



MAMHILAD

ENVIRONMENTAL STATEMENT

CHAPTER 8

GROUND CONDITIONS



Consultation Draft

Chapter 8 Contents

8	Ground Conditions	1
8.1	Introduction	1
8.2	Assessment Methodology	1
8.3	Legislative and Policy Context	9
8.4	Baseline Conditions	11
8.5	Prediction of Potential Effects	13
8.6	Mitigation	15
8.7	Residual Effects	16
8.8	Assessment of Cumulative Effects.....	19
8.9	Summary.....	20
8.10	References.....	20

Chapter 8 Appendices (See Volume 2)

Appendix 8.1 Phase I Desk Study (October 2016)

Consultation Draft

Blank Page

8 Ground Conditions

8.1 Introduction

- 8.1.1 This chapter describes the desk based assessment of geology and soils, including potential contaminated land, groundwater quality and unstable land which may affect, or be affected by the proposed development, both during the construction phase and the subsequent operational phase.
- 8.1.2 It provides an overview of the baseline geological and soil conditions in the area, the potential presence of land and groundwater contamination, Sites of Special Scientific Interest (SSSIs) and an assessment of potential effects relating to geology and soils. Appropriate mitigation measures to avoid or reduce significant effects are also presented.
- 8.1.3 The proposed development does not include the development of any agricultural land.

8.2 Assessment Methodology

- 8.2.1 This section describes the methodology which has been used in the assessment of geology and soils, including potential contaminated land, which may affect, or be affected, by the construction and operation of the proposed development.
- 8.2.2 Effects resulting from scheme impacts may be adverse or beneficial. The assessment methodology is designed to identify both and seek ways in which to minimise adverse environmental effects and maximise beneficial effects. There is also an opportunity for environmental gain through remediation where proposed works impinge on contaminated land.

Spatial Scope

- 8.2.3 The geographical extent of this study considered all locations where physical works and ground disturbance will take place and the spatial scope was defined by the red line boundary as outlined on the Illustrative Masterplan in Figure 2.1.
- 8.2.4 Initial baseline desk studies have sought to identify those locations of likely geotechnical risk and contamination sources, and where pathways and pollutant linkages could result from construction activities. In addition, the desk studies have identified where the geological conditions may impact on the scheme.
- 8.2.5 The following study has been completed for the site and forms the basis of this report: Phase I Desk Study, WB03660 R1 Mamhilad, Pontypool, Monmouthshire, October 2016. This report is included as Appendix 8.1.

Temporal Scope

- 8.2.6 The baseline scenario considered the sub-surface conditions on site as they exist at the time of writing in 2016 and the current effects on any particular resources or receptors. Assessment of the construction period considers the impacts and associated effects of construction on areas of potentially contaminated land or geological resources within the spatial scope of the proposed development and associated works, including the remediation of any contamination, if required.
- 8.2.7 The operational scenario considers the effect that any residual contamination could have on the general environment surrounding the proposed scheme and an assessment of the risks of ground pollution as a result of the operation of the proposed scheme, and identification of mitigation measures to address these risks where necessary.

Sensitive Receptors

- 8.2.8 The following sensitive receptors which may be impacted by the construction and operation of the proposed scheme have been identified.

Table 8.1: Summary of Sensitive Receptors

Receptor	Description
Regionally important geology	Cutting through important geological strata, excavation or sterilisation of valuable geological assets (mineral resources)
Regionally important soils	High value agricultural soils
Human Health	Including construction and maintenance workers
Controlled Waters	<p>Pollution could occur to aquifers and local surface water courses. Perched groundwater may be present above impermeable clay layers such as weathered Lower Coal Measures, within alluvial or glacial deposits. The following strata underlying the site have been designated as Secondary A aquifers which are protected under the Water Resources Act 1991 which makes it an offence to “knowingly permit” pollution of controlled waters, which include groundwater:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Raglan Mudstone Formation; <input type="checkbox"/> St Maugham’s Formation; <input type="checkbox"/> Head Deposits. <p>In addition, a number of surface watercourses have been identified close to the routes.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Berthin Brook; and <input type="checkbox"/> Tributaries of the above watercourses.
Fabric of infrastructure	Contaminated material could affect the integrity of building material used in construction

Consultation

- 8.2.9 A Scoping Report was submitted to the Council and the Council’s response to this, the Scoping Opinion, is included at Appendix 1.1.
- 8.2.10 The Scoping Opinion indicated that the risk management framework outlined in BS10175:2011 (Ref 8.1), Welsh Government Document WG 15450 (Ref 8.2), Contaminated Land Welsh statutory guidance and Welsh Local Government Associated Document, requirements for the Chemical Testing of Imported Materials for Various End Uses should be followed. All baseline desk study works have been carried out in accordance with these documents.

Desk Study

- 8.2.11 As part of the current proposed scheme a Geotechnical and Geo-environmental Desk Study report has been produced by Clarkebond (UK) Ltd, Phase I Desk Study, Mamhilad, Pontypool, Monmouthshire, Report No WB03660 R1 October 2016 (Appendix 8.1).

Site Survey

- 8.2.12 A site walkover was undertaken by a Clarkebond (UK) Ltd engineers in April 2016 as part of the initial baseline assessment. This enabled verification of mapping data and familiarisation of site conditions and confirmed that there is no land within the application site that is in agricultural use.

Methodology

- 8.2.13 The sensitivity of geological receptors is determined according to the methodology show in Table 8.2 below.

Table 8.2 Sensitivity

Sensitivity	Geological Receptors
High (National)	<ul style="list-style-type: none"> • Site of Special Scientific Interest (SSSI); and • agricultural land of Grade 1 quality.
Medium (Regional)	<ul style="list-style-type: none"> • RIGS site; and • agricultural land of Grade 2 quality.
Low (District)	<ul style="list-style-type: none"> • agricultural land of Grade 3, 4 or 5 quality

- 8.2.14 Magnitude is determined by the predicted deviation from baseline conditions and the likely scale of impact. Quantifiable assessment of magnitude has been undertaken where possible. In cases where only qualitative impact assessment is possible, magnitude has been defined as fully as possible. The methodology for determining the magnitude of an impact is shown in Table 8.3 below.

Table 8.3: Scale for magnitude with respect to impacts on geological/soil receptors

Magnitude	Description
High	<ul style="list-style-type: none"> • Change in favourable condition status of geological SSSI; • generation of large volume of hazardous materials for disposal off site; • permanent impact on geological conditions; and • physical removal or degradation (including loss of structure and contamination) of a large area of soil.
Moderate	<ul style="list-style-type: none"> • Generation of hazardous and non-hazardous materials for disposal off site; • temporary impact on geological conditions; and • physical removal or degradation (including loss of structure and contamination) of a moderate area of soil
Low	<ul style="list-style-type: none"> • Generation of inert and non-hazardous waste materials which may be suitable for re-use on site; • no permanent impact on geological conditions; and • physical removal or degradation (including loss of structure and contamination) of a minor area of soil.

- 8.2.15 The likely significance of the effects were assessed using the matrix in Table 8.4, in conjunction with professional judgement to consider site specific factors that may be of relevance.

Table 8.4: Significance of effects after incorporating mitigation with regards to geology / soil receptors

Magnitude of Impact	Sensitivity of Receptors		
	Low	Moderate	High
Low	1	2	3
Moderate	2	3	4
High	3	4	5

- 8.2.16 A descriptive meaning for each of the five points on the significance of effects scale and the corresponding significance of the impact in EIA terms is detailed in Table 8.5.

Table 8.5 Descriptive Significance

Scale Point	Description and Examples		Significance
1	Negligible Effect	Minimal impact on geological conditions, minor loss of Grade 4 or 5 soils	Not significant
2	Slight Effect	Changes the Made Ground deposits only, moderate/major loss/ degradation of Grade 4 or 5 soils	
3	Minor Effect	Superficial disturbance to near surface deposits, changes in geomorphology, minor, moderate or large loss/ degradation of Grade 3 soils, minor loss/ degradation of Grade 1 or 2 soils. Sterilisation of low quality mineral resources	
4	Moderate Effect	Substantial changes due to cuttings, moderate/ large loss/ degradation of Grade 2 soils or moderate loss/ degradation of Grade 1 soils. Sterilisation of high quality mineral resource	Significant
5	Major Effect	Loss of exposed designated geological feature or large loss/ degradation of Grade 1 soils.	

Contaminated Land

- 8.2.17 The NRW (By default adopting Part IIA of the Environmental Protection Act (EPA) 1990 (as amended) (Ref 8.10) provides guidance on EIA with regard to contamination issues (Scoping Guidelines on EIA; The EA, (May, 2002)) (Ref 8.22). There is also a considerable amount of guidance that has been prepared in order to assist both local authorities and practitioners in assessing the degree to which land is contaminated and deciding whether such land is contaminated within the meaning of Part IIA of the Environmental Protection Act (EPA) 1990 (as amended) (Ref 8.10) and associated guidance.
- 8.2.18 The EPA 1990 (Ref 8.10) provides a statutory definition of contaminated land:
- 8.2.19 "Contaminated Land is any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that...

- significant harm is being caused or there is a significant possibility of such harm being caused;
 - significant pollution of controlled waters is being, or is likely to be caused."
- 8.2.20 Underpinning the guidance is a contaminant -pathway-receptor methodology, which is used to identify Significant Pollutant Linkages (SPLs). The following definitions apply:
- contaminant source: contamination identified (exceeding corresponding guideline values);
 pathway: the means by which the hazardous contamination can come into contact with the receptor;
 and
 - receptor: the entity which is vulnerable to harm from the source.
- 8.2.21 In order to assess the potential for contamination to cause a significant effect, the extent and nature of the potential source or sources of contamination were assessed, the pathways identified, and any sensitive receptors or resources identified and appraised to determine their value and sensitivity to contamination related impacts.
- 8.2.22 When a significant hazard was identified and potential sensitive receptors noted as present, then the potential effects were determined by considering the pathways whereby the hazard may affect the receptors. During the assessment it was assumed that there will be (either during or after construction) a pathway present between the source and the receptor, unless there is a clear indication that this will not be the case
- 8.2.23 The strength of pathway between a source and receptor is a function of the distance between the two and the ease or otherwise of the migration pathway. For example, on sites underlain by impermeable clays, the migration pathway via groundwater would be weak even over short distances. Within sands, the migration pathway would be strong for receptors in close proximity to a source and weak for receptors at some distance from the source.
- 8.2.24 For a proposed scheme such as this where much of the ground is covered in hard surfacing, the migration pathway for soil or water contamination is generally moderate or weak.
- 8.2.25 The pathway is invariably strong for construction workers on contaminated sites, because they are likely to be in close proximity to the soils, particularly during ground works. However, the effect may be weaker as the effects are acute (short-term), as opposed to being chronic (long term).
- 8.2.26 The combination of the sensitivity of the receptor and the magnitude of the effect was used to provide an indication of the level of contamination on the site and the nature and significance of possible effects
- 8.2.27 The following sensitivity criteria in Table 8.6 were derived to take into account the nature of the receptor as well as the period of exposure. The sensitivity of the receptor/resource is based on the value of the feature. The categories were derived based on standards and targets set by government authorities such as Natural England (NE) and the EA and advisory bodies, such as the Construction Industry Research and Information Association (CIRIA).

Table 8.6: Scale for evaluating the sensitivity of receptors (from land contamination)

Sensitivity	Low	Moderate	High
Construction workers	Minimal construction works	Limited Earthworks	Extensive earthworks and demolition of buildings
Future Site Users	Industrial, infrastructure, warehouses, car parks	Commercial, open spaces	Residential land use, allotments
Controlled Waters(ground or surface water)	Controlled waters with limited potable use, or limited input to sensitive or important ecosystems	locally important water resources used for public water supplies but which can be substituted; private water supplies; and water resources that perform a major function in relation to locally important	water resources used for major potable supplies (i.e. by a water supply utility); and water resources that perform a major function in relation to nationally

		sites for nature conservation (SINCs etc.).	protected sites for nature conservation (SSSI).
Built Environment	Infrastructure (e.g. Roads, railways, tramways)	Sites with a local interest for education or cultural appreciation	Sites of international importance, World Heritage Sites, Scheduled monuments

8.2.28 Effects of contaminated land on the receptors were assessed taking into account magnitude as described in Table 8.7, which is based on CIRIA C552 (CIRIA, 2001) [13] (Ref 8.23), the general Quality Assessment (GOA) Scheme, Source Protection Zones (SPZs) and published Contaminated Land Reports (CLRs), Technical Reports (TRs) and Science Reports (SRs).

Table 8.7 Magnitude

Magnitude	Definition
High	<ul style="list-style-type: none"> • previous or on-going activities on or near to a site where severe harm to a defined receptor is very likely; • site investigation data indicating contamination on many sites affected by current or former uses. Quantitative or qualitative risk assessment data estimating a significant likelihood of adverse effects from exposure to pollutants in the environment; and • loss of special characteristics of a water resource. Change in GOA grade, pollution of potable source, severe flood risk, loss of fisheries. Any pollution inside Zone 1 or a groundwater protection zone of special interest.
Moderate	<ul style="list-style-type: none"> • previous or on-going activity where harm to a defined receptor is possible but severe harm is unlikely; • site investigation data indicating moderate contamination. Quantitative or qualitative risk assessment data estimating medium risk of adverse effects from exposure to pollutants in the environment; and • impact on water resources. Reduction in the production of fisheries, moderate changes insufficient to reduce water quality.
Low	<ul style="list-style-type: none"> • greenfield site or previous on-going activities where harm to a defined receptor is unlikely; • site investigation data indicating significant contamination is unlikely. Quantitative or qualitative risk assessment data estimating low likelihood of adverse effects from exposure to pollutants in the environment; and • minor impact insufficient to affect the use or characteristics of the water resource

8.2.29 The likely significance of the effects were assessed using the matrix in Table 8.8, in conjunction with professional judgement to consider site specific factors that may be of relevance.

Table 8.8: Significance of effects after incorporating mitigation

Magnitude of Impact	Sensitivity of receptors		
	Low	Moderate	High
Low	1	2	3
Moderate	2	3	4
High	3	4	5

8.2.30 A descriptive meaning for each of the five points on the significance of effects scale and corresponding significance of the effect in EIA terms is detailed in Table 8.9. Indicative examples of potential effects for each scale point are included for illustration (adapted from CIRIA publication C552 [13] (CIRIA, 2001) Ref 8.23).

Consultation Draft

Table 8.9: Significance criteria for land contamination

Scale Point	Description and Examples			Significance
1	Negligible Effect		<ul style="list-style-type: none"> no discernible negative effects 	Not Significant
2	Slight Effect	Adverse	<ul style="list-style-type: none"> easily preventable, non-permanent health effects on humans; minor low-level and localised contamination of on-site soils; and easily repairable damage to buildings/infrastructure. 	
		Beneficial	<ul style="list-style-type: none"> remediation of localised low levels of contamination; remediation of non-sensitive water resource contamination; and minimal improvements to overall soil and water quality 	
3	Minor Effect	Adverse	<ul style="list-style-type: none"> easily preventable, permanent health effects on humans; pollution of non-sensitive water resources; and localised damage to buildings/infrastructure (on or off site). 	
		Beneficial	<ul style="list-style-type: none"> remediation of localised moderate levels of contamination; remediation of moderate, localised sensitive water resource contamination; and re-use of excavated soils on-site to avoid disposal to landfill 	
4	Moderate Effect	Adverse	<ul style="list-style-type: none"> medium / long-term (chronic) risk to human health; medium long-term risk of pollution of sensitive water resources; significant damage to buildings / infrastructure (on or off site); and contamination of offsite soils. 	Significant
		Beneficial	<ul style="list-style-type: none"> remediation of localised high levels of contamination; remediation of significant, localised sensitive water resource contamination; and 	

			<ul style="list-style-type: none"> re-use of moderate quantities of excavated soils on-site to avoid disposal to landfill
5	Major Effect	Adverse	<ul style="list-style-type: none"> short-term (acute) risk to human health; short-term risk of pollution of sensitive water resources; catastrophic damage to buildings / infrastructure; and generation of significant quantities of waste sediment or soils for landfill
		Beneficial	<ul style="list-style-type: none"> remediation of significant, widespread elevated levels of soil contamination; remediation of significant, widespread sensitive water resource contamination; and re-use of significant quantities of excavated soils on-site to avoid disposal to landfill

8.3 Legislative and Policy Context

8.3.1 The main legislative framework regarding geology and soils (including contaminated land) is set by the following Acts and Regulations

- Agriculture Act 1986 (Ref 8.3);
- Construction (Design and Management Regulations) 2007 (Ref 8.4);
- The Contaminated Land (Wales) (Amendment) Regulations 2012 (Ref 8.5);
- The Water Resources (Control of Pollution (Oil Storage) (Wales) Regulations 2016 (Ref 8.6);
- Control of Substances Hazardous to Human Health 2002 (as amended) (Ref 8.7);
- Environmental Damage and Liability (Prevention and Remediation) Regulations 2009 (Ref 8.8);
- Environmental Permitting Regulations (England and Wales) 2010 (Ref 8.9);
- Environmental Protection Act 1990 (as amended by the Environment Act 1995) (Ref 8.10);
- Environmental Protection (Duty of Care) Regulations 1991 (as amended 2003) (Ref 8.11);
- Landfill Directive 1999/31/EC 1999 (Ref 8.12);
- Hazardous Waste (England and Wales) Regulations 2005 (Ref 8.13);
- Landfill Tax (Contaminated Land) Order 1996 (Ref 8.14);
- Landfill (England and Wales) Regulations 2002 (Ref 8.15);
- Town and Country Planning Act 1990 (Ref 8.16);
- Water Act 2003 (Ref 8.17);
- Water Resources Act 1991 (WRA 1991) and Amendment 2009 (Ref 8.18); and

- Wildlife and Countryside Act 1981 and (Amendment) Act 1985 (as amended by the Countryside and Rights of Way Act 2000) (Ref 8.19).
- 8.3.2 The Wildlife and Countryside Act 1981 (Ref 8.19) (as amended) provides statutory protection of SSSIs, some of which are of geological importance. The importance of nature conservation, including areas with geological features, is also emphasised in the Environmental Protection Act 1990 (as amended) (Ref 8.10).
- 8.3.3 The prevention of pollution is regulated by several pieces of legislation including the Environmental Permitting Regulations 2010 (Ref 8.9), which regulates pollution control by requiring permits for emissions to, for example, air and water
- 8.3.4 The statutory process for dealing with contaminated land in England and Wales is set out in Part IIA of the Environmental Protection Act 1990 (EPA,1990) (Ref 8.10) (as amended by the Environment Act 1995 and the Water Act 2003) (Ref 8.17). Part IIA sets in place a regime whereby contaminated land can be identified, a decision made as to how the land will be remediated and where responsibility for this will fall. The primary legislation is supported by a number of secondary legislative instruments including the Contaminated Land (Wales) (Amendment) Regulations 2012 (Ref 8.5).
- 8.3.5 The need to consider contaminated land issues during the planning process is set out in the Town and Country Planning Act 1990 (Section 215) (Ref 8.16). This Act gives local authorities the ability to require developers to investigate contamination and, if necessary, remediate the land.
- 8.3.6 There are also a number of waste related regulations which serve to protect soils from contamination by waste management, such as the Hazardous Waste (England and Wales) Regulations 2005 (as amended by Hazardous Waste (England and Wales) Regulations 2009) (Ref 8.13), Environmental Protection (Duty of care) Regulations 1991 (Ref 8.11), Waste Management Licensing Regulations 1994 (as amended by Waste Management Licensing Regulations 1997) (Ref 8.20), Landfill Directive 1999 (Ref 8.9), Landfill Tax (Contaminated land) Order 1996 (Ref 8.14) and Landfill (England and Wales) Regulations 2002 (as amended by The Landfill (England and Wales) Regulations 2004 and 2005) (Ref 8.15).
- 8.3.7 Under the Control of Substances Hazardous to Health Regulations 2002 (COSHH) (Ref 8.7) and the Construction (Design and Management) (CDM) Regulations 2007 (Ref 8.4), where a developer knows or suspects the presence of contaminated soil, provision should be made to ensure that risks to the public and site workers are minimised.

Planning Policy

National Planning Policy

- 8.3.8 Welsh national planning policy is set out in the Planning Policy Wales (PPW) Version 9 November 2016 (Ref 8.21). PPW refers to protecting geological conservation interests and soil as well as preventing development from contributing, or being put at an unacceptable risk from, or being adversely affected by, unacceptable levels of soil and water pollution or land instability.
- 8.3.9 In the context of the proposed development, pollution should be minimised and other adverse effects on the local and natural environment. To prevent unacceptable risks from pollution and land instability, the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account.
- 8.3.10 Planning policies and decisions should also ensure that the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation. As a minimum once the land has been remediated it should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990 (Ref 8.10).
- 8.3.11 The proposed development complies with Welsh national planning policy as ground investigations and all associated assessments have and will be produced in accordance with national guidance documents which are underpinned by the requirements of Part IIA of the Environmental Protection Act 1990 (Ref 8.10).

Local Planning Policy

- 8.3.12 The Local Authorities are expected to comply with the PPW by setting out environmental criteria, against which planning applications will be assessed so as to ensure that permitted operations do not have unacceptable adverse impacts on the natural and historic environment or human health impacts on the flow and quantity of surface and groundwater and migration of contamination from the site; and take into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality.
- 8.3.13 With regard to the Development Plan, the Torfaen County Borough Council Local Development Plan (LDP) was adopted in December 2013 (Ref 8.11) includes Policy BG1. This policy encourages development proposals to promote sustainable construction techniques and the use of recycled materials in construction, especially on demolition sites or where aggregate is excavated as part of site construction.
- 8.3.14 There are no designated geological sites in Torfaen (either a SSSI or Regionally Important Geological Site (RIGS)).
- 8.3.15 The proposed development is considered to comply with local planning policy as ground investigations and assessments of both ground conditions and contamination will take into account local guidance documents and policy and national guidance documents and policy which are underpinned by the requirements of Part IIA of the Environmental Protection Act 1990 (Ref 8.10).

Other Statutory Requirements

- 8.3.16 Any activity which intersects, disturbs or enters any of the Authority's coal interests requires the Coal Authority's prior written authorisation. The site is not underlain by any coal bearing strata and as such there is no need to consider this matter further.

8.4 Baseline Conditions

Introduction

- 8.4.1 As part of the current proposed scheme a Geotechnical and Geo-environmental Desk Study report has been produced by Clarkebond (UK) Ltd, Phase I Desk Study, Mamhilad, Pontypool, Monmouthshire, Report No WB03660 R1 August 2016. This report is presented at Appendix 8.1.
- 8.4.2 The section below provides a summary of the current site conditions and history. A more detailed description is included in the Phase I Desk Study.
- 8.4.3 There is no land within the application site that is in agricultural use.
- 8.4.4 The Mamhilad Estate site can be separated into three main areas, the former Nylon Spinners factory in the south, the office buildings in the northeast quadrant and the remaining area of the northwest quadrant which is a complex of rough ground and demolished buildings. The northeast quadrant contains numerous office buildings, including Mamhilad House, Caerleon House, Cwmbran House, Monmouth House and Brecon House. Tarmac and concrete car parking lie along the eastern boundary of the site, connected by 'East Way,' which runs between the car parking and the three largest office buildings; Brecon House, Mamhilad House and Caerleon House.
- 8.4.5 The northeast corner is occupied by a large area of concrete hardstanding adjacent to Cwmbran House (approximately 1.5 acres) which remains following the demolition of Blaenavon House. Most areas between buildings are landscaped and include grassed areas as well as shrubs and mature trees.
- 8.4.6 The Parke-Davis part of the site is generally level. To the northeast there is a large tarmac car park and a small additional car park which takes up the southern end of the adjacent field. The southeastern side of the site comprises trees and landscaping together with ornamental ponds which separate the A4042 from three two storey office blocks, all of which are in a significant state of disrepair.

- 8.4.7 Along the central belt of the site are the two main factory buildings, a large warehouse to the south and a smaller factory. The general area is strewn with roofing fabric which has blown off the buildings. The lorry bays for the factory are along the northwest site.
- 8.4.8 The geology of the application site is shown on the 1:50,000 scale British Geological Survey (BGS) map, Sheet 232, Abergavenny, 1990. The site is shown to be underlain by Made Ground. Head Deposits are shown encroaching on to the northwest corner of the northern site with a finger of Alluvium close to the eastern corner, around Berthin Brook to the east of the site.
- 8.4.9 The solid geology is predominantly the Raglan Mudstone Formation of Upper Silurian age with the younger St Maughan's Formation of Lower Devonian Age shown underlying the far south western edge of the site.
- 8.4.10 The BGS type descriptions for the formations are as follows:
- Raglan Mudstone Formation - *'Red mudstones and silty mudstones with calcretes and sandstones.'*
 - St Maughan's Formation - *'Interbedded purple, brown and green sandstones and red mudstones with intraformational conglomerates containing calcrete clasts.'*
- 8.4.11 The orientation of the beds of the Raglan Mudstone are influenced by the fault that runs along the valley to the east with the beds shown dipping 18°-44° beneath the southern factory site. There is a normal fault shown approximately along the northern boundary of the site with down throw to the north.
- 8.4.12 The Monmouthshire & Brecon Canal is to the west of the site. It is at a higher elevation and therefore there is no risk to this receptor from the redevelopment. There are numerous small issues and streams that shed down from the high ground to the west and then join Berthin Brook which runs along the valley on the eastern side of the A4042. Overall the groundwater generally flows beneath the site from an approximately north to south direction.
- 8.4.13 The risk to these tributaries from potential contamination on site should be considered as high.
- 8.4.14 The superficial deposits, Head in the northwest corner and Alluvium to the east are classified as Secondary (undifferentiated Layers) and Secondary A (Permeable Layers) respectively. Whilst likely to be minimal in influence there are groundwater and surface water abstractions, therefore the risk to these as receptors should also be considered as high. The underlying bedrock, St Maughan's and the Raglan Mudstone, are classified as Secondary 'A' aquifers with permeability likely to be predominantly governed by fracturing within the rock mass. The overall groundwater sensitivity is considered as medium.
- 8.4.15 Environmental hazards highlighted on the plans include historical land use that could be considered contaminated.
- 8.4.16 The existing Made Ground is likely to be low risk provided there have been no oil or chemical spills as it is likely to have been site won natural soils that were originally used for creating the building platform.
- 8.4.17 The age of construction means the potential for asbestos within the internal fabric of buildings to be demolished could be a risk. A full asbestos survey should be undertaken prior to demolition.
- 8.4.18 Above and below ground storage tanks should be assessed for contamination around the extents. The natural soils should tend to attenuate and restrict the migration of any contamination.
- 8.4.19 The existing processes which pose a contamination risk are timber processing, workshops, vehicle parking and old electricity sub stations. Any leaking oil drums and hazardous chemical stores together with area where burning has taken place all also pose a risk.
- 8.4.20 Geotechnical hazards identified include:
- Alluvium- if significantly thick and poor quality this will prevent locally the adoption of shallow conventional foundations.

- Significant thicknesses of made ground could require treatment before reuse beneath hardstanding
- Faults within the bedrock should not have an adverse effect, although could be a factor in groundwater migration.
- Ground investigations and contamination testing will need to be completed to classify the soils in terms of contamination. The main aim would be to retain as much soil on site and restrict off-site disposal to landfill.

8.5 Prediction of Potential Effects

8.5.1 This section describes the anticipated activities to be undertaken during the construction and operational phases of the proposed development which may result in effects relating to geology and soils. Mitigation measures to address the anticipated effects are then described in the following section and then any remaining residual effects predicted to occur as a result of the scheme and post-mitigation are then outlined in the subsequent section.

Works Affecting Geology & Soils

Construction Phase

8.5.2 The scheme is currently at outline design stage, on that basis, earthworks volumes and cut/fill volumes are not currently available.

8.5.3 The proposed scheme will include a range of construction activities across different areas and in different phases, which can be summarised as follows:

- shallow excavation works - areas where shallow excavation works will be undertaken will result in the permanent removal of made ground, soils and weathered bedrock.
- foundations - areas where shallow foundations are required will result in the permanent removal of soils and weathered rock;
- earthworks – where major earthworks are required, a cut and fill balance will be aimed for; however, surplus soils may be suitable for reuse elsewhere on the scheme depending on testing of the soils and providing it falls within defined acceptability criteria;
- retaining walls – potential for permanent removal of soils and rock.
- general construction works – movement of materials, storage of hazardous chemicals leading to secondary impacts on soils and groundwater.

8.5.4 The main effects associated with these works are considered to include dust generation, loss of soils (though not of high agricultural value), soil drainage, impacts to physical, chemical and biological properties of soils (for example through compaction, contamination or mixing). Potential secondary effects as a result of the above include potential impacts to surface and groundwater quality, surface drainage (flooding), human health, flora and fauna (green spaces).

8.5.5 Table 8.10 below presents a summary of the current proposals broadly separated into the five activities that may affect geology and soils along the route and could encounter contaminated land.

Table 8.10 Summary of Current Proposals

Engineering Aspect	Location	Description	Effect on Geology and Soils
Shallow Excavations Works	Site Wide	Excavation for Road, services etc.	<p>Permanent removal of near surface soils and near surface weathered rock.</p> <p>Excavation of road surfacing which may not be suitable for re-use and may require disposal.</p> <p>Excavation of road surfacing which may not be suitable for re-use and may require disposal.</p> <p>May encounter contaminated soils which may require disposal as hazardous waste.</p>
Foundations	Site Wide	Foundation excavation	<p>Permanent removal of near surface soils and near surface weathered rock</p> <p>May encounter contaminated soils which may require disposal as hazardous waste.</p>
Earthworks	Site Wide		<p>Excavation of near surface soils, cut and fill exercises, formation of slopes and embankments.</p> <p>Assessment and classification of excavated soils required to ensure re-use on other parts of the scheme.</p> <p>Potential for degradation and compaction of soils.</p>
Retaining Walls	Western side of site with slopes	Retaining Wall Construction	Permanent removal of near surface soils and near surface weathered rock
General Construction Works	Across whole site	Movement of plant, compounds, storage of material.	<p>Potential for degradation and compaction of soils along access routes.</p> <p>Construction is also likely to involve digging new trenches for the diversion of utilities which would result in the temporary loss of soil and may affect soil structure.</p>

Operational Phase

8.5.6 Once operational, the proposed development could potentially have the following effects on geology and soils:

- Any new electric substations proposed are likely to be at discrete locations, however they could potentially contain hazardous substances in the transformers, switchgear and batteries and may contain coolants or chemicals which could leak in the event of a system failure which could contaminate near surface soils; and
- surface run off from the parking and roads could contaminate near surface soils with hydrocarbons leaked from vehicles using the site.

8.6 Mitigation

Construction Phase Mitigation

- 8.6.1 The construction phase will be carried out in accordance with a Construction Environmental Management Plan (CEMP) to be prepared by the construction contractor prior to commencement of works. Where relevant, these documents will include the following mitigation measures in respect of soils.

Protection of Soil Structure and Quality

- 8.6.2 Soils and rock would be permanently removed in areas where excavations are proposed. Where appropriate any excavated material will be reused on site if acceptable. A Materials Management Plan, in accordance with industry adopted guidance will be prepared by the contractor. Where temporary works are proposed for the construction of the proposed scheme, soils would also be stripped and then reinstated upon completion of the construction period.
- 8.6.3 Soils would be stripped, handled, stored and reinstated using best practice procedures, in accordance with appropriate guidelines, such as DEFRA's 2009 'Code of Practice for the Sustainable Use of Soils on Construction Sites' (Ref 8.24). Best practice procedures include topsoil and subsoil stripping, stockpiling and placing in the driest possible conditions and storing soils for as short periods as possible.
- 8.6.4 To minimise impacts on soil structure and quality, the topsoil will be sequentially stripped from the working areas. Topsoil and subsoil will be stockpiled separately so that they can be replaced in the same sequential layers, in keeping with the existing soil profile. Soil stockpiles would be clearly defined. Tracked equipment would be used where possible, and traffic would be confined to designated routes to minimise compaction.
- 8.6.5 Other possible mitigation measures may include, but not be limited to, the use of a proprietary geotextile membrane to protect the existing ground condition, a layer of inert crushed granular material on the membrane to form temporary running surfaces for construction plant and reinforcement of access tracks.

Prevention of Contamination

- 8.6.6 Hazardous substances, including contaminated land, fuels, chemicals, waste and construction material, will be handled in accordance with appropriate Codes of Construction Practise for each risk
- 8.6.7 Procedures would be put in place should contaminated land be encountered including contact details of the relevant consultees and regulators. Should any unexpected contamination be encountered during the construction works, all works will cease whilst an assessment of the level and extent of contamination is undertaken. In all cases where contamination is identified, a risk assessment will be undertaken to determine if remediation is required. Any clean-up will be conducted as part of the construction works. Guidance regarding the correct procedure for storage, handling and disposal of contaminated soils will be detailed in the CEMP.
- 8.6.8 Emergency procedures would be in place to respond to potential accidental spillages and leaks. Particular consideration will be given to works around and displacement of the buried utilities.
- 8.6.9 Construction workers will be provided with appropriate personal protective equipment and direct contact with the soil should be limited.

Management of Waste

- 8.6.10 A Site Waste Management Plan (SWMP) will be incorporated within the CEMP for the proposed development. This document will outline the procedures for storage and disposal of waste, including hazardous and potentially contaminated wastes, to ensure appropriate disposal and minimal associated environmental effects. Waste Management is considered in detail in Chapter 13.

Intrusive Works

- 8.6.11 Where piling or penetrative ground improvement is required through contaminated ground, works will be carried out in accordance with the EA "Piling into contaminated sites" (Ref 8.25) guidance and a Foundation Works Risk Assessment will be undertaken.

8.7 Residual Effects

- 8.7.1 This section provides details of the effects predicted to occur during both construction and operational phases as a result of the proposed development and following implementation of the mitigation measures identified above – See Table 8.10.

Table 8.10: Summary of mitigation and effects – geology and soils

Phase	Receptor	Summary of Effect	Mitigation	Level of Effect	Adverse/Beneficial	Permanent/Temporary	Residual Effect
Construction	Soils	Temporary stripping and stockpiling with associated risks of deterioration of soil quality/. Compaction of soils by construction traffic.	Works will be undertaken in accordance with appropriate guidelines, such as DEFRA's 2009 Code of Practice for the Sustainable Use of Soils on Construction Sites. Best practice procedures include soil stripping, stockpiling and placing in the driest possible conditions and storing soils for as short periods as possible. Soil stockpiles would be clearly defined	Slight	Adverse	Temporary	No Significant
		Permanent removal and reuse on site.	As above plus production of a Materials Management Plan to ensure appropriate	Slight	Adverse	Permanent	Not Significant

			re-use of soils and assessment and appropriate disposal of unacceptable material				
		Compaction of soils by construction traffic.	Tracked equipment would be used where possible, and traffic would be confined to designated routes to minimise compaction	Slight	Adverse	Permanent	Not significant
		Re-use of excavated soils elsewhere on the scheme	Production of a Materials Management Plan to ensure appropriate re-use of soils and assessment.	Minor	Beneficial	Permanent	Not significant
	Secondary A Aquifers	Mobilisation of potential contamination during ground works	Procedures will be put in place should contaminated land be encountered, including suitable management/ remediation. Where this might be related to piled foundations, a Foundation Works Risk Assessment in accordance with EA guidance will be undertaken.	Slight	Adverse	Temporary	Not Significant
	Surface water	Accidental spills or leakages of	Hazardous substances, including	Slight	Adverse	Temporary	Not Significant

		hazardous substances and migration into underlying groundwater or mobilisation of potential contamination during ground works.	contaminated land, fuels, chemicals, waste and construction material, will be stored, handled, transported and disposed of, according to relevant legislation and best practice guidance to mitigate spillages and leaks. Procedures will be put in place should contaminated land be encountered including suitable management/ remediation.				
	General Public	Harm to human health by ingestion / inhalation / dermal contact with contaminated soils.	Dust will be suppressed using best practice methods to prevent spread of potentially contaminated windblown material.	Negligible		Permanent	Not significant
	Construction Workers	Harm to human health by ingestion / inhalation / dermal contact with contaminated soils, asphyxiation or explosion due to hazardous gases from	Use of appropriate Personal Protective Equipment, toolbox talks and good site hygiene procedures.	Slight	Adverse	Permanent	Not Significant

		contaminated land during construction activities.					
Operational	Built Environment	Chemical attack on concrete or permeation of water supply pipelines from contaminated land.	Appropriate design of concrete and pipelines if any significant contamination is encountered including allowance for winter salting .	Slight	Adverse	Permanent	Not Significant
	Near Surface Soils	Drainage from roads and park and ride sites contaminating near surface soils	Appropriate drainage design to include the installation of petrol interceptors.	Slight	Adverse	Permanent	Not Significant
	Near surface soils	Proposed Substations contaminating near surface soils through leakage	Appropriate design and specification of components choosing less hazardous options where possible.	Slight	Adverse	Permanent	Not Significant

8.8 Assessment of Cumulative Effects

- 8.8.1 The proposed development is not anticipated to have major impacts on geology and soils. Many of the potential effects will be mitigated (avoided or reduced) through remediation of any contaminated soils and reuse of soils within the development as set out above. Mitigation measures will be achieved through close collaboration between the engineering design and environmental teams, as well as through liaison between the project team and NRW.
- 8.8.2 The only development that it is considered necessary to consider on a cumulative basis having regard to ground conditions is the development of the Pontypool Parke Estate land that forms Phase III of the Mamhilad Strategic Site. This will be developed after Phases I and II (the subject of this application) and it is anticipated that its construction phase will be carried out in accordance with a Construction Environmental Management Plan (CEMP) to be prepared by the construction contractor prior to commencement of works which will include similar mitigation measures, where necessary, in respect of ground conditions.

- 8.8.3 Construction of Phase III is unlikely to interact with the construction of Phases I and II, however even if it does, the implementation of suitable mitigation as mentioned above will mean that cumulative effects will be the same as the effects identified for the proposed development.

8.9 Summary

- 8.9.1 On the basis that mitigation measures are implemented appropriately it is considered there will be no significant residual effects on geology and soils during either the construction or operational phase of the proposed development.
- 8.9.2 The proposed development includes areas where the soils have been classified as non- agricultural land due to the urban land use of the scheme. Any soils for reuse will be appropriately protected during the works and where construction does interact with soils, the 'Code of Practice for the Sustainable Use of soils on Construction Sites' (DEFRA, 2009) (Ref 8.25) will be followed
- 8.9.3 Contaminated land assessments have been undertaken as part of the assessment of the proposed development, in accordance with guidance in the PPW 2016 (Ref 8.21) and other UK legislation and guidance including CLR11 (Ref 8.26) and CIRIA C552 (Ref 8.23). Should any further assessment be considered necessary it can be adequately achieved by the imposition of suitably worded planning conditions.

8.10 References

Ref 8.1 – Investigation of Potentially Contaminated Sites – Code of Practice, (BS 10175:2011+A1:2013), 2011, BSI Standards Publication

Ref 8.2 – Welsh Government (2012) Contaminated Land Statutory Guidance [online] Available at: <http://gov.wales/docs/desh/publications/130712contaminated-land-statutory-guidance-2012-en.pdf>

Ref 8.3 - Agriculture Act 1986 [online] Available at: <http://www.legislation.gov.uk/ukpga/1986/49/contents>

Rev 8.4 - Construction (Design and Management Regulations) 2007 [online] Available at: <http://www.hse.gov.uk/pubns/books/l153.htm>

Ref 8.5 – the Contaminated Land (Wales) (Amendment) regulations 2012 [online] Available at: <http://gov.wales/topics/environmentcountryside/epq/contaminatedland/documents/?lang=en>

Ref 8.6 – The Wales Resources (Control of Pollution) (Oil Storage) (Wales) Regulations 2016 [online] Available at: <http://senedd.assembly.wales/mgIssueHistoryHome.aspx?lId=14584>

Ref 8.7 - Control of Substances Hazardous to Human Health 2002 (as amended)

Ref 8.8 - Environmental Damage and Liability (Prevention and Remediation) Regulations 2009 [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/221095/pb13895-indepth-guide-regs09.pdf

Ref 8.9 - Environmental Permitting Regulations (England and Wales) 2010 [online] Available at: http://www.legislation.gov.uk/uksi/2010/675/pdfs/uksi_20100675_en.pdf

Ref 8.10 - Environmental Protection Act 1990 (as amended by the Environment Act 1995) [online] Available at: <http://www.legislation.gov.uk/ukpga/1990/43/contents>

Ref 8.11 Local Development Plan (LDP), Torfaen County Borough Council. Local Development Plan (to 2021), Adopted Plan – Written Statement, December 2013) Available at: <http://www.torfaen.gov.uk/en/PlanningAndDevelopment/Planningpolicy/LocalDevelopmentPlan/Local-Development-Plan.aspx>

Ref 8.12 - Landfill Directive 1999/31/EC 1999 [online] Available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69347/pb13563-landfill-directive-100322.pdf

Ref 8.13 - Hazardous Waste (England and Wales) Regulations 2005 [online] Available at:
http://www.legislation.gov.uk/uksi/2005/894/pdfs/uksi_20050894_en.pdf

Ref 8.14 - Landfill Tax (Contaminated Land) Order 1996

Ref 8.15 - Landfill (England and Wales) Regulations 2002 [online] Available at:
<http://www.legislation.gov.uk/ukdsi/2002/0110395905/contents>

Ref 8.16 - Town and Country Planning Act 1990 [online] Available at:
<http://www.legislation.gov.uk/ukpga/1990/8/contents>

Ref 8.17 - Water Act 2003 [online] Available at:
http://www.legislation.gov.uk/ukpga/2003/37/pdfs/ukpga_20030037_en.pdf

Ref 8.18 - Water Resources Act 1991 (WRA 1991) and Amendment 2009 [online] Available at:
<http://www.rrc.co.uk/nlpdfs/W2010/LINKS/Water%20Resources%20Act%201991.pdf>

Ref 8.19 - Wildlife and Countryside Act 1981 and (Amendment) Act 1985 (as amended by the Countryside and Rights of Way Act 2000) [online] Available at: http://jncc.defra.gov.uk/PDF/waca1981_schedule3.pdf

Ref 8.20 - Waste Management Licensing Regulations 1994 (as amended by Waste Management Licensing Regulations 1997) [online] Available at: <http://www.legislation.gov.uk/uksi/1994/1056/made>

Ref 8.21 - Planning Policy Wales (PPW) Version 8 Jan 2016 [online] Available at:
<http://gov.wales/topics/planning/policy/ppw/?lang=en> Ref 8.22 - Scoping Guidelines on EIA; The EA, (May, 2002) [online] Available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296952/geho0411btrf-e-e.pdf

Ref 8.23 – Contaminated Land Risk Assessment – A Guide to Good Practice (CIRIA C552) 2001

Ref 8.24 – Piling into Contaminated Sites – Environment Agency [online] Available at:
<http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/scho0202bisw-e-e.pdf>

Ref 8.25 - Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA) 2009 [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69308/pb13298-code-of-practice-090910.pdf

Ref 8.26 – Model Procedures for the Management of Land Contamination (Contaminated Land Report 11) 2004 [online] Available at: <http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/scho0804bibr-e-e.pdf>