		(S)		0	240000
	Combined Vulnerability:	High				
	Combined Aquifer: Pollutant Speed	Productive Bedrock Aquifer, No Superficial Aquifer				
	Bedrock Flow:	Well Connected Fractures				
	Baseflow Index:	40-70%				
	Superficial	<90%				
	Superficial	<3m				
	Thickness:	No. Dete				
	Recharge:	INU Dala				

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR	
	Groundwater Vulnerability Map					
	Combined Unproductive Aquifer (may have productive aquifer beneath) Classification: Combined Unproductive	A8NE (S)	0	3	443394 240000	
	Vulnerability: Combined Aquifer: Unproductive Bedrock Aquifer, No Superficial Aquifer Pollutant Speed: Low					
	Bedrock Flow:     Well Connected Fractures       Dilution:     <300 mm/year					
	Superficial <90% Patchiness: Superficial <3m					
	Thickness: Superficial No Data Recharge:					
	Groundwater Vulnerability - Soluble Rock Risk					
	Classification: Significant Risk - Problems Unlikely	A8NW (S)	0	3	443386 240000	
	Groundwater Vulnerability - Soluble Rock Risk					
	Classification: Significant Risk - Problems Unlikely	A8NW (NE)	0	3	443386 240194	
	Bedrock Aquifer Designations					
	Aquifer Designation: Principal Aquifer	A8NE (SE)	0	3	443480 240000	
	Bedrock Aquifer Designations					
	Aquifer Designation: Principal Aquifer	A8NE (SE)	0	3	443490 240074	
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A8NW	0	3	443386	
		(NE)			240194	
	Aquifer Designation: Secondary Aquifer - A	A8NE (S)	0	3	443420 240000	
	Bedrock Aguifer Designations					
	Aquifer Designation: Secondary Aquifer - A	A8NW (S)	0	3	443386 240000	
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A8NE	0	3	443394	
	(S) 24000					
	Aquifer Designation: Unproductive Strata	A8NE (S)	0	3	443420 240019	
	Superficial Aquifer Designations No Data Available					
	Extreme Flooding from Rivers or Sea without Defences					
	Flooding from Rivers or Sea without Defences					
	Areas Benefiting from Flood Defences					
	Flood Water Storage Areas					
	None					
	Flood Defences None					
	OS Water Network Lines					
1	Watercourse Form: Inland river Watercourse Length: 367.8 Watercourse Level: On ground surface Permanent: True	A7NE (SW)	293	4	442953 239926	
	Watercourse Name: Not Supplied Catchment Name: Thames Primacy: 1					

### Intégral Géotechnique

### Waste

Map ID	Details		Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Historical Landfill S	ites				
2	Licence Holder: Location: Name: Operator Location: Boundary Accuracy: Provider Reference: First Input Date: Last Input Date: Last Input Date: Specified Waste Type: EA Waste Ref: Regis Ref: WRC Ref: BGS Ref: Other Ref:	Not Supplied Banbury, Oxfordshire Broughton Road Not Supplied As Supplied EAHLD13562 Not Supplied Deposited Waste included Inert and Industrial Waste 0 Not Supplied 3100/0105 Not Supplied TP0179, 13.6.4439	A9NW (SE)	463	2	444042 239896
	Local Authority Lan	dfill Coverage				
	Name:	Cherwell District Council - Has supplied landfill data		0	5	443386 240194
	Local Authority Landfill Coverage					
	Name:	Oxfordshire County Council - Has supplied landfill data		0	6	443386 240194
	Local Authority Recorded Landfill Sites					
3	Location: Reference: Authority: Last Reported Status: Types of Waste: Date of Closure: Positional Accuracy: Boundary Quality:	Broughton Road, Banbury 10 Cherwell District Council, Environmental Health Department <b>Unknown</b> Fly Tipping Not Supplied Positioned by the supplier Good	A9NW (E)	421	5	444008 239939
	Potentially Infilled L	and (Non-Water)				
4	Bearing Ref: Use: Date of Mapping:	SE Unknown Filled Ground (Pit, quarry etc) 1992	A9SW (SE)	496	-	444063 239852
	Potentially Infilled Land (Water)					
5	Use: Date of Mapping:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc) 1955	A8NW (SW)	32	-	443251 239884
Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
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	BGS 1:625,000 Solid	l Geology				
	Description:	Lias Group	A8NW (NE)	0	1	443386 240194
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil >120 mg/kg	A8NW (NE)	0	1	443386 240194
	Cadmium Concentration:	<1.8 mg/kg				
	Chromium	>180mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg >100 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil 60 - 120 mg/kg	A8NE (S)	0	1	443420 240019
	Cadmium	<1.8 mg/kg				
	Chromium	120 - 180 mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg 60 - 80 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil 25 - 35 mg/kg	A8NE (SE)	0	1	443468 240055
	Cadmium	<1.8 mg/kg				
	Concentration:	60 - 90 mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg <15 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil 15 - 25 mg/kg	A8NE (SE)	0	1	443490 240074
	Concentration: Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	60 - 90 mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg 15 - 30 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil 45 - 60 mg/kg	A8NE (SE)	0	1	443490 240074
	Concentration: Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	60 - 90 mg/kg				
	Lead Concentration: Nickel	<100 mg/kg 15 - 30 mg/kg				
	BGS Estimated Sal	Chamietry				
	Source: Soil Sample Type: Arsenic Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil 60 - 120 mg/kg	A8NE (SE)	9	1	443555 240120
	Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	120 - 180 mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg 60 - 80 mg/kg				

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Source:	Chemistry British Geological Survey, National Geoscience Information Service	A8NW	47	1	443222
	Soil Sample Type: Arsenic Concentration:	Rural Soil 60 - 120 mg/kg	(W)			240194
	Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	>180mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg >100 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil 45 - 60 mg/kg	A8NE (S)	73	1	443394 239865
	Concentration: Cadmium	<1.8 mg/kg				
	Concentration: Chromium	60 - 90 mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg 15 - 30 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil 60 - 120 mg/kg	A13NE (NE)	150	1	443578 240601
	Concentration: Cadmium	<1.8 mg/kg				
	Concentration: Chromium	>180mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg >100 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil >120 mg/kg	A8SE (S)	337	1	443523 239617
	Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	>180mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg >100 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil 60 - 120 mg/kg	A12NE (NW)	367	1	443000 240722
	Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	>180mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg >100 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil 15 - 25 mg/kg	A12SE (W)	368	1	442867 240230
	Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	90 - 120 mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg 30 - 45 mg/kg				

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic Concentration: Cadmium Concentration: Chromium Concentration: Lead Concentration: Nickel	British Geological Survey, National Geoscience Information Service Rural Soil 45 - 60 mg/kg <1.8 mg/kg 120 - 180 mg/kg <100 mg/kg 45 - 60 mg/kg	A9NW (SE)	433	1	444000 239863
6	BGS Recorded Mine Site Name: Location: Source: Reference: Type: Status: Operator: Operator: Operator Location: Periodic Type: Geology: Commodity: Positional Accuracy:	Paral Sites Bretch Farm Pits Bretch Farm Pits Neithrop, Banbury, Oxfordshire British Geological Survey, National Geoscience Information Service 74827 Opencast Ceased Unknown Operator Not Supplied Jurassic Horsehay Sand Formation Sand Located by supplier to within 10m	A9NW (E)	302	1	443875 240120
	BGS Recorded Mine	eral Sites				
7	Site Name: Location: Source: Reference: Type: <b>Status:</b> Operator: Operator: Operator: Operator: Coperator: Geology: Commodity: Positional Accuracy:	Bretch Farm Pits Neithrop, Banbury, Oxfordshire British Geological Survey, National Geoscience Information Service 74826 Opencast <b>Ceased</b> Unknown Operator Not Supplied Jurassic Northampton Sand Formation (Northampton Sand Ironstone) Sand Located by supplier to within 10m	A9NW (E)	392	1	443985 240010
	BGS Measured Urba	an Soil Chemistry				
	No data available					
	BGS Urban Soil Che	mistry Averanes				
	No data available					
	Coal Mining Affecte	d Areas				
	In an area that might	not be affected by coal mining				
	Non Coal Mining Ar	eas of Great Britain				
	No Hazard					
	Potential for Collaps	sible Ground Stability Hazards				
	Hazard Potential:	Very Low	A8NW	0	1	443386
	Source:	British Geological Survey, National Geoscience Information Service	(S)			240000
	Potential for Collaps Hazard Potential: Source:	sible Ground Stability Hazards Very Low British Geological Survey, National Geoscience Information Service	A8NW (NE)	0	1	443386 240194
	Potential for Compr	essible Ground Stability Hazards				
	Hazard Potential: Source:	No Hazard British Geological Survey, National Geoscience Information Service	A8NW (NE)	0	1	443386 240194
	Potential for Compr Hazard Potential: Source:	essible Ground Stability Hazards No Hazard British Geological Survey, National Geoscience Information Service	A8NW (S)	0	1	443386 240000
	Potential for Ground	d Dissolution Stability Hazards				
	Hazard Potential: Source:	Very Low British Geological Survey, National Geoscience Information Service	A8NE (SE)	0	1	443490 240074
	Potential for Ground	d Dissolution Stability Hazards				
	Hazard Potential: Source:	Very Low British Geological Survey, National Geoscience Information Service	A8NE (SE)	0	1	443480 240000
	Potential for Ground Hazard Potential: Source:	d Dissolution Stability Hazards No Hazard British Geological Survey, National Geoscience Information Service	A8NW (NE)	0	1	443386 240194

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Ground Dissolution Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (S)	0	1	443386 240000
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Service	A8NW (S)	0	1	443386 240000
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A8NW (NE)	0	1	443386 240194
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential:         Low           Source:         British Geological Survey, National Geoscience Information Service	A8NE (S)	48	1	443481 239902
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential:         Low           Source:         British Geological Survey, National Geoscience Information Service	A8NW (W)	76	1	443184 240187
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential:         Moderate           Source:         British Geological Survey, National Geoscience Information Service	A8NW (W)	150	1	443106 240196
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A7NE (SW)	175	1	443023 240000
	Potential for Landslide Ground Stability Hazards	(011)			210000
	Hazard Potential: Very Low	A7NE	219	1	443027
	Source: British Geological Survey, National Geoscience Information Service	(W)			240160
	Potential for Landslide Ground Stability Hazards	A 71/5	007	4	440000
	Source: British Geological Survey, National Geoscience Information Service	(W)	231	I	240048
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A9SW (SE)	250	1	443789 239857
	Potential for Running Sand Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (S)	0	1	443386 240000
	Potential for Running Sand Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (NE)	0	1	443386 240194
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A8NE (S)	0	1	443420 240019
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Low	A8NE	0	1	443394
	Source: British Geological Survey, National Geoscience Information Service	(S)			240000
	Hazard Potential No Hazard	A8NW	0	1	443386
	Source: British Geological Survey, National Geoscience Information Service	(NE)			240194
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (S)	0	1	443386 240000
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NE (S)	0	1	443420 240000
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A8NE (SE)	9	1	443555 240120
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A8NW (W)	47	1	443222 240194
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NE (S)	73	1	443394 239865
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential:         Low           Source:         British Geological Survey, National Geoscience Information Service	A13NE (NE)	150	1	443578 240601

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Radon Potential - R	adon Affected Areas				
	Affected Area: Source:	The property is in an Intermediate probability radon area (5 to 10% of homes are estimated to be at or above the Action Level). British Geological Survey, National Geoscience Information Service	A8NE (SE)	0	1	443525 240026
	Radon Potential - R	adon Affected Areas				
	Affected Area:	The property is in an Intermediate probability radon area (5 to 10% of homes are estimated to be at or above the Action Level).	A8NE (SE)	0	1	443500 240001
	Source:	British Geological Survey, National Geoscience Information Service				
	Radon Potential - R	adon Affected Areas				
	Affected Area:	The property is in a Higher probability radon area (10 to 30% of homes are estimated to be at or above the Action Level). British Geological Survey, National Geoscience Information Service	A8NW (NE)	0	1	443386 240194
	Bodon Botontial B	oden Affected Areas				
	Affected Area:	The property is in a Higher probability radon area (10 to 30% of homes are estimated to be at or above the Action Level).	A8NW (S)	0	1	443386 240001
	Radon Potential - Ra	adon Protection Measures		0	4	442525
	Source:	dwellings or extensions British Geological Survey, National Geoscience Information Service	(SE)	0	I	240026
	Radon Potential - R	adon Protection Measures				
	Protection Measure:	Basic radon protective measures are necessary in the construction of new dwellings or extensions	A8NE (SE)	0	1	443500 240001
	Source:	British Geological Survey, National Geoscience Information Service				
	Radon Potential - R	adon Protection Measures				
	Protection Measure:	Full radon protective measures are necessary in the construction of new dwellings or extensions	A8NW (NE)	0	1	443386 240194
	Source:	British Geological Survey, National Geoscience Information Service				
	Radon Potential - R	adon Protection Measures				
	Protection Measure: Source:	Full radon protective measures are necessary in the construction of new dwellings or extensions British Geological Survey, National Geoscience Information Service	A8NW (S)	0	1	443386 240001



# **Industrial Land Use**

Map ID	Details			Estimated Distance From Site	Contact	NGR
8	Contemporary Trade Name: Location: Classification: Status: Positional Accuracy:	e Directory Entries R J Mobile Valeting Services 12, Dover Avenue, Banbury, Oxfordshire, OX16 0JL Steam Cleaning Services Inactive Automatically positioned to the address	A13SE (NE)	73	-	443586 240416
9	Contemporary Trade Name: Location: Classification: Status: Positional Accuracy:	e Directory Entries J J Domestic Services 10, Conway Drive, Banbury, Oxfordshire, OX16 0QW Cleaning Services - Domestic Inactive Automatically positioned to the address	A13SE (NE)	193	-	443722 240395
10	Contemporary Trade Name: Location: Classification: Status: Positional Accuracy:	e Directory Entries Barry'S Boiler Service 26, Arundel Place, Banbury, Oxfordshire, OX16 0PW Boilers - Servicing, Replacements & Repairs Inactive Automatically positioned to the address	A14SW (NE)	318	-	443845 240424
11	Contemporary Trade Name: Location: Classification: Status: Positional Accuracy:	e Directory Entries Cleanox Hygiene 132, Bretch Hill, Banbury, Oxfordshire, OX16 0LZ Commercial Cleaning Services Inactive Automatically positioned to the address	A14SW (E)	360	-	443936 240273
11	Contemporary Trade Name: Location: Classification: Status: Positional Accuracy:	e Directory Entries Alan Newman Ltd 65, Edmunds Road, Banbury, Oxfordshire, OX16 0QJ Sheet Metal Work Inactive Automatically positioned to the address	A14SW (E)	400	-	443972 240299
12	Contemporary Trade Name: Location: Classification: Status: Positional Accuracy:	e Directory Entries Uk Profile Components Ltd 7, Denbigh Close, Banbury, Oxfordshire, OX16 0BQ Aluminium Fabricators Active Automatically positioned to the address	A9SW (SE)	434	-	443919 239725
13	Contemporary Trade Name: Location: Classification: Status: Positional Accuracy:	e Directory Entries Compulsive Cleaning 110, Bretch Hill, Banbury, Oxfordshire, OX16 0NH Commercial Cleaning Services Inactive Automatically positioned to the address	A9NW (E)	450	-	444026 240157
14	Points of Interest - C Name: Location: Category: Class Code: Positional Accuracy:	Commercial Services Air Auto Services 5 Caernarvon Way, Banbury, OX16 0PG Transport, Storage and Delivery Distribution and Haulage Positioned to address or location	A13NE (N)	268	7	443577 240731
15	Points of Interest - C Name: Location: Category: Class Code: Positional Accuracy:	Commercial Services Alan Newman 65 Edmunds Road, Banbury, OX16 0QJ Construction Services Metalworkers Including Blacksmiths Positioned to address or location	A14SW (E)	400	7	443972 240299
16	Points of Interest - F Name: Location: Category: Class Code: Positional Accuracy:	Public Infrastructure Sewage Pumping Station OX16 Infrastructure and Facilities Waste Storage, Processing and Disposal Positioned to an adjacent address or location	A9SW (SE)	471	7	443937 239690
17	Points of Interest - F Name: Location: Category: Class Code: Positional Accuracy:	Recreational and Environmental Play Area OX16 Recreational Playgrounds Positioned to an adjacent address or location	A8NE (SE)	88	7	443667 240062
18	Points of Interest - F Name: Location: Category: Class Code: Positional Accuracy:	Recreational and Environmental Play Area OX16 Recreational Playgrounds Positioned to an adjacent address or location	A13NE (NE)	172	7	443585 240622

# **Industrial Land Use**

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Points of Interest - F	Recreational and Environmental				
19	Name: Location: Category: Class Code: Positional Accuracy:	Play Area Harlech Close, OX16 Recreational Playgrounds Positioned to address or location	A9NW (E)	276	7	443851 240165
	Points of Interest - F	Recreational and Environmental				
19	Name: Location: Category: Class Code: Positional Accuracy:	Play Area Not Supplied Recreational Playgrounds Positioned to an adjacent address or location	A9NW (E)	277	7	443852 240164
	Points of Interest - F	Recreational and Environmental				
20	Name: Location: Category: Class Code: Positional Accuracy:	Playground Prescott Avenue, OX16 Recreational Playgrounds Positioned to an adjacent address or location	A14NW (NE)	445	7	443905 240639
	Points of Interest - F	Recreational and Environmental				
21	Name: Location: Category: Class Code: Positional Accuracy:	Playground Chester Way, OX16 Recreational Playgrounds Positioned to address or location	A14NW (NE)	491	7	443829 240834
	Points of Interest - F	Recreational and Environmental				
21	Name: Location: Category: Class Code: Positional Accuracy:	Play Area Not Supplied Recreational Playgrounds Positioned to an adjacent address or location	A19SW (NE)	492	7	443782 240874

# **Sensitive Land Use**

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Nitrate Vulnerable	Zones				
22	Name: Description: Source:	Cherwell (Ray To Thames) And Woodeaton Brook Nvz Surface Water Environment Agency, Head Office	A8NW (NE)	0	3	443386 240194

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Environment Agency - Head Office	June 2020	Annually
Cherwell District Council - Environmental Health Department	September 2017	Annual Rolling Update
Discharge Consents		
Environment Agency - Thames Region	July 2021	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - Thames Region	March 2013	
Integrated Pollution Controls		
Environment Agency - Thames Region	January 2009	
Integrated Pollution Prevention And Control		
Environment Agency - South East Region - West Thames Area	July 2021	Quarterly
Environment Agency - Thames Region	July 2021	Quarterly
Local Authority Integrated Pollution Prevention And Control		
Cherwell District Council - Environmental Health Department	October 2014	Variable
Local Authority Pollution Prevention and Controls		
Cherwell District Council - Environmental Health Department	October 2014	Not Applicable
Local Authority Pollution Prevention and Control Enforcements		
Cherwell District Council - Environmental Health Department	October 2014	Variable
Nearest Surface Water Feature		
Ordnance Survey	June 2021	
Pollution Incidents to Controlled Waters		
Environment Agency - Thames Region	September 1999	
Prosecutions Relating to Authorised Processes		
Environment Agency - Thames Region	July 2015	
Prosecutions Relating to Controlled Waters		
Environment Agency - Thames Region	March 2013	
Registered Radioactive Substances		
Environment Agency - Thames Region	June 2016	Annually
River Quality		
Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points		
Environment Agency - Head Office	April 2012	Annually
River Quality Chemistry Sampling Points		
Environment Agency - Head Office	April 2012	Annually
Substantiated Pollution Incident Register		
Environment Agency - South East Region - West Thames Area	July 2021	Quarterly
Environment Agency - Thames Region - West Area	July 2021	Quarterly
Water Abstractions		
Environment Agency - Thames Region	July 2021	Quarterly
Water Industry Act Referrals		
Environment Agency - Thames Region	October 2017	Quarterly
Groundwater Vulnerability Map		
Environment Agency - Head Office	June 2018	As notified
Groundwater Vulnerability - Soluble Rock Risk		
Environment Agency - Head Office	June 2018	As notified
Bedrock Aquifer Designations		
Environment Agency - Head Office	January 2018	Annually
Superficial Aquifer Designations		
Environment Agency - Head Office	January 2018	Annually
Source Protection Zones		
Environment Agency - Head Office	May 2021	Bi-Annually

Agency & Hydrological	Version	Update Cycle
Extreme Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	March 2021	Quarterly
Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	March 2021	Quarterly
Areas Benefiting from Flood Defences		
Environment Agency - Head Office	March 2021	Quarterly
Flood Water Storage Areas		
Environment Agency - Head Office	March 2021	Quarterly
Flood Defences		
Environment Agency - Head Office	March 2021	Quarterly
OS Water Network Lines		
Ordnance Survey	July 2021	Quarterly
Surface Water 1 in 30 year Flood Extent		
Environment Agency - Head Office	May 2018	Annually
Surface Water 1 in 100 year Flood Extent		
Environment Agency - Head Office	May 2018	Annually
Surface Water 1 in 1000 year Flood Extent		
Environment Agency - Head Office	May 2018	Annually
Surface Water Suitability		
Environment Agency - Head Office	February 2016	Annually
BGS Groundwater Flooding Susceptibility		
British Geological Survey - National Geoscience Information Service	May 2013	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	November 2002	Not Applicable
Historical Landfill Sites		
Environment Agency - Head Office	May 2021	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - Thames Region	January 2009	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - South East Region - West Thames Area	July 2021	Quarterly
Environment Agency - Thames Region - West Area	July 2021	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - South East Region - West Thames Area	July 2021	Quarterly
Environment Agency - Thames Region - West Area	July 2021	Quarterly
Local Authority Landfill Coverage		
Cherwell District Council - Environmental Health Department	February 2003	Not Applicable
Oxfordshire County Council	February 2003	Not Applicable
Local Authority Recorded Landfill Sites		
Cherwell District Council - Environmental Health Department	October 2018	
Oxfordshire County Council	October 2018	
Potentially Infilled Land (Non-Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water)		
Landmark Information Group Limited	December 1999	
Registered Landfill Sites		
Environment Agency - Thames Region - West Area	March 2006	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - Thames Region - West Area	April 2018	
Registered Waste Treatment or Disposal Sites		
Environment Agency - Thames Region - West Area	June 2015	
Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites		
Health and Safety Executive	March 2017	Annually
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	August 2001	
Planning Hazardous Substance Enforcements		
Cherwell District Council	February 2016	Variable
Oxfordshire County Council	February 2016	Variable
Planning Hazardous Substance Consents		
Cherwell District Council	February 2016	Variable
Oxfordshire County Council	February 2016	Variable

Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	December 2015	Annually
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	May 2021	Bi-Annually
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	As notified
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability Ove Arup & Partners	June 1998	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	April 2020	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	Annually
Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	July 2021	Quarterly
Fuel Station Entries Catalist Ltd - Experian	August 2021	Quarterly
Gas Pipelines National Grid	May 2021	Annually
Points of Interest - Commercial Services PointX	September 2021	Quarterly
Points of Interest - Education and Health PointX	September 2021	Quarterly
Points of Interest - Manufacturing and Production PointX	September 2021	Quarterly
Points of Interest - Public Infrastructure PointX	September 2021	Quarterly
Points of Interest - Recreational and Environmental PointX	September 2021	Quarterly
Underground Electrical Cables National Grid	May 2021	Annually

Sensitive Land Use	Version	Update Cycle
Ancient Woodland		
Natural England	February 2021	<b>Bi-Annually</b>
Areas of Adopted Green Belt		
Cherwell District Council	October 2020	Quarterly
Areas of Unadopted Green Belt		
Cherwell District Council	October 2020	Quarterly
Areas of Outstanding Natural Beauty		
Natural England	January 2021	Bi-Annually
Environmentally Sensitive Areas		
Natural England	January 2017	
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Natural England	February 2021	Bi-Annually
Marine Nature Reserves		
Natural England	July 2019	Bi-Annually
National Nature Reserves		
Natural England	January 2021	Bi-Annually
National Parks		
Natural England	February 2018	Bi-Annually
Nitrate Sensitive Areas		
Natural England	April 2016	Not Applicable
Nitrate Vulnerable Zones		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	April 2016	
Environment Agency - Head Office	June 2017	Bi-Annually
Ramsar Sites		
Natural England	August 2020	Bi-Annually
Sites of Special Scientific Interest		
Natural England	February 2021	Bi-Annually
Special Areas of Conservation		
Natural England	July 2020	Bi-Annually
Special Protection Areas		
Natural England	February 2021	Bi-Annually

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo	
Ordnance Survey	Map data	
Environment Agency	Environment Agency	
Scottish Environment Protection Agency	SEPA	
The Coal Authority	数 The Coal Authority	
British Geological Survey	British Geological Survey	
Centre for Ecology and Hydrology	Centre for Ecology & Hydrology	
Natural Resources Wales	Syfowth System Comme Necesari Necesari Vision	
Scottish Natural Heritage	SCOTTISH HERITAGE	
Natural England	ENGLAND	
Public Health England	Public Health England	
Ove Arup	ARUP	
Stantec UK Ltd	Stantec	



# **Useful Contacts**

Contact	Name and Address	Contact Details	
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk	
2	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk	
3	Environment Agency - Head Office Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409	
4	<b>Ordnance Survey</b> Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk	
5	Cherwell District Council - Environmental Health Department Bodicote House, Bodicote, Banbury, Oxfordshire, OX15 4AA	Telephone: 01295 252535 extn 4511 Fax: 01295 270028 Website: www.cherwell-dc.gov.uk	
6	Oxfordshire County Council County Hall, New Road, Oxford, Oxfordshire, OX1 1ND	Telephone: 01865 792422 Fax: 01865 810106 Email: environmental.services@oxfordshire.gov.uk Website: www.oxfordshire.gov.uk	
7	PointX 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk	
8	Natural England County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk	
-	Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org	
-	Landmark Information Group Limited 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 / Natural Resources Wales / SEPA have a charging policy in place for enquiries.















# Site Sensitivity Map - Slice A



### **Order Details**

 
 Order Number:
 284732938\_1\_1

 Customer Ref:
 12692/LP

 National Grid Reference:
 443390, 240190
 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

## Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

0844 844 9952 0844 844 9951 www.envirocheck.co.uk

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A Landmark Information Group Service v50.0 10-Sep-2021 Page 1 of 6

## Industrial Land Use Map



### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF





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A Landmark Information Group Service v50.0 10-Sep-2021 Page 2 of 6



# Flood Map - Slice A



## **Order Details**

 
 Order Number:
 284732938\_1\_1

 Customer Ref:
 12692/LP

 National Grid Reference:
 443390, 240190
 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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A Landmark Information Group Service v50.0 10-Sep-2021 Page 3 of 6



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.

# **Borehole Map - Slice A**



## **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 500

## Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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A Landmark Information Group Service v50.0 10-Sep-2021 Page 4 of 6





**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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A Landmark Information Group Service v50.0 10-Sep-2021 Page 5 of 6



## EA/NRW Suitability Map - Slice A



### **Order Details**

 
 Order Number:
 284732938\_1\_1

 Customer Ref:
 12692/LP

 National Grid Reference:
 443390, 240190
 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

## Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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A Landmark Information Group Service v50.0 10-Sep-2021 Page 6 of 6



# Estimated Soil Chemistry Arsenic - Slice A

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## **Order Details**

Order Details: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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A Landmark Information Group Service v50.0 10-Sep-2021 Page 1 of 5





## **Order Details**

Order Details: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

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A Landmark Information Group Service v50.0 10-Sep-2021 Page 2 of 5





## **Order Details**

Order Details: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

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A Landmark Information Group Service v50.0 10-Sep-2021 Page 3 of 5





## **Order Details**

Order Details: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

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A Landmark Information Group Service v50.0 10-Sep-2021 Page 4 of 5



## Estimated Soil Chemistry Nickel - Slice A



## **Order Details**

Order Details: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

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A Landmark Information Group Service v50.0 10-Sep-2021 Page 5 of 5



# Site Sensitivity Map - Segment A8



### **Order Details**

 
 Order Number:
 284732938\_1\_1

 Customer Ref:
 12692/LP

 National Grid Reference:
 443390, 240190
 Slice: Site Area (Ha): Plot Buffer (m):

А 14.06 100

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

0844 844 9952 0844 844 9951 www.envirocheck.co.uk

A Landmark Information Group Service v50.0 10-Sep-2021 Page 1 of 2



# Site Sensitivity Map - Segment A13



## **Order Details**

 
 Order Number:
 284732938\_1\_1

 Customer Ref:
 12692/LP

 National Grid Reference:
 443390, 240190
 Slice: Site Area (Ha): Plot Buffer (m):

А 14.06 100

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

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A Landmark Information Group Service v50.0 10-Sep-2021 Page 2 of 2

## Geology 1:50,000 Maps Legends

### **Superficial Geology**

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Not Supplied - Holocene
	HEAD	Head	Clay, Silt, Sand and Gravel	Not Supplied - Quaternary

### **Bedrock and Faults**

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	CNL	Chipping Norton Limestone Formation	Limestone, Ooidal	Not Supplied - Bathonian
	FMB	Forest Marble Formation	Limestone and Mudstone, Interbedded	Not Supplied - Bathonian
	WHL	White Limestone Formation	Limestone	Not Supplied - Bathonian
	HYSA	Horsehay Sand Formation	Sandstone	Not Supplied - Bajocian
	NS	Northampton Sand Formation	Sandstone, Limestone and Ironstone	Not Supplied - Aalenian
	WHM	Whitby Mudstone Formation	Mudstone	Not Supplied - Toarcian
	MRB	Marlstone Rock Formation	Ferruginous Limestone and Ironstone	Not Supplied - Pliensbachian
	DYS	Dyrham Formation	Siltstone and Mudstone, Interbedded	Not Supplied - Pliensbachian
	CHAM	Charmouth Mudstone Formation	Mudstone	Not Supplied - Sinemurian
/		Faults		

# Intégral

## Géotechnique

### Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps. The various geological layers - artificial and landslip deposits, superficial

geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

### Geology 1:50,000 Maps Coverage

Map ID:	1	
Map Sheet No:	201	
Map Name:	Banbury	
Map Date:	1982	
Bedrock Geology:	Available	
Superficial Geology:	Available	
Artificial Geology:	Available	
Faults:	Not Supplie	ed
Landslip:	Available	
Rock Segments:	Not Supplie	ed

### Geology 1:50,000 Maps - Slice A



**Order Details:** Order Number: Customer Reference: 284732938\_1\_1 12692/LP National Grid Reference: 443390, 240190 Slice: A 14.06 Site Area (Ha): Search Buffer (m): 500 Site Details: Withycombe Farm, Bretch Hill, Banbury, OX16 1JF Tel: Fax: Web: 0844 844 9952 0844 844 9951 Landmark

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### Artificial Ground and Landslip

Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

### Artificial ground includes:

- Made ground man-made deposits such as embankments and spoil heaps on the natural ground surface.
  Worked ground - areas where the ground has been cut away such as
- Worked ground areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground areas where the ground has been cut away then wholly or partially backfilled.

 Landscaped ground - areas where the surface has been reshaped.
 Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.





 Order Details:

 Order Number:
 284732938\_1\_1

 Customer Reference:
 12692/LP

 National Grid Reference:
 443390, 240190

 Slice:
 A

 Site Area (Ha):
 14.06

 Search Buffer (m):
 500

 Site Details:
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v15.0 10-Sep-2021

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### **Bedrock and Faults**

Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.





Order Details: Order Number: Customer Reference: National Grid Reference: Slice: Site Area (Ha): Search Buffer (m):	284732938_1_1 12692/LP 443390, 240190 A 14.06 500	
Site Details: Withycombe Farm, Bretch H	-lill, Banbury, OX16	1JF
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### **Combined Surface Geology**

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

### Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

### Contact

British Geological Survey Kingsley Dunham Centre Keyworth Nottingham NG12 5GG Telephone: 0115 936 3143 Fax: 0115 936 3276 email: enquiries@bgs.ac.uk website: www.bgs.ac.uk

### **Combined Geology Map - Slice A**



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Historical Mapping Legends			
Ordnance Survey County Series 1:10,560	Ordnance Survey Plan 1:10,000	1:10,000 Raster Mapping	

### Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:10,560	1887	2
Warwickshire	1:10,560	1889	3
Oxfordshire	1:10,560	1900	4
Oxfordshire	1:10,560	1923	5
Oxfordshire	1:10,560	1938	6
Oxfordshire	1:10,560	1938	7
Historical Aerial Photography	1:10,560	1948	8
Ordnance Survey Plan	1:10,000	1955	9
Ordnance Survey Plan	1:10,000	1968	10
Ordnance Survey Plan	1:10,000	1980 - 1983	11
Ordnance Survey Plan	1:10,000	1992 - 1995	12
10K Raster Mapping	1:10,000	1999	13
10K Raster Mapping	1:10,000	2006	14
VectorMap Local	1:10,000	2021	15
			-

### Historical Map - Slice A



### **Order Details**

Order Number: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

### Site Details

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### Oxfordshire

### **Published 1887**

### Source map scale - 1:10,560

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



National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### Site Details

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### Warwickshire

### Published 1889

### Source map scale - 1:10,560

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



### Historical Map - Slice A



### **Order Details**

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### Site Details

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### Oxfordshire

### Published 1900

### Source map scale - 1:10,560

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### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

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### Oxfordshire

### Published 1923

### Source map scale - 1:10,560

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### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP Α 14.06 500

### Site Details

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### Oxfordshire

### Published 1938

### Source map scale - 1:10,560

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

### Map Name(s) and Date(s)



### Historical Map - Slice A



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### Oxfordshire

### Published 1938

### Source map scale - 1:10,560

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







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## **Historical Aerial Photography** Published 1948

### Source map scale - 1:10,560

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

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### Map Name(s) and Date(s)



### **Historical Aerial Photography - Slice A**



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 500

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### **Ordnance Survey Plan**

### Published 1955

### Source map scale - 1:10,000

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### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### **Ordnance Survey Plan**

### Published 1968

### Source map scale - 1:10,000

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



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP Α 14.06 500

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### **Ordnance Survey Plan** Published 1980 - 1983 Source map scale - 1:10,000

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

### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### **Ordnance Survey Plan** Published 1992 - 1995 Source map scale - 1:10,000

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

### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### **10k Raster Mapping**

### Published 1999

### Source map scale - 1:10,000

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

### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### Site Details

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### **10k Raster Mapping**

### Published 2006

### Source map scale - 1:10,000

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

### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### VectorMap Local

### Published 2021

### Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

### Map Name(s) and Date(s)



### Historical Map - Slice A



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 500

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Historical Mapping Legends			
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500	Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250	Large-Scale National Grid Data 1:2,500 and 1:1,250	

### Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:2,500	1882	2
Oxfordshire	1:2,500	1900	3
Oxfordshire	1:2,500	1922	4
Ordnance Survey Plan	1:1,250	1967	5
Ordnance Survey Plan	1:2,500	1973	6
Additional SIMs	1:1,250	1983	7
Additional SIMs	1:2,500	1984	8
Additional SIMs	1:2,500	1990	9
Additional SIMs	1:1,250	1990	10
Large-Scale National Grid Data	1:2,500	1993	11
Large-Scale National Grid Data	1:1,250	1993	12
Historical Aerial Photography	1:2,500	1999	13

### Historical Map - Segment A8



### **Order Details**

Order Number: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF





### Oxfordshire

### Published 1882

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



### **Historical Map - Segment A8**



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### Site Details

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### Oxfordshire

### Published 1900

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



### **Historical Map - Segment A8**



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### Oxfordshire

### Published 1922

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



### **Historical Map - Segment A8**



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### Ordnance Survey Plan

### Published 1967

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A8



### **Order Details**

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### Ordnance Survey Plan

### Published 1973

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



### **Historical Map - Segment A8**



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

0844 844 9952 0844 844 9951 www.envirocheck.co.uk

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### **Additional SIMs**

### Published 1983

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A8



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

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### **Additional SIMs**

### Published 1984

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



-

### Historical Map - Segment A8



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

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### **Additional SIMs**

### Published 1990

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



-

### Historical Map - Segment A8



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF





### **Additional SIMs**

### Published 1990

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A8



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF





### Large-Scale National Grid Data

### Published 1993

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



### **Historical Map - Segment A8**



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

### Large-Scale National Grid Data

### Published 1993

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A8



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

# **Historical Aerial Photography**

### Published 1999

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

### Historical Aerial Photography - Segment A8



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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Historical Mapping Legends			
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500	Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250	Large-Scale National Grid Data 1:2,500 and 1:1,250	

### Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Oxfordshire	1:2,500	1882	2
Oxfordshire	1:2,500	1900	3
Oxfordshire	1:2,500	1922	4
Ordnance Survey Plan	1:1,250	1967	5
Ordnance Survey Plan	1:1,250	1971	6
Ordnance Survey Plan	1:2,500	1973	7
Additional SIMs	1:1,250	1977 - 1990	8
Additional SIMs	1:1,250	1990	9
Large-Scale National Grid Data	1:1,250	1993	10
Historical Aerial Photography	1:2,500	1999	11
			•

### Historical Map - Segment A13



### **Order Details**

Order Number: 284732938\_1\_1 Customer Ref: 12692/LP National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF





### Oxfordshire

### Published 1882

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s) \_ \_ \_ \_ \_ \_ -1/ 1/ 11 005\_12 1882 1:2,500 11 11 11 . \_ \_ \_ \_ \_ \_ \_ -Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

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### Oxfordshire

### Published 1900

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s) \_ \_ \_ \_ \_ -1/ 1/ 11 005\_12 1900 1:2,500 11 11 11 . \_ \_ \_ \_ \_ \_ \_ -Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

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### Oxfordshire

### Published 1922

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s) \_ \_ \_ \_ \_ \_ \_ \_ \_ -1/ 1/ 11 005\_12 1922 1.2,500 11 11 11 . \_ \_ \_ \_ \_ \_ \_ -



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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### **Ordnance Survey Plan**

### Published 1967

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### Site Details

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### **Ordnance Survey Plan**

### Published 1971

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF





### Ordnance Survey Plan

### Published 1973

### Source map scale - 1:2,500

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

### Map Name(s) and Date(s)



### Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

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### Site Details

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### **Additional SIMs**

### Published 1977 - 1990

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP Α 14.06 100

### Site Details

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### **Additional SIMs**

### Published 1990

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

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### Large-Scale National Grid Data

### Published 1993

### Source map scale - 1:1,250

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

### Map Name(s) and Date(s)



### Historical Map - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



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### **Historical Aerial Photography**

### Published 1999

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

### Historical Aerial Photography - Segment A13



### **Order Details**

Order Number: Customer Ref: National Grid Reference: 443390, 240190 Slice: Site Area (Ha): Search Buffer (m):

284732938\_1\_1 12692/LP А 14.06 100

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:

### **Envirocheck**<sup>®</sup> Report:

### Mining and Ground Stability Datasheet

### **Order Details:**

### Order Number: 284732938\_1\_1

### Customer Reference: 12692/LP

### National Grid Reference: 443390, 240190

Slice: A

#### Site Area (Ha): 14.06

Search Buffer (m): 500

### Site Details:

Withycombe Farm Bretch Hill Banbury OX16 1JF

### **Client Details:**

MR H Pritchard Integral Geotechnique Integral House 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX



### Contents

Report Section and Details	Page Number		
Summary	-		
The Summary section provides an overview of the data contained within the report, detailing th or the existence of a data set in relation to the buffer selected. For ease of reference, the report is broken down into 4 sections of data; Mining and Natural Ca Use Information (1:2,500), Historical Land Use Information (1:10,000) and Ground Stability Data	e number of data set features vities Data, Historical Land a (1:50,000).		
Mining and Natural Cavities Data	1		
The Mining and Natural Cavities Data section features data sets related to the existence of mir hazards; and details of naturally formed cavities. Data sets within this section are not plotted, with the exception of BGS Recorded Mineral Sites which feature on the Historical Land Use Information (1:10,000) map.	ing areas and their potential and Potential Areas		
Historical Land Use Information (1:2,500)	-		
The Historical Land Use Information (1:2,500) section contains data captured from analysis carried out by Landmark of 1:1,250 and 1:2,500 scale historical Ordnance Survey mapping, identifying areas where, historically, the land uses were potentially contaminative. For the purpose of this Envirocheck module, only historical data relating to mining and ground stability has been included and plotted on the corresponding Historical Land Use Information (1:2,500) map. This section also includes the Subterranean Features data set, which details various man-made and man-used underground spaces obtained from the Subterranea			
Historical Land Use Information (1:10,000)	2		
The Historical Land Use (1:10,000) section covers data captured from the systematic analysis carried out by Landmark of 1:10, 560 and 1:10,000 scale historical Ordnance Survey mapping dating back to the mid-19th century, identifying potentially contaminative past industrial land uses. For the purpose of this Envirocheck module, only data relating to mining and ground stability has been included and plotted			
For the purpose of this Envirocheck module, only data relating to mining and ground stability has on the accompanying Historical Land Use Information (1:10,000) map.	as been included and plotted		
For the purpose of this Envirocheck module, only data relating to mining and ground stability has on the accompanying Historical Land Use Information (1:10,000) map. Ground Stability Data (1:50,000)	as been included and plotted 3		
For the purpose of this Envirocheck module, only data relating to mining and ground stability his on the accompanying Historical Land Use Information (1:10,000) map. Ground Stability Data (1:50,000) The Ground Stability (1:50,000) section includes the BGS Geosure data suite, reporting features separate maps. Also reported is brine subsidence, brine mining and salt mining data sets, of w Mining Related Features are plotted, and subsidence insurance claims and insurance investiga plotted.	as been included and plotted  3 es to 250m and plotted onto 3 hich Brine Pumping and Salt tions data, which is not		
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#### Report Version v53.0

### Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m
Mining and Natural Cavities Data				
BGS Recorded Mineral Sites	pg 1			2
Coal Mining Affected Areas			n/a	n/a
Man Made Mining Cavities				
Mining Instability			n/a	n/a
Natural Cavities				
Non Coal Mining Areas of Great Britain				n/a
Potential Mining Areas				
Historical Land Use Information (1:2,500)				
Extractive Industries or Potential Excavations from 1855-1909 (100m)				n/a
Extractive Industries or Potential Excavations from 1893-1915 (100m)				n/a
Extractive Industries or Potential Excavations from 1906-1937 (100m)				n/a
Extractive Industries or Potential Excavations from 1924-1949 (100m)				n/a
Extractive Industries or Potential Excavations from 1950-1980 (100m)				n/a
Subterranean Features (100m)				n/a
Historical Land Use Information (1:10,000)				
Air Shafts				
Disturbed Ground				
General Quarrying				
Heap, unknown constituents				
Mineral Railway				
Mining & quarrying general				
Mining of coal & lignite				
Quarrying of sand & clay, operation of sand & gravel pits	pg 2			1
Former Marshes				
Potentially Infilled Land (Non-Water)	pg 2			1
Potentially Infilled Land (Water)	pg 2		1	
Ground Stability Data (1:50,000)				
CBSCB Compensation District			n/a	n/a
Brine Pumping Related Features				
Brine Subsidence Solution Area				
Potential for Collapsible Ground Stability Hazards	pg 3	Yes		n/a
Potential for Compressible Ground Stability Hazards	pg 3	Yes		n/a
Potential for Ground Dissolution Stability Hazards	pg 3	Yes		n/a
Potential for Landslide Ground Stability Hazards	pg 3	Yes	Yes	n/a
Potential for Running Sand Ground Stability Hazards	pg 3	Yes		n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 4	Yes	Yes	n/a
Salt Mining Related Features				



Report Version v53.0

### Summary

### **Mining and Natural Cavities Data**

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	BGS Recorded Miner Site Name: E Location: Source: E Reference: 7 Type: C Status: C Operator: C	ral Sites Bretch Farm Pits Neithrop, Banbury, Oxfordshire British Geological Survey, National Geoscience Information Service 74827 Opencast Ceased Unknown Operator Net Supelied	A9NW (E)	302	1	443875 240120
	Operator Location: I Periodic Type: Geology: H Commodity: S Positional Accuracy: L	Not Supplied Jurassic Horsehay Sand Formation Sand Located by supplier to within 10m				
2	BGS Recorded Miner         Site Name:       E         Location:       M         Source:       E         Reference:       T         Type:       O         Status:       O         Operator:       L         Operator Location:       M         Periodic Type:       G         Geology:       M         Positional Accuracy:       L	ral Sites Bretch Farm Pits Neithrop, Banbury, Oxfordshire British Geological Survey, National Geoscience Information Service 74826 Opencast Ceased Unknown Operator Not Supplied Jurassic Northampton Sand Formation (Northampton Sand Ironstone) Sand Located by supplier to within 10m	A9NW (E)	392	1	443985 240010
	Coal Mining Affected	Areas not be affected by coal mining				
	Non Coal Mining Area No Hazard	as of Great Britain				

### Historical Land Use Information (1:10,000)

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Quarrying of sand	& clay, operation of sand & gravel pits				
3	Use: Date of Mapping:	Not Supplied 1923 - 1955	A9NE (SE)	499	-	444075 239880
	Potentially Infilled	Land (Non-Water)				
4	Use: Date of Mapping:	Unknown Filled Ground (Pit, quarry etc) 1992	A9SW (SE)	496	-	444063 239852
	Potentially Infilled	Land (Water)				
5	Use: Date of Mapping:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc) 1955	A8NW (SW)	32	-	443251 239884

### Ground Stability Data (1:50,000)

Map ID	Details	Quadrant Reference (Compass Direction	Estimated Distance From Site	Contact	NGR
	CBSCB Compensation District				
	Brine Subsidence Solution Area				
	The site does not fall within the brine subsidence solution area.				
6	Potential for Collapsible Ground Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Server	ice (S)	0	1	443386 240000
7	Potential for Collapsible Ground Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Serv	ice (NE)	0	1	443386 240194
	Potential for Compressible Ground Stability Hazards           Hazard Potential:         No Hazard           Source:         British Geological Survey, National Geoscience Information Servegical Survey	A8NW ice (NE)	0	1	443386 240194
	Potential for Compressible Ground Stability Hazards           Hazard Potential:         No Hazard           Source:         British Geological Survey, National Geoscience Information Server	A8NW ice (S)	0	1	443386 240000
8	Potential for Ground Dissolution Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Server	A8NE (SE)	0	1	443490 240074
9	Potential for Ground Dissolution Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Server	ice (SE)	0	1	443480 240000
	Potential for Ground Dissolution Stability Hazards           Hazard Potential:         No Hazard           Source:         British Geological Survey, National Geoscience Information Server	ice (NE)	0	1	443386 240194
	Potential for Ground Dissolution Stability Hazards           Hazard Potential:         No Hazard           Source:         British Geological Survey, National Geoscience Information Server	ice (S)	0	1	443386 240000
10	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Server	ice (S)	0	1	443386 240000
11	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Server	A8NW ice (NE)	0	1	443386 240194
12	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Low           Source:         British Geological Survey, National Geoscience Information Server	A8NE (S)	48	1	443481 239902
13	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Low           Source:         British Geological Survey, National Geoscience Information Server	ice (W)	76	1	443184 240187
14	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Moderate           Source:         British Geological Survey, National Geoscience Information Server	ice (W)	150	1	443106 240196
15	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Low           Source:         British Geological Survey, National Geoscience Information Server	ice (SW)	175	1	443023 240000
16	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Server	ice (W)	219	1	443027 240160
17	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Very Low           Source:         British Geological Survey, National Geoscience Information Server	A7NE ice (W)	237	1	443003 240048
18	Potential for Landslide Ground Stability Hazards           Hazard Potential:         Moderate           Source:         British Geological Survey, National Geoscience Information Server	A9SW ice (SE)	250	1	443789 239857
	Potential for Running Sand Ground Stability Hazards           Hazard Potential:         No Hazard           Source:         British Geological Survey, National Geoscience Information Server	A8NW (S)	0	1	443386 240000
	Potential for Running Sand Ground Stability Hazards           Hazard Potential:         No Hazard           Source:         British Geological Survey, National Geoscience Information Server	A8NW ice (NE)	0	1	443386 240194

### Ground Stability Data (1:50,000)

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Shrinl	king or Swelling Clay Ground Stability Hazards				
19	Hazard Potential: Source:	Low British Geological Survey, National Geoscience Information Service	A8NE (S)	0	1	443420 240019
	Potential for Shrinl	king or Swelling Clay Ground Stability Hazards				
20	Hazard Potential: Source:	Low British Geological Survey, National Geoscience Information Service	A8NE (S)	0	1	443394 240000
	Potential for Shrinl	king or Swelling Clay Ground Stability Hazards				
21	Hazard Potential: Source:	Low British Geological Survey, National Geoscience Information Service	A8NE (SE)	9	1	443555 240120
	Potential for Shrini	king or Swelling Clay Ground Stability Hazards				
22	Hazard Potential: Source:	Low British Geological Survey, National Geoscience Information Service	A8NW (W)	47	1	443222 240194
	Potential for Shrinl	king or Swelling Clay Ground Stability Hazards				
23	Hazard Potential: Source:	Low British Geological Survey, National Geoscience Information Service	A13NE (NE)	150	1	443578 240601
	Potential for Shrini	king or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	No Hazard British Geological Survey, National Geoscience Information Service	A8NW (NE)	0	1	443386 240194
	Potential for Shrinl	king or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	No Hazard British Geological Survey, National Geoscience Information Service	A8NW (S)	0	1	443386 240000
	Potential for Shrinl	king or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	No Hazard British Geological Survey, National Geoscience Information Service	A8NE (S)	0	1	443420 240000
	Potential for Shrini	king or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	No Hazard British Geological Survey, National Geoscience Information Service	A8NE (S)	73	1	443394 239865

### **Historical Map List**

#### The following mapping has been analysed for Historical Land Use Information (1:2,500):

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	SP4339	1973
Ordnance Survey Plan	SP4340	1973
Ordnance Survey Plan	SP4340	1973

#### The following mapping has been analysed for Historical Land Use Information (1:10,000):

1:10,560	Mapsheet	Published Date
Oxfordshire	005_00	1887
Warwickshire	055_NE	1892
Oxfordshire	005_NE	1900
Oxfordshire	005_SE	1900
Warwickshire	055_NE	1900
Oxfordshire	005_NE	1923
Oxfordshire	005_SE	1923
Oxfordshire	005_NE	1938
Oxfordshire	005_SE	1938
Warwickshire	055_NE	1938
Ordnance Survey Plan	SP43NW	1955
Ordnance Survey Plan	SP44SW	1955
1:10,000	Mapsheet	Published Date
Ordnance Survey Plan	SP43NW	1992
Ordnance Survey Plan	SP44SW	1995

### **Data Currency**

Mining and Cavities Data	Version	Update Cycle
BGS Recorded Mineral Sites		
British Geological Survey - National Geoscience Information Service	May 2021	<b>Bi-Annually</b>
Coal Mining Affected Areas		
The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Man Made Mining Cavities		
Stantec UK Ltd	May 2021	<b>Bi-Annually</b>
Mining Instability		
Ove Arup & Partners	June 1998	Not Applicable
Natural Cavities		
Stantec UK Ltd	May 2021	<b>Bi-Annually</b>
Non Coal Mining Areas of Great Britain		
British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Historical Land Use Information (1:2,500)	Version	Update Cycle
Subterranean Features		
Landmark Information Group Limited	February 2020	<b>Bi-Annually</b>
Ground Stability Data (1:50,000)	Version	Update Cycle
Ground Stability Data (1:50,000) CBSCB Compensation District	Version	Update Cycle
Ground Stability Data (1:50,000) CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	Version August 2011	Update Cycle As notified
Ground Stability Data (1:50,000) CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB) Potential for Collapsible Ground Stability Hazards	Version August 2011	Update Cycle As notified
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service	Version August 2011 April 2020	Update Cycle As notified Annually
Ground Stability Data (1:50,000) CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB) Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service Potential for Compressible Ground Stability Hazards	Version August 2011 April 2020	Update Cycle As notified Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service	Version August 2011 April 2020 January 2019	Update Cycle As notified Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards	Version August 2011 April 2020 January 2019	Update Cycle As notified Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service	Version August 2011 April 2020 January 2019 January 2019	Update Cycle As notified Annually Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards	Version August 2011 April 2020 January 2019 January 2019	Update Cycle As notified Annually Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service	Version August 2011 April 2020 January 2019 January 2019 January 2019	Update Cycle As notified Annually Annually Annually Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Running Sand Ground Stability Hazards	Version August 2011 April 2020 January 2019 January 2019 January 2019	Update Cycle As notified Annually Annually Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Running Sand Ground Stability Hazards         British Geological Survey - National Geoscience Information Service	Version August 2011 April 2020 January 2019 January 2019 January 2019 January 2019	Update Cycle As notified Annually Annually Annually Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Running Sand Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Running Sand Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Running Sand Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Shrinking or Swelling Clay Ground Stability Hazards	Version August 2011 April 2020 January 2019 January 2019 January 2019 January 2019 January 2019	Update Cycle As notified Annually Annually Annually Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Running Sand Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Shrinking or Swelling Clay Ground Stability Hazards         British Geological Survey - National Geoscience Information Service	VersionAugust 2011April 2020January 2019January 2019January 2019January 2019January 2019January 2019January 2019January 2019	Update Cycle As notified Annually Annually Annually Annually Annually Annually
Ground Stability Data (1:50,000)         CBSCB Compensation District         Cheshire Brine Subsidence Compensation Board (CBSCB)         Potential for Collapsible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Compressible Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Ground Dissolution Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Landslide Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Running Sand Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Shrinking or Swelling Clay Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Shrinking or Swelling Clay Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Shrinking or Swelling Clay Ground Stability Hazards         British Geological Survey - National Geoscience Information Service         Potential for Shrinking or Swelling Clay Ground Stability Hazards	Version August 2011 April 2020 January 2019	Update Cycle As notified Annually Annually Annually Annually Annually Annually

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	Map data
British Geological Survey	British Geological Survey
The Coal Authority	W The Coal Authority
Ove Arup	ARUP
Stantec UK Ltd	Stantec
Wardell Armstrong	your earth dur world
Johnson Poole & Bloomer	<b>IPB</b>

### **Useful Contacts**

Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
-	Landmark Information Group Limited 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



### Historical Land Use Information (1:2,500)

General Specified Site Specified Buffer(s)	K Bearing Ref	erence Point	8 Map ID			
Potentially Contaminative Inc (Extractive Industries Activity	lustrial ( /)	Jses				
	Point	Line	Polygon			
Extractive Industries Activity from 1855 - 1909						
Extractive Industries Activity from 1893 - 1915	5 🔺		$\square$			
Extractive Industries Activity from 1906 - 1937	′ <b>L</b>					
Extractive Industries Activity from 1924 - 1949						
Extractive Industries Activity from 1950 - 1980	) 🔺					
Subterranean Features						
	Point	Line	Polygon			
Subterranean Features						

### Mining and Ground Stability - Segment A8



#### **Order Details**

Order Number:
Customer Ref:
National Grid Reference
Slice:
Site Area (Ha):
Plot Buffer (m):

284732938\_1\_1 12692/LP Ice: 443390, 240190 A 14.06 100

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF





-

### Historical Land Use Information (1:2,500)

General								
🔼 Specified Site	8 Map ID							
Several of Type at Location								
Potentially Contaminative Industrial Uses (Extractive Industries Activity)								
			Point	Line	Polygon			
Extractive Industi	ies Activity from 1855 - 1	909						
Extractive Industr	ies Activity from 1893 - 1	915						
Extractive Industr	ies Activity from 1906 - 1	937						
Extractive Industr	ies Activity from 1924 - 1	949						
Extractive Industi	ies Activity from 1950 - 1	980	4					
Subterranean Features								
			Point	Line	Polygon			
Subterranean Fe	atures							

### Mining and Ground Stability - Segment A13



#### **Order Details**

Order Number:
Customer Ref:
National Grid Reference
Slice:
Site Area (Ha):
Plot Buffer (m):

284732938\_1\_1 12692/LP Ice: 443390, 240190 A 14.06 100

**Site Details** Withycombe Farm, Bretch Hill, Banbury, OX16 1JF



Tel: Fax: Web:



### Historical Land Use Information (1:10,000)

#### General

0	Specified Site	Specified Buffer(s)	Х	Bearing Reference Point	8	Map ID
	Several of Type a	t Location				

### Potentially Contaminative Industrial Uses (Past Land Uses - Mining)

uses - mining)	Point	Line	Polygon
Air Shafts	<b>♦</b>		
Disturbed Ground	•		
General Quarrying	•		
Heap, unknown constituents	•		22
Mineral Railway	<b>♦</b>		
Mining and Quarrying General	•		
Mining of Coal & Lignite	<b>♦</b>		
Quarrying of Sand and Clay, Operation of Sand and Gravel Pits	<b>♦</b>		
Historical Land Use	Point	Line	Polygon
Potentially Infilled Land (Non-Water)	•		
Potentially Infilled Land (Water)	•		
Former Marsh	⊮		

#### Mining Data

Potential Mining Area

BGS Recorded Mineral Site

### Mining and Ground Stability - Slice A



#### **Order Details**

 
 Order Number:
 284732938\_1\_1

 Customer Ref:
 12692/LP

 National Grid Reference:
 443390, 240190
 Slice: Site Area (Ha): Search Buffer (m):

А 14.06 500

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF











### Index Map

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

#### Slice

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

#### Segment

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

#### Quadrant

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

A selection of organisations who provide data within this report:





British Geological Survey



Envirocheck reports are compiled from 136 different sources of data.

### **Client Details**

MR H Pritchard, Integral Geotechnique, Integral House, 7 Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX

### **Order Details**

 Order Number:
 284732938\_1\_1

 Customer Ref:
 12692/LP

 National Grid Reference:
 443400, 240190

 Site Area (Ha):
 14.06

 Search Buffer (m):
 500

### Site Details

Withycombe Farm, Bretch Hill, Banbury, OX16 1JF

Full Terms and Conditions can be found on the following link: http://www.landmarkinfo.co.uk/Terms/Show/515



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

A Landmark Information Group Service v50.0 10-Sep-2021 Page 1 of 1

APPENDIX B

**BGS RADON REPORT** 



LAURA PULLIN INTEGRAL GEOTECHNIQUE (WALES) LTD INTEGRAL GEOTECNIQUE INTEGRAL HOUSE 7 BEDDAU WAY CAERPHILLY CF83 2AX

### Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: BGS\_320346/26331 Client reference: 12692 Banbury



Search location



Contains OS data © Crown Copyright and database right 2021. OS OpenMap Local: Scale: 1:5 000 (1cm = 50 m) Search location indicated in red

This report describes a site located at National Grid Reference 443396, 240198. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.



### Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

- 1. No protective measures
- 2. Basic protective measures
- 3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

### Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective* measures for new buildings (2015 edition), which also provides guidance on what to do if the result indicates that protective measures are required.

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2015 edition) Radon: Guidance on protective measures for new buildings?

### FULL RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2015 Edition).* Additional information and guidance is available from the Building Research Establishment website (<u>http://www.bre.co.uk/radon/).</u>

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The PHE provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.



#### **Radon Affected Area**



% Homes estimated to be at
or above the action level
0-1%
1-3%
3-5%
5-10%
10-30%
30-100%

Scale: 1:10 000 (1cm = 100 m) Search area indicated in red

Is the property in a radon Affected Area as defined by Public Health England (PHE) and if so what percentage of homes are estimated to be above the Action Level? YES

**Additional Information** 

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 10 TO 30% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

PHE recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m<sup>-3</sup>) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to exceed the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a radon problem in the property; the only way to find out whether the radon level is above or below the Action Level is to carry out a radon measurement.



PHE advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels above the Action Level (200 Bq m<sup>-3</sup>) should be remediated. Householders with levels between the Target Level (100 Bq m<sup>-3</sup>) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. PHE provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a "Radon Affected Area" as identified by PHE. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from PHE at <u>www.ukradon.org.</u>



### What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m<sup>-3</sup>). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

### Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293): **Radon in the workplace.** BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.ukwebsite: www.brebookshop.com



### Contact Details

### Keyworth Office

British Geological Survey Environmental Science Centre Nicker Hill Keyworth Nottingham NG12 5GG Tel: 0115 9363143 Email: enquiries@bgs.ac.uk

### Wallingford Office

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### Edinburgh Office

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### Terms and Conditions

#### **General Terms & Conditions**

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  and purpose of data collection, and the age of the resultant material may render it unsuitable for certain
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  as that used in the original compilation of the BGS geological map, and to which the geological linework available
  at that time was fitted.
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Report issued by BGS Enquiry Service

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TRIAL PIT LOGS

Intégral House, 7 Beddau Way Castegate Business Park Castegate Business Park Castegate Business Park Castegate Business Park Castegate Cristiness Park Castegate Cristiness Park Castegate Cristiness Park Castegate Cristiness Park Castegate Business Park Castegate Busines		Project Name: Bretch Hill, Banbury			Project No.: <b>12692</b>	Trial Pit No.: <b>TP01</b> Sheet 1 of 1				
Location:						Logged By:	Scale			
Banbury			Client: Bloor Homes Western			GNS	1:25			
Equipment: JCB 3CX			Coordinates:			Dimensions	1.70m			
Date Excav	ated:	27/09/2021		Level:			Depth : 59 2.40m 6			
Sam	nples & Ir	n-situ Testing	Depth (m)		Legend	Stratum D	escription			
0.10	FS	Results	()			Loose brown slightly clayey sandy slightly grave	elly organic rich SILT. Grave	l is fine to coarse		
0.50	ES		0.20			Loose to medium dense orange brown slightly o fine to coarse sub-angular calcareous sandston	clayey silty slightly gravelly S e.	SAND. Gravel is		
			0.70		x x 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Medium dense to dense orange brown and grey COBBLES and BOULDERS of blocky and sub- coarse sub-angular and sub-rounded sandstone	v slightly sandy very slightly angular ferruginous limestor a.	gravelly ne. Gravel is fine to		
			1.50			Extremely weak light grey and light brown very MUDSTONE. (Recovered as fine to coarse grav mudstone and limestone)	thinly bedded and fissile cal rels and cobbles of sub-ang	careous ular tabular		
								-2		
			2.40			End of Trialp	it at 2.40 m	-3		
								- 4		
								-5		
Remarks: 1. Soil infiltrat	ion test at	tempted in pit	ľ	Groundwa	iter:	No groundwater encountered	D - Small disturbed samp	e		
		Stability:	Stable	in the short term	E - BUIK disturbed sample ES - Environmental soil s W - Water sample	ample AGS				
Int Géotech	Intégral House, 7 Beddau Way Castlegate Business Park Castlegate Business Park Fux. 029 2082176 mail@integraigeotec.com			Project Bretc	Name: <b>h Hill, E</b>	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP02</b> Sheet 1 of 1		
--------------------------------	---	-----------------------------	--------------	------------------	---	---	---	---	--	--
Location:		manifformedt affectier: com					Logged By:	Scale		
Banbury				Client	: Bloc	or Homes Western	GNS	1:25		
Equipment:	JCB 3	BCX		Coordii	nates:		Dimensions	1.70m		
Date Excava	ated:	27/09/2021		Level:			Depth : 50 2.00m 0			
Sam Depth (m)	nples & II Type	n-situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum D	escription			
0.10	ES					Soft brown silty sandy slightly gravelly organic r ferruginous sandstone. (TOPSOIL)	ich CLAY. Gravel is fine to c	oarse sub-angular		
0.40	ES В		0.30		0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 ·	Medium dense becoming dense orange brown and BOULDERS (0.25m x 0.4m) of sub-angular fine to coarse angular and sub-angular ferruging -Slow progress of excavation at base of pit.	slightly silty slightly sandy to and blocky ferruginous lime bus limestone.	sandy COBBLES estone. Gravel is		
			2.00					2		
			2.00			End of Trialp	it at 2.00 m			
								- 3		
								- 4		
Remarks: 1. Soil infiltrati	Remarks:				iter: Stable	No groundwater encountered	Key:       D - Small disturbed sample       B - Bulk disturbed sample       ES - Environmental soil sample       W - Water sample			

Int	Intégral House, 7 Beddau Way Castlegate Business Park Caerphilty CF83 2AX		Project	Name:		Project No.:	Trial Pit No.:			
Géotech	nique	Caerphilly CF83 2AX Tel. 029 20807991		Bretc	h Hill, E	Banbury	12692	TP03		
	C. C.	mail@integralgeotec.com						Sheet 1 of 1		
Location:				Client	· Bloc	or Homes Western	Logged By:	Scale		
Banbury							GNS	1:25		
Equipment:	JCB 3	сх		Coordii	nates:		Dimensions	1.70m		
Date Excava	ated:	27/09/2021		Level:			Depth : 50 1.00m 9:			
Sam	ples & Ir	n-situ Testing	Depth		Legend	Stratum D	escription			
Depth (m)	Туре	Results	(11)	(III AOD)		Loose brown and mid brown clayey slightly silty	slightly gravelly organic rich	SAND. Gravel is		
0.10	ES		0.15			Loose to medium dense orange brown slightly s	iL) silty slightly gravelly SAND.	Gravel is fine to		
					^×× × ^×	coarse sub-angular and angular ferruginous lim	estone.	-		
0.40	ES				$\begin{pmatrix} x & x \\ x & x \end{pmatrix}$			-		
			0.60		$\times \times \times \times \times \times \times$			-		
			0.00		×××××	Medium dense to dense slightly silty very slightly blocky and sub-angular sandstone and ferruging	y sandy GRAVEL. Gravel is ous limestone.	fine to coarse		
0.8					×××					
1.00			1.00			Dense orange brown and grey slightly slity slig BOULDERS of blocky and sub-angular ferrugin	htly sandy slightly gravelly C ous limestone. Gravel is fine	OBBLES and to coarse sub-		
1.00						angular terruginous limestone.	adroak			
						End of Trialp	it at 1.00 m	'-		
								-		
								-		
								-		
								-		
								- 2		
								-		
								-		
								-		
								-		
								-		
								-		
								-		
								- 3		
								-		
								- -		
								-		
								-		
								-		
								-		
								-		
								-		
								- - -		
							- 5			
Remarks:	I	1	0	Groundwa	iter:	No groundwater encountered	Key:			
1. Soil infiltrati	ion test at	tempted in pit	ŀ	D4-1-111	0		D - Small disturbed sampl B - Bulk disturbed sample			
			۱ <sup>۵</sup>	Stability:	Stable	e m me snort term	ES - Environmental soil sa W - Water sample	ample AUD		

Int Géotech	Intégral House, 7 Beddau Way Castlegate Business Park Castlegate Business Park Frances Park Frances Park Mathematic Park Frances Park Franc					Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP04</b> Sheet 1 of 1
Location:							Logged By:	Scale
Banbury				Client	:: Bloc	or homes western	GNS	1:25
Equipment:	JCB 3	SCX		Coordii	nates:		Dimensions	1.70m
Date Excava	ated:	27/09/2021		Level:			Depth : 5 1.35m 0 0	
Sam	ples & li	n-situ Testing	Depth (m)		Legend	Stratum D	escription	
0.05	ES		0.20			Loose brown orange brown slightly slity very slit sub-angular ferruginous sandstone and limesto Medium dense orange brown slightly clayey slig sub-angular ferruginous sandstone and limesto Dense orange brown and grey slightly sandy ve BOULDERS (0.25m x 0.3m) of angular and sub limestone. Gravel is fine to coarse sub-angular Solve progress of excavation due to suspected End of Trialp	phtly gravelly SAND. Grave ne. (TOPSOIL) htly gravelly SAND. Gravel ne. -angular and blocky ferrugin ferruginous limestone. bedrock. 	Is time to coarse
Remarks:				Groundwa	ter:	No groundwater encountered	Key:	-4
	lemarks.					e in the short term	D - Small disturbed samp B - Bulk disturbed sample ES - Environmental soil s W - Water sample	ample AGS

Int Géotech	Intégral Castlegate Business Park Castlegate Business Park Ceerphily CF83 2AX Tot. 029 20807991 Fax. 029 2080276 mail@integralgeotec.com			Project Breto	Name: <b>:h Hill, E</b>	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP05</b> Sheet 1 of 1	
Location:		man (grinte) a george serie					Logged By:	Scale	
Banbury				Clien	(: Bioc	or Homes Western	GNS	1:25	
Equipment:	JCB 3	BCX		Coordi	nates:		Dimensions	1.70m	
Date Excava	ated:	27/09/2021		Level:			Depth : 500 1.40m 600		
Sam	ples & Ir	n-situ Testing	Depth (m)		Legend	Stratum D	escription		
Depth (III)	туре	Nesuits	()			Loose brown and orange brown slightly silty ver coarse sub-angular ferruginous sandstone and	y slightly gravelly SAND. Gr limestone. (TOPSOIL)	ravel is fine to	
0.20	ES		0.25		× × × ×	Medium dense orange brown and light brown lo gravelly SAND. Gravel is fine to coarse sub-ang	cally red brown slightly silty Jular ferruginous sandstone	very slightly . and limestone.	
0.50	ES								
0.70	В		0.65			Medium dense becoming dense orange brown slightly gravelly COBBLES and BOULDERS of	and grey very slightly silty ve	ery slightly sandy _ uginous shelly _	
						limestone. Gravel is fine to coarse angular and a	sub-angular ferruginous lime edrock	estone.	
								- 1 - - -	
			1 40					-	
	1.					End of Trialp	it at 1.40 m		
								-	
								-	
								- 2	
								-	
								-	
								-	
								- 3	
								-	
								- - -	
								-	
								- 4	
								- - -	
								-	
								- 5	
Remarks:			C	Groundwa	ater:	No groundwater encountered	Key: D - Small disturbed sampl	e	
			\$	Stability:	Stable	e in the short term	B - Bulk disturbed sample ES - Environmental soil sa W - Water sample	ample AGS	

In Géotech	<b>tégral</b> nnique	Intégral House, 7 Beddau W Castlegate Business Park Ceerphilly CF83 2AX Tol. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com	lay	Project Bretc	Name: h Hill, E	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP06</b> Sheet 1 of 1
Location:		nangen og ag en er or er					Logged By:	Scale
Banbury				Client	:: Bloc	or Homes Western	GNS	1:25
Equipment:	JCB 3	BCX		Coordii	nates:		Dimensions	2.10m
Date Excav	ated:	27/09/2021	1	Level:			Depth : 5 1.40m 0	
Sam Depth (m)	nples & l Type	n-situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum D	escription	
Depth (m) 0.10 0.50 0.90	Type ES ES B	Results	(m) 0.30 1.10 1.40			Soft brown silty slightly sandy slightly gravelly o angular ferruginous limestone and rare brick. (T Stiff brown slightly silty slightly gravelly CLAY. G ferruginous sandstone. Dense grey and orange brown slightly clayey sl (0.2m x 0.2m) of blocky and sub-rounded ferrug angular and sub-rounded ferruginous limestone 	ightly gravelly COBBLES At inous limestone. Gravel is f it at 1.40 m	Tine coarse sub- angular and blocky - 1 ND BOULDERS Tine to coarse sub- - 2
Remarks:				Groundwa	ter:	No groundwater encountered	Key:	-4
			S	Stability:	Stable	in the short term	D - Small disturbed samp B - Bulk disturbed sample ES - Environmental soil s W - Water sample	ample AGS

Intégral House, 7 Beddau Way Castegate Business Park Castegate Business Park Castegate Business Park Castegate Business Park Castegate Business Park Castegate Business Park Tel: 029 20862176 mai/Sintegatieedite.com	Projec Breto	t Name: ch Hill, E	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP07</b> Sheet 1 of 1
Location:				Logged By:	Scale
Banbury	Clien	t: Bloo	or Homes Western	GNS	1:25
Equipment: JCB 3CX	Coordi	inates:		Dimensions	2.10m
Date Excavated: 27/09/2021	Level:			Depth : 6 1.40m 0 	
Samples & In-situ Testing De Depth (m) Type Results (	pth Level n) (m AOD	Legend	Stratum D	escription	
0.10 ES			Loose orange brown sandy organic rich slightly angular ferruginous limestone and occasional c	gravelly SILT. Gravel is fine eramic and earthenware. (T	to coarse sub- OPSOIL)
0	30		Loose orange brown slightly gravelly SAND. Gr sandstone and limestone.	avel is fine to coarse sub-an	ngular ferruginous
0.50 ES 0	50		Medium dense to dense orange brown and ligh GRAVEL. Gravel is fine to coarse angular and s	brown and grey slightly silt ubangular ferruginous limes	y slightly sandystone.
0	80		Dense orange brown and grey slightly silty sand (0.2m x 0.2m) of blocky and sub-angular ferrugi	ly slightly gravelly COBBLE nous shelly limestone. Grav	S and BOULDERS . rel is fine to coarse
1.00 B			sub-angular ferruginous limestoneVery slow progress of excavation.		- 1 -
					- - - -
			End of Triajp	it at 1.40 m	-4
Remarks:	Groundwa Stability:	ater: Stable	No groundwater encountered	Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sa	e AGS

Inte Géotechr	Intégral Castingate Business Park Castingate Business Park Castingate Business Park Castingate Business Park Castingate Business Park Castingate Business Park Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com			Project Bretc	Name: h Hill, E	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP08</b>		
Controlin	nquu	mail@integralgeotec.com						Sheet 1 of 1		
Location:				0:			Logged By:	Scale		
Banbury				Client	: Bloc	or Homes Western	GNS	1:25		
Equipment:	JCB 3	CX		Coordin	nates:		Dimensions	2.00m		
Date Excavat	ted:	27/09/2021		Level:			Depth : E 2.00m ::			
Samp	oles & Ir	n-situ Testing	Depth		Legend	Stratum D	escription			
0.10	ES		0.20			eramic and earthenware. (T EL. with occasional cobbles sub-angular ferruginous sar by very slightly sandy slightly b-angular and angular ferru b-angular ferruginous cryst edrock	OPSOIL) of sub-angular ndstone. 1 y gravelly uginous shelly and alline limestone. 2			
								-3		
Remarks:	Remarks:					No groundwater encountered e in the short term	Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sa W - Water sample	ample		

Int Géotechi	Intégral House, 7 Beddau Way Castiegate Business Park Castiegate Busine			Project Bretc	Name: <b>h Hill, E</b>	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP09</b> Sheet 1 of 1
Location:				Client	· Plor	or Homos Western	Logged By:	Scale
Banbury				Client			GNS	1:25
Equipment:	JCB 3	SCX		Coordii	nates:		Dimensions	1.70m
Date Excava	ted:	27/09/2021		Level:			Depth : 6 2.10m 0	
Samp	oles & Ir	n-situ Testing	Depth (m)	Level (m AOD)	Legend	Stratum D	escription	
Depth (m)	Type	Results	(m) 0.25 1.80 2.10			Loose orange brown slightly silty slightly gravell sub-angular ferruginous sandstone and limestor angular and sub-angular ferruginous sandstone -Frequent cobbles of blocky sub-angular ferrugi Dense orange brown and light brown and grey s BOULDERS (0.2m x 0.3m) of blocky sub-angula -Slow progress of excavation -End of friaip	y SAND. Gravel is fine to cone. (TOPSOIL) / GRAVEL. Gravel is fine to cone of the cone of	parse rounded to coarse blocky and m ly COBBLES and d sandstone. 2 3
Remarks:			G	 Groundwa	iter: Stable	No groundwater encountered	Key:           D - Small disturbed sample           B - Bulk disturbed sample           FS - Environmental cell	
				,			W - Water sample	

Int Géotech	é <b>gral</b> nique	Intégral House, 7 Beddau W Castlegate Business Park Caerphilly CF83 2AX Tol. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com	ay	Project Bretc	Name: Th Hill, E	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP10</b> Sheet 1 of 1
Location:							Logged By:	Scale
Banbury				Client	I: Bloc	or Homes Western	GNS	1:25
Equipment:	JCB 3	BCX		Coordi	nates:		Dimensions	2.00m
Date Excava	ated:	28/07/2021		Level:			Depth : 6 2.20m c	
Sam Depth (m)	ples & li Type	n-situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum De	escription	
0.10	ES		0.30			Soft brown silty slightly sandy slightly gravelly or rounded and sub-rounded sandstone and rare a Firm orange brown slightly silty very slightly sand angular sandstone.	ganic rich CLAY. Gravel is i ngular brick and ceramic. ( dy slightly gravelly CLAY. G	ine to coarse FOPSOIL) iravel is fine sub-
1.00	В		0.70			Stiff light brown and mottled grey slightly silty fis	sured CLAY.	- 1
			1.60 2.10 2.20			Stiff blue grey and mottled orange brown slightly dense brown silty SAND. Weak orange brown thinly bedded and fissile for MUDSTONE and LIMESTONE. End of Trialpi	silly CLAY with occasional	lenses of medium
								3
								- 4
Remarks: 1. Soil infiltrati	ttempted in pit	•	Groundwa Stability:	ater: Stable	No groundwater encountered	Key: D - Small disturbed sampl B - Bulk disturbed sample ES - Environmental soil sa W - Water sample	ample AGS	

Int Géotech	t <b>égral</b> nique	Integral House, 7 Beddau W Castlegate Business Park Caerphilly CF83 2AX Tol. 029 20807991 Fax. 029 20862176	ay	Project Breto	t Name: <b>:h Hill, E</b>	Banbury	Project No.: <b>12692</b>	Tria <b>T</b>	al Pit No.: <b>P11</b>	
Location:	- NG	mail@integralgeotec.com					Logged By:	She	eet 1 of 1 Scale	
Banbury				Client	t: Bloo	or Homes Western	FG		1:25	
Equipment:	JCB 3	BCX		Coordi	nates:		Dimensions	2.50	)m	
Date Excava	ated:	28/07/2021		l evel:			Depth : 5			
Same Same			<u> </u>							
Depth (m)	Type	Results	Depth (m)	(m AOD	) Legend	Stratum D	escription			
0.20	0.20 ES 0.40					Firm grey blue and mottled orange brown slight fine to medium sub-angular firm grey blue and mottled orange brown slight	y silty sandy slightly gravell	y CLAY. G	ravel is -	
			1.80			Firm grey dark blue and mottled orange brown a fine sub-angular ferruginous limestone and muc	slightly silty slightly gravelly Istone.	CLAY. Gra	vel is	
			3.40			End of Trialp	it at 3.40 m		-3	
									- 4	
Remarks:		1		Groundwa	ater:	No groundwater encountered	Key:			
			ļ	o		·	D - Small disturbed sampl B - Bulk disturbed sample	D - Small disturbed sample B - Bulk disturbed sample		
				Stability:	Stable	e in the short term	ES - Environmental soil sa W - Water sample	ample	AGS	

Intégral House, 7 Beddau Way Castingate Business Park Castinity CF83 2AX Control Control Contr			Project	Name:		Project No.:	Trial Pit No.:			
Géotech	nique	Tel. 029 20807991 Fax. 029 20862176		Breto	h Hill, E	Banbury	12692	TP12		
Location:		maik@integralgeotec.com					Logged By:	Sheet 1 of 1 Scale		
Banbury				Client	: Bloc	or Homes Western	GNS	1:25		
Equipment:	JCB 3	BCX		Coordi	nates:		Dimensions	2.20m		
Date Excava	ated:	28/07/2021		Level:			Depth : 5 3.20m 0			
Sam	ples & li	n-situ Testing	Depth	Level	Logond	Ctratum D				
Depth (m)	Туре	Results	(m)	(m AOD)	Legend	Stratum of Soft brown silty slightly sandy slightly gravelly o	rganic rich CLAY. Gravel is	fine to coarse sub-		
0.60	ES		0.30			Soft brown slity slightly sandy slightly gravely o angular and sub-rounded limestone. (TOPSOIL MADE GROUND: Medium dense brown slightly medium sub-angular sandstone, limestone and Medium dense light grey beige and orange brow and medium angular and sub-angular extremely -Grading into poorly cemented sandstone below	ranic rich CLAY. Gravei is silty slightly gravelly SAND rare brick and ash.	. Gravel is fine and .D. Gravel is fine - 2		
			3.20			End of Trialp	it at 3.20 m	-3		
								- 4		
<b>Remarks:</b> 1. Soil infiltrati	temarks: . Soil infiltration test attempted in pit				iter: Stable	No groundwater encountered	Key: D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sa W - Water sample	ample		

Intég	Intégral House, 7 Beddau Way Castlegate Business Park Castlegate Business Park			Project Bretc	Name: h Hill, E	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP13</b>		
Geotechnie	que	Fax. 029 20862176 mail@integralgeotec.com				-		Sheet 1 of 1		
Location:							Logged By:	Scale		
Banbury				Client	:: Bloc	or Homes Western	GNS	1:25		
Equipment: J	JCB 30	cx		Coordi	nates:		Dimensions	2.20m		
Date Excavated	d: 2	28/07/2021		Level:			Depth : 50 1.45m 6			
Sample Depth (m) T	s & In vpe	-situ Testing Results	Depth (m)	Level (m AOD)	Level Legend Stratum Description					
0.10	ES		. ,			Loose brown silty slightly gravelly organic rich S and sub-rounded ferruginous limestone. (TOPS	AND. Gravel is fine to coars OIL)	se sub-angular		
			0.25		× × ×	Loose orange brown slightly silty gravelly SANE	. Gravel is fine to coarse ar	ngular ferruginous		
	0.50				× × × × × × ×	limestone.		- - -		
			0.50		e . 0	Medium dense to dense orange brown slightly s sub-angular ferruginous limestone.	ilty slightly sandy GRAVEL	and COBBLES of		
						-Becoming dense				
					a ° ° ° 0 ° ° ° 0	-Very slow progress of excavation below 1.4m E	GL	-		
								- 1		
				9 ° 9 ° 0 9 ° 9 ° 0			-			
		1 45								
						End of Thaip	itat 1.45 m			
								-		
								-2		
								-		
								- - -		
								-		
								-		
								-		
								- 3		
								-		
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								- - -		
								- 4		
								-		
								-		
								-		
								-		
								- 5		
Remarks:				 Groundwa	ter:	No groundwater encountered	Key:			
	temarks:					e in the short term	D - Small disturbed sampl B - Bulk disturbed sample ES - Environmental soil sa W - Water sample	e AGS		

Intégra Géotechnique	Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF63 2AX Tel. 029 20807991 Ess. 029 20807991		Project Bretc	Name: <b>h Hill, I</b>	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP14</b>
	mail@integralgeotec.com						Sheet 1 of 1
Location:			Cliont	· Plo	ar Homoo Western	Logged By:	Scale
Banbury			Client	. םוטי		FG	1:25
Equipment: JCB	3CX		Coordi	nates:		Dimensions	2.60m
Date Excavated:	28/07/2021		Level:			Depth : 5 3.50m c	
Samples & I Depth (m) Type	n-situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum De	escription	
Depth (m) Type	Kesuits	0.50 2.55 3.50			Loose brown and orange brown slightly clayey s sub-angular and sub-rounded ferruginous cryster Stiff blue grey mottled yellow brown silty CLAY.	lightly gravelly SILT. Grave ulline limestone and mudsto	Lis fine to coarse ne. (TOPSOIL)
Remarke:		1	Froundwa	ler:	No groundwater encountered	Kov	
remarks:		s	Stability:	Stabl	e in the short term	D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sa	ample AGS
						vv - vvater sample	

Int Géotech	tégral inique	Intégral House, 7 Beddau V Castlegate Business Park Caerphilly CF83 2AX Tot. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com	Vay	Project Breto	t Name: <b>:h Hill, I</b>	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP15</b> Sheet 1 of 1
Location:				Client			Logged By:	Scale
Banbury				Client	I: BIO	or homes western	FG	1:25
Equipment:	JCB 3	BCX		Coordi	nates:		Dimensions	2.60m
Date Excava	ated:	28/07/2021		Level:			Depth : 5 2.60m 0	
Sam Depth (m)	ples & li Type	n-situ Testing Results	Depth (m)	Level (m AOD	Legend	Stratum D	escription	
Depth (m)	Туре	Results	(m) 0.40 1.70 2.30 2.60			Soft brown and orange brown silty sandy CLAY Firm to stiff orange brown slightly silty sandy sli sub-angular ferruginous limestone and mudstor Stiff blue grey and mottled orange brown silty C Dense light brown and orange brown and grey Gravel is fine to coarse angular and sub-angula limestone. End of Triat	T(TOPSOIL)  ghtly gravelly CLAY. Gravel te.  LAY.  slightly clayey very slightly s ir calcareous shell fragment it at 2.60 m	is fine and medium
Remarks:				Groundwa	ater:	No groundwater encountered	Key:	-5
			S	Stability:	Gene and b	rally stable with local instability associated with cot oulder removal	D - Small disturbed samp B - Bulk disturbed sample ES - Environmental soil s W - Water sample	ample AGS

Int Géotech	t <b>égral</b> nique	Intégral House, 7 Beddau V Castlegate Business Park Caerphilly CF83 2AX Tol. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com	lay	Project Bretc	Name: h Hill, E	Banbury	Project No.: <b>12692</b>	Trial Pit No.: <b>TP16</b> Sheet 1 of 1
Location:				Client	· Bloc	or Homos Western	Logged By:	Scale
Banbury				Client	. Dioc		GNS	1:25
Equipment:	JCB 3	SCX		Coordii	nates:		Dimensions	2.00m
Date Excava	ated:	28/07/2021		Level:			Depth : 59 3.50m 0	
Sam Depth (m)	ples & li Type	n-situ Testing Results	Depth (m)	Level (m AOD)	Legend	Stratum D	escription	
						Loose brown silty slightly gravelly organic rich S	SAND. (TOPSOIL)	
			0.20			Medium dense orange brown slightly silty sandy ferruginous sandstone. Gravel is fine to coarse sandstone.	GRAVEL with frequent cob sub-angular and sub-rounde	DOBBLES and 1
			1.00			Medium dense to dense orange brown slightly s BOULDERS (0.25m x 0.4m) of ferruginous sand and sub-rounded ferruginous sandstone.	silty slightly sandy gravelly C	DBBLES and rse sub-angular
Romarke			3.50		<u>, a×. ∘ ă, 'β</u> ,	End of Trialp	it at 3.50 m	- 4
Remarks:			G	Groundwa	iter:	No groundwater encountered	<b>Key:</b> D - Small disturbed sampl	e D
			S	Stability:	Stable	e in the short term	B - Bulk disturbed sample ES - Environmental soil sa W - Water sample	AGS

Int	tégral	Intégral House, 7 Beddau W Castlegate Business Park Caerphilly CF83 2AX	ay	Project Broto	Name:	Banhury	Project No.:	Trial Pit No.:
Géotech	inique	Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Dieto	л <b>пш,</b> 1	Ballbury	12052	<b>IP1/</b> Sheet 1 of 1
Location:		mental market and a second second					Logged By:	Scale
Banbury				Client	: Blo	or Homes Western	GNS	1:25
Equipment:	JCB 3	CX		Coordi	nates:		Dimensions	2.80m
Date Excava	ated:	28/07/2021		Level:			Depth : 50 3.50m 0.	
Sam	ples & Ir	n-situ Testing	Depth (m)		Legend	Stratum D	escription	
Deptil (III)	туре	Nesuits	()	(		Loose brown slightly clayey silty organic rich SA	AND. (TOPSOIL)	
			0.20			Loose orange brown slightly silty SAND.		
0.50	ES		0.60			Firm to stiff light brown and mottled grey slightly bands (<50mm) of ferruginous limestone.	silty CLAY with localised s	ubordinate thin
								- 1
								2
			2.50			Extremely weak very thinly bedded and thinly la MUDSTONE / SILTSTONE. (Recovered as fine sub-angular MUDSTONE / SILTSTONE) -Locally Calcareous	minated light grey and orar to coarse gravel and cobbl	nge brown es of tabular and - 3
			3.50			End of Trials	it at 3.50 m	
								4
								- 5
Remarks:		1	् इ	 Groundwa Gtability:	ter: Stabl	No groundwater encountered le in the short term	Key: D - Small disturbed samp B - Bulk disturbed sample ES - Environmental soil s	le AGS
							W - Water sample	

Inf	tégral	Intégral House, 7 Beddau W Castlegate Business Park	aý	Project	Name:		Project No.:	Trial Pit No.:
Géotech	inique	Caerphily CF83 2AX Tel. 029 20807991 Fax. 029 20862176		Bretc	h Hill, I	Banbury	12692	TP18
Location:	S.C	mail@integralgeotec.com					Logged By:	Sheet 1 of 1
Pophuny				Client	: Bloo	or Homes Western		1:25
Ballbury							GNS	1.25
Equipment:	JCB 3	СХ		Coordir	nates:		Dimensions	2.30m
Date Excava	ated: 2	28/07/2021		Level:			Depth : 5 1.20m 0 	
Sam	ples & In	-situ Testing	Depth (m)	Level (m AOD)	Legend	Stratum D	escription	
Deptil (III)	туре	Results	()	(		Loose orange brown silty slightly gravelly SAND	. Gravel is fine to coarse ta	bular and sub-
			0.15			Weak orange brown and grey thin to medium su	b-horizontally bedded fissil	e slightly
						weathered, close to medium sub-vertical, open fossiliferous LIMESTONE.	and regularly jointed and fra	actured ferruginous
						-Local instability associated with boulder and co	bble removal.	-
						-Very slow progress of excavation		-
								-
								-
								- 1
								-
			1.20			End of Trialp	it at 1.20 m	
								-
								-
								-
								-
								-
								- 2
								- -
								-
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								- 3 -
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								-
								-
								-
								- 4
								-
								r F
								-
								-
								- 5
Remarks:	ion test att	empted in pit	0	Groundwa	ter:	No groundwater encountered	Key: D - Small disturbed same	
	יסיו וכסו מוו	omptod in pit	:	Stability:	Stabl	e in the short term	B - Bulk disturbed sample ES - Environmental soil sa W - Water sample	AGS

APPENDIX D

WINDOWLESS SAMPLE LOGS

	Intégra	Intégral H Castlegal Caerphili	louse, 7 Be te Business y CF83 2A0	iddau Way i Park K	Project Nar Bretch F	me: III Ba	anhury	,		Project No.: 12692	Borehole No.:
Géot	echniqu	E Fax. 029 mail@inte	20807991 20862176 agraigented	com	Broton	, De	, instang			12002	Sheet 1 of 1
Locati	on:	maniferiti	-1-0-10018C	6-36 <sup>0011</sup>						Coordinates:	Hole Type:
Banbu	iry				Client:	Bloor	Home	s West	ern		WLS
Equipm	ent: GEC	26			Diameter o	f Casino	J:			Level:	Scale
		-				- 、	, 				1:25
Diamete	er of Boring:	101m	nm		Depth of Ca	asing:				Dates	Logged By:
	Wator		Samples	& In situ Testi	ng	Dopth	Loval		1	27/09/2021 -	GNS
Well	Strikes	Depth (m)	Туре	Res	ults	(m)	(m AOD)	Legend		Stratum Description	
						0.05			Loose brown slightly clay Gravel is fine to coarse s stone. Frequent roots an	vey sandy slightly gravelly or sub-angular and sub-rounded d rootlets. (TOPSOIL)	ganic rich silt. I calcareous mud - - -
						0.20		× · · · ×	Firm to stiff orange brown Gravel is fine to coarse a	n and brown silty sandy sligh Ingular and sub-angular ferru	tty gravelly CLAY. Iginous limestone.
								× ×			- - -
		1.00	C	50 (11,11/50	for 115mm)	1.00				End of Borehole at 1.00 m	
Remarks	5:							Ke	/: Small disturbed sample	W - Water cample	
1). Windo 2). Grour 3) Refus	ow sample fro ndwater not e al of sampling	om GL to 1 ncountered requipmer	.0m BGL. d. nt at 1.0m	BGL.				B - E ES - SPT CPT	Siniar disturbed sample Bulk disturbed sample Environmental soil sample - Standard Penetration Test (split sp - Standard Penetration Test (solid co	vv - vvatet sample U - Undisturbed sample TCR - Total Core Recove SCR - Solid Core Recove One) RQD - Rock Quality Des	ery ery ignation

	Intégra	Intégral H Castlegal	louse, 7 Be te Businese	ddau Way Park	Project Na	me:				Project No.:	Borehole	No.:
Géot	echniqu	Caerphill Tel. 029	y CF83 2A0 20807991	¢	Bretch H	lill, Ba	anbury	/		12692	WS0	2
0000	conniqu	Fax. 029 mail@inte	20862176 egralgeotec	om							Sheet 1 c	of 1
Locati	on:				Client	Bloor	Homo	e Woet	orp	Coordinates:	Hole Typ	be:
Banbu	iry				Chern.	DIOOI	TIOME	5 11031	em		WLS	
Fauinm	ent <sup>.</sup> GEC	0.26			Diameter o	f Casin	<b>n</b> .			l evel:	Scale	
Equipm		20			Diameter	r Odolnų	y.				1:25	
Diamete	er of Boring	: 101m	nm		Depth of C	asing:				Dates	Logged E	Ву:
			Comulas	0 la situ Tasti						27/09/2021 -	GNS	
Well	Water Strikes	Depth (m)	Type	Res	ults	Depth (m)	(m AOD)	Legend		Stratum Description		
XXX									Loose orange brown san fine to coarse sub-angula	ndy slightly gravelly organic r ar ferruginous limestone. (TC	ich SILT. Gravel i: DPSOIL)	s .
												-
						0.30		X, X, X,	Medium dense orange b	rown slightly silty slightly gra	velly SAND.	
								×, ×, ×, ×, ×,		en uginous sanusione anu in	nesione.	-
								× × ×				-
						0.70			Dense orange brown slig	htly clayey silty slightly sand	Jy GRAVEL and	
											estone.	-
		1.00	с	50 (25 for 11	5mm/50 for	1.00		<u>.</u>		End of Borehole at 1.00 m		
	- 1.00 C 5			2001								-
	Water Strikes       Samples & Depth (m)         1.00       C         1.00       C										-	
												-
												-
												-
												-
												-
												- 2
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												- 4
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												-
												-
												-
												-
												- 5
Remarks	s:						•	Key D - S	/: Small disturbed sample	W - Water sample		
1). Windo 2). Grour	ow sample fro ndwater not e	om GL to 1 ncountered	.0m BGL. d.					B - E	Bulk disturbed sample Environmental soil sample	U - Undisturbed sample TCR - Total Core Recov	ery	60
3) Refus	al of sampling	g equipmer	nt at 1.0m	BGL.				SPT CPT	Standard Penetration Test (split sp     Standard Penetration Test (solid co	oon) SCR - Solid Core Recovone) RQD - Rock Quality Des	ery	ao

	Intégr	Intégral H Castlegat	iouse, 7 Be e Business	iddau Way s Park	Project Na	me:				Project No.:	Borehole No.:
Géot	echniqu	Caerphilly Tel. 029 2	CF83 2A)	×	Bretch I	Hill, Ba	anbury	1		12692	WS03
0000	ooningo	Fax. 029 mail@inte	20862176 Igralgeotec	c.com							Sheet 1 of 1
Location	on:				Client	Bloor	Home	e Wast	orn	Coordinates:	Hole Type:
Banbu	ry				Chern.	DIOOI	TIOME	5 11031	em		WLS
Equipm	ont: CEC	26			Diameter	of Casin	л.				Scale
Lquipin		520			Diameter		J.				1:25
Diamete	er of Boring	· 105m	ım		Depth of C	asing.				Dates	Logged By:
										27/09/2021 -	GNS
Well	Water Strikes	Depth (m)	Samples Type	& In situ Testi Res	ng sults	Depth (m)	Level (m AOD)	Legend		Stratum Description	
								XXX	Loose brown and orange Gravel is fine to coarse b	brown slightly silty slightly g	ravelly SAND.
						0.15		× × ×	(TOPSOIL) Medium dense orange br	rown and light brown silty gra	avelly SAND
								$\times \times \times$	Gravel is fine to coarse b	locky and sub-angular ferrug	ginous sandstone.
								×××××			-
								$\hat{\mathbf{x}} \times \hat{\mathbf{x}}$			-
								× × ×			-
								× × ×			-
		1.00	С	N=27 (2,2	/1,7,9,10)			× × × × ×			- - 1
								×××			-
								x × × × ×			-
								$\times \times \times$			-
								$\times \times \times \times$			-
								××××			-
								×,× ×			-
		1.90	С	50 (25 for 8	5mm/50 for	1.90		× ×	` 	End of Borehole at 1.90 m	
				1151	nm)						- 2
											-
											-
											-
											-
											-
											-
											- 3
											-
											-
											-
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											-
											-
											- 4
											-
											- - -
											-
											-
Remarks	5:							Key	 <i>r</i> :		
1). Windo	w sample fr	om GL to 1.	9m BGL.					D - S B - E	Small disturbed sample Bulk disturbed sample	W - Water sample U - Undisturbed sample	
3) Refusa	al of samplin	g equipmen	it at 1.9m	BGL.				ES - SPT CPT	Environmental soil sample - Standard Penetration Test (split spo - Standard Penetration Test (solid co	TCR - Total Core Recove oon) SCR - Solid Core Recove one) RQD - Rock Quality Des	ery AGS

	Intégra	Castlegal Caerphill	touse, 7 Be te Business y CF83 2A	addau Way s Park X	Project Nai	me:	anhun	,		Project No.:		).:
Géot	echniqu	e Fax. 029 mail@inte	20807991 20862176 egralgeotes	com	Dietchii	iiii, Do	anbury			12052	Sheet 1 of 1	1
Locati	on:	mangana	ograngeone.							Coordinates:	Hole Type:	:
Banbu	iry				Client:	Bloor	Home	s West	ern		WLS	
Equipm	ent: Geo	26			Diameter	f Casin	a.			Level:	Scale	
Lquipini	ent. Geo	20			Diameter	r Casing	y.				1:25	
Diamete	er of Boring	: 105m	nm		Depth of C	asing:				Dates	Logged By	:
	Water		Samples	& In situ Testi	ng	Depth	Level			27/09/2021 -	GNS	
Well	Strikes	Depth (m)	Туре	Res	ults	(m)	(m AOD)	Legend	Loose brown and orange	stratum Description		
						0.00			Gravel is fine to coarse b and brick. (TOPSOIL)	locky and sub-angular ferru	ginous sandstone	-
						0.20		× × ×	Loose orange brown slig Gravel is fine to coarse s	htly clayey slightly silty sligh ub-angular ferruginous lime	tly gravelly SAND. stone.	-
								× × ×				-
									- - -			-
									e  			-
								***** *				-
		1.00	С	N=8 (1,1	/3,2,1,2)			× × ×	- - -			- 1
								××××	-			r -
									e - -			-
									2 			-
								××××				-
								× × ×	- 			-
								× × ×				-
		2.00	с	N=7 (1,0	/1,2,1,3)							- 2
									e  			-
								× × ×	- 			-
						2.40		× × ×	Dense orange brown slig	htly silty sandy GRAVEL. G	ravel is fine to	-
								××××				-
		0.00		50 (40 40/50	fan (00mm)	0.00		× × × ×				-
		2.80		50 (12,12/50	for 160mm)	2.80				End of Borehole at 2.80 m		-
												- 3
												-
												-
												-
												-
												-
												- 4
												-
												-
												-
												Ē
												Ę
												È
												- 5
Remarks	5:			1		I	1	L D - S	⊥ <b>/:</b> Small disturbed sample	W - Water sample		
1). Windo 2). Grour 3) Refusa	bw sample fro ndwater not e al of sampling	om GL to 2 incountered g equipmer	.8m BGL d. nt at 2.8m	BGL.				B - E ES - SPT CPT	Bulk disturbed sample Environmental soil sample - Standard Penetration Test (split spr - Standard Penetration Test (solid cc	U - Undisturbed sample TCR - Total Core Recov SCR - Solid Core Recov	ery AG	S

Intó	Intégral Castlega	House, 7 Be te Businese	ddau Way Park	Project Nar	ne:				Project No.:	Borehole No.:	
Géotechni	Tel. 029	y CF83 2A) 20807991	¢	Bretch H	lill, Ba	nbury	,		12692	WS05	
0000001111	mail@in	20862176 egralgeotec	com							Sheet 1 of 1	
Location:				Client <sup>.</sup>	Bloor	Home	e Wast	ern	Coordinates:	Hole Type:	
Banbury				Chern.	DIOOI	TIOME	5 11031	enn		WLS	
Equipment: (	EO 26			Diameter	Casing	N-				Scale	
				Diameter o	Casing	J-				1:25	
Diameter of Bo	ina: 105r	nm		Depth of Ca	asina:				Dates	Logged By:	
					asing.			r	28/09/2021 -	GNS	
Well Water Strike	Depth (m)	Samples Type	& In situ Testi Res	ng ults	Depth (m)	Level (m AOD)	Legend		Stratum Description		
	2.00	C C	N=34 (4,6 N=50 (5,8/50	0/7,9,9,9)	0.15 0.90 2.00			Loose brown and orang SAND. Gravel is fine to limestone. (TOPSOIL) Stiff grey silty slightly sa Medium dense orange b to coarse sub-angular fe	e brown slightly silty very slig coarse sub-angular ferrugino ndy CLAY.	AND. Gravel is fine dstone1	2
Remarks: 1). Window samp 2). Groundwater 3) Refusal of sam	e from GL to 2 ot encountere pling equipme	.0m BGL d. nt at 4.8m	BGL.				Кеу D - S В - В ES - Sept	: mall disturbed sample ulk disturbed sample Environmental soil sample	W - Water sample U - Undisturbed sample TCR - Total Core Recov	ery ery	5

Géot	Intégra echniau	Castlegal Caerphilt Caerphilt Tel. 029 2 Eav. 020	louse, 7 Be te Business y CF83 2A0 20807991 20862176	iddau Way I Park K	Project Nar Bretch H	ne: IIII, Ba	anbury	,		Project No.: <b>12692</b>	Borehole No.: WS06
	10	mail@inte	20862176 egralgeotec	com							Sheet 1 of 1
Banbu	on: Iry				Client:	Bloor	Home	s West	ern	Coordinates:	Hole Type: WLS
Fauipm	ent: GEC	26			Diameter o	f Casin	<b>л</b> .			l evel:	Scale
Lquipin	ent. GEC	20			Diameter o	Casing	y.				1:25
Diamete	er of Boring:	105m	ım		Depth of Ca	asing:				Dates	Logged By:
	10/2427		Samples	& In citu Tecti		Damáh	Laural			27/09/2021 -	GNS
Well	Vvater Strikes	Depth (m)	Type	Res	sults	Depth (m)	(m AOD)	Legend		Stratum Description	
						0.00			Loose brown and mid br rich SAND. Frequent roc angular ferruginous sand	own clayey slightly silty sligh ots and rootlets. Gravel is fine dstone. (TOPSOIL)	tly gravelly organic to coarse sub- - -
		1.00	C	N=10 (2,2 N=50 (25 for for 24	2/2,2,2,4) r 135mm/50 5mm)	1.50			Loose becoming mediun GRAVEL. Gravel is fine i and limestone.	n dense orange brown silty s to coarse sub-angular ferrugi n slightly gravelly CLAY. Grav ferruginous limestone. End of Borehole at 1.70 m	lightly sandy inous sandstone
Remarks	5:							Key	f:		- 4
1). Windo 2). Grour 3) Refusa	s: ow sample fro ndwater not e al of sampling	om GL to 1 ncountered g equipmer	.7m BGL. d. nt at 1.7m	BGL.				D - S B - E ES - SPT CPT	, . Small disturbed sample Bulk disturbed sample Environmental soil sample - Standard Penetration Test (split sp - Standard Penetration Test (solid c	W - Water sample U - Undisturbed sample TCR - Total Core Recove soon) SCR - Solid Core Recov one) RDD - Rock Quality Des	ery ery ionation

Géot	Intégra echniqu	Castlegal Caerphil) Caerphil) Tel. 029 2 Fax. 029	touse, 7 Be te Business y CF83 2A0 20807991 20862176	eddau Way s Park X	Project Na Bretch I	me: <b>Hill, Ba</b>	anbury	/		Project No.: <b>12692</b>	Borehole No.: WS07
Locati	on:	mail@inte	egralgeote	c.com						Coordinates:	Sheet 1 of 1 Hole Type
Banbu	iry				Client:	Bloor	Home	s West	ern		WLS
<b>F</b> auliana		201			Diamatan	f Casim				Laval	Scale
Equipm	ent. JCB	307			Diameter	i Casing	y.				1:25
Diamete	er of Boring:	: 105m	ım		Depth of C	asing:				Dates	Logged By:
	Water		Samples	& In situ Testi	ng	Dopth				27/09/2021 -	GNS
Well	Strikes	Depth (m)	Туре	Res	ults	(m)	(m AOD)	Legend		Stratum Description	
						0.00			Gravel is fine to coarse s limestone.	wn slightly slity very slightly ub-angular ferruginous sanc	gravelly SAND. Istone and
						0.30		××	Soft orange brown silty siferruginous sandstone.	andy gravelly CLAY. Gravel	is fine to coarse
								××	-Soils locally wet and sof	tened	
								× ×	-		
								××			-
		1.00	с	N=7 (2,1	/2,1,1,3)			××			[ - 1
								×	- - -		-
								××			-
								×× 	2		- - -
								× × *	-		
								××			-
								××			-
		2.00	С	N=3 (2,1	/1,1,1,0)			××	2  2		- 2
								××			-
								×	-		-
								××			-
								××	?  ?		
								×			
		0.00			405			××			
		3.00		50 (5,8/50 1	or 125mm)	3.00				End of Borehole at 3.00 m	
											-
											-
											-
											- 4
											-
											l F
											-
											Ļ
											ŀ
											Ļ
											- 5
Remarks	S:						ı	D-S	/: Small disturbed sample	W - Water sample	
2). Groui 3) Refus	ndwater not e al of sampling	ncountered g equipmer	d. d. at 3.0m	BGL.				B - E ES - SPT CPT	Bulk disturbed sample Environmental soil sample - Standard Penetration Test (split spo - Standard Penetration Test (solid co	U - Undisturbed sample TCR - Total Core Recov SCR - Solid Core Recov	ery AGS

	Intóar	Intégral H Castlegat	iouse, 7 Be e Businese	iddau Way s Park	Project Na	me:				Project No.:	Borehole No.:	
Géot	echniqu	Caerphilly Tel: 029 2	CF83 2A0	×	Bretch I	Hill, Ba	anbury	,		12692	WS08	
		mail@inte	20862176 Igralgeotec	c.com							Sheet 1 of 1	
Locati	on:				Client <sup>.</sup>	Bloor	Home	s Wes	tern	Coordinates:	Hole Type:	
Banbu	ıry				Oliciti.	Diooi	nome.	3 1103	lem		WLS	
Equipm	ent: GEC	) 26			Diameter	of Casin	а.			l evel:	Scale	
Lquipin		720			Diameter	Ji Casing	y.				1:25	
Diamete	er of Boring	· 105m	ım		Depth of C	asina.				Dates	Logged By:	
Diamet		. 10011			Deptilore				1	28/09/2021 -	GNS	
Well	Water Strikes	Depth (m)	Samples Type	& In situ Testi Res	ng ults	Depth (m)	Level (m AOD)	Legend		Stratum Description		
			,,						Soft brown silty sandy o	rganic rich CLAY. Frequent ro	oots and rootlets.	
						0.20		<u></u>		abtly silty condy CRAVEL Cr	aval is fina ta	
								× × ×	coarse sub-angular ferru	uginous sandstone.		
								× × ×			-	
								×××××			-	
								××××			-	
								××××			-	
		1.00	с	N=5 (2.2	/1.1.1.2)			× × × ×			- 1	1
					,			×  ^  × ×				
								×      × ×			-	
						1 40		× ^ × · · · × · · · · · · · · · · · · ·				
								×	fine to coarse angular a	slightly sandy slightly gravelly nd sub-angular ferruginous s	/ CLAY. Gravel is	
								×	-Soils wet and softened		-	
								×			-	
								×			-	
		2.00	С	N=6 (1,1	/1,1,1,3)			×— —			- 2	2
								<u>~</u>	× 		-	
									×		-	
								 ×			-	
						0.00		×			-	
						2.00		××× ×××	Loose becoming mediur gravelly SAND. Gravel i	n dense orange brown very s s fine to coarse angular and s	slightly clayey sub-angular	
								××× ×××	ferruginous sandstone.	-		
								××× ×××	×		-	
		3.00	C	N=8 (1,1	/1,1,2,4)			× × × × ×	×		- 3	3
								×××`×	×		-	
								×`×`×	×.		-	
								××××			-	
								$\stackrel{\times}{} \stackrel{\times}{} \stackrel{\times}{} \stackrel{\times}{}$			-	
								× × × × × ×	×		-	
								× × × ×	ž		-	
		4.00	с	50 (9,11/50	for 160mm)	4.00		Âx X	() <del>-</del>	End of Borehole at 4.00 m		4
											-	
											-	
											-	
											-	
											-	
											-	
											-	
											- 5	5
Remark	S:							Ke D -	<b>y:</b> Small disturbed sample	W - Water sample		
2). Grou	ow sample front ndwater not e	encountered	un BGL. 1.					B - ES	Bulk disturbed sample - Environmental soil sample	U - Undisturbed sample TCR - Total Core Recov		
s) Ketus	ai ui sampiin	y equipmen	n at 4.0M	IDGL.				SP CP	I - Standard Penetration Test (split split) I - Standard Penetration Test (solid of the standard Penetration Test (solid of the split)	coon) SCR - Solid Core Recov cone) RQD - Rock Quality Des	rery signation	

Géot	Intégra echniqu	Castlegal Caerphilt Caerphilt Tel: 029 Fax: 029 mail@inte	louse, 7 Be e Business / CF83 2AJ 20807991 20862176 agralgeotec	addau Way s Park X	Project Na Bretch H	me: <b>Iill, Ba</b>	anbury	,		Project No.: <b>12692</b>	Borehole No. <b>WS09</b> Sheet 1 of 1	:							
Locati	on:				Client:	Bloor	Home	s West	ern	Coordinates: Hole Type									
Danbu	ii y									WLS Scolo									
Equipm	ent: GEC	0 26			Diameter o	of Casing	g:			Level:	1:25								
Diamete	er of Boring	· 105m	ım		Depth of C	asina:				Dates	Logged By:								
			Complex	9 In aitu Taati						28/09/2021 -	FG								
Well	Water Strikes	Depth (m)	Samples Type	Res	sults	Depth (m)	Level (m AOD)	Legend		Stratum Description									
Remarks	5:	1.00	C	N=31 (4,4	4/6,8,8,9) 0mm/50 for nm)	0.40			Soli to firm brown motue fine to coarse sub-angul Stiff to very stiff brown ye CLAY. Gravel is fine to c calcareous fossils. <i>becoming dry and very fria</i> Stiff orange and yellow b angular calcareous mud	Bornange brown slightly sandy sligoarse angular to sub-rounded         ble with increase in gravel corr         brown gravelly CLAY. Gravel stone and limestone.         "End of Borehole at 1.60 m"         "W - Water sample	ghtly gravelly d limestone and <i>ntent</i> . is fine to coarse								
1). Windo 2). Grour 3) Refus	ow sample fr ndwater not e al of samplin	om GL to 1 encountered g equipmer	.6m BGL. J. it at 1.6m	I BGL.				D - S B - E ES - SPT CPT	imali disturbed sample iulk disturbed sample Environmental soil sample - Standard Penetration Test (split sp - Standard Penetration Test (solid c	W - Water sample U - Undisturbed sample TCR - Total Core Recove SCR - Solid Core Recove	ery AG	S							

	Intérre	Intégral H Castlegat	louse, 7 Be e Business	ddau Way Park	Project Na	ime:				Project No.:	Borehole No.:
Géot	echniqu	Caerphill Tel. 029 2 Fax. 029	CF83 2A0 20607991 20862176	(	Bretch I	Hill, Ba	anbury	,		12692	WS10
Locati	on.	manginte	egralgeotec	com						Coordinates:	Hole Type:
Banbu	iry				Client:	Bloor	Home	s West	ern		WLS
Fauipm	ent <sup>.</sup> GEO	) 26			Diameter	of Casin	ı.			l evel:	Scale
Equipin		20			Diameter		J.				1:25
Diamete	er of Boring	: 105m	ım		Depth of C	Casing:				Dates 28/09/2021 -	Logged By:
Well	Water		Samples	& In situ Testi	ing	Depth	Level	Legend		Stratum Description	
vven	Strikes	Depth (m)	Туре	Res	sults	(m)	(m AOD)	Legenu	Soft brown silty slightly s	sandy slightly gravelly organi	c rich CLAY.
Weil	Strikes	Depth (m) 1.00 2.00 3.00 4.00	Type C C	Res N=16 (3,3 N=26 (3,5 N=30 (3,5	ults 3/3,4,4,5) 2/3,3,4,5) 3/5,6,7,8)	(m) 0.20 0.70 2.30 4.00	(m AOD)	Legend           X <td>Soft brown silty slightly s Gravel is fine to coarse r (TOPSOIL) Loose orange and brown Firm to stiff light grey mo</td> <td>Stratum Description sandy slightly gravelly organi rounded and sub-rounded sa n slightly silty SAND.</td> <td>c rich CLAY. Indstone.</td>	Soft brown silty slightly s Gravel is fine to coarse r (TOPSOIL) Loose orange and brown Firm to stiff light grey mo	Stratum Description sandy slightly gravelly organi rounded and sub-rounded sa n slightly silty SAND.	c rich CLAY. Indstone.
Remark 1). Wind 2). Grou	s: ow sample fr ndwater not e	om GL to 4.	.0m BGL.					<b>Key</b> D - S B - E ES -	r: mall disturbed sample sulk disturbed sample Environmental soil sample	W - Water sample U - Undisturbed sample TCR - Total Core Recov	ery
ງ) Refus	ai of samplin	y equipmer	n at 4.0m	BGL.				SPT CPT	<ul> <li>Standard Penetration Test (split sp - Standard Penetration Test (solid c</li> </ul>	coon) SCR - Solid Core Recov	ery

	Intégra	Intégral H Castlegat	louse, 7 Be e Business	addau Way s Park	Project Nar	me:				Project No.:	Borehole No.:				
Géot	echniqu	Caerphill Tel. 029	CF83 2A0 20807991	×	Bretch H	lill, Ba	anbury	,		12692	WS11				
0000	conniqu	Fax: 029 mail@inte	20862176 graigeotec	c.com							Sheet 1 of 1	1			
Locati	on:				Client	Bloor	Homo	e Woet	orp	Coordinates:	Hole Type:				
Banbu	ıry				Client.	ылл	поше	5 11651	em		WLS				
Equipm	ent: GEC	26			Diameter o	f Casin	n.			l evel:	Scale				
Lquipin		20			Diameter o	r Casinų	y.				1:25				
Diamete	er of Borina:	105m	ım		Depth of Ca	asina:				Dates	Logged By:				
			0	0 I		5			1	28/09/2021 -	GNS				
Well	Water Strikes	Depth (m)	Samples Type	Res	ults	Depth (m)	(m AOD)	Legend		Stratum Description					
									Soft brown silty slightly s Gravel is fine to coarse r (TOPSOIL)	andy slightly gravelly organio ounded and sub-rounded sa	c rich CLAY. ndstone.	-			
						0.30			Medium dense orange b to coarse sub-angular fe	rown slightly silty gravelly S/ rruginous limestone.	AND. Gravel is fine				
					0.80			Dense slightly sandy GR	AVEL and COBBLES of fine v limestone.	to coarse sub-					
		1.00	с	N=50 (7,7/50	) for 245mm)	1.00				End of Borehole at 1.00 m		1			
												- 3			
Bernerd								Ko	 /:		I	- 5			
Remarks 1). Windo 2). Grour 3) Refus	s: ow sample fro ndwater not e al of sampling	om GL to 1. ncountered g equipmer	.0m BGL. d. at at 1.0m	BGL.				<b>D</b> - 9 B - 8 ES - SPT CPT	<ul> <li>Final disturbed sample</li> <li>Bulk disturbed sample</li> <li>Environmental soil sample</li> <li>Standard Penetration Test (split sp</li> <li>Standard Penetration Test (solid cr</li> </ul>	W - Water sample U - Undisturbed sample TCR - Total Core Recov oon) SCR - Solid Core Recov one) ROD - Rock Quality Des	ery AG	S			

	Intégre	Intégral H Castlega	touse, 7 Be te Businese	iddau Way Park	Project Na	me:			Project No.:	Borehole No.:	
Géot	echniqu	Caerphill Tel. 029 Fax. 029 mail@int	y CF83 2A0 20807991 20862176 egralgenter	< com	Bretch I	Hill, Ba	anbury	/		12692	WS12 Sheet 1 of 1
Locati	on:	maniform	anananan							Coordinates:	Hole Type:
Banbu	ıry				Client:	Bloor	Home	s West	ern		WLS
Equipm	ient: GEC	0 26			Diameter o	of Casin	a:			Level:	Scale
	010	0				- Caolin,	9.				1:25
Diamet	er of Boring	: 105n	nm		Depth of C	asing:				Dates 28/09/2021 -	Logged By: GNS
Well	Water		Samples	& In situ Testi	ng	Depth	Level	Legend		Stratum Description	
	Strikes	Depth (m)	Туре	Res	ults	(m)	(m AOD)		Soft brown silty sandy o	rganic rich CLAY. Frequent ro	oots and rootlets.
		1.00 1.50 2.00 3.00	C D C	N=14 (1,1 N=5 (1,1	1/2,3,5,4) /2,1,1,1) /2,2,2,1)	0.25			Soft brown silty sandy o (TOPSOIL) Medium dense brown ar fine to coarse sub-angul Firm becoming soft orar Gravel is fine to coarse s -Soils locally wet and so -Stiff below 3.60m BGL	rganic rich CLAY. Frequent ro nd orange brown silty gravell ar ferruginous limestone.	gravelly CLAY. Istone. -1 -3
		4.00	С	N=31 (1,1	/1,5,9,16)	4.00			; ; ;	End of Borehole at 4.00 m <sup></sup>	4
Demo		4.50	С	50 (25 for 9 105r	5mm/50 for mm)						-5
1) Wind	5: ow sample fr	om CL to 4						D - 9	•• Small disturbed sample	W - Water sample	
2). Grou 3) Refus	ndwater not e al of sampling	encountere g equipmer	d. ht at 4.0m	BGL.				B - E ES - SPT	Bulk disturbed sample Environmental soil sample - Standard Penetration Test (split sp - Standard Penetration Test (split sp	U - Undisturbed sample TCR - Total Core Recov SCR - Solid Core Recov	ery AGS

**APPENDIX E** 

SOIL INFILTRATION TEST RESULTS

12692 Bretch Hill, Banbury





12692 Bretch Hill, Banbury

Trial Pit Information		Cv	cle 1	Cvr	le 2	Cvr	cle 3	1								14/-	40	D	46 -	~ 7		~						
Length (m)	1.70	Time (min)	Depth (m)	Time (min)	Depth (m)	Time (min)	Depth (m)									vva	iter	Deb	xn ۱	/S I	Ime	e						
Width (m)	0.60	0	1.30	0	1.25	0	1.22											-	<i>(</i>	、								
Depth (m)	2.00	1	1.00	1	1.41	1	1.37											Time	(min	.)								
Groundwater	Dry	2	1.44	2	1.41	2	1.57		0		5		10		15		20	)	25		30		35		40		45	50
Weather Conditions	Clear	4	1.50	4	1.52	4	1.50																					
Date	27 Sop 21	4	1.50	4	1.57	4	1.55		0.00																			
Date	27-3ep-21	0	1.00	5	1.00	5	1.50		0.40																			
		0	1.73	10	1.75	10	1.09		0.10 +																			
Dementer		10	1.60	15	1.60	13	1.74		0.00																			
Remarks		14	1.91	20	1.88	20	1.81		0.20 +											_								
		26	2.00	25	1.92	25	1.89																					
				37	2.00	45	2.00		0.30 +								-											
									0.40 +	_																		 
									0.50 +	_													_					
									0.60 +	_																		
									0 70 \																			
								1	5.10					T			1							T				
									0.80																			
									0.00																			
									0.00																			
								-	0.90 +																			
								E	1 00																			
								Ē	1.00 +																			
								b																				
								e	1.10 +								++					+ + + +						
								, L																				
								e	1.20 🛓	-						+ +	++											
								/at																				
								5	1.30											_			_					
Final Excavation Depth (m)		Cy	cle 1	Cyc	le 2	Cyc	cle 3		N																			
At end of testing cycle			2.00	)	2.00	-	2.00		1.40	<u></u>										_			_					 
Water Depths (m)									· · · · · · · · · · · · · · · · · · ·	- <b>N</b>																		
Water depth at start of test			1.30	)	1.25		1.22		1.50 +									_					_				_	 
Water depth at end of test			2.00		2.00		2.00																					
Effective depth (measured)			0.70		0.75		0.78		1 60 -																			
% Effective storage depth			1.00		1.00		1.00																					
Effective Storage Depths (m)									1 70																			
Effective storage depth (100%)			0.70		0.75		0.78																					
Effective storage depth (75%)			0.70	,	0.70		0.59		1 80																			
Effective storage depth (50%)			0.35		0.30		0.39	1	1.00							*		+										
Effective storage depth (00%)			0.00		0.00		0.00		1 00					N														
Outflow Time (min)			0.10	1	0.19		0.20		1.90 +																			
Time for measured outflow			26		37		45		2 00																			
Time for 100% outflow			20		37		45		2.00 -																			 
Time for 75 25% outflow			20		37		40																					
Volume of Outflow (m <sup>3</sup> )			5	,	15		17.7					_	←C	vcle 1					- Cvcle	<del>2</del> - 2					Cycle 3	3		
Over measured effective death			0.74		0.77		0.80						5	,					2,50						.,	-		
Over 100% offective depth			0.71		0.77		0.60	1					_ ~						<u> </u>									
Over 100% effective depth			0.71		0.77		0.60						C	1 25 8	\$ 75%	D			C2 2	5&1	'5%				3 25 8	& 75%	%	
FIGHT / 5% - 25% effective dept	11		0.36	<u>'</u>	0.38		0.40																					
Surface Area (m )							1.5.1																					
For 100% effective storage			4.24	•	4.47		4.61																					
For 50% effective storage			2.63		2.75		2.81								-		<u> </u>			_			. –		,			
Over measured depth			4.24	·	4.47		4.61								Des	ign \$	Soll	Infilti	atior	ו Ra	ite:	1.3	s⊨-0	4 m	/S			
Soil Infiltration Rate (m/s)		Су	cle 1	Cyc	le 2	Cyc	cle 3									-												
Over 100% effective depth			1.1E-04	H .	7.7E-05		6.4E-05																					
Over measured depth			1.1E-04	-	7.7E-05		6.4E-05																					
Over 75% - 25% effective dept	י <u></u> ו		2.5E-04	4	1.5E-04		1.3E-04																					

12692 Bretch Hill, Banbury



12692 Bretch Hill, Banbury





12692 Bretch Hill, Banbury



Intégral Géotechnique
# **BRE365 SOIL INFILTRATION RATE TEST - TP18**

12692 Bretch Hill, Banbury



APPENDIX F

LABORATORY CHEMICAL TEST RESULTS (SOILS)





Gary Shawley Integral Geotechnique Integral House 7 Beddau Way Castlegate Business Park CF83 2AX

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

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**t:** 02920807991

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e: gary@integralgeotec.com

## Analytical Report Number : 21-13600

Project / Site name:	Banbury	Samples received on:	01/10/2021
Your job number:	12692	Samples instructed on/ Analysis started on:	01/10/2021
Your order number:	12692 GNS	Analysis completed by:	12/10/2021
Report Issue Number:	1	Report issued on:	12/10/2021
Samples Analysed:	10 soil samples		



Agnieszka Czerwińska Technical Reviewer (Reporting Team) For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	<ul> <li>4 weeks from reporting</li> </ul>
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.





Lab Sample Number	2031361	2031362	2031363	2031364	2031365			
Sample Reference				TP1	TP3	TP3	TP4	TP5
Sample Number				None Supplied				
Depth (m)				0.50	0.10	0.40	0.50	0.20
Date Sampled				27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021
Time Taken				0830	0945	0945	1030	1100
	T	5						
Analytical Parameter (Soil Analysis)	Units	mit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	13	11	12	14
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40
Asbestos in Soil	Туре	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.9	7.8	8.0	7.5	7.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	670	660	290	480	650
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0074	0.0030	0.0047	0.017	0.0039
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	300	360	180	260	420
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.0	2.4	0.9	1.4	2.4
Loss on Ignition @ 450oC	%	0.2	MCERTS	11.7	12.4	10.6	10.8	12.1
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
				× 0.00	10.00	× 0.00	× 0.00	10.00





Lab Sample Number				2031361	2031362	2031363	2031364	2031365
Sample Reference				TP1	TP3	TP3	TP4	TP5
Sample Number				None Supplied				
Depth (m)				0.50	0.10	0.40	0.50	0.20
Date Sampled				27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021
Time Taken				0830	0945	0945	1030	1100
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids	-	-						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	83	110	45	83	110
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	5.1	5.0	4.9	4.9	5.0
Boron (water soluble)	mg/kg	0.2	MCERTS	0.2	0.4	< 0.2	0.2	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	330	290	330	300	280
Copper (aqua regia extractable)	mg/kg	1	MCERTS	4.7	6.8	5.3	9.4	11
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	39	27	32	51
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	140	120	130	130	120
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	550	510	550	510	510
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	250	250	280	240	260

U/S = Unsuitable Sample I/S = Insufficient Sample





Lab Sample Number	2031366	2031367	2031368	2031369	2031370			
Sample Reference				TP6	TP10	TP11	TP12	TP18
Sample Number				None Supplied				
Donth (m)	0.50	0.10	0.20	0.60	0.10			
Data Sampled				27/00/2021	27/00/2021	27/00/2021	27/00/2021	27/00/2021
Time Taken				1110	27/09/2021	27/09/2021	1025	1225
	1	-	1	1110	0630	0900	1025	1325
Analytical Parameter (Soil Analysis)	Units	imit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	15	13	9.2	14
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40
Asbestos in Soil	Туре	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.6	8.1	8.0	8.1	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	570	690	480	480	580
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0054	0.0054	0.0076	0.085	0.0036
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	350	450	320	520	480
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.4	2.5	1.5	1.3	2.6
Loss on Ignition @ 450oC	%	0.2	MCERTS	9.1	9.1	6.2	4.5	12.6
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1.2.3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ahi)pervlene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
			0	- 3.03	. 3.03	. 3.05	. 3.05	- 5.65
	mc/kg	0.0	MCEDTC	<i>c</i>	<i>c</i>	<i></i>	<i></i>	<i></i>
Speciated Total EPA-16 PAHs	тіў/ку	0.0	PICERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80





Lab Sample Number				2031366	2031367	2031368	2031369	2031370
Sample Reference				TP6	TP10	TP11	TP12	TP18
Sample Number				None Supplied				
Depth (m)				0.50	0.10	0.20	0.60	0.10
Date Sampled				27/09/2021	27/09/2021	27/09/2021	27/09/2021	27/09/2021
Time Taken				1110	0830	0900	1025	1325
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	210	87	63	53	120
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	4.0	2.6	2.1	1.7	5.1
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	1.3	0.5	< 0.2	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	180	110	85	75	290
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19	20	19	21	9.7
Lead (aqua regia extractable)	mg/kg	1	MCERTS	45	47	27	21	40
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	120	57	46	39	120
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	320	200	140	130	490
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	290	160	140	130	230

 $\label{eq:US} U/S = Unsuitable \ Sample \qquad I/S = \ Insufficient \ Sample$ 





#### Analytical Report Number : 21-13600 Project / Site name: Banbury

\* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2031361	TP1	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2031362	TP3	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
2031363	TP3	None Supplied	0.4	Brown loam and clay with gravel and vegetation.
2031364	TP4	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2031365	TP5	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2031366	TP6	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2031367	TP10	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
2031368	TP11	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2031369	TP12	None Supplied	0.6	Brown loam and clay with gravel and vegetation.
2031370	TP18	None Supplied	0.1	Brown loam and clay with gravel and vegetation.





Analytical Report Number : 21-13600 Project / Site name: Banbury

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	w	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Moisture Content	Molsture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	w	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	w	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP- OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	w	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS





Analytical Report Number : 21-13600 Project / Site name: Banbury

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name Analyt	rtical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland. Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

APPENDIX G

LABORATORY CHEMICAL TEST RESULTS - ARSENIC BIOACCESSIBILITY TESTING





Gary Shawley Integral Geotechnique Integral House 7 Beddau Way Castlegate Business Park CF83 2AX

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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

t: 02920807991 f: 02920862176

e: gary@integralgeotec.com

# Preliminary Report Number : 21-13594

Project / Site name:	Banbury	Samples received on:	01/10/2021
Your job number:	12692	Samples instructed on/ Analysis started on:	01/10/2021
Your order number:	12692 GNS	Analysis completed by:	07/10/2021
Report Issue Number:	0	Report issued on:	07/10/2021
Samples Analysed:	6 soil samples		



Izabela Wójcik Technical Reviewer (Reporting Team) For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	<ul> <li>4 weeks from reporting</li> </ul>
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies.

An estimate of measurement uncertainty can be provided on request.





#### Analytical Report Number: 21-13594 Project / Site name: Banbury : 12692 GNS

Your	Order	NO:	12692	GN

Lab Sample Number				2031326	2031327	2031328	2031329	2031330
Sample Reference				TP4	TP6	TP8	TP13	TP15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.05	0.10	0.10	0.10	0.50
Date Sampled				27/09/2021	27/09/2021	27/09/2021	28/09/2021	28/09/2021
Time Taken				1030	1015	1130	0925	1010
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	40	59	43	30	27
Moisture Content	%	0.01	NONE	15	16	13	14	16
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	0.40
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	120	120	290	200	92
Stomach Phase								
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	4.3	5.4	7.1	7.2	6.5
Arsenic Bioaccessible Fraction	%	-	NONE	3.6	4.5	2.5	3.6	7.1
Stomach and Intestine Phase								
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	5	6.6	6.3	8.7	6.5
Arsenic Bioaccessible Fraction	%	-	NONE	4.2	5.5	2.16	4.34	7.05
Bioaccessibility Summary Data (Maximum value) S	tomach I	Phase (S)	or Stomac	h and Intestine P	hase (SI)			
Arsenic Bioaccessible Fraction	%	-	NONE	4.2 % (SI)	5.5 % (SI)	2.5 % (S)	4.3 % (SI)	7.1 % (S)

U/S = Unsuitable Sample I/S = Insufficient Sample





Lab Sample Number				2031331
Sample Reference				TP17
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				28/09/2021
Time Taken				1115
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	59
Moisture Content	%	0.01	NONE	12
Total mass of sample received	kg	0.001	NONE	0.40
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	120
Stomach Phase				
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	4.9
Arsenic Bioaccessible Fraction	%	-	NONE	4
Stomach and Intestine Phase				
Arsenic (Bioaccessible)	mg/kg	0.1	NONE	3.2
Arsenic Bioaccessible Fraction	%	-	NONE	2.6
Bioaccessibility Summary Data (Maximum value)	Stomach	Phase (S)	or Stomac	1
Arsenic Bioaccessible Fraction	%	-	NONE	4 % (S)

U/S = Unsuitable Sample I/S = Insufficient Sample





#### Analytical Report Number : 21-13594 Project / Site name: Banbury

\* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2031326	TP4	None Supplied	0.05	Brown loam and clay with gravel and vegetation.
2031327	TP6	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
2031328	TP8	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
2031329	TP13	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
2031330	TP15	None Supplied	0.5	Brown loam and clay with gravel.
2031331	TP17	None Supplied	0.5	Brown loam and clay with gravel and vegetation.





Analytical Report Number : 21-13594 Project / Site name: Banbury

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BARGE-UBM Bioaccessibility Test for Metals	Bioaccessibility extraction method for metals. Test portion sieved to < 250 um. All analysis including aqua regia extractable are determined on this test portion. Material > 250um reported as oversize (stones).	ISO 17924: 2018 Soil quality for the assessment of human exposure from ingestion of soil and soil material	UBM-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom. For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland. Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

**APPENDIX H** 

LABORATORY GEOTECHNICAL TEST RESULTS



Apex Testing Solutions Limited Sturmi Way Village Farm Industrial Estate Pyle Bridgend CF33 6BZ

Attention: Laura Davies

Unit 7-8 Hawarden Business Park Manor Road (off Manor Lane) Hawarden Deeside CH5 3US Tel: (01244) 528700 Fax: (01244) 528701 email: hawardencustomerservices@alsglobal.com Website: www.alsenvironmental.co.uk

# **CERTIFICATE OF ANALYSIS**

Date of report Generation: Customer: Sample Delivery Group (SDG): Your Reference: Location: Report No: Order Number: 06 October 2021 Apex Testing Solutions Limited 211002-54 D21530 Banbury 616079 1487

We received 6 samples on Friday October 01, 2021 and 6 of these samples were scheduled for analysis which was completed on Wednesday October 06, 2021. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:



Sonia McWhan Operations Manager



ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291. Version: 3.1 Version Issued: 06/10/2021



Report Number: 616079 Location: Banbury Superseded Report:

Validated

# **Received Sample Overview**

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
25082706	TP2		1.00	30/09/2021
25082707	TP4		0.70	30/09/2021
25082710	TP6		0.90	30/09/2021
25082708	TP7		1.00	30/09/2021
25082711	TP10		1.00	30/09/2021
25082709	WS12		1.50	30/09/2021

Only received samples which have had analysis scheduled will be shown on the following pages.



**SDG:** 211002-54

CERTIFICATE OF	ANALY 515
Report Number:	616079

Superseded Report:

Client Ref.: D21530 Location: Ba									
Results Legend          X       Test         N       No Determination	Lab Sample No(s)			25082707	25082710	25082708	25082711	25082709	
Sample Types -	Custome Sample Refer	r ence	TP2	TP4	TP6	TP7	TP10	WS12	
S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate	AGS Refere	nce							
PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage	Depth (m) Container			0.70	0.90	1.00	1.00	1.50	
RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other				250g Amber Jar (ALE210)					
	Sample Ty	ре	ა	ა	ა	ა	S	S	
Anions by Kone (soil)	All	NDPs: 0 Tests: 6	X	X	X	X	X	x	
рН	All	NDPs: 0 Tests: 6	x	X	X	X	x	x	
Sample description	All	NDPs: 0 Tests: 6	x	X	X	x	x	x	



WS12

25082709

Report Number: 616079 Location: Banbury Superseded Report:

Vegetation

Validated

# **Sample Descriptions**

Grain Sizes							
very fine <0.	063mm fine 0.0	63mm - 0.1mm m	edium 0.1mm	n - 2mm coa	rse 2mm - 1	0mm very coa	rse >10mm
Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2	I
25082706	TP2	1.00	Dark Brown	Sand	Stones	Vegetation	
25082707	TP4	0.70	Dark Brown	Sand	Stones	Vegetation	
25082710	TP6	0.90	Dark Brown	Sandy Loam	Stones	Vegetation	
25082708	TP7	1.00	Dark Brown	Sandy Loam	Stones	Vegetation	
25082711	TP10	1.00	Dark Brown	Clay	None	None	

Dark Brown

Sand

Stones

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

1.50

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



**SDG:** 211002-54 Client Ref.: D21530

# **CERTIFICATE OF ANALYSIS** Report Number: 616079

Validated

Superseded Report:

Client Re	ef.: D21530			Location:	Banbury			
Results Legend	C	ustomer Sample Ref.	TP2	TP4	TP6	TP7	TP10	WS12
# ISO17025 accredited.     M mCERTS accredited.     a Aqueous / settled sample.     dids. fib: Discover / fittered sample.     tot.unfilt Total / unfiltered sample.     subcontracted - refer to subcontractor report for         accreditation status.     * % recovery of the surrogate standard to check the     efficiency of the method. The results of individual		Depth (m) Sample Type Date Sampled Sample Time Date Received	1.00 Soil/Solid (S) 30/09/2021 01/10/2021	0.70 Soil/Solid (S) 30/09/2021 01/10/2021	0.90 Soil/Solid (S) 30/09/2021 	1.00 Soil/Solid (S) 30/09/2021 01/10/2021	1.00 Soil/Solid (S) 30/09/2021 01/10/2021	1.50 Soil/Solid (S) 30/09/2021 
compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4+§@ Sample deviation (see appendix)		SDG Ref Lab Sample No.(s) AGS Reference	211002-54 25082706	211002-54 25082707	211002-54 25082710	211002-54 25082708	211002-54 25082711	211002-54 25082709
Moisture Content Ratio (% of as received sample)	%	PM024	17	12	16	14	16	26
рН	1 pH Units	TM133	8.07 M	8.11 M	8.19 M	8.12 M	8.01 M	7.01 M
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.0399 M	0.0161		0.036		0.0351 M
Soluble Sulphate 2:1 extract as SO4 BRE	<0.004 g/l	TM243	IVI.		0.0122 M		0.0116 M	





SDG: 211002-54 Client Ref.: D21530

### Report Number: 616079 Location: Banbury

Superseded Report:

# Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM243		Mixed Anions In Soils By Kone

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden.



SDG: 211002-54 Client Ref.: D21530 Report Number: 616079 Location: Banbury Superseded Report:

# **Test Completion Dates**

Lab Sample No(s)	25082706	25082707	25082710	25082708	25082711	25082709
Customer Sample Ref.	TP2	TP4	TP6	TP7	TP10	WS12
AGS Ref.						
Depth	1.00	0.70	0.90	1.00	1.00	1.50
Туре	Soil/Solid (S)					
Anions by Kone (soil)	06-Oct-2021	06-Oct-2021	06-Oct-2021	06-Oct-2021	06-Oct-2021	06-Oct-2021
pН	04-Oct-2021	04-Oct-2021	04-Oct-2021	04-Oct-2021	04-Oct-2021	04-Oct-2021
Sample description	03-Oct-2021	03-Oct-2021	03-Oct-2021	03-Oct-2021	03-Oct-2021	03-Oct-2021

	SDG:	211002-54	Client Reference:	D21530	Report Number:	616079
(AIS)	Location:	Banbury	Order Number:	1487	Superseded Report:	

Appendix

## General

1. Results are expressed on a dry weight basis (dried at  $35^{\circ}$ C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

#### 19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
•	Sample holding time exceeded in laboratory
0	Sample holding time exceeded due to late arrival of instructions or
e	samples
§	Sampled on date not provided

#### 20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

#### Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysof le	White Asbestos
Amosite	Brow n Asbestos
Cro ci dolite	Blue Asbe stos
Fibrous Act nolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

#### Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

#### Respirable Fibres

Respirable fibres are defined as fibres of <3  $\mu$ m diameter, longer than 5  $\mu$ m and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

TEST REPORT					
PARTICLE SIZE DISTRIBUTION ANALYSIS BS1377'Part 2'1990					
Project No:	D21530	Client:	Integra	I Geotechnique	
Project Name:	12692 - Banbury	Address	Integra	l House	
ATS Sample No:	25868	7 Beddau Way Castlegate Business Park Caerphilly CF83 8PH		gate Business Park nilly 3PH	
Site Ref / Hole ID:	TP2	Depth (m):		1.00	
Sample No:		Sample Type:		Disturbed	
Sampling Certificate Received:	No	Material Descr	iption:	Brown clayey sandy GRAVEL with high cobble content	
Location in Works:	N/A	Material Sourc	:e:	Site Generated	
Date Sampled:		Material Suppl	ier:	Site Generated	
Sampled By:	Client	Specification:		BS1377	
Date Received:	30 September 2021	Date Tested:		04 October 2021	

## **Test Results**

Sieving			
Particle Size	% Bessing		
mm	70 Fassing		
125	74		
90	59		
75	48		
63	44		
50	36		
37.5	32		
28	29		
20	26		
14	23		
10	22		
6.3	19		
5.0	19		
3.35	18		
2.00	16		
1.18	16		
0.600	15		
0.425	14		
0.300	13		
0.212	12		
0.150	10		
0.063	8		

Sieve:	Pre dried				
Pipette:					
100					
90					
80					
70					
use 60					
50 J					
40					
30					
20					
10					
0					
0.01	0.1	1	10	100	1000

Sample Porti	Sample Portions Particle Density Mg/m3		Uniformity Coofficient	
Cobbles / Boulders	56	NI/A	Oniformity Coefficient	
Gravel	27	IN/A		
Sand	9	Dry mass of sample, kg	$B_{60}, B_{10}$	
Silt / Clay	8	23.9	N/A	

### Remarks:

QA Ref.
BS1377 - 4

S1377 - 4 Rev. 2



	)明	Approver	Date	Fig
l,	UKAS	A Grogan	04/10/2021	PSD
	7771	A Grogan, Laboratory	Manager	

	TEST REPORT					
	PARTICLE SIZE DIS BS1377:	Part 2:1990	ANAL Y	515		
Project No:	D21530	Client:	Integra	I Geotechnique		
Project Name:	12692 - Banbury	Address	Integra 7 Bedd	ll House lau Way		
ATS Sample No:	25869		Castle Caerph CF83 8	gate Business Park nilly 3PH		
Site Ref / Hole ID:	TP4	Depth (m):		0.70		
Sample No:		Sample Type:		Disturbed		
Sampling Certificate Received:	No	Material Descr	iption:	Brown sandy clayey GRAVEL with high cobble content		
Location in Works:	N/A	Material Sourc	e:	Site Generated		
Date Sampled:		Material Suppl	ier:	Site Generated		
Sampled By:	Client	Specification:		BS1377		
Date Received:	30 September 2021	Date Tested:		04 October 2021		

## **Test Results**

Sieving			
Particle Size	% Dessing		
mm	% Passing		
125	89		
90	63		
75	51		
63	38		
50	35		
37.5	28		
28	24		
20	21		
14	19		
10	18		
6.3	16		
5.0	16		
3.35	15		
2.00	14		
1.18	13		
0.600	13		
0.425	12		
0.300	11		
0.212	11		
0.150	10		
0.063	8		

Sieve:	Pre dried				
Pipette:					
100					
90					
80					
70					
isgi 60					
50 the second					
a) 40					
30					
20					
10					
0					
0.01	0.1	1	10	100	100

Sample Porti	ons	Particle Density Mg/m3	Uniformity Coofficient	
Cobbles / Boulders	62	N/A	Onnormity Coenicient	
Gravel	24	N/A	ם / ם	
Sand	6	Dry mass of sample, kg	$B_{60}$ / $D_{10}$	
Silt / Clay	8	20.4	N/A	

### Remarks:

QA Ref.
BS1377 - 4

BS1377 - 4 Rev. 2.0



Apex Testing Solutions

Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096

略	Approver
KAS	A Groga
7771	A Grogan

	Date
Grogan	04/10/2021
Grogan, Laboratory	Manager

Fig

TEST REPORT				
Determination Of Water Content				
ISO 17892-1: 2014				
Project No: D215	530	Client: Integral C	Geotechnique	
Project Name: 1269	2 - Banbury	Address: Integral F 7 Beddau	łouse i Way	
ATS Sample No: 2587	2	Castlega Caerphill CF83 8P	te Business Park y H	
Site Ref / Hole ID:	TP6	Depth (m):	0.90	
Sample No:		Sample Type:	Disturbed	
Sampling Certificate Received:	No	Material Description:	Brown gravelly CLAY	
Location in Works:	N/A	Material Source:	Site Generated	
Date Sampled:		Material Supplier:	Site Generated	
Sampled By:	Client	Specification:	BS1377	
Date Received:	30 September 2021	Date Tested:	01 October 2021	
	Moisture Content (%)	30.2		
Moisture Content (%)     30.2         Remarks:         Apex Testing Solutions         Approver         Date				
QA Ref.	Apex Testing Solutions	Approver Da	Fig	
EN ISO 17892-	Pyle, Bridgend, CF33 6BZ	G A Grogan	05/10/2021 MC	

ISO 17892-1:2014 E

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A Grogan, Laboratory Manager

#### **TEST REPORT** LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX BS 1377:Part 2:1990. Clause 4.3/5.3/5.4 D21530 **Project No:** Client: Integral Geotechnique **Project Name:** 12692 - Banbury Address: **Integral House** 7 Beddau Way **Castlegate Business Park ATS Sample No:** 25872 Caerphilly CF83 8PH Site Ref / Hole ID: TP6 0.90 Depth (m): Sample No: Sample Type: Disturbed Sampling Certificate No **Material Description:** Brown gravelly CLAY **Received:** Location in Works: N/A Material Source: Site Generated Material Supplier: Site Generated **Date Sampled:** Client Specification: BS1377 Sampled By: 04 October 2021 **Date Received:** 30 September 2021 Date Tested:

## **Test Results**

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QA Ref.	J	0	Apex Testing Solutions	高	Approver	Date	Fig.
S1377 - 2	A	S	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	UKAS	L Davis	05/10/2021	ATT
Rev. 2.0	1000 A		Tel: 01656 746762 Fax: 01656 749096	7771	L Davis, Quality Ma	nager	

TEST REPORT PARTICLE SIZE DISTRIBUTION ANALYSIS				
	BS1377:	Part 2:1990		
Project No:	D21530	Client:	Integra	Il Geotechnique
Project Name:	12692 - Banbury	Address	Integra 7 Bedo	il House lau Way
ATS Sample No:	25870		Castle Caerph CF83 8	gate Business Park nilly 3PH
Site Ref / Hole ID:	TP7	Depth (m):		1.00
Sample No:		Sample Type:		Disturbed
Sampling Certificate Received:	No	Material Descr	iption:	Brown slightly clayey sandy GRAVEL with high cobble content
Location in Works:	N/A	Material Sourc	;e:	Site Generated
Date Sampled:		Material Suppl	lier:	Site Generated
Sampled By:	Client	Specification:		BS1377
Date Received:	30 September 2021	Date Tested:		04 October 2021

### **Test Results**

Sieving		
Particle Size	% Passing	
mm	70 Fassing	
125	100	
90	92	
75	61	
63	55	
50	43	
37.5	39	
28	39	
20	26	
14	24	
10	22	
6.3	20	
5.0	19	
3.35	18	
2.00	17	
1.18	16	
0.600	14	
0.425	12	
0.300	11	
0.212	9	
0.150	7	
0.063	5	



Sample Porti	ons	Particle Density Mg/m3	Uniformity Coofficient
Cobbles / Boulders	45	N/A	Uniformity Coefficient
Gravel	38	N/A	ם / ם
Sand	12	Dry mass of sample, kg	$B_{60}, B_{10}$
Silt / Clay	5	13.3	N/A

### Remarks:

QA Ref.
BS1377 -

BS1377 - 4 Rev. 2.0



**Apex Testing Solutions** 

Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096

UKAS	A Groga
7771	A Grogan

**A** ......

	Date
irogan	04/10/2021
Grogan, Laboratory	Manager

Fig

TEST REPORT								
Determination Of Water Content								
ISO 17892-1: 2014								
Project No: D21	530	Client: Integral C	Geotechnique					
Project Name: 1269	92 - Banbury	Address: Integral H	louse					
ATS Sample No: 2587	<b>'</b> 1	Castlega Caerphill CF83 8P	Castlegate Business Park Caerphilly CF83 8PH					
Site Ref / Hole ID:	TP10	Depth (m):	1.00					
Sample No:		Sample Type:	Disturbed					
Sampling Certificate Received:	Νο	Material Description:	Light brown CLAY					
Location in Works:	N/A	I/A Material Source:						
Date Sampled:		Material Supplier:	Site Generated					
Sampled By:	Client	Specification:	BS1377					
Date Received:	30 September 2021	Date Tested:	01 October 2021					
	Moisture Content (%)	29.3						
Remarks:								
QA Ref.	Apex Testing Solutions	Approver Da	Fig					
EN ISO 17892-	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	A Grogan	05/10/2021 <b>MC</b>					

EN ISO 17892-1:2014 E



A Grogan, Laboratory Manager

7771

#### **TEST REPORT** LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX BS 1377:Part 2:1990. Clause 4.3/5.3/5.4 D21530 **Project No:** Client: Integral Geotechnique **Project Name:** 12692 - Banbury Address: Integral House 7 Beddau Way **Castlegate Business Park ATS Sample No:** 25871 Caerphilly CF83 8PH **TP10** Site Ref / Hole ID: 1.00 Depth (m): Disturbed Sample No: Sample Type: Light brown CLAY Sampling Certificate No **Material Description: Received:** Location in Works: N/A Material Source: Site Generated Material Supplier: Site Generated **Date Sampled:** Client Specification: BS1377 Sampled By: 01 October 2021 **Date Received:** 30 September 2021 Date Tested:

### **Test Results**

QA Ref.

BS1377 - 2

Rev. 2.0



Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096

**Apex Testing Solutions** 

Approver	Date	Fig.				
L Davís	05/10/2021	A				
L Davis, Quality Manager						

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TEST REPORT									
Determination Of Water Content									
ISO 17892-1: 2014									
Project No: D215	30	Client: Integral	Geotechnique						
Project Name: 12692	2 - Banbury	Address: Integral I 7 Bedda	House u Way						
ATS Sample No: 25873	3	Castlega Caerphil CF83 8P	Castlegate Business Park Caerphilly CF83 8PH						
Site Ref / Hole ID:	WS12	Denth (m):	1 50						
Sample No:		Sample Type:	Disturbed						
Sampling Certificate Received:	No	Material Description	Brown gravelly CLAY						
Location in Works:	N/A	Material Source:	Site Generated						
Date Sampled:		Material Supplier:	Site Generated						
Sampled By:	Client	Specification:	BS1377						
Date Received:	30 September 2021	Date Tested:	01 January 2021						
	Moisture Content (%)	48.2							
Remarks:									
	Apex Testing Solutions	Approver Da	te Fig						
	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	A Grogan	05/10/2021 MC						

N ISO 17892 1:2014 E



Tel: 01656 746762 Fax: 01656 749096

7771

A Grogan, Laboratory Manager

#### **TEST REPORT** LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX BS 1377:Part 2:1990. Clause 4.3/5.3/5.4 D21530 **Project No:** Client: Integral Geotechnique **Project Name:** 12692 - Banbury Address: Integral House 7 Beddau Way Castlegate Business Park **ATS Sample No:** 25873 Caerphilly CF83 8PH Site Ref / Hole ID: 1.50 WS12 Depth (m): Sample No: Sample Type: Disturbed Sampling Certificate No **Material Description:** Brown gravelly CLAY **Received:** Location in Works: N/A Material Source: Site Generated Site Generated **Date Sampled: Material Supplier:** Client **Specification:** BS1377 Sampled By: 04 October 2021 **Date Received:** 30 September 2021 Date Tested:

### **Test Results**



 
 QA Ref.
 Apex Testing Solutions
 Approver
 Date
 Fig.

 BS1377 - 2 Rev. 2.0
 Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762
 Fax: 01656 749096
 7771
 L Davis, Quality Manager
 Fig.
 ATT
 **APPENDIX** 

SUMMARY OF CHEMICAL RESULTS - TOPSOIL, MADE GROUND AND NATURAL SOILS

### SUMMARY OF LABORATORY SOIL TEST RESULTS

### METALS AND SEMI-METALS

Job No.:12692Site:Bretch Hill, BanburySoil Type:Topsoil and SubsoilSoil Organic Matter:1%

No.	Location	Depth (m)	Arsenic	Boron	Beryllium	Cadmium	Chromium	Chromium (VI)	Copper	Lead	Mercury (Elemental)	Nickel	Selenium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
1	TP1	0.50	83	0.2	5.1	< 0.2	330	< 4.0	4.7	31	< 0.3	140	< 1.0	550	250
2	TP3	0.10	110	0.4	5.0	< 0.2	290	< 4.0	6.8	39	< 0.3	120	< 1.0	510	250
3	TP3	0.40	45	< 0.2	4.9	< 0.2	330	< 4.0	5.3	27	< 0.3	130	< 1.0	550	280
4	TP4	0.50	83	0.2	4.9	< 0.2	300	< 4.0	9.4	32	< 0.3	130	< 1.0	510	240
5	TP5	0.20	110	0.5	5.0	< 0.2	280	< 4.0	11	51	< 0.3	120	< 1.0	510	260
6	TP6	0.50	210	0.8	4.0	< 0.2	180	< 4.0	19	45	< 0.3	120	< 1.0	320	290
7	TP10	0.10	87	1.3	2.6	< 0.2	110	< 4.0	20	47	< 0.3	57	< 1.0	200	160
8	TP11	0.20	63	0.5	2.1	< 0.2	85	< 4.0	19	27	< 0.3	46	< 1.0	140	140
9	TP12	0.60	53	< 0.2	1.7	< 0.2	75	< 4.0	21	21	< 0.3	39	< 1.0	130	130
10	TP18	0.10	120	0.8	5.1	< 0.2	290	< 4.0	9.7	40	< 0.3	120	< 1.0	490	230
Screening Criteria Value		37.0	290.0	1.7	11.0	-	6.0	2400.0	200.0	1.2	130.0	250.0	410.0	3700.0	
Source of Screening Criteria Value		S4UL	S4UL	S4UL	S4UL	-	S4UL	S4UL	C4SL	S4UL	S4UL	S4UL	S4UL	S4UL	
#### SUMMARY OF LABORATORY SOIL TEST RESULTS

### **INORGANIC CHEMICALS & OTHERS**

Job No.:12692Site:Bretch Hill, BanburySoil Type:Topsoil and SubsoilSoil Organic Matter:1%

#### oss on ignition, dried solids Water Soluble Sulphate Total TOC by Ignition in O2 Moisture conten Asbestos in Asbestos No. Location Depth (m) Cyanide Phenol pН Sulphide Total Sulphur Equivalent SOM at 30 C Sulphate as SO4 Soil Quantification (%) (g/l) (mg/kg) (mg/kg) (pH units) (mg/kg) (mg/kg) (%) (%) (%) (%) (mg/kg) 0.50 300 360 180 3.44 4.13 TP1 < 1.0 11.7 12 < 1.0 0.0074 670 660 < 1.0 2.0 Not-detected #N/A 7.9 TP3 0.10 < 1.0 12.4 13 < 1.0 7.8 0.0030 < 1.0 Not-detected #N/A 2 0.40 10.6 8.0 TP3 < 1.0 11 < 1.0 0.0047 290 < 1.0 0.9 1.55 Not-detected #N/A TP4 10.8 12.1 9.1 480 650 0.50 < 1.0 < 1.0 7.5 0.017 < 1.0 260 2.41 Not-detected #N/A 12 1.4 420 TP5 0.20 < 1.0 14 < 1.0 7.5 0.0039 < 1.0 2.4 4.13 Not-detected #N/A TP6 0.50 < 1.0 14 < 1.0 7.6 0.0054 570 < 1.0 350 1.4 2.41 #N/A Not-detected TP10 0.10 < 1.0 9.1 15 < 1.0 8.1 0.0054 690 < 1.0 450 2.5 4.30 Not-detected #N/A 480 TP11 0.20 < 1.0 6.2 13 < 1.0 8.0 0.0076 < 1.0 320 2.58 Not-detected #N/A 1.5 TP12 < 1.0 4.5 9.2 < 1.0 8.1 0.085 480 < 1.0 520 480 1.3 2.24 Not-detecte #N/A 0.10 TP18 < 1.0 14 < 1.0 7.7 0.0036 580 < 1.0 2.6 4.47 Not-detected #N/A 10 0.001 34.0 120.0 Screening Criteria Value ----ATRISK S4UL IOM Source of Screening Criteria Value

# SUMMARY OF LABORATORY SOIL TEST RESULTS

POLYAROMATIC HYDROCARBONS (PAH)

Job No.:12692Site:Bretch Hill, BanburySoil Type:Topsoil and SubsoilSoil Organic Matter:1%

No.	Location	Depth (m)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthra cene	Benzo(a)pyrene	Benzo(b)fluoran thene	Benzo(ghi)peryl ene	Benzo(k)fluoran thene	Chrysene	Dibenzo(ah)anth racene	Fluoranthene	Fluorene	Indeno(123cd)p yrene	Naphthalene	Phenanthrene	Pyrene
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
1	TP1	0.50	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	5 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2	TP3	0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
3	TP3	0.40	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
4	TP4	0.50	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
5	TP5	0.20	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
6	TP6	0.50	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
7	TP10	0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
8	TP11	0.20	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
9	TP12	0.60	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
10	TP18	0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	Scre	eening Criteria Value	210.0	170.0	2400.0	7.2	2.2	2.6	320.0	77.0	15.0	0.24	280.0	170.0	27.0	2.3	95.0	620.0
	Source of Scre	ening Criteria Value	s4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL

APPENDIX J

CLEA BIOACCESSIBILITY WORK SHEETS

CLEA Software	e Version 1.071		Page 1 of 5
Report generated	26/10/2021		
Report title	Banbury Bioaccessible Arsenic		Environment Agency
Created by	GNS at Integral Geotechnique		
BASIC SETTINGS			
Land Use	Residential with produce (C4SL)		
Building Receptor Soil	Small terraced houseFemale (res C4SL)Start age class1Sandy loam	End age class 6	Exposure Duration 6 years
Exposure Pathways	Direct soil and dust ingestion Consumption of homegrown produce Soil attached to homegrown produce	Dermal contact with indoor dust	Inhalation of indoor dust Inhalation of soil dust Inhalation of indoor vapour Inhalation of outdoor vapour

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Environment

La	nd Use	Reside	ntial with	ı produc	e (C4S	L)							Recepte	or	Female	(res C4SL)		Agency
	E	xposure	Freque	ncies (c	lays yr <sup>-1</sup>	<sup>1</sup> )		Occupation P	eriods (hr day <sup>-1</sup> )	Soil to skin	adherence	ate				Max expose	d skin factor	
	t soil ingestion	umption of egrown produce	ial contact with or dust	al contact with	ation of dust /apour, indoor	ation of dust /apour, outdoor		SIS	suoo	factors (	mg cm²)	$\mathfrak{t}$ soil ingestion $\mathfrak{r}_i$	weight (kg)	height (m)	ation rate lay <sup>-1</sup> )	or (m <sup>2</sup> m <sup>-2</sup> )	loor (m² m²)	l skin area
Age Class	Dired	Cons home	Dern indoc	Dern soil	Inhal and	Inhal and		Indoe	Outd	Indoe	Outd	Direc (g da	Body	Body	Inhal (m <sup>3</sup> c	opul	Outc	Tota (m <sup>2</sup> )
1	180	180	180	170	365	365		23.0	1.0	0.06	0.10	0.10	5.60	0.7	5.4	0.32	0.26	3.43E-01
2	365	365	365	170	365	365		23.0	1.0	0.06	0.10	0.10	9.80	0.8	8.0	0.33	0.26	4.84E-01
3	365	365	365	170	365	365		23.0	1.0	0.06	0.10	0.10	12.70	0.9	8.9	0.32	0.25	5.82E-01
4	365	365	365	170	365	365		23.0	1.0	0.06	0.10	0.10	15.10	0.9	10.1	0.35	0.28	6.36E-01
5	365	365	365	170	365	365		19.0	1.0	0.06	0.10	0.10	16.90	1.0	10.1	0.35	0.28	7.04E-01
6	365	365	365	170	365	365		19.0	1.0	0.06	0.10	0.10	19.70	1.1	10.1	0.33	0.26	7.94E-01
7	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	22.10	1.2	12.0	0.22	0.15	8.73E-01
8	0	0	0	0	0	0	ΙC	0.0	0.0	0.00	0.00	0.00	25.30	1.2	12.0	0.22	0.15	9.36E-01
9	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	27.50	1.3	12.0	0.22	0.15	1.01E+00
10	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	31.40	1.3	12.0	0.22	0.15	1.08E+00
11	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	35.70	1.4	12.0	0.22	0.14	1.19E+00
12	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	41.30	1.4	15.2	0.22	0.14	1.29E+00
13	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	47.20	1.5	15.2	0.22	0.14	1.42E+00
14	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	51.20	1.6	15.2	0.22	0.14	1.52E+00
15	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	56.70	1.6	15.2	0.21	0.14	1.60E+00
16	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	59.00	1.6	15.2	0.21	0.14	1.63E+00
17	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	70.00	1.6	15.7	0.33	0.27	1.78E+00
18	0	0	0	0	0	0		0.0	0.0	0.00	0.00	0.00	70.90	1.6	13.6	0.33	0.27	1.80E+00

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## **Consumption Rates**



				Co	nsumption rates	dyweight day <sup>-1</sup> ) by Produce Group						
			MEAN	RATES		90TH PERCENTILE RATES						
Age Class	Green veg	Root veg	Tuber veg	Herb. Fruit	Shrub fruit	Tree fruit	Green veg	Root veg	Tuber veg	Herb. Fruit	Shrub fruit	Tree fruit
1	3.47E+00	5.22E+00	9.22E+00	8.90E-01	1.07E+00	1.87E+00	7.12E+00	1.07E+01	1.60E+01	1.83E+00	2.23E+00	3.82E+00
2	3.34E+00	1.61E+00	3.14E+00	1.93E+00	2.60E-01	5.84E+00	5.87E+00	2.83E+00	6.60E+00	3.39E+00	4.60E-01	1.03E+01
3	3.34E+00	1.61E+00	3.14E+00	1.93E+00	2.60E-01	5.84E+00	5.87E+00	2.83E+00	6.60E+00	3.39E+00	4.60E-01	1.03E+01
4	3.34E+00	1.61E+00	3.14E+00	1.93E+00	2.60E-01	5.84E+00	5.87E+00	2.83E+00	6.60E+00	3.39E+00	4.60E-01	1.03E+01
5	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
6	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
7	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
8	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
9	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
10	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
11	2.54E+00	1.20E+00	2.65E+00	1.25E+00	1.10E-01	2.89E+00	4.53E+00	2.14E+00	4.95E+00	2.24E+00	1.90E-01	5.16E+00
12	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
13	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
14	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
15	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
16	1.03E+00	4.90E-01	1.60E+00	5.10E-01	4.00E-02	1.18E+00	1.87E+00	8.90E-01	3.05E+00	9.30E-01	8.00E-02	2.13E+00
17	1.26E+00	6.00E-01	1.18E+00	6.90E-01	9.00E-02	1.27E+00	2.36E+00	1.12E+00	2.35E+00	1.29E+00	1.80E-01	2.38E+00
18	1.35E+00	6.40E-01	1.25E+00	7.40E-01	1.00E-01	1.36E+00	2.34E+00	1.12E+00	2.36E+00	1.28E+00	1.80E-01	2.37E+00

Top 2 applied? Yes

Where top 2 method is applied, two produce categories use 90th percentile rates, while the remainder use the mean. Produce categories vary on a chemical-by-chemical basis. Where top 2 method is not used, all produce categories for all chemicals assume 90th percentile rates.

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## Building Small terraced house

Soil Sandy loam



Building footprint (m <sup>2</sup> )	2.80E+01
Living space air exchange rate (hr <sup>-1</sup> )	5.00E-01
Living space height (above ground, m)	4.80E+00
Living space height (below ground, m)	0.00E+00
Pressure difference (soil to enclosed space, Pa)	3.10E+00
Foundation thickness (m)	1.50E-01
Floor crack area (cm <sup>2</sup> )	4.23E+02
Dust loading factor (µg m <sup>-3</sup> )	5.00E+01

Porosity, Total (cm <sup>3</sup> cm <sup>-3</sup> )	5.30E-01
Porosity, Air-Filled (cm <sup>3</sup> cm <sup>-3</sup> )	2.00E-01
Porosity, Water-Filled (cm <sup>3</sup> cm <sup>-3</sup> )	3.30E-01
Residual soil water content (cm <sup>3</sup> cm <sup>-3</sup> )	1.20E-01
Saturated hydraulic conductivity (cm s <sup>-1</sup> )	3.56E-03
van Genuchten shape parameter m (dimensionless)	3.20E-01
Bulk density (g cm <sup>-3</sup> )	1.21E+00
Threshold value of wind speed at 10m (m s <sup>-1</sup> )	7.20E+00
Empirical function (F <sub>x</sub> ) for dust model (dimensionless)	1.22E+00
Ambient soil temperature (K)	2.83E+02
Soil pH	7.00E+00
Soil Organic Matter content (%)	6.00E+00
Fraction of organic carbon (g g <sup>-1</sup> )	3.48E-02
Effective total fluid saturation (unitless)	5.12E-01
Intrinsic soil permeability (cm <sup>2</sup> )	4.75E-08
Relative soil air permeability (unitless)	6.42E-01
Effective air permeability (cm <sup>2</sup> )	3.05E-08

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## Soil - Vapour Model

Depth to top of source (no building) (cm)	0
Depth to top of source (beneath building) (cm)	65
Default soil gas ingress rate?	Yes
Soil gas ingress rate (cm <sup>3</sup> s <sup>-1</sup> )	2.50E+01
Building ventilation rate (cm <sup>3</sup> s <sup>-1</sup> )	1.87E+04
Averaging time surface emissions (yr)	6
Finite vapour source model?	No
Thickness of contaminated layer (cm)	200

Air	Dispersion Mode	əl
-----	-----------------	----



Air dispersion factor at height of 0.8m *	0.400.00
	2400.00
Air dispersion factor at height of 1.6m *	0.00
Fraction of site cover (m <sup>2</sup> m <sup>-2</sup> )	0.75

Soil - Plant Model	factor	Homegrow Average	n fraction High	Soil loading factor	Preparation correction factor
	g DW g <sup>-1</sup> FW	dimensi	onless	g g⁻¹ DW	dimensionless
Green vegetables	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	0.103	0.06	0.40	1.00E-03	1.00E+00
Tuber vegetables	0.210	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	0.058	0.06	0.40	1.00E-03	6.00E-01
Shrub fruit	0.166	0.09	0.60	1.00E-03	6.00E-01
Tree fruit	0.157	0.04	0.27	1.00E-03	6.00E-01

Gardener type Average

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Report generated	26-Oct-21	
Report title	Banbury Bioaccessible Arsenic	Agency
Created by	GNS at Integral Geotechnique	
RESULTS		

CLEA Software Version 1.071		Repor	t generated	26-Oct-27	1									Page 2	of 11	
Environment Agency												Apply Top	2 Approac	h to Produ	ce Group	
	Assessm	nent Criterion	(mg kg <sup>-1</sup> )	Rat	io of ADE to	HCV	.	50%	rule?	Two applied?	n vegetables	vegetables	r vegetables	aceous fruit	b fruit	fruit
	oral	inhalation	combined	oral	inhalation	combined	Saturation Limit (mg kg <sup>-</sup> ')	Oral	Inhal	ਰੂ	Gree	Root	Lube	lerb	Shru	Lee
1 Arsenic (C4SL child)	2.63E+02	5.26E+02	NR	1.00	0.50	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
2																
3																
4																
5																
6																
7																
8																
9																
10																
11	1															
12																
13																
14					1											
15	1															
16																
17																
18																
19																
20																

CLEA Software Version 1.071		Repo	ort generated	26-Oct-21				Page 3 of 1	1							
Environment Agency												Apply Top	2 Approac	h to Produ	ce Group	
	i			i		ī	1 1	i		- o applied?	egetables	getables	egetables	eous fruit	uit	It
	Assessr	ment Criterior	i (mg kg <sup>-1</sup> )	Rati	o of ADE to	HCV	Saturation Limit (ma ka <sup>-1</sup> )	50%	rule?	Two	> ue	t ve	er «	pace	ub fr	e frui
	oral	inhalation	combined	oral	inhalation	combined	Gaturation Limit (ing kg )	Oral	Inhal	Top	Gree	Roo	μ	Hert	Shr	Tree
21																-
22																
23																
24																
25																
26																
27																
28		1								İ		l		l		
29			1				1									
30		1		1						1						

CLEA Software Version 1.07	1					Repo	ort generated			26-Oct-21							Page 4 of 1	1
Environment Agency	5	Soil Dist	tributio	'n							Media	a Concentr	ations					
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup> FW	mg kg⁻¹ FW	mg kg <sup>-1</sup> FW			
1 Arsenic (C4SL child)	99.9	0.1	0.0	100.0	2.63E+02	NR	1.31E+02	1.12E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-01	1.05E-01	6.04E-02	8.67E-02	5.26E-02	2.89E-01
2																		
3																		
4		l																
5																		
6																		
7																		
8																		
9															}			
10	1			1														
11																		
12																		
13			1															
14			1															
15																		
16																		
17			1															
18																		
19		l																
20			1															

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Environment Agency		Soil Dist	tributio	n							Media	Concentrat	tions					
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW	mg kg⁻¹ FW	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW
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Environment Agency		Avera	ige Daily Ex	cposure (m	g kg⁻¹ bw c	lay⁻¹)				Dist	ribution by	y Pathwa	ıy (%)		
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1 Arsenic (C4SL child)	1.38E-04	1.36E-04	2.61E-05	4.34E-06	0.00E+00	0.00E+00	0.00E+00	46.12	45.19	8.69	0.00	0.00	0.00	0.00	0.00
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Environment Agency		Avera	ge Daily Ex	posure (m	g kg <sup>-1</sup> bw c	lay⁻¹)				Dist	ribution b	y Pathwa	ay (%)		
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency		Oral Health Criteria Value (µg kg¹ BW day¹)		innaiation Heatin Unterla value (µg kgʻ <sup>1</sup> BW day <sup>-1</sup> )	Oral Mean Daily Intake (µg day <sup>-1</sup> )	Inhalation Mean Daily Intake (µg day <sup>1</sup> )	Alr-water partition coefficient $(K_{aw})$ $(cm^3 cm^{-3})$	Coefficient of Diffusion in Air $(m^2  s^{-1})$	Coefficient of Diffusion in Water $(m^2 s^{-1})$	log K <sub>oc</sub> (cm <sup>3</sup> g <sup>-1</sup> )	log $K_{ow}$ (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g <sup>-1</sup> DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1 Arsenic (C4SL child)	ID	0.3	ID	0.0087	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	0.071	1
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Environment Agency	Oral Health Criteria Value (µg kg <sup>+</sup> BW day <sup>-1</sup> )	inhalation Health Criteria Value (µg kg¹ BW day⁻¹)	Oral Mean Daily Intake (µg day¹)	Inhalation Mean Daily Intake (µg day <sup>1</sup> )	Air-water partition coefficient (K <sub>aw</sub> ) (cm <sup>3</sup> cm <sup>-3</sup> )	Coefficient of Diffusion in Air $(m^2  s^{-1})$	Coefficient of Diffusion in Water $(m^2 s^{-1})$	log K <sub>oc</sub> (cm <sup>3</sup> g <sup>-1</sup> )	og $K_{ow}$ (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g <sup>-1</sup> DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ngestion (unitless)	Relative bioavailability via dust nhalation (unitless)
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Environment Agency	Soli-to-water partition coefficient $(cm^3 g^4)$	Vapour pressure (Pa)	Water solubility (mg L <sup>-1</sup> )	Soli-to-plant concentration factor for green vegetables (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	Soli-to-plant concentration factor for root vegetables (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	Soli-to-plant concentration factor for tuber vegetables (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	Soli-to-plant concentration factor for herbaceous fruit (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	Soli-to-plant concentration factor for shrub fruit (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	Soli-to-plant concentration factor for tree fruit (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	
1 Arsenic (C4SL child)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw	
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Environment Agency	Soli-to-water partition coefficient $\left( cm^3  g^4 \right)$	∕apour pressure (Pa)	Nater solubility (mg L <sup>-1</sup> )	Sol-to-plant concentration actor for green vegetables (mg g <sup>1</sup> fbut DW or FW basis over ng g <sup>1</sup> DW soil)	Soll-to-plant concentration actor for root vegetables (mg g <sup>1</sup> bDV or FV basis over ng g <sup>1</sup> DV soil)	Soli-to-plant concentration actor for tuber vegetables [mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	Soli-to-plant concentration actor for herbaceous fruit (mg g <sup>1</sup> plant DW or FW basis over ng g <sup>1</sup> DW soil)	Sol-to-plant concentration actor for shrub fruit img g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	soli-to-plant concentration actor for tree fruit img g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)
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Report generated	26-Oct-21	
Report title	Banbury Bioaccessible Arsenic	Agency
Created by	GNS at Integral Geotechnique	
RESULTS		

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Environment Agency												Apply Top	2 Approac	h to Produ	ce Group	
	Assessm	nent Criterion	(mg kg <sup>-1</sup> )	Rat	io of ADE to	HCV	.	50%	rule?	Two applied?	n vegetables	vegetables	r vegetables	aceous fruit	b fruit	fruit
	oral	inhalation	combined	oral	inhalation	combined	Saturation Limit (mg kg <sup>-</sup> ')	Oral	Inhal	ਰੂ	Gree	Root	Lube	lerb	Shru	Lee
1 Arsenic (C4SL child)	2.63E+02	5.26E+02	NR	1.00	0.50	NR	NR	No	No	Yes	Yes	No	No	No	No	Yes
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CLEA Software Version 1.071		Report generated 26-Oct-21							1	Page 3 of 11							
Environment Agency												Apply Top	2 Approac	h to Produ	ce Group		
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	Assessr	ment Criterior	i (mg kg <sup>-1</sup> )	Rati	o of ADE to	HCV	Saturation Limit (ma ka <sup>-1</sup> )	50%	rule?	Two	> ue	t ve	er «	pace	ub fr	e frui	
	oral	inhalation	combined	oral	inhalation	combined	Gaturation Limit (ing kg )	Oral	Inhal	Top	Gree	Roo	μ	Hert	Shr	Tree	
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Environment Agency	5	Soil Dist	tributio	'n							Media	a Concentra	ations					
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW	mg kg⁻¹ FW	mg kg <sup>-1</sup> FW
1 Arsenic (C4SL child)	99.9	0.1	0.0	100.0	2.63E+02	NR	1.31E+02	1.12E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-01	1.05E-01	6.04E-02	8.67E-02	5.26E-02	2.89E-01
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Environment Agency		Soil Dist	tributio	n							Media	Concentrat	tions					
	Sorbed	Dissolved	Vapour	Total	Soil	Soil gas	Indoor Dust	Outdoor dust at 0.8m	Outdoor dust at 1.6m	Indoor Vapour	Outdoor vapour at 0.8m	Outdoor vapour at 1.6m	Green vegetables	Root vegetables	Tuber vegetables	Herbaceous fruit	Shrub fruit	Tree fruit
	%	%	%	%	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg m <sup>-3</sup>	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW	mg kg⁻¹ FW	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW	mg kg <sup>-1</sup> FW
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Environment Agency		Avera	ige Daily Ex	cposure (m	g kg⁻¹ bw c	lay⁻¹)				Dist	ribution by	y Pathwa	y (%)		
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
1 Arsenic (C4SL child)	1.38E-04	1.36E-04	2.61E-05	4.34E-06	0.00E+00	0.00E+00	0.00E+00	46.12	45.19	8.69	0.00	0.00	0.00	0.00	0.00
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Environment Agency		Avera	ge Daily Ex	posure (m	g kg <sup>-1</sup> bw c	lay⁻¹)				Dist	ribution b	y Pathwa	ay (%)		
	Direct soil ingestion	Consumption of homegrown produce and attached soil	Dermal contact with soil and dust	Inhalation of dust	Inhalation of vapour	Background (oral)	Background (inhalation)	Direct soil ingestion	Consumption of homegrown produce	Dermal contact with soil and dust	Inhalation of dust	inhalation of vapour (indoor)	Inhalation of vapour (outdoor)	Background (oral)	Background (inhalation)
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Environment Agency		Oral Health Criteria Value (µg kg¹ <sup>1</sup> BW day¹)		imaation Heatin Unterla Value (µg kgʻ <sup>1</sup> BW day <sup>-1</sup> )	Oral Mean Daily Intake (µg day <sup>-1</sup> )	Inhalation Mean Daily Intake (µg day <sup>-1</sup> )	Air-water partition coefficient (K <sub>aw</sub> ) (cm <sup>3</sup> cm <sup>-3</sup> )	Coefficient of Diffusion in Air $(m^2  s^{-1})$	Coefficient of Diffusion in Water $(m^2 s^{-1})$	$\log K_{oc} (cm^3 g^{-1})$	log K <sub>ow</sub> (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g <sup>-1</sup> DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
1 Arsenic (C4SL child)	ID	0.3	ID	0.0087	NR	NR	NR	NR	NR	NR	NR	0.03	0.5	1	0.071	1
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Environment Agency	Oral Health Criteria Value (µg kg <sup>-1</sup> ВW day <sup>-1</sup> )		inhalation Health Criteria Value (µg kg¹ BW day¹)	Oral Mean Daily Intake (иg day <sup>-1</sup> )	Inhalation Mean Daily Intake (иg day <sup>-1</sup> )	Air-water partition coefficient (K <sub>aw</sub> ) (cm <sup>3</sup> cm <sup>-3</sup> )	Coefficient of Diffusion in Air $(m^2  s^{-1})$	Coefficient of Diffusion in Water $(m^2 s^{-1})$	log K <sub>oc</sub> (cm <sup>3</sup> g <sup>-1</sup> )	log $K_{ow}$ (dimensionless)	Dermal Absorption Fraction (dimensionless)	Soil-to-dust transport factor (g g <sup>-1</sup> DW)	Sub-surface soil to indoor air correction factor (dimensionless)	Relative bioavailability via soil ingestion (unitless)	Relative bioavailability via dust inhalation (unitless)
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Environment Agency	Soli-to-water partition coefficient $(cm^3 g^4)$	Vapour pressure (Pa)	Water solubility (mg L <sup>-1</sup> )	Soli-to-plant concentration factor for green vegetables (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	Soli-to-plant concentration factor for root vegetables (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	Soli-to-plant concentration factor for tuber vegetables (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	Soli-to-plant concentration factor for herbaceous fruit (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	Soli-to-plant concentration factor for shrub fruit (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	Soli-to-plant concentration factor for tree fruit (mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soli)	
1 Arsenic (C4SL child)	5.00E+02	NR	1.25E+06	0.00043 fw	0.0004 fw	0.00023 fw	0.00033 fw	0.0002 fw	0.0011 fw	
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Environment Agency	Soli-to-water partition coefficient $\left( cm^3  g^4 \right)$	∕apour pressure (Pa)	Nater solubility (mg L <sup>-1</sup> )	Sol-to-plant concentration actor for green vegetables (mg g <sup>1</sup> fbut DW or FW basis over ng g <sup>1</sup> DW soil)	Soll-to-plant concentration actor for root vegetables (mg g <sup>1</sup> bDV or FV basis over ng g <sup>1</sup> DV soil)	Soli-to-plant concentration actor for tuber vegetables [mg g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	Sol-to-plant concentration actor for herbaceous fruit (mg g <sup>1</sup> plant DW or FW basis over ng g <sup>1</sup> DW soil)	Sol-to-plant concentration actor for shrub fruit img g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)	soli-to-plant concentration actor for tree fruit img g <sup>-1</sup> plant DW or FW basis over mg g <sup>-1</sup> DW soil)
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**FIGURES** 



