Land at Rockfield Road,
Monmouth

Geo-Environmental
Phase 1 Desk Study

Hallam Land Management

Brookbanks

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Document Control Sheet

Document Title: Geo-Environmental Phase I Desk Study

Document Ref: 10410/DS/01

Project Name: Land at Rockfield Road, Monmouth

Project Number: 10410

Client: Hallam Land Management Ltd

Document Status

Rev	Issue Status	Prepared / Date	Checked / Date	Approved / Date
0	Draft	AM 28.06.16	DS 01.07.16	PAB 01.07.16
1	Final	AM 19.07.16	DS 19.07.16	PAB 19.07.16

Issue Record

Name / Date & Revision	01.07.16	19.07.16				
Suzy Birdseye – Hallam Land Management Ltd	0	1				

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Appendix

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1 Introduction

1.1 Brookbanks Consulting Ltd is appointed by Hallam Land Management Ltd to complete a Phase 1 Geo-Environmental Desk Study for a proposed residential development at Land at Rockfield Road, Monmouth.

1.2 The objective of the study is to research the likely geotechnical and chemical characteristics of the soil and ground water environment.

2 Background Information

Location & Details

2.1 The proposed development lies to the west of Rockfield Road (B4233). The north and south of the proposed development are bound by agricultural hedges, and beyond the southern boundary are back gardens of residential dwellings. The west of the proposed development bound by back gardens of the residential dwelling.

2.2 The land is currently undeveloped and is not thought to have been historically subject to any significant built development. The proposed development area is outlined in red, as shown on Figure 2a, below:

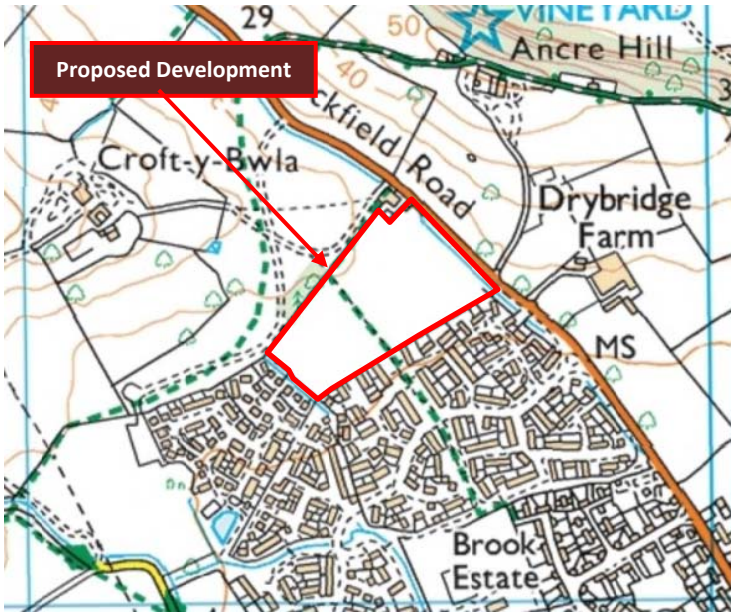

Figure 2a: Site Location

Development Criteria

2.3 It is proposed to develop up to 130 Residential Dwellings.

Sources of Information

2.4 The following bodies were consulted during the study:

- Environmental Matters - Natural Resources Wales
- Development Advice Map - Welsh Government
- The State of Contaminated Land in Wales - Natural Resources Wales

2.5 The following information has been gathered during the study:

- Environmental Search - Landmark Envirocheck Report, June 2016
- Published Geology - British Geological Survey

3 Historical Site Uses

3.1 In appraising the Site history, published Ordnance Survey maps have been reviewed dating from 1886 up to the present day. A selection of large scale maps used in this report, are contained within the Appendix.

3.2 Inspection of the Ordnance Survey maps has revealed that since 1886, the Site has largely remained undeveloped. A path is shown to run through the centre of the Site since 1886.

3.3 The surrounding area is shown to include a number of potentially contaminative land uses. Since 1887, several roads and lanes have been present which provide access around the surrounding area. Associated with the expansion of the existing road network, several residential developments have been built south of the Site. North of the Site, a clay pit is shown between 1902 and 1981 (but identified as an old clay pit by 1922).

3.4 Since 1981, a former Works is identified within the surrounding area of the Site and since 2000, a Caravan Site and Industrial Estate are shown to the south of the Site.

3.5 The historical off-site activities are detailed below in Figure 3a:

Site Use / Activity	Date first shown	Date last Shown	Approximate Distance (m)	Direction
Rockfield Road	1886	Still Present	Bounds Site	East
Residential Development	1938 (Approx. 350m south of the Site)	Still Present	Bounds Site (Since 2000)	South
Lodge	1922	Still Present	Adjacent	North East
Watery Lane	1886	Still Present	350	South West
Ancrehill Lane	1885	Still Present	450	North East
Electric Light Station	1902	1954	650	East
Former Works	1981	2006	650	East
Poultry House	1981	Still Present	650	South
Riffle Range	1886	200	750	South West
Territorial Army Centre	2016	Still Present	750	South East
Race Course	1902	1953	800	South East
Osbaston Suburb	1981	Still Present	850	North East
Caravan and Camp Site	2000	Still Present	850	South
Industrial Estate	2000	Still Present	850	South
Clay Pit	1902 (Old Clay Pit by 1922)	1981	900	North West
Tanks	1922 1922	1971 1981	950 950	East South East

Table 3a: Off-Site Historical Site Uses

3.6 The main development shown over the years is the residential development to the south and Osbaston, along with associated road infrastructure and amenities (i.e. employment and schools) which are shown mainly to the south and east of the Site.

3.7 Potentially significant contaminative land uses identified on-site include: **agricultural.**

Potentially significant contaminative land uses identified within the surrounding areas include: **agricultural, roads (Rockfield Road, Watery Lane and Ancrehill Lane), an old clay pit and former Works**.

4 Recent & Current Site Usage

4.1 With the exception of a path running through the centre of the Site, the Site is currently undeveloped. The historical map search suggests that the land has previously been set as agricultural land.

5 Ground Conditions

Geology

5.1 With reference to the British Geological Survey map, the Site is shown to be underlain by interbedded siltstones and mudstones of the Raglan Mudstone Formation. There is a vertical fault shown to run through the underlying geology to the north-east of the proposed development.

5.2 The majority of the Site shows sand and gravel Superficial geology from River Terrace Deposits, 2.

5.3 There are no areas of Artificial Ground/ Made Ground or Landslip areas reported on Site.

5.4 The Site geology is illustrated below on Figure 5a:

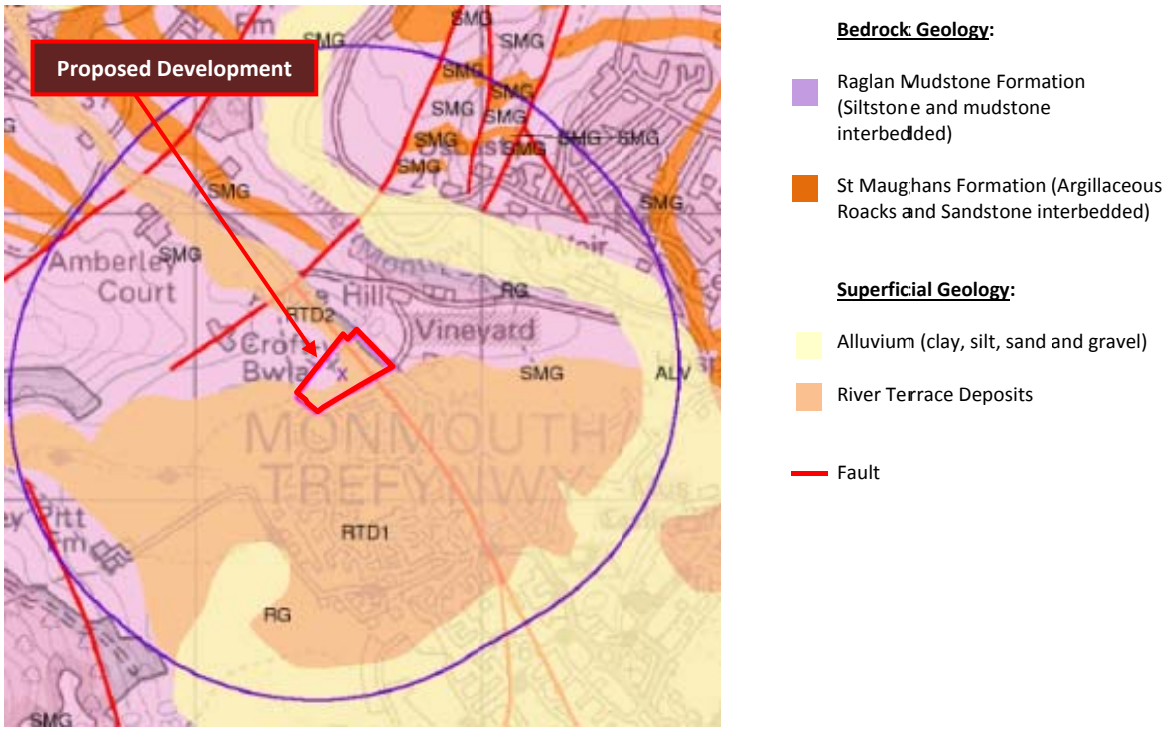

Figure 5a: BGS Published Geology

5.5 BGS records include the following ratings for a number of potential ground stability hazards on or within 250m of the Site boundary:

- Collapsible ground stability: Very Low*
- Compressible ground: No Hazard*
- Ground Dissolution: No Hazard*
- Landslide: Very Low*/ Low*
- Running Sand: No Hazard*/ Very Low*
- Shrinking & Swelling Clay: Very Low*

*stability hazard on Site

Mining

5.6 The Site is not reported to be in an area affected by coal mining.

5.7 It is reported that the Site is at a *Highly Unlikely* to *Rare* risk of Non Coal Mining Areas of Great Britain.

5.8 There is one **BGS Recorded Mineral Sites** recorded within 1,000m of the Site boundary. This is to Great Osbaston, located at Dixton, Monmouth approximately 963m north-east of the Site. This was an opencast mine for the commodity of Common Clay and Shale. This has since been ceased operation.

Radon

5.9 The north and east of the Site is shown to be situated within an intermediate probability area affected by radon, where between 1-3% of homes are above the action level in the north of the Site and between 5-10% within the east of the Site. Furthermore, the west of the Site is shown to be situated within a low probability area affected by radon, where less than 1% of homes are above the action level.

5.10 For the north and west of the Site, it is reported that no radon protection measures are necessary for the construction of new developments. However for the east of the Site, it is reported that basic radon protective measures are necessary in the construction of new dwellings or extensions.

Estimated Soil Chemistry

5.11 DEFRA/EA Soil Guideline Values (SGVs) are indicators of levels of contamination in the soil that may present unacceptable risks to human health (should there be any contact), as well as providing guidance to Local Authorities to determine contaminated land under Part 2A. However, these are merely indicative values in which exceedance may simply require further site-specific investigation as opposed to definitive remedial works.

5.12 Figure 5b below summarises the estimated soil chemistry on Site in comparison to the Contaminated Land Exposure Assessment (CLEA) Soil Guideline Values:

Heavy Metal	Estimated Site Concentration (mg/kg) *	CLEA SGV – Residential (mg/kg)	CLEA SGV – Commercial & Industrial (mg/kg)	Year SGV Published
Arsenic	<15	32	640	2009
Cadmium	< 1.8	10	230	2009
Chromium	60 – 120	130	5000	2002
Lead	< 100	450	750	2002
Nickel	15 - 30	130	1800	2009

Table 5b: Estimated Soil Chemistry & CLEA SGVs

**The British Geological Survey (BGS) Estimated Soil Chemistry dataset provides modelled estimates of ambient background concentrations of Potentially Harmful Elements (PHE) in topsoil: Arsenic (As), Cadmium (Cd), Chromium (Cr), Nickel (Ni) and Lead (Pb). The*

data has been created by combining high resolution geochemical data (from the BGS G-BASE and Imperial College Wolfson geochemical survey database) and the soil parent material maps derived from the BGS DiGMapGB geological data and covers the whole of Great Britain (excluding London).

5.13 The estimated heavy metal concentrations on Site are all shown to be below the published CLEA SGVs and may be confirmed should a soil assessment be required at the detailed design stage.

6 Hydrology

Flooding

6.1 The River Monnow is the nearest Primary/Main River to the Site, situated approximately 479m to the north-east.

6.2 The surrounding area comprises a drainage network shown as Secondary and Tertiary Rivers on Figure 6a. The nearest to the Site are two unnamed drains, the first is situated along the north eastern boundary along Rockfield Road and the second is to the south-west, adjacent to the residential properties off Catherine Close.

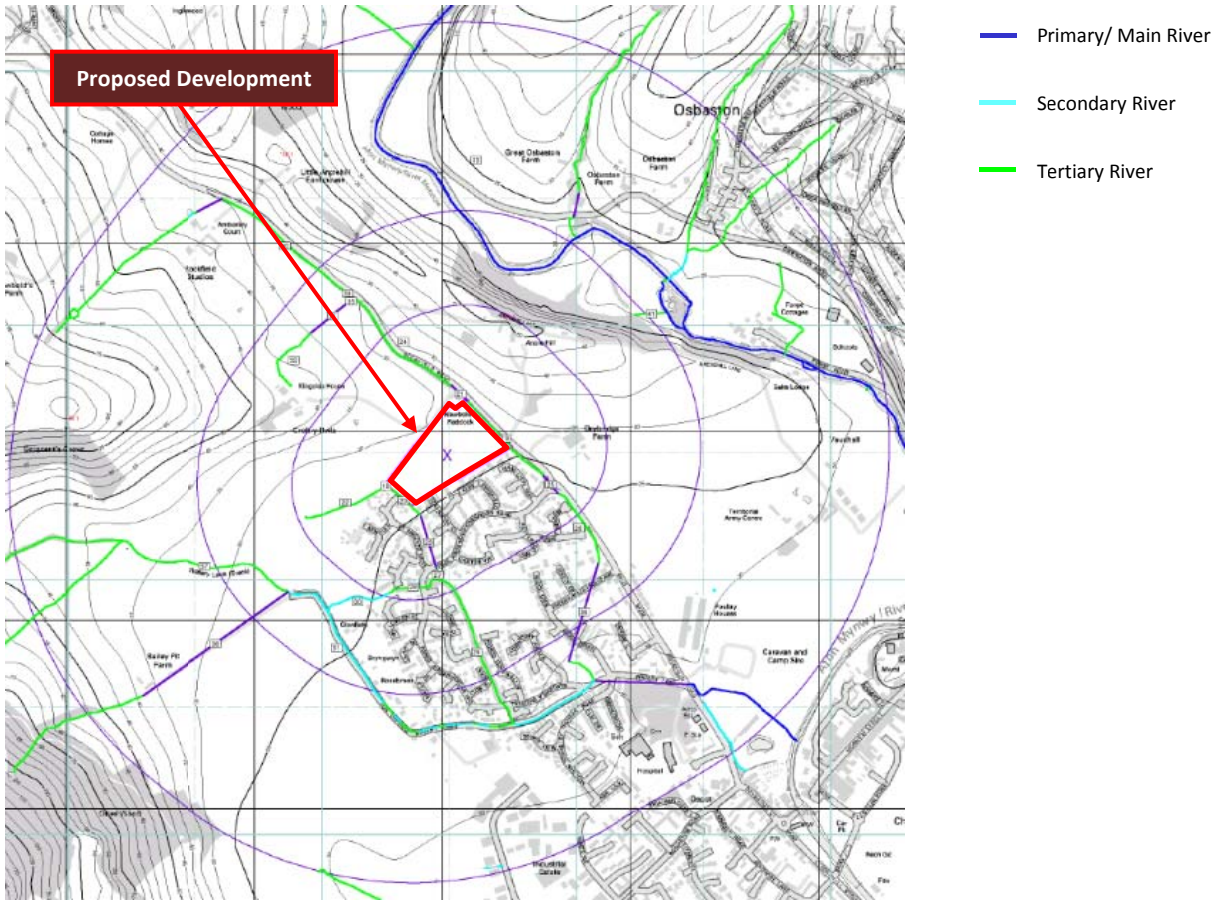

Figure 6a: EA/ Natural Resources Wales Detailed River Network Map

6.3 A series of Technical Notes (TANs) have been produced to supplement Planning Policy Wales (PPW), a document in which the land use policies are set out by the Welsh Government. In particular, TAN 15 which looks at Development and Flood Risk.

6.4 In addition to PPW and TAN 15, Development Advice Maps* form a precautionary framework to guide planning decisions with regards to new development and flood risk.

*The TAN 15 Development and Flood Risk Maps are based on Environment Agency's extreme flood outlines (Zone C) and the British Geological Survey drift data (Zone B). Zone B data originally published 2004, Zone C data revised January 2015 (with additional minor amendment in Denbighshire in March 2015).

6.5 The TAN 15 Development and Flood Risk Mapping shows that the Site lies within Zone A; being an area considered to be at little or no risk of fluvial or coastal/tidal flooding. This is further illustrated below on Figure 6b:

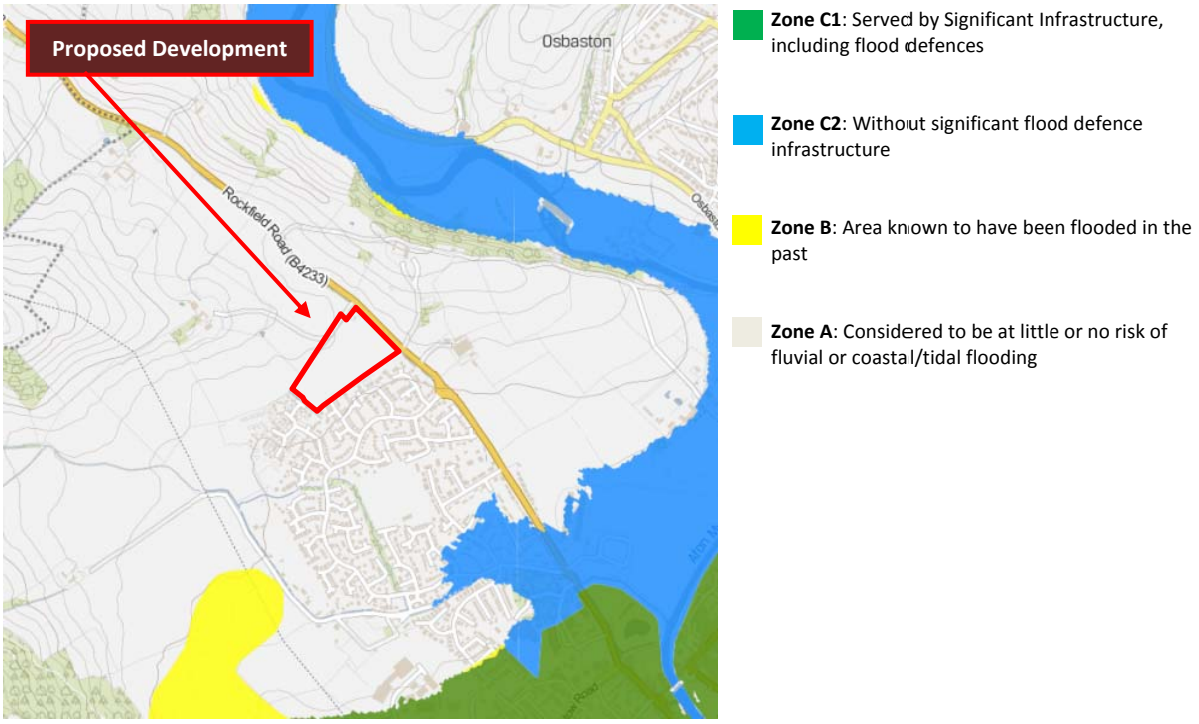

Figure 6b: TAN 15 Development and Flood Risk Mapping

6.6 The risk of surface water flooding has been mapped by the NRW, using information provided by Monmouthshire Council, the Lead Local Flood Authority, and is provided within the Envirocheck Report. Figure 6c illustrates areas of low to high risk of surface water flooding on Site:

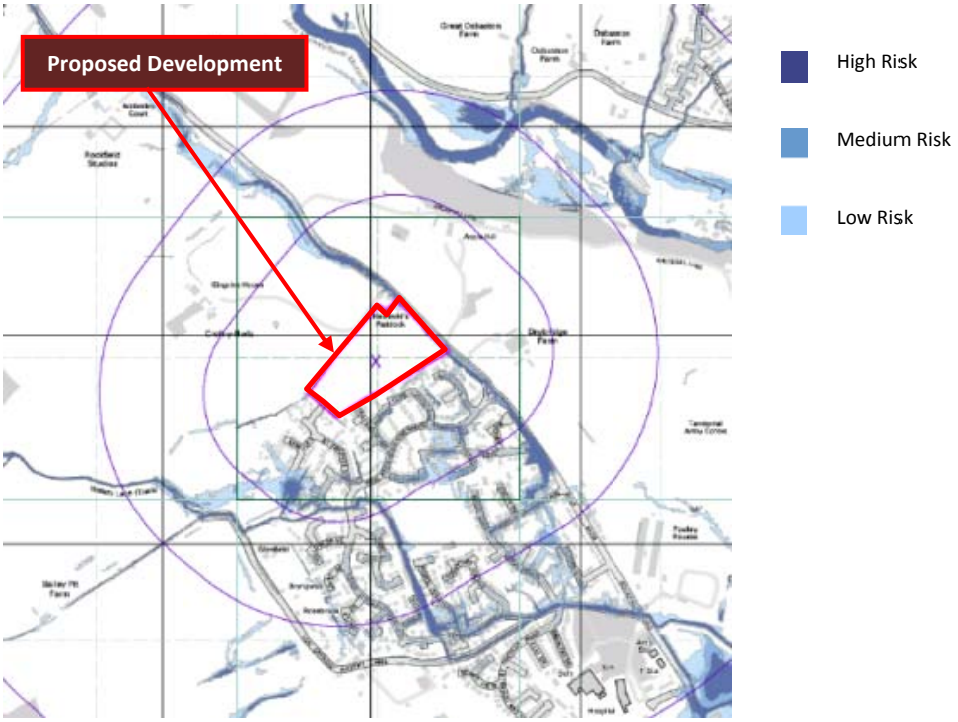

Figure 6c: EA Risk of Flooding from Surface water within the Envirocheck Report

6.7 According to the **BGS Groundwater Flooding Susceptibility** records there is potential for groundwater flooding to occur at the surface of the site, as illustrated below on Figure 6d:

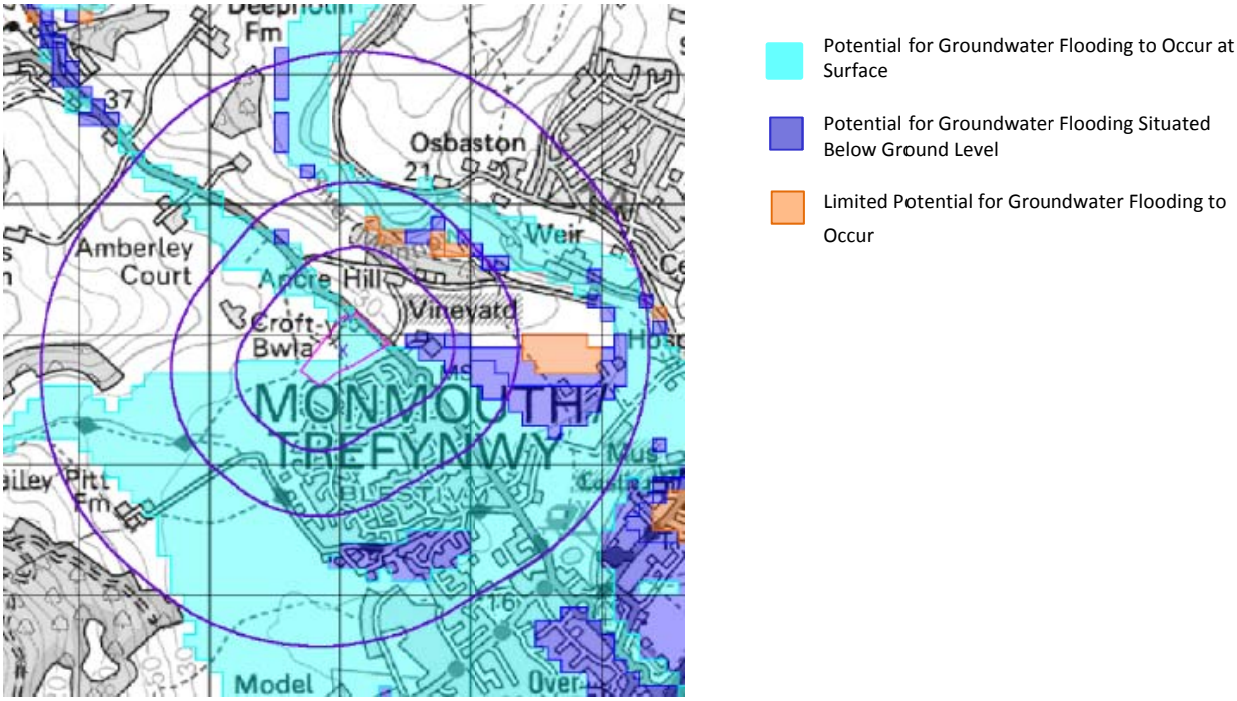

Figure 6d: BGS Groundwater Flooding Susceptibility Map

6.8 A further 17 records of potential groundwater flooding are listed within 500m of the site, these are detailed below in Figure 6e:

Flooding Type	Distance (m)	Direction
Potential for Groundwater Flooding to Occur at Surface	On-site	West
	327	North
	354	East
Potential for Groundwater Flooding Situated Below Ground Level	65	East
	215	East
	315	East
	321	East
	325	North East
	354	North West
	428	North East
	463 x2	North East x2
	466	North East
Limited Potential for Groundwater Flooding to Occur	279	North
	317	North
	357	North East
	392 x2	North East x2

Figure 6e: BGS Groundwater Flooding Susceptibility

Discharge Consents

6.9 There are seven **Discharge Consents** recorded within 1,000m of the proposed Site, three of which are shown to have been revoked. The remaining four active discharge consents are shown in Table 6f.

Operator - Location	Property Type	Discharge Type	Status	Receiving Water	Distance (m)	Direction
Mr S Gleed - Stw Serving Building Plot, Watery Lane	Domestic Property (Single)	Sewage Discharges – Final/Treated Effluent – Not Water Company	New Consent*	Monnow Trib.	592	South
Mr & Mrs R Kear – Plot 2 The Forge Osbaston	Domestic Property (Single)	Sewage Discharges – Final/Treated Effluent – Not Water Company	New Consent*	River Monnow	681	East
Mr J H Foster – Salts Lodge Ancre Hill Lane	Domestic Property (Multiple)	Unspecified	New Consent**	River Monnow	758	East
Z L Zorab – Bailey Pit, Watery Lane	Domestic Property (Multiple)	Sewage Discharges – Final/Treated Effluent – Not Water Company	New Consent*	Trib. of River Monnow	787	South West

Table 6f: Discharge Consents

* (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)

**(Water Resources Act 1991, Section 88)

Water Quality

6.10 There is one **River Quality Biology Sampling Point** situated within 1,000m of the Site boundary. This is for the River Monnow situated approximately 479m north-east. It was given a Grade A (Very Good) River Quality Biology GQA between the years 1990 to 2008 however in 2009 this was downgraded to Grade B (Good).

6.11 There are no **River Quality Chemistry Sampling Points** situated within 1,000m of the Site boundary.

Surface Water Abstraction

6.12 There are fifteen **Surface Water Abstraction** permits recorded within 2,000m of the Site boundary. These are further illustrated in Table 6g.

6.13 The closest abstraction licence recorded is for domestic purposes, approximately 435m north of the site. The abstraction occurs from the River Monnow near Ancre Hill and the Permit start date is November 1998, however no end date has been supplied.

Operator - Location	Abstraction	Permit Start Date	Permit End Date	Distance (m)	Direction
Mrs J Morris – River Monnow Near Ancre Hill	Household Water Supply: Drinking; Cooking; Sanitary; Washing; (Small Garden)	November 1998	Not Supplied	435	North
Mr Robert George Miller Everett – Not Available	Private Water Supplies (Domestic)	Not Supplied	Not Supplied	437	East
Natural Resources Wales – Leat Off The River Monnow at Osbaston	Environmental: Fish Pass/Canoe Pass	April 2015	Not Supplied	610	North East
The Environment Agency – Leat Off The River Monnow at Osbaston	Environmental: Fish Pass/Canoe Pass	January 2008	Not Supplied	610	North East
Old Manor Electric Company – River Monnow at Osbaston	Electricity: Transfer between Sources	April 2016	Not Supplied	611	North East
Old Manor Electric Company – River Monnow at Osbaston	Electricity: Transfer between Sources	August 2007	Not Supplied	611	North East
James Price – River Monnow Near Deepholme Farmk	General Agriculture: Spray Irrigation – Direct	Not Supplied	Not Supplied	919	North
Messrs M Ward – Spring Near Bailey Pit Farm	General Farming and Domestic	March 1966	Not Supplied	1157	South West
Mrs J Harding-Rolls – Spring at Rockfield	Household Water Supply: Drinking; Cooking; Sanitary; Washing (Small Garden)	February 2001	Not Supplied	1632	North West
Mrs J Harding-Rolls – Spring at Rockfield	Household Water Supply: Drinking; Cooking; Sanitary; Washing (Small Garden)	January2001	Not Supplied	1632	North West
Mrs J Harding-Rolls – Spring at Rockfield	Household Water Supply: Drinking; Cooking; Sanitary; Washing (Small Garden)	April 1992	Not Supplied	1632	North West
C Long & Son – Spring Near Newbolds Farm	General Farming and Domestic	March 1970	Not Supplied	1810	West
Messrs M Ward – Spring Near Newbolds Farm	General Farming and Domestic	March 1966	Not Supplied	1810	West
Dwr Cymru Cyfyngegig – River Wye at The Mayhill Intake	Public Water Supply: Potable Water Supply – Direct	April 2006	Not Supplied	1827	East
Mr J Price – River Monnow Near Deepholme Farm	General Agriculture: Spray Irrigation – Direct	June 2014	Not Supplied	1865	North West

Table 6g: Surface Water Abstractions

7 Hydrogeology

Aquifer Designation

7.1 The underlying interbedded siltstones and mudstones of the Raglan Mudstone Formation, form a Secondary A Aquifer. This is illustrated below in Figure 7a:

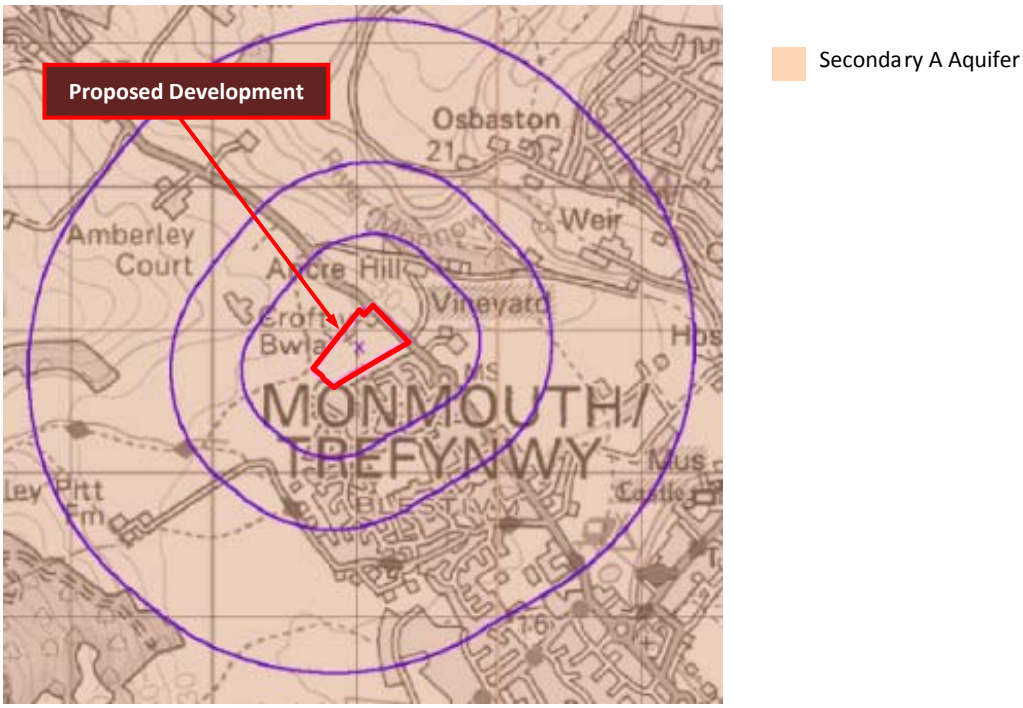

Figure 7a: BGS Bedrock Designation

7.2 The Superficial sand and gravel of the River Terrace Deposits,2 also form a Secondary A Aquifer, as illustrated below in Figure 7b:

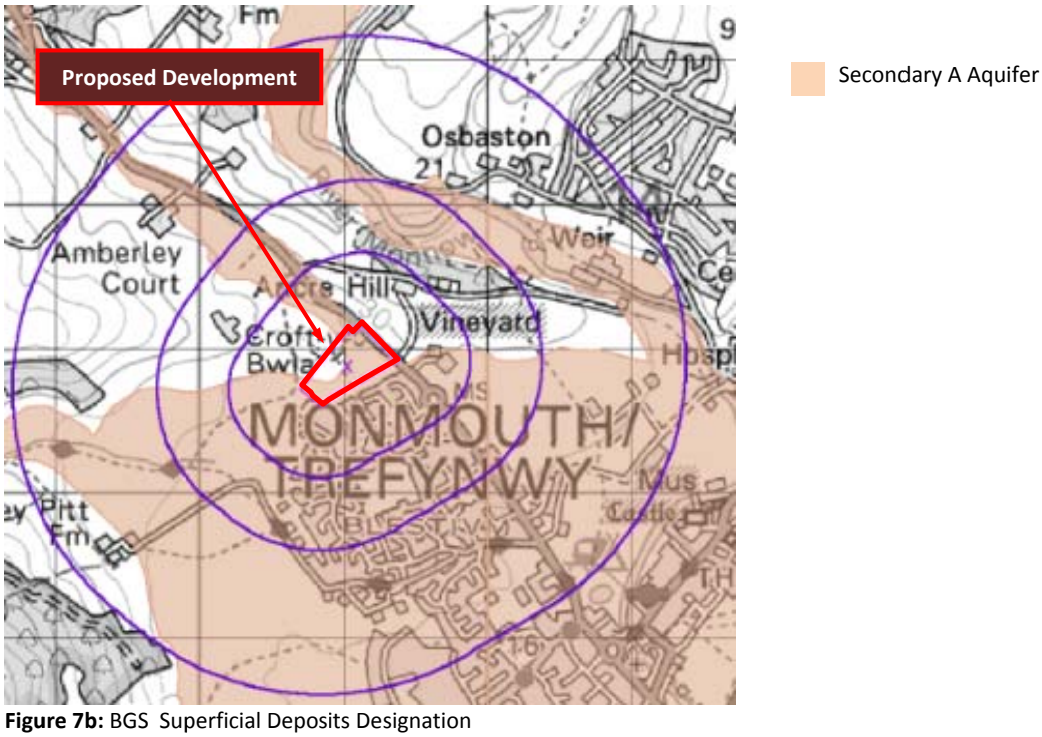

Figure 7b: BGS Superficial Deposits Designation

7.3 The following definitions are provided by the NRW for the Aquifer Designation shown on site:

- **Secondary Aquifers** – *"These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:*

- **Secondary A** - *permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;*

Groundwater Vulnerability

7.4 The underlying interbedded siltstones and mudstones of the Raglan Mudstone Formation along with the Superficial Sand and Gravel of the River Terrace Deposits form a Minor Aquifer with soils of intermediate leaching potential. This is illustrated below in Figure 7c:

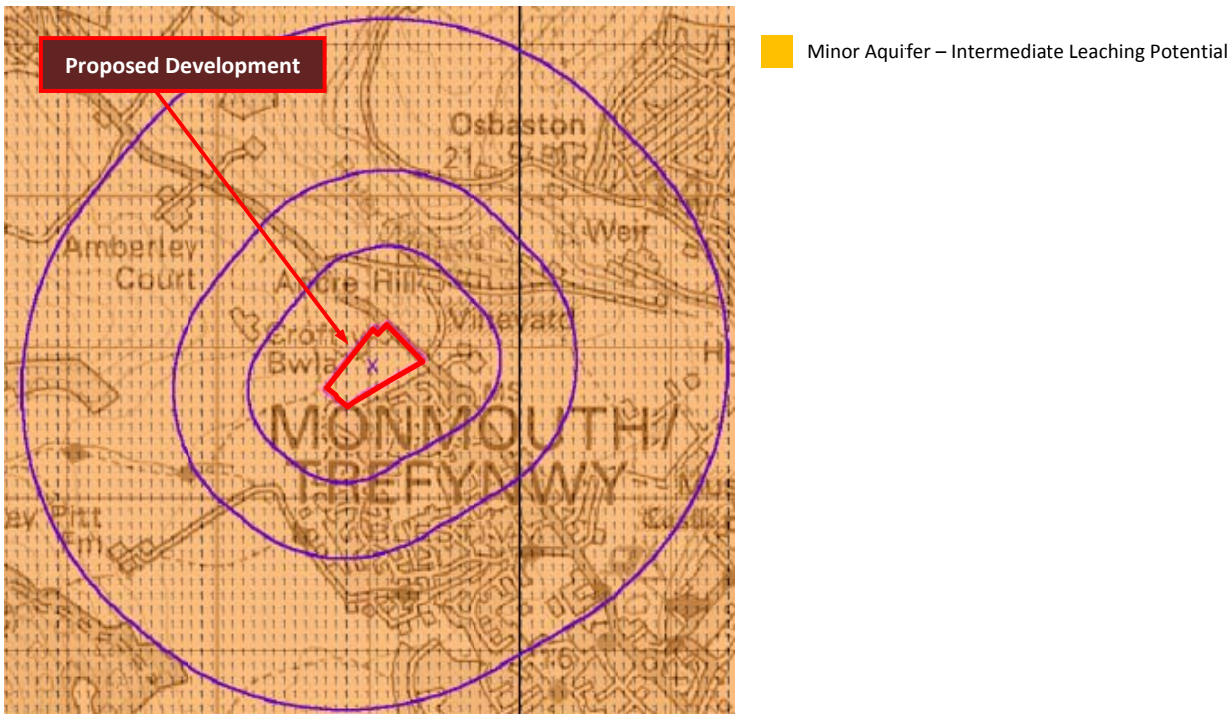

Figure 7c: Groundwater Vulnerability

7.5 **Minor Aquifers** are fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction, they are important for local supplies and in supplying base flow to rivers.

Groundwater Abstractions

7.6 There are four **Groundwater Abstraction** permits recorded within 2,000m of the Site boundary, these are outlined in Table 7d.

7.7 The closest abstraction licence recorded is for general farming and domestic purposes, approximately 139m east of the site. The abstraction is from a well at Drybridge Farm and the Permit start date is August 1999, however no end date has been supplied.

Operator - Location	Abstraction	Permit Start Date	Permit End Date	Distance (m)	Direction
Mr J Griffiths – Well at Drybridge Farm	General Farming and Domestic	August 1999	Not Supplied	139	East
Mr C Ward – Well at Little Ancrehill Farm	General Farming and Domestic	January 1999	Not Supplied	755	North West
Mr A Mullins – Borehole at Model Farm	General Farming and Domestic	March 1966	Not Supplied	1154	South
Messrs H. W. White And Son – Not Supplied	Not Supplied	Not Supplied	Not Supplied	1235	South West

Table 7d: Groundwater Abstractions

Source Protection Zones

7.8 There are no **Source Protection Zones** within 1000m of the site boundary.

8 Potential Contaminative Uses & Statutory Registers

8.1 There are four **Pollution Incidents to Controlled Waters** recorded within 1,000m of the Site boundary, these are further detailed in Figure 8a:

Property Type - Location	Incident Date	Pollutant	Incident Severity	Receiving Water	Distance (m)	Direction
Chemical Industry – Stream Side in Field along Watery Lane	January 1991	Mud/Clay/Soil	Category 2 – Significant Incident	Not Given	220	South West
Not Given – Osbaston Weir	April 1995	Unknown	Category 3 – Minor Incident	Not Given	617	North East
Road (Lost Load) – Monnow	April 1991	Unknown	Category 3 – Minor Incident	Not Given	621	South
Not Given – Alongside Forge Road, Osbaston	February 1995	Farm Effluent/Slurry	Category 3 – Minor Incident	Not Given	792	East

Figure 8a: Pollution Incidents to Controlled Waters

8.2 There is one **Prosecution Relating to Authorised Processes** recorded within 1,000m of the Site boundary. This is at Wonastow Road Industrial Estate West approximately 941m south of the proposed development. This was issued due to the failure to comply with packaging waste regulations where a guilty verdict and a fine of £3,600 was issued on the 7th November 2006.

8.3 None of the following have been recorded within 1,000m of the Site boundary:

- Contaminated Land Register Entries and Notices
- Enforcement and Prohibition Notices
- Integrated Pollution Controls
- Integrated Pollution Prevention and Control
- Local Authority Integrated Pollution Prevention And Control
- Local Authority Pollution Prevention and Control Enforcement
- Local Authority Pollution Prevention and Controls
- Prosecutions Relating to Authorised Processes
- Prosecutions Relating to Controlled Waters
- Registered Radioactive Substance
- Substantiated Pollution Incident Register
- Water Industry Act Referrals

Hazardous Substances

8.4 There are no records of the following on or within a 1,000m radius of the Site boundary:

- Control of Major Accident Hazards Sites (COMAH)
- Explosive Sites
- Notification of Installations Handling Hazardous Substances (NIHHS)
- Planning Hazardous Substance Consents
- Planning Hazardous Substance Enforcements

8.5 There are nineteen **Contemporary Trade Directory Entries** recorded within 1,000m of the Site boundary. These are further detailed below in Table 8b:

Name - **Location**	Classification	Status	**Distance (m)**	**Direction**
Wyewear – 7 St Vincents Drive, Monmouth	T-Shirts	Active	81	South
Gleed Services Ltd – 43 St Vincents Drive Monmouth	Electrical Engineers	Active	249	South West
Beeline Oils – 29 Willow Drive, Monmouth	Lubricant Manufacturers & Distributors	Active	281	South
Mayhill Garage – Rolls Avenue, Monmouth	Garage Services	Inactive	425	South East
J Blake – 4 Hendre Close, Monmouth	Scrap Metal Merchants	Active	574	South East
M. C. S. Cleaning & Maintenance Services – 19 Rockfield Road, Monmouth	Waste Disposal Services	Active	584	South East
Old Manor Electric Company Ltd – The Old Manor, Forge Road, Osgbaston	Electricity Companies	Active	678	North East
N A F – Naf Unit 4 Tehways, Wonastow Road Industrial Estate East, Wonastow Road	Pet Foods & Animal Feeds	Inactive	800	South
Natural Animal Feeds Ltd – Unit 4-5, Wonastow Road Industrial Estate (West)	Pet Foods & Animal Feeds	Inactive	825	South
Hereford Utilities Ltd – Unit 1a, Techway, Wonastow Road Industrial Estate (West)	Agricultural Merchants	Inactive	831	South
The Garage Workshops – Unit 1a-1b, Techway, Wonastow Road Industrial Estate (West)	Garage Services	Inactive	831	South
Mtex Manufacturing – Unit 2, Techway, Wonastow Road Industrial Estate (West)	Machinery – Industrial & Commercial	Inactive	835	South
Mould Tool Reports - Unit 1a, Techway, Wonastow Road Industrial Estate (West)	Tool Design, Manufacturers & Makers	Inactive	839	South
Oasis Metal Products Ltd – Unit 2-3, Techway, Wonastow Road Industrial Estate (West)	Metal Products – Fabricated	Active	864	South
Travis Perkins Plc – Unit 2-3, Wonastow Road Industrial Estate (West)	Builders Merchant	Active	952	South
Eco Glass Studio – 6 Drybridge Park, Monmouth	Stained Glass Designers & Producers	Inactive	957	South East
Paul Jarrold Tyres – Unit 2, Wonastow Road Industrial Estate (West)	Tyre Dealers	Active	965	South
Evans Test Engineering – Apex House Business Centre, Wonastow Road Industrial Estate (East)	Testing, Inspection & Calibration Equipment Manufacturers	Active	967	South
Monnow Mowers & Machinery Ltd – Unit 1, Wonastow Road Industrial Estate (West)	Lawnmowers & Garden Machinery – Sales & Service	Active	997	South

Table 8b: Contemporary Trade Directory Entries

8.6 There are no **Fuel Station Entries** within 1,000m of the Site.

Waste

8.7 Monmouthshire Council is the **Local Authority Landfill Coverage** for the Site.

8.8 There are two **Potentially Infilled Land (Non Water)** sites identified within 1,000m of the Site. These are both listed as 'Unknown Filled Ground' (Pit, quarry, etc.) and are located on the mapping as of 1979 and 1981, situated approximately 728m south and 949m north-east of the Site.

8.9 There are nine **Potentially Infilled Land (Water)** sites identified within 1,000m of the Site, since 1886. These are all 'Unknown Filled Ground' (Pond, marsh, river, stream, dock, etc.). They are all situated approximately between 454m east and 997m east.

8.10 There are no provided reports of the following within 1,000m of the Site boundary:

- BGS Recorded Landfill Sites
- Historical Landfill Sites
- Integrated Pollution Control Registered Waste Sites
- Licensed Waste Management Facilities (Landfill Boundaries)
- Licensed Waste Management Facilities (locations)
- Local Authority Recorded Landfill Sites
- Registered Landfill Sites
- Registered Waste Transfer Sites
- Registered Waste Treatment or Disposal Sites

9 Environmental Setting

9.1 There are three Ancient Woodlands located within 1,000m of the Site. These are further illustrated below in Table 9a and Figure 9b:

Name	Areas (ha)	Type	Distance (m)	Direction
Not Supplied	5.39	Ancient and Semi-Natural Woodland	682	West
Not Supplied	3.23	Ancient and Semi-Natural Woodland	789	North
Not Supplied	243.31	Plantation on Ancient Woodland	998	South West

Table 9a: Ancient Woodlands

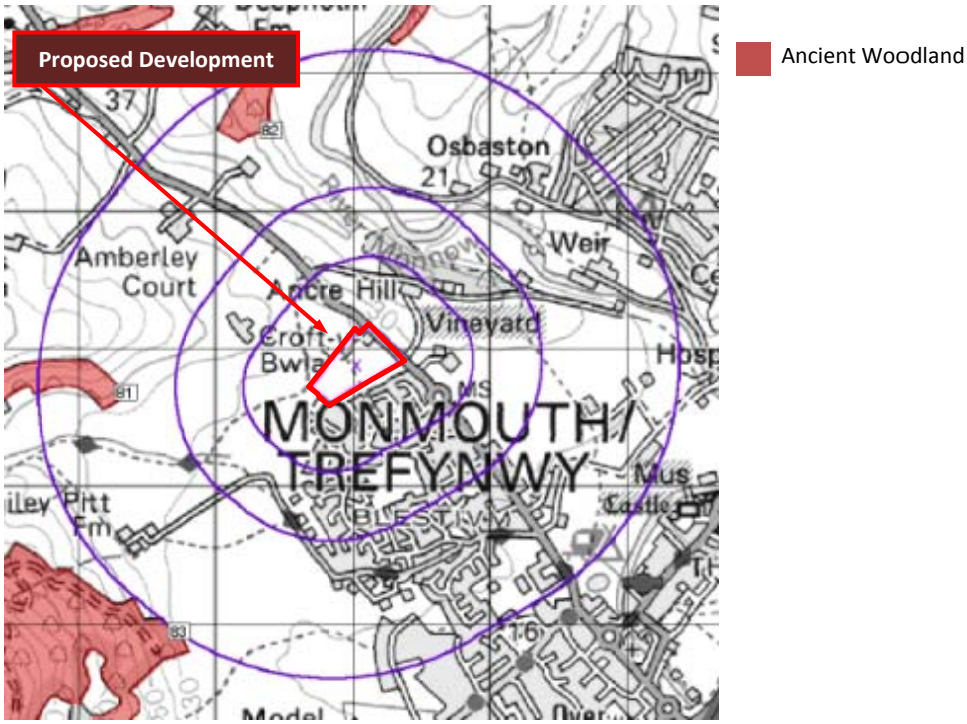

Figure 9b: Sensitive Land Uses

9.2 None of the following are reported within 1,000m of the Site boundary:

- Areas of Adopted Green Belt
- Areas of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Areas
- Forest Parks
- Local Nature Reserves
- Marine Nature Reserves
- National Nature Reserves
- National Parks
- Nitrate Sensitive Areas
- Nitrate Vulnerable Zones
- Ramsar Sites
- Sites of Special Scientific Interests
- Special Areas of Conservation
- Special Protection Areas
- World Heritage Sites

10 Site Conceptual Model

10.1 Guidance has been published by the Department of the Environment, Transport and the Regions (DETR Circular 02/2000) 'Environmental Protection Act 1990: Part 11A – Contaminated Land (20th March 2000) which promotes the 'suitable for use approach'. This has since been replaced by the DEFRA: Contaminated Land Statutory Guidance (April 2012). The DEFRA note, which covers the United Kingdom, uses 'The "suitable for use" approach which focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary

greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore need to be assessed on a site-by-site basis.

10.2 The "suitable for use" approach consists of three elements:

- Ensuring that land is suitable for its current use - in other words, identifying land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise ("remediating" the land): the new contaminated land regime provides general machinery to achieve same.

- Ensuring that land is made suitable for any new use, as planning permission is given for that new use - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given) for the development and, where necessary to avoid unacceptable risk to human health and the environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes.

- Limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought - in other words, recognising that the risks from contaminated land can be satisfactorily assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby risking distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

10.3 The Natural Resources Wales (NRW) has expanded on the Environmental Protection Act (1990) within their 'State of Contaminated Land in Wales (2016)' where ''In situations, where it is unreasonable to remediate contaminated land, a remediation declaration may be issued by the local authority.'' It is also stated that ''In certain circumstances contaminated land may be designated as a *Special Site*. In this situation the role and responsibility of the local authority as lead regulator for Part 2A is transferred to Natural Resources Wales''.

10.4 Also addressed within the DEFRA guidance is the issue of 'contaminated land'. 'Before the **Local Authority** can make the judgement that any land appears to be **Contaminated Land** on the basis that **Significant Harm** is being caused, or that there is a **Significant Possibility** of such harm being caused, the authority must therefore identify a **Significant Pollutant Linkage**.

10.5 This means that each of the following has been identified:

- A Contaminant Source
- A Pathway
- A Receptor

and that:

- The **Contaminant** is causing **Significant Harm** to **that Receptor.**

Or

- There is a **Significant Possibility** of such harm being caused by the **Contaminant to the Receptor**.

10.6 Where any of the three elements of the Source-Pathway-Receptor (SPR) are not present, there is no risk and therefore land cannot be classified as statutory 'contaminated land'.

10.7 In terms of controlled waters, DEFRA: Contaminated Land Statutory Guidance (April 2012) notes the following:

"A.35 Section 78A (9) defines the pollution of controlled waters as: 'The entry into controlled waters of any poisonous, noxious or polluting matter or any solid waste matter'.

A.36 Before determining that pollution of controlled waters is being, or is likely to be, caused, the local authority should be satisfied that a substance is continuing to enter controlled waters or is likely to enter controlled waters. For this purpose, the local authority should regard something as being "likely" when they judge it more likely than not to occur.

A.37 Land should not be designated as contaminated land where:
(a) A substance is already present in controlled waters;
(b) Entry into controlled waters of that substance from land has ceased; and
(c) It is not likely that further entry will take place.

A.38 Substances should be regarded as having entered controlled waters where:
(a) They are dissolved or suspended in those waters; or
(b) If they are immiscible with water they have direct contact with those waters on or beneath the surface of the water.

A.39 The term "continuing to enter" should be taken to mean any entry additional to any which has already occurred."

10.8 At Phase 1 stage, it is necessary to develop an initial conceptual site model to understand the possible relationships between contaminants, pathways and receptors. If a hazardous source, via an exposure pathway to a potential receptor can be established then there is a 'pollutant linkage', which is preliminarily risk assessed using parameters summarised in Table 10a, below. At this stage, the conceptual model is prepared without site specific soils, groundwater or gas testing and as such, the findings should be treated only as first and general indications of possible SPR linkages.

10.9 The primary potential sources of contamination on Site are indicated below:

Agricultural Use	-	Soil and Water Contamination

10.10 The primary potential sources of contamination on Site are indicated below:

Agricultural Use	-	Soil and Water Contamination
Existing Roads	-	Soil and Water Contamination
Old Clay Pit	-	Soil and Water Contamination
Former Works	-	Soil and Water Contamination

10.11 The potential receptors at the site are:

- End users / site occupiers
- Adjacent users / occupiers
- Controlled waters
- Flora and fauna
- Buildings & construction materials

10.12 The potential pathways at the site are primarily:

- Direct ingestion of soil / water / fruit or vegetable
- Inhalation of dust / vapours
- Direct skin contact with the ground / water
- Regression of plant growth due to phytotoxic contamination
- Vertical and lateral migration of contamination

10.13 While limited information is available at this stage methodology has been developed to help identify the potential contamination risk and linkages. The severity of damaging effects and the likelihood of any linkage have been considered.

10.14 Given the potential consequence and likelihood, a risk rating is given, based on the following matrix:

		Consequence			
		Severe	**Moderate**	**Mild**	**Minor**
Probability (Likelihood)	**Highly Likely**	Very High	High	Medium	Low
	Likely	High	Medium	Medium/Low	Low
	Possible	Medium	Medium/Low	Low	Very Low
	Unlikely	Medium/Low	Low	Very Low	Very Low

Table 10a: Risk ratings

10.15 The risk ratings are described as follows:

Very High: There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action.

High: Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action.

Medium: It is possible that without appropriate remediation action harm could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.

Low: It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at worst if any harm was realised any effects would be mild.

Very Low: The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

Source	Pathway	Receptor	Comment	Risk Rating	Potential Mitigation
Contaminated soils **On-site:** • Agricultural **Off-site:** • Agricultural • Existing Roads • Former Clay Pit • Former Works	Direct Ingestion & contact	Site workers & occupiers	Historically undeveloped Site, with the exception of a path. Agricultural use may have included the use of pesticides and fertilizers which may pose minor potential contamination. An assessment of the soils may be required at the detailed design stage.	Low	-
	Inhalation of dust			Low	-
	Direct skin contact			Low	-
	Vertical & lateral migration	Controlled waters	The Site is situated on a Minor Aquifer with intermediate leaching potential.	Low	-
	Direct uptake	Flora	Historically undeveloped site, with the exception of a path. On-site use discourages plant growth.	Low	-
	Direct contact	Building materials	The Site is situated on a Minor Aquifer with intermediate leaching potential.	Low	-
Contaminated Groundwater **On-site:** • Agricultural **Off-site:** • Agricultural • Existing Roads • Former Clay Pit • Former Works	Direct Ingestion & contact	Site workers & occupiers	The Site is situated on a Minor Aquifer with intermediate leaching potential. Groundwater flow into site is likely however none of the surrounding off-site sources have the potential to detrimentally impact the proposed site.	Low	-
	Direct skin contact			Low	-
	Vertical & lateral migration	Controlled waters		Low	-
	Direct uptake	Flora		Low	-
	Direct contact	Building materials		Low	-
Elevated gas **On-site:** None **Off-site:** None	Vertical & lateral migration	Site workers & occupiers	Historically undeveloped Site, with the exception of a path. The Site is situated on a Minor Aquifer with intermediate leaching potential. No potential sources for gassing have been identified within an influencing distance of the proposed development	Low	-
		Adjacent occupiers	Historically undeveloped Site, with the exception of a path. The Site is situated on a Minor Aquifer with intermediate leaching potential. No potential sources for gassing have been identified within an influencing distance of the proposed development	Low	-

Table 10b – Site SPR summary

11 Discussion & Summary

11.1 A review of readily available Site environmental data, including historical mapping and statutory registers and consultation with appropriate authorities has identified the following:

Agricultural land on Site which may include the following typical contaminants: nitrogen, potassium and phosphorous contained within fertilisers; chemicals from pesticides and herbicides; coliform and non-coliform bacteria from livestock waste and manure application; and hydrocarbons from oil and fuel leakages from machinery. Taking into consideration the existing underlying geology and aquifer, this feature generally provides a ***low*** rating for risk. However, this may vary depending on the persistence of the chemicals used and further assessment of the Site's soils will be required at the detailed design stage to establish baseline conditions.

There are **three existing roads** shown within proximity to the Site (**Rockfield Road, Watery Lane** and **Ancrehill Lane**). Potential contaminants may include: heavy metals, oils, fuels and Polycyclic Aromatic Hydrocarbons. Further assessment of the site's soils may be required at the detailed design stage to establish baseline conditions. However, Rockfield Road is separated from the Site by an agricultural hedge. Watery Lane is separated by residential development to the south and Ancrehill Lane is separated from the Site by agricultural fields. It is therefore considered to be a ***low*** risk rating.

An **old clay pit** is situated approximately 900m north-east of the Site boundary. Potential contaminants may include: metals, acids, highly corrosive mineralised waters, metal sulphides and hazardous / non-hazardous chemicals. Further assessment of the site's soils will be required at the detailed design stage to establish baseline conditions. However, the former clay pit is not identified since 1981 and has been built over by residential development, forming the suburb of Osbaston. Therefore the old clay pit is considered to be a ***low*** risk rating.

A **former Works** is shown approximately 650m east of the proposed development. Potential contaminants may include: diesel fuels, solvents and oils. Further assessment of the site's soils will be required at the detailed design stage to establish baseline conditions. However, it is considered to be a ***low*** risk due to the distance from the Site, and it is separated from the Site by existing roads, the River Monnow and agricultural fields.

Summary

11.2 After reviewing the historical mapping, geological data, hydrological data, sensitive land uses, industrial land uses, waste and hazardous substances, there are no uses identified within close proximity of the Site that are potentially contaminative or likely to be prohibitive to the planned development. The overall contaminative risk at the Site is considered to be ***Low***.

11.3 Further assessment of the Site's soils may be required at the detailed design stage to establish baseline conditions.

12 Limitations

12.1 The benefits of this report are provided solely to Hallam Land Management Ltd. The conclusions and recommendations contained herein are limited to those given the general availability of background information and the planned usage of the Site. Brookbanks Consulting Ltd do not confer any third party rights for the information contained in the report.

12.2 All distances referred to in this report are measured from the boundary of the planned development Site unless otherwise advised.

12.3 Third party information has been used in the preparation of this report, which Brookbanks Consulting Ltd, by necessity assume is correct at the time of writing.

Appendix

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