Spring (Talywain) Ltd

The British

Reclamation Scheme

Environmental Statement
This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 124039-00
Preface

This Environmental Statement has been prepared by Arup on behalf of Spring (Talywain) Ltd. It accompanies a planning application under the Town and Country Planning Act 1990 to reclaim the site of the former British ironworks’, Abersychan to facilitate its development for residential and business uses.

Copies of the Environmental Statement can be purchased in a hard copy format for £100 or on CD for £50, by arrangement with Arup at the address below.

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ENVIRONMENTAL STATEMENT
NON-TECHNICAL SUMMARY

Introduction
Spring (Talywain) Limited, who purchased The British Site in July 2007, are preparing a Masterplan for the residential, commercial and employment re-development of the site in line with the Torfaen Local Plan. The proposals will be promoted through two applications, one for reclamation of the site to alleviate former mining hazards, followed by a second application for development in accordance with the Masterplan.

This summary forms part of an Environmental Statement which has been prepared to support the first of these applications. It outlines the proposed reclamation works, the main environmental effects, and any mitigation proposals necessary to reduce the adverse effects.

Site History and Background
The site known as ‘The British’ is one of the largest Brownfield sites in South Wales at Talywain, approximately 6km north west of Pontypool. The British site has been subject to over 200 years of despoliation by heavy industry including several collieries, an ironworks and landfill operations.

To the north and east, the site adjoins the linked communities of Golynos, Castle Wood, Garndiffaith, Talywain and Abersychan. A disused railway embankment, up to some 14m high, crosses the Cwm Sychan valley, isolating the south east part of the site from Abersychan. To the south of the site is the settlement of Pant-glas and to the south east is a rugby field.

Buildings, surviving from the British Ironworks, are located in the central part of the site - the former offices/workshop and the Cornish engine house. They are statutorily protected, along with other relict structures.

The existing landform of the site is varied. Presently, much of the change in level takes place via steep tip faces between upper and lower plateau areas.

Underground mining took place at the site from at least 1826 and numerous recorded workings outcrop beneath or close to the site.

About the Development Proposals
Land at the British is allocated for redevelopment in the Torfaen development plan. The purpose of the reclamation works is to generate land, suitable in profile, stability and safety, to accommodate future development and support local regeneration initiatives.

The earthworks reprofiling is aimed at creating a gently sloping landform which serves as a transition between the developed valley floors and surrounding uplands. These works will replace the existing surface water regime through the site with an open water channel which will become a permanent feature of the restored site.

A series of high quality coal seams sit beneath the northern plateau of the site and the shallow mineworkings present a hazard to subsequent development and existing users. A number of alternatives were considered to remediate the mining features, including excavation and backfill or grouting of the mineworkings. Excavations were found to offer the most robust remedy by removal of hazards across a wide area. Drill and grout treatment is less suited to large scale reclamation; it would have similar amenity impacts and would be less efficient in remediating the hazards.

Where the coal is sufficiently close to the surface, therefore, in the northern part of the site it will be extracted as part of the reclamation process; simultaneously dealing with existing hazards, obviating sterilisation of the coal resource and providing revenues to subsidise the restoration and aftercare programme for the site. Approximately 350,000 tonnes of coal may be recovered this way.

On completion of bulk excavations, the workings will be backfilled and compacted to form stable development platforms. The restored landform will be hydrosed in preparation for redevelopment.

It is anticipated that the reclamation scheme will be completed in less than 48 months and in three main phases of site preparation, excavation and restoration. The rate of excavation will depend on the market for the coal product.

Environmental Impact Assessment
An environmental impact assessment of the effects of the development has been conducted by members of the assessment team.

Summary findings are presented below, concentrating on the impacts likely to occur during the process of reclamation.
The completed scheme will prevail for a temporary period only, pending implementation of the Masterplan for housing and complementary land uses.

**Ground and Groundwater Conditions**

The site is underlain by Lower and Middle Coal Measures which dip towards the south-west and contain a number of coal seams and ironstone horizons which have been mined in the past.

Glacial deposits overlie the solid strata consisting of boulder clays and sand and gravel deposits; the surface of the natural glacial deposits can be seen adjacent to Farm Road and in the vicinity of Pant Glas, elsewhere, they are masked by made ground.

The main area of made ground lies within the northern plateau and comprises ironworks waste, colliery spoil and a 1960's tip.

Reclamation will stabilise the ground, removing steep and eroded slopes, to be replaced by gentler gradients designed to acceptable factors of safety. In addition the current hazards from abandoned mineworkings - shafts and adits - will be removed.

Some limited soil contamination has been found. Where such soils are to remain in place they will be capped to ensure that they conform to government guidelines for the subsequent proposed land uses.

The reclamation works are designed to have positive impacts on the ground and groundwater conditions at the site. During the works ground gases and groundwater quality will be routinely monitored.

**Surface Water and Drainage**

The Cwm Byrgwm Stream and the Cwm Sychan and Blaengaefog Brooks are conveyed beneath parts of the site in masonry culvert systems constructed when the British Ironworks was developed. Culverted flows emerge at the toe of a steep, overgrown slope some 200m east of the site from where it flows towards Abersychan and its confluence with the Afon Llwyd.

A mine water drainage roadway, known as the Golynos Watercourse, passes beneath part of the site and discharges to the Cwm Sychan Brook downstream of the site. It comprises an unlined roadway within rock, located at depths of 40m to 60m.

The drainage system on the site is in a long neglected condition. Erosion of colliery spoil tips, just upstream or within the site, together with fly-tipping, has caused the blockage or partial-blockage of several drop shafts and culverts. Also, the system has been much modified over the years, particularly with the abandonment and infilling of reservoirs and feeder ponds. Under-sized and/or blocked drop shafts and culverts are unable to convey peak floods and this has resulted in surcharging, over spilling, wash-outs and erosion gullies.

A new surface watercourse will be constructed early in the reclamation scheme to convey the streams through the site in a new open channel designed to meet modern standards. It will flow sinuously through a green corridor and form a significant wetland feature. Flows from the new channel will be discharged off-site via a new culvert constructed under Lodge Road before discharging into the open channel section of the Cwm Sychan Brook downstream of the site. Flows will be attenuated with flood storage being provided within lower lying land in the vicinity of Big Arch.

The existing Golynos Watercourse would continue to function as a mine water drain and would not be disturbed by the proposed works.

The primary impact would be permanent resolution of existing surface water drainage problems caused by the antiquity of the existing site system. Coal washing and water treatment facilities are likely to be required during reclamation scheme to safeguard water quality in the Cwm Sychan Brook. Water will be treated in a series of stilling ponds located within the southern part of the excavation, allowing water to be filtered prior to discharge to the realigned channel.

**Landscape and Visual**

The site lies on the western, lower slopes of the Llwyd valley, with ground levels falling approximately north to south via steep tip faces between an upper and lower plateau. There are no designated landscapes within or close to the site.

A disused railway embankment runs along the eastern boundary separating the site, both physically and visually, from the urban areas located in the valley floor. It carries a national long distance cycleway.

The original natural topography over much of the site is obscured by the residual shale and spoil mounds. This highly disturbed landscape of valleys, plateaux and scattered industrial ruins, regenerative vegetation and peripheral settlement forms a transitional fringe landscape between the uplands and moorland slopes to the west and contrasting suburban character of Abersychan and Talywain to the east. Particularly in the south of the site it has a feeling of being separate and quite remote.

The site is effectively screened from much more distant views from the west by the ridge landform of Byrgwm and Waun Wen.

The site’s location and its local landscape character are such that no significant detriment to the landscape
character and appearance of the wider locality would be likely to result from the proposed development. While there will be some modest gains to the landscape structure such as the restored watercourse of the Cwm Sychan Brook, these will be balanced by the loss of scrub and heathland habitats. Part removal of the old rail embankment to locate a new access point just north of the Big Arch will open up the site to the east.

In the long term the reclaimed landform will form an excellent basis for a Masterplan where major landscape infrastructure proposals will form a key part of regenerating this part of the valley landscape. Without the scheme the site will continue to degrade.

The loss of existing vegetation and tree cover is an unavoidable impact during the reclamation works but the principal impact will be on the visual amenity of nearby residents at Castle Wood, Elizabeth Row and Pant Glas. Although noise bunds will screen the working surfaces, these mitigation features will temporarily cut off the majority of the long views across the valley. The overburden mounds will be bulky/high features in the southern part of the site.

**Ecology and Nature Conservation**

The British supports a mosaic of habitat types, including those which are considered semi-natural such as Beech Woodland and those that have clearly established as a result of the industrial heritage of the site such as the vegetated mounds of colliery spoil and railway embankment to east. Agricultural habitats in the form of acid and neutral grassland are evident, particularly in the northern and north western parts of the site.

There are no nationally designated sites within The British but, due to its relatively undisturbed nature, several areas have developed into valuable ecological features and support notable flora and fauna, including reptiles, nesting birds, bats and invertebrates.

The reclamation proposals, entailing extensive earthworks and an almost total vegetation strip, will result in direct habitat loss and fragmentation, together with potential for indirect impacts on adjoining habitats due to disturbance, (e.g. noise, light) dust deposition and changes to the hydrological regime.

The railway embankment along the eastern boundary would be retained, except for one section, together with its associated habitats.

Early consultation with the local authority ecologist and Countryside Council for Wales established the principle that habitat loss within the excavation footprint and areas needed for screen embankments, overburden mounds and road diversions would be an inevitable consequence of the scheme.

To mitigate for the loss of habitats it is proposed to enhance the value of land within the ownership of the applicant but outside the site and translocate certain species, including:

- Enhancement of grassland areas at Hay Meadow and in Cwm Sychan valley;
- Enhancement of off-site heathland at British Top Tip and lower Cwm Byrgwm Tip using turves from on-site heathland;
- Control of Bracken within British Heath and Cwm Byrgwm Valley;
- Translocation of reptiles from within the reclamation boundary to the railway embankment, Cwm Byrgwm and British Heath; and
- New wetland habitats will be created on-site around the new stream course.

**Archaeology and Cultural Heritage**

The Sites and Monuments Record has 15 entries for the site, including a Grade II* Listed Building – The British Office Quadrangle; two Scheduled Ancient Monuments – the remains of the Cornish Pumping Engine House (Grade II listed) and the Air Furnace within the office complex. The Big Arch is also listed at Grade II.

In 1997 evaluation trenches were excavated in areas of the former industrial complex with a view to investigate the furnaces and the foundations of the casting house, the forge and mill, the engine blowing house, the brickworks and the coke ovens. This evaluation identified the location of the main below ground structures relating to the furnaces, the façade of the casting house, the engine blowing house and the forge and mill. It also identified the possible southern extent of the brickworks.

The bulk excavation will remove any below ground features that currently survive within the extraction area; this will involve the removal of archaeological remains relating to the coke ovens, the brickworks and the tramway and rail links. Fieldwork has established that these structures have been significantly truncated by previous activity within the site. As such the surviving remains do not warrant preservation in situ, but do merit preservation by record. This could be achieved through a programme of archaeological mitigation works.

There will be no direct impact from the extraction process on those features which lie outside this area. Those features of the highest value will be preserved in situ and that the reclamation scheme has been designed so it will have no direct impact upon them.
Transport and Accessibility

The northern part of the site is accessed from the B4246 via Farm Road. Farm Road bisects the northern plateau and is a public highway giving through access to Mountain Road and properties at Castle Wood and Elizabeth Row. Access into the southern part of the site from the B4246 (Lodge Road) is via a masonry tunnel through the disused railway embankment, known locally as the Big Arch, which also provides access to Pant Glas.

Farm Road will be stopped up during the reclamation works, with access to Castle Wood being retained and the through route to Mountain Road, serving Elizabeth Row and other properties diverted through the site on a new highway. The new route would punch through the railway embankment at a point just north of the Big Arch by means of a new T junction with the B4246.

The traffic projections indicate that there could be up to around 260 daily vehicle movements during the bulk excavation phase of the reclamation work. Most of these would be attributable to staff car journeys to and from work rather than the exportation of the coal by heavy goods vehicles, which would account for approximately 42 movements. This amounts to an increase in traffic on the B4246 of under 3%.

It is proposed to route all coal exportation goods vehicles to and from the south, avoiding the World Heritage site at Blaenavon.

A Transport Implementation Strategy has been devised to provide a formal basis for securing safeguards regarding vehicle routing and road condition, as well as a means of outlining commitments to ensuring any local disruption is minimised.

Air Quality

The existing site has extensive areas of unmade, non-vegetated ground giving rise to wind erosion of soil and hence, dust emissions in the local area.

The reclamation scheme will entail substantial earthmoving and extraction activities which would also give rise to dust emissions with subsequent potential impact in terms of dust nuisance and elevated fine particle (referred to as PM_{10}) concentrations.

The bulk excavations with coal recovery would take place close to residential properties. Application of standard dust mitigation measures would reduce the potential impact in terms of dust nuisance and elevated PM_{10} concentrations to within acceptable limits for the majority of the time.

However, during dry conditions when operations take place close to housing, nuisance from dust is expected and careful management is required to avoid its occurrence.

The increase in road traffic on local highways would have no significant air quality impact.

Noise

A number of houses border the reclamation site, in an area where noise levels are generally low, particularly where distant from traffic on the B4246.

Subject to the rate of coal extraction, the bulk excavations in the north of the site could continue for a period of up to 42 months, moving in a north-south direction. During preparation, excavation and reinstatement, there will be noise from earth moving equipment, excavators, tractor dozers, loading and unloading trucks, stand-by generators and other fixed and moveable equipment and plant.

It is intended to carry out works over a six day week 0800 – 1800 Mondays to Fridays and 0800 – 1300 on Saturdays with no working on Sundays or Bank Holidays, unless permitted.

Progressive working and restoration will mean a short duration of activity at any one location. Impact predictions, however, indicate noise levels in excess of target criteria at various sensitive locations around the site, including noise attenuation from proposed bunds and overburden mounds.

In order to keep noise to an acceptable level for normal site working, additional measures, including the provision of bunds above 5m and the use of close board fencing, will be tailored to those locations most affected. Noise can be further reduced by the use of smaller quieter plant, where practicable, and the careful location of haul routes and proper maintenance. All equipment will comprise sound reduced models and regular noise monitoring will be undertaken to ensure that agreed levels are adhered to. A complaints response system will be established, in addition to the proposed Liaison Committee, to deal with noise incidents. Pro-active management systems should, however, pre-empt the occurrence of such incidents ensuring their prevention.

Socio-Economic Impacts

The reclamation works will provide opportunities for civil construction and extraction jobs during the period of the works. Up to 100 persons may be working on the site at any one time, including supervisory staff, plant operators, earthworks operatives and contractor staff.

The negative impact on community and residential amenity for the temporary duration of the reclamation scheme is counteracted by the benefits, on completion,
of the presence of a restored landscape which has removed safety hazards, dereliction and unsightliness. The regeneration benefits of the reclamation scheme will be primarily derived with the implementation of subsequent housing and complementary development.

Conclusion

The reclamation scheme at the British will remediate and reprofile a degrading site as well as play a significant role in the revitalisation of the local economy by creating a stable landform ready for future development.

As with any reclamation project of this size, adverse environmental impacts will occur, however measures can be implemented to reduce many of these impacts. The residual disbenefits must then be weighed in the balance with the potential economic and social benefits of future development on the site.
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Part A: Context
1 Introduction

1.1 The Proposed Reclamation Scheme

Spring (Talywain) Ltd, who purchased the site in July 2007, are preparing a Masterplan for the site in accordance with the allocation in the Adopted Torfaen Local Plan.

The proposals will be promoted through two planning applications, one for reclamation of the site, to alleviate former mining hazards and undertake earthworks to form a suitable land profile for development, followed by a second application for development in accordance with the Masterplan. This Environmental Statement supports the first of these applications.

1.2 Environmental Impact Assessment

1.2.1 Need

The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, SI1999 No. 293, as subsequently amended, (hereafter referred to as the ‘Regulations’), specifies the types of development for which environmental impact assessment is or may be required, based on EC Directive 85/337 and subsequent revisions.

The need for environmental impact assessment (EIA) is specified under Schedule 1 of the Regulations.

The output of the EIA process is an Environmental Statement (ES). The purpose of the ES, this document, is to provide an objective and systematic account of the potential environmental effects of the development, their significance and to assess the ability of the site and surrounding area to accept those impacts. Within this framework the Statement:

- Examines the character of the site and the surrounding area;
- Considers the interaction between the proposed development and the site;
- Anticipates the likely environmental effects of the project on the environment; and
- Describes a range of measures designed to avoid, minimise or mitigate any harmful effects or enhance the positive effects of the project.

1.2.2 Scope

A scoping report was prepared in January 2008 and submitted under item 5 of the Regulations. The purpose of the scoping exercise was to seek agreement with the planning authority and statutory agencies on the approach to be taken in the EIA. A copy of the scoping report is included at Appendix A.

The environmental issues considered to be most pertinent to the application were identified as:

- The impact of the scheme on designated heritage features and the known archaeological resource.
- The temporary impact of the reclamation works on the community and, in particular, the amenity of nearby residents for the duration of the works.
- The integrity of the final landform/landscape with its surroundings.
- The relationship of the reclaimed site with surrounding settlement.
- The impact of the scheme on ground conditions and surface water and groundwater regimes.

At the time of writing, a response to the scoping request is awaited from the planning authority, Torfaen County Borough Council.
1.2.3 Assessment Team

The ES has been prepared by an independent team of specialists comprising:

- Powell Dobson: Masterplanning and Urban Design
- Anthony Jellard Associates Ltd: Landscape and Visual Assessment
- Sohtys Brewster: Ecology and Nature Conservation
- CgMs Ltd/Cambrian: Archaeology and Cultural Heritage
- Atisreal: Planning
- ERM: Health Impact and Sustainability Assessment
- Arup: Noise, Air Quality, Transport, Ground and Groundwater Conditions, Surface Water and Drainage and Community Impacts

1.2.4 Method

In preparing the ES, the EIA team has built on baseline knowledge, using the combined experience of the project team members and field data, to objectively predict the impacts of development and identify any measures necessary to mitigate adverse effects.

The approach to EIA is based on standard methodologies and consistency with best practice guidelines. Significance criteria, where feasible, are used to transparently evaluate impact predictions according to a clearly defined scale and within a generic framework, for consistency between topics. In this way the costs and benefits of the scheme are clearly presented.

The following methodology generally applies:

- Identification of potential impacts

Impacts are defined as physical changes to the environment attributable to the construction and occupation of the scheme, compared with the baseline conditions. Baseline conditions are defined as the environmental conditions that would develop without the proposed scheme.

The effects of impacts on existing resources and receptors may be adverse or beneficial, direct or indirect, temporary or permanent.

- Spatial and temporal scope

Spatial
The area over which impacts could occur is wider than the site. The study area will vary depending on the subject under consideration. Specific study areas are described in each subject section, and allow for assessment of indirect as well as direct effects, together with off-site works.

Temporal
In considering the environmental effects of the proposed scheme, it is necessary to identify both adverse and beneficial impacts, direct and indirect, during the operation and on completion. Also it is recognised that some environmental measures will take time to become established and effective.

- Identification of potential receptors

Receptors are defined as the physical resource or user group that will experience an impact. The effect of an environmental impact will depend on the spatial relationship between the source and the receptor. Some receptors will be more sensitive to certain environmental impacts than others. The baseline studies will identify the potential environmental receptors.

- Prediction and significance of impact

1 The responsibility for topic findings in the detailed assessments lies with the relevant specialist.
Much of the predictive exercise is undertaken on the basis of the expert judgement of the study team. Whatever the predictive approach, the objective has been one of presenting a clear justification for the strategy adopted, and stating all relevant assumptions to allow independent review.

Assessing the significance of environmental effects is not simple, since there are frequently no standards against which to make a comparison. The ES has relied upon reasoned arguments based on the advice and views of the specialist expertise of the study team.

The significance of impact is assessed, where practicable, against a defined scale set out in Table 1.1. Criteria specific to particular subjects are included in the relevant chapters; where no specific criteria are stipulated the generic framework in Table 1.1 is used to guide evaluation. Broadly, significance of impact is a function of:

- The value of the resource (international, national, regional and local level importance);
- The magnitude of the impact, be it adverse or beneficial;
- The timescale involved, temporary or permanent; and
- The sensitivity of the receptor and numbers affected.

### Cumulative Impacts

The project may give rise to impacts which are cumulative with those of other developments or which have combined impacts on sensitive receptors. Such impacts are considered, where relevant, on a chapter by chapter basis and in the concluding part of the Environmental Statement.

#### Table 1.1 – Significance Criteria

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<thead>
<tr>
<th>SIGNIFICANCE</th>
<th>CRITERIA</th>
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<tbody>
<tr>
<td>Severe</td>
<td>Only adverse effects are assigned this level of importance as they represent key factors in the decision-making process. These effects are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.</td>
</tr>
<tr>
<td>Major</td>
<td>These effects are likely to be important considerations at a regional or district scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process. Mitigation measures and detailed design work are unlikely to remove all of the effects upon the affected communities or interests.</td>
</tr>
<tr>
<td>Moderate</td>
<td>These effects, if adverse, while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource. They represent issues where effects will be experienced but mitigation measures and detailed design work may ameliorate/enhance some of the consequences upon affected communities or interests. Some residual effects will still arise.</td>
</tr>
<tr>
<td>Minor</td>
<td>These effects may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project and consideration of mitigation or compensation measures.</td>
</tr>
<tr>
<td>Negligible</td>
<td>No effects or those which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.</td>
</tr>
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#### 1.2.5 Statement Structure

The Environmental Statement is divided into three parts:

- **Part A** provides the context, giving background details about the various options/choices considered, information about the site and its surrounding area and the development proposals.
Part B assesses the impacts likely to occur in relation to the construction and operation of the site. This section variously considers impacts on landscape and visual amenity, ecological resources, soils and ground conditions, drainage and water resources, archaeology and heritage, land use and material assets, and social and economic impacts. The sustainability of the scheme is considered in relation to each topic and revisited in Part C.

Part C draws together the conclusions of the ES.

A non-technical summary forms part of the ES as required by the Regulations. It is presented separately and a copy is provided at the front of this document.
2 Site and Environs

2.1 Introduction

This chapter provides a summary of the site’s location and conditions. Detailed descriptions, on a topic by topic basis, can be found in the respective assessment chapters in Part B.

2.2 Site Location and General Description

The site (Figure 1), known as ‘The British’, is one of the largest Brownfield sites in South Wales occupying approximately 71ha of land at Talywain, some 6km northwest of Pontypool, Gwent. It lies just off the B4246 and is centred on grid reference (NGR: SO 257 037).

To the north and east, the site adjoins the linked communities of Golynos, Castle Wood, Garndiffaith, Talywain and Abersychan. A disused railway embankment, up to some 14m high, crosses the Cwm Sychan valley, isolating the south-east part of the site from Abersychan. To the south of the site is the settlement of Pant Glas and to the south-east is a rugby field.

2.3 Topography and Landscape

The existing topography of the site and its surrounds is shown in Figure 2.

The site lies on the western, lower slopes of the Llwyd valley between 370m and 200 AOD. The ridge line to the west of the site rises to over 550m AOD and has an average height of approximately 480m AOD.

The existing landform of the site is varied. Ground levels fall by some 30m, from 255m AOD in the north-west and southern perimeters of the site to 226m AOD in the south-east. Presently, much of this change in level takes place via steep tip faces between an upper and lower plateau.

The original natural topography over much of the site is obscured by the residual shale and spoil mounds. There are several industrial ruins of heritage value and the railway embankment is a linking feature with the World Heritage Site at Blaenavon.

This highly disturbed landscape of valleys, plateaux and scattered industrial ruins, regenerative vegetation and peripheral settlement forms a transitional fringe landscape between the uplands and moorland slopes to the west and contrasting suburban character of Abersychan and Talywain to the east. Particularly in the south of the site it has a feeling of being separate and quite remote.

2.4 Access

The northern part of the site is accessed from the B4246 via Farm Road. Farm Road bisects the northern plateau and is a public highway giving through access to Mountain Road and, inter alia, properties at Castle Wood and Elizabeth Row. The northern access via Farm Road has a highly-skewed approach to the B4246 and visibility is restricted by the bridge abutments where it passes under the former railway line.

Access into the southern part of the site from the B4246 (Lodge Road) is via a masonry tunnel through the disused railway embankment, known locally as the Big Arch, which also provides access to Pant Glas. It shares a substandard junction onto Lodge Road with The Promenade. Big Arch has restricted headroom.
2.5  Land Use

2.5.1  Historic

A major ironworks was built on the site in 1826 by the British Iron Company. After some 30 years of gradually increasing output of pig iron, the British Iron Works was sold in 1852 to the owners of the Ebbw Vale Ironworks. Until the mid 1870s, it produced mainly rolled, wrought-iron rails. From 1877 until 1883, the works produced Spiegel-eisen, a white iron, containing upwards of 5% manganese, used in steel-making as a late addition to the smelt. However, steel-making was not undertaken at the British works. Closure in 1883 was due to exhaustion of local ores, the cost of manganese imports and the consolidation of steel-making at the Ebbw Vale Victoria Works.

More recently the south eastern area of the site (1964-1968) was occupied by an old Pontypool Urban District Council Municipal tip. A small area in the southern area of the site was also used as a scrap yard (car breaking).

Underground mining took place at the site from at least 1826 until 1984. The Griffin and Big Arch licensed drift mines worked or re-worked the primary seams, leaving shallow underground voids and numerous mineshafts and adits. Numerous relevant mine plan records are held by the Coal Authority; however, the mining record is undoubtedly incomplete since deposition of abandonment plans did not become a legal requirement until the 1870s.

Years of coal/ironstone mining and industrial activity, therefore, have substantially altered the natural landform and the original topography is obscured by residual shale and spoil mounds.

2.5.2  Existing

Currently much of the site enjoys no beneficial use. Although the original organic soil cover has been lost from the extensive derelict areas of the site Castle Wood meadow, in the north of the site, is used for pony grazing and the adjacent meadows have a history of management for hay cutting. There is some sheep grazing of other parts of the site.

A number of rights of way exist within and adjoin the site and a cycle path on the railway embankment is part of the Celtic Trail. Hence parts of the site have recreational usage. A high voltage overhead electricity line on steel lattice supports crosses the eastern part of the site from north to south.

There are no occupied properties on the reclamation site but a number of scattered dwellings are close to its boundaries including:

- cottages and bungalows along the northern perimeter at Castle Wood;
- a terrace of former industrial cottages known as Elizabeth Row adjacent to the south west boundary; and
- Brook Cottage, New Cottage and Bracken Lodge, at Pant Glas, on the southern perimeter of the site.

On higher ground to the north west of Farm Road are small scale industrial premises, for sale at the time of writing but formerly occupied by ETM Steel Fabrication.

The bulk of the settlement of Abersychan/Talywain lies to the east of the line of the former railway and B4246.

2.6  Geology

The site is underlain by Lower and Middle Coal Measures which dip towards the south west at gradients of between 1 on 10 and 1 on 6. These strata contain a number of coal seams and ironstone horizons which have been mined in the past. They are intersected by the Clydach Bridge Fault comprising a pair of faults, some 50m to 60m apart, which traverse the
western part of the site in a NNW-SSE orientation. The strata between the pair of faults are
downthrown by some 12m to 15m.

Glacial deposits overlie the solid strata. They are typically 3m to 4m thick and consist of
head deposits, boulder clays and sand and gravel deposits; coarse sandstone boulders
commonly occur in the basal layer. The surface of the natural glacial deposits can be seen
adjacent to Farm Road and in the vicinity of Pant Glas, elsewhere, they are masked by
made ground.

The principal area of made ground lies within the northern plateau of the site and comprises:

- Ironworks Waste (1820s to 1890s)
- Colliery Spoil (1820s to 1980s)
- The 1960s Tip

The ironworks waste consists of a heterogeneous mixture of mainly sand and gravel size
fragments of ash and clinker, with occasional cobble-size fragments of brick and slag. It is
generally contaminated with the phytotoxic elements copper, nickel and zinc and contains
occasional elevated values of arsenic, cadmium and lead. The pH values of the ironworks
waste are near-neutral.

The colliery spoil is typically well-graded, with a matrix of silt and sand containing much
gravel and occasional cobbles of mudstone, together with coal fragments and fines and
sporadic items of colliery rubbish. Apart from slightly elevated values of arsenic, the colliery
spoil is uncontaminated.

The 1960s Tip is some 4m to 8m thick and overlies ironworks waste along its north east
side and colliery spoil along its south west side. In between, it rests on glacial deposits.
The waste comprises a loose, heterogeneous mixture; typically it is a layered sequence of
sand sized fragments of ash (principally fire-grate ash) containing pieces of plastic, metal
and glass bottles; also common pockets of man-made fibre, polythene bags and pieces of
cloth; occasionally bales and bundles of nylon waste from a factory. Gas monitoring has
shown very little methane and a low to moderate carbon dioxide level, suggesting that
anaerobic degradation is essentially complete. Chemical analyses showed generally slight
contamination.

Samples taken from the former scrap yard site exhibited elevated levels of lead, chromium,
copper, nickel and zinc. Visible oil contamination of the ground surface has not penetrated
the fill material beyond about 25mm.

2.7 Hydrology

Figure 3 shows the watercourses and culverts on the site. The principal stream is the Cwm
Sychan Brook which rises on Waun Wen at a level of 490mOD and flows through the
incised Cwm Sychan valley west of the site. It is culverted beneath the site and re-emerges
at the toe of a steep, overgrown slope some 200m east of the site from where it flows
towards Abersychan and its confluence with the Afon Lwyd.

Two tributary streams, the Cwm Byrgwm stream and the Blaengaefog Brook, enter culverts
beneath the site where they join the Cwm Sychan Brook. A further unnamed tributary
stream, with a catchment in the Golynos Golf Range area, also enters the culvert system.

The drainage system on the site is in a long neglected condition. Erosion of colliery spoil
tips, just upstream or within the site, together with fly-tipping, has caused the blockage or
partial blockage of several drop shafts and culverts. Also, the system has been much
modified over the years, particularly with the abandonment and infilling of reservoirs and
feeder ponds. Under sized and/or blocked drop shafts and culverts are unable to convey
peak floods and this has resulted in surcharging, over spilling, wash-outs and erosion
gullies. Given the age of the system, with some parts of the site having been derelict for more than 100 years, the routes and functions of some culverts are now unknown.

At the downstream edge of the site (Big Arch), the catchment area of Cwm Sychan Brook and its tributaries is 5.5km², comprising the following sub-catchments:

- Blaengaefog Brook 1.2km²
- Cwm Sychan Brook (including Castle Wood) 2.8km²
- Cwm Byrgwm Stream 1.5km²

### 2.8 Hydrogeology

*Figure 4* shows the existing groundwater drainage systems. Investigations have identified a water table near the base of the made ground and within the superficial deposits. A separate, lower water table occurs in the Coal Measures strata and abandoned mine workings (Reference 1).

The shallower groundwater table is likely to be controlled to some extent by drainage into the culvert system which lies at depths of 10m to 15m in the south east part of the site. The deeper water table is controlled by the original minework drainage system. This includes a cross-measures tunnel called the Lion Watercourse and a drainage tunnel in the Bottom Vein Ironstone horizon called the Golynos Watercourse, see *Figure 4*. Both watercourses have shallow drainage gradients leading towards Big Arch where the watercourses lie at about 18m depth.

The Lion Watercourse trends WSW beneath rising ground, so quickly reaches a depth of 25m to 30m. The Golynos Watercourse trends NNW and lies at depths of 40m to 50m. Whilst the Lion Watercourse is known to have collapsed at one location, the Golynos Watercourse was in relatively good order when surveyed in 1993 (Reference 2). It joins the culvert system east of Big Arch and produces a persistent large flow of mine water, being the principal outlet for a vast mineworkings catchment extending north westwards as far as Big Pit at Blaenavon.

Analyses have shown the groundwater to be slightly acidic with high iron concentrations.

### 2.9 Ecology

The British supports a mosaic of habitat types, including those which are considered semi-natural (e.g. Beech Woodland) and those that have clearly established as a result of the industrial heritage of the site (e.g. vegetated mounds of colliery spoil, railway embankment to east). Agricultural habitats in the form of acid and neutral grassland are also evident, particularly in the northern and north western parts of the site. *Figure 5* illustrates the main habitat types.

Due to the lack of intervention and largely undisturbed nature of much of the site, several of the habitat types have developed into valuable ecological features and include examples of Priority Habitats listed on the UK Biodiversity Action Plan (BAP) and within the local Torfaen BAP. These habitats and other features are considered capable of supporting protected or otherwise notable flora and fauna including reptiles, nesting birds, bats and invertebrates.

### 2.10 Noise and Air Quality

Ambient noise levels on the site are generally low, except close to the B4246 which is a source of traffic noise in the east of the site.

A survey of dust deposition rates at ten locations around the British from August 1991 to March 1992 showed relatively high rates for a rural area. Further studies in 1994-95 concluded that the nature, size and mineralogy of the particles provided evidence that the British site was the main source of the dust, presumed to originate from areas of bare soil (exacerbated by motorcycle scrambling) and access tracks.
An analysis in 1999 (Reference 3) could find no evidence that the British site, as it then existed, contributed significantly to the incidence of PM$_{10}$ particles (i.e. less than 10 microns) measured at Abersychan.

### 2.11 Cultural Heritage

Heritage features are shown on Figure 6. They include the original British and former National Coal Board (NCB) building which is Grade II listed, the courtyard of which contains an air furnace scheduled as an Ancient Monument. The Cornish Engine House is also scheduled as an Ancient Monument, and Big Arch is Grade II listed.

Remnants of the coke ovens and other parts of the 19th century industrial complex which no longer survive above ground were investigated in May – June 1997 (Babtie Group). This confirmed the location of the main below ground structures relating to the furnaces, the façade of the casting house, the engine blowing house and the forge and mill, together with the possible southern extent of the brickworks.

In addition to the archaeology of the ironworks, the south west corner of the site contains a number of mining features such a Gellynawsaidd Pit. The railway embankment is a historic landscape feature linking the British with the World Heritage Site at Blaenavon.

### 2.12 References

**Reference 1** - MRM Environmental, Hydrological Assessment of The British Reclamation Scheme, near Abersychan, Gwent November 1993

**Reference 2** - Robert West Consulting, Condition and Topographical Survey of the main surface water culvert system at the site of the former British Colliery at Abersychan April 1997, Ref 6038/010/F01

**Reference 3** - Halcrow: Torfaen BC, the British Reclamation Scheme Report on Dust Modelling for Opencast Reclamation June 1999, Ref KC/BRT/R2
3 Alternatives

Item 2 of Schedule 4 to the 1999 Regulations requires the provision of “an outline of the main alternatives studied by the applicant and an indication of the main reasons for his choice taking into account the environmental effects”. This chapter considers the options that were considered during development of the proposed reclamation scheme.

3.1 Reclamation techniques for dealing with mine workings and other site features

In considering the possible remedial strategies for the site it was necessary to take full account of the impact of abandoned mine workings and mine entrances on the site and also that of the spoil tips, in the event of instability. The principal issue was public safety with any remedial measures needing to be robust and effective in this respect. Remedial measures were also required to not unreasonably compromise future land use proposals for the site.

The general approaches that may be adopted to address the threats of abandoned mineworkings are:

- **Avoid** – Security measures to prevent access to dangerous areas.
- **Treat** – Secure mine entrances by capping and fill mineworkings by grouting.
- **Remove** – Excavate to remove dangerous features such as mine entrances and remaining voids in the ground, to sufficient depth to eliminate the hazard.

3.1.1 Security Measures

Mine entrances or collapse features are sometimes secured by fencing to prevent accidental access to a dangerous location. In conjunction with warning signs, this approach can be regarded as a reasonable response in the short term, i.e. until a more permanent solution can be implemented. Notwithstanding the effectiveness of fencing such a large area, since the purpose of the reclamation scheme is that of facilitating the economic regeneration and redevelopment of the site, this option was discarded as being neither viable nor offering a permanent solution.

3.1.2 Securing Mine Entrances

Mine entrances can be made safe by filling and capping in the case of shafts and excavating out/securely backfilling adits where they are shallow enough to collapse to surface. Smaller shafts can be plugged with mass concrete. It would be possible to treat all the recorded mine entrances on this site in this manner. However:

- The locations of many of the entrances are not precisely known and it would first be necessary to carry out exploratory excavations or drilling to positively locate them. Given the age of the mining records and lack of surface survey control, search areas of up to 25m in diameter would be necessary. Furthermore, many recorded entrances are now buried beneath tips and substantial excavations would be needed to find them.
- The density of mine entrances, particularly in the central part of the site, is so great that large parts of the site surface would be disrupted by the search and treats process.
- It would not address the problem of unrecorded mine entrances.
- Given the large numbers, it would be expensive to treat the mine entrances alone – and this would not address the problem of shallow mineworkings.

3.1.3 Filling the Mineworkings

A conventional method of removing the subsidence hazards associated with abandoned shallow mineworkings is to fill in any remaining voids in the worked horizons by drilling into them and injecting grout. Drilling is usually carried out on a 3m x 3m grid; closer around the perimeter of the grouted area to prevent escape of grout. Treatment depths are typically in the range 20m to 30m, depending on the anticipated height of voids and characteristics of
the overlying strata. This is a standard approach for smaller development sites where only the building footprints are grouted, making the process economic.

There are disadvantages to this technique:

- The cost is very high (typically £30/m²) and the majority of the site would need to be treated to achieve the objective of removing the hazard.

- Significant pollution risks are associated with accidental escapes of grout to watercourses. Given the complexity of connections between the various mineral horizons and the many known (and unknown) links to the surface water system, it would be difficult to guarantee that pollution incidents would not occur.

- The process would be very disruptive. Taken together with the treatment of mine entrances, the necessary access arrangements to allow earth moving plant and drilling rigs to cross the site would result in virtually all of the surface vegetation and much of the industrial landscape being destroyed. This method of treatment, therefore, has little environmental advantage over bulk excavation (see below).

The safety aspect of operating small plant and drilling rigs, with the risk of collapse of the surface beneath, is also a material factor.

3.1.4 **Bulk Excavation**

The chosen strategy for dealing, in principal, with the mining hazards on the site is bulk excavation. This entails excavation of the mineral horizons to remove any remaining voids in the ground, and then replace the excavated spoil as an engineered, compacted backfill. It constitutes a robust and comprehensive method of treatment for the following reasons:

- Remaining coal can be recovered in the operation, helping to finance the remediation.

- Any remaining voids or shaft going to greater depth encountered in the excavation floor can be positively sealed to provide a sound surface on which to place the backfill.

- A satisfactory depth of compacted backfill would be sufficient to preclude migration to surface any voids that remain below the excavation base.

- Future use of the final restored surface is not unduly compromised.

- Safe working is relatively straightforward since this operation would be carried out by very large plant, removing hazards as the works progress.

3.1.5 **Preferred Reclamation Strategy**

In identifying the preferred technique for dealing with the choice lay between treatment or removal, with the pros and cons set out in the Table 3.2.

**Table 3.2: Comparison of Reclamation Techniques**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Treating Mine Entrances and Filling Workings</th>
<th>Excavation and Backfilling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robust solution</td>
<td>Robust solution; correctly engineered would effectively eliminate the hazard. However, unpredictable impact on hydrogeology, with possible adverse effects off site.</td>
<td>Robust solution provided excavation depth is sufficient. Technique effectively deals with mine entrances and workings in a single operation</td>
</tr>
<tr>
<td>Economic achievability</td>
<td>High cost of treating the site. Post-treatment enhancement in land value unlikely to support the level of investment</td>
<td>Incidental coal recovery can be used to offset the costs of reclamation to the extent that, on the basis of estimated coal prices, redevelopment is economically viable.</td>
</tr>
</tbody>
</table>
### Treating Mine Entrances and Filling Workings

<table>
<thead>
<tr>
<th>Factor</th>
<th>Excavation and Backfilling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compromises future land</td>
<td>If carried out to good engineering standards, long term future land use would remain flexible</td>
</tr>
<tr>
<td>Environmental impact</td>
<td>Almost total destruction of existing land surface.</td>
</tr>
</tbody>
</table>

On the basis of the above comparison, the option of treating the mine entrances and mineworkings was discarded as a principal means of reclaiming the site because of cost, the extent of environmental disturbance (no better than bulk excavation), the uncertainty of hydrogeological impacts and the safety of implementation.

#### 3.2 Extent of Excavation

Bulk excavation is considered most appropriate in the northern part of the site, containing the shallower coal seams. Various alternative excavation options were examined.

- **Option 1:** This consists of two separate excavations, one to the north of Farm Road and the other to the south. Farm Road and supporting strata remains unexcavated.

- **Option 2:** In Option 2 both areas in Option 1 are amalgamated. Farm Road is diverted while the excavation and backfilling works proceed.

- **Option 3:** As Option 2 but with the extraction area extended further towards the south-west. Part of the Mountain Road (in addition to Farm Road) is diverted to allow excavation and backfilling.

- **Option 4:** As Option 3 but with the area extended south-eastwards.

- **Option 5:** The excavation footprint is similar to Option 4 but extends further towards the north-west and north.

The remediated area increases with each option and the choice is a balance between maximising the area of reclamation, having enough space within the site to deal with the earthworks operation (given the need storage and movement of overburden) and cost efficiency. An assessment found Option 4 to be the optimum, giving an incidental coal yield of up to 350,000 tonnes. Option 4 was chosen because it remediated the maximum practicable extent of shallow mineworkings whilst confining operations within the site boundaries and optimising coal recovery.

#### 3.3 Direction of Workings

Two options for working the excavation have been considered:

- **Option A** – south to north with the initial void at south east end.

- **Option B** – north to south with the initial void at north west end;

In Option A, material from the initial void is placed in the overburden mounds. The excavation proceeds north westwards until it reaches the final void. Material from the overburden mounds is then used to fill the final void. Option B involves working in the opposite direction. Option B was preferred because it involves working away from the nearest housing at Castle Wood, enabling early restoration and offering potential for the early release of land for development close to the main part of Talywain.
3.4 Final Landform and Access

3.4.1 Landform
The preferred end landform is one which most closely reflects the natural topography prior to human intervention. A form with gently contoured slopes grading into the surroundings best fulfils this requirement whilst at the same time optimising land for redevelopment and delivering suitable gradients for road and other infrastructure. The most efficient scheme in this respect, however, would result in the loss of one or more of the remnant industrial buildings and structures on the site, protected for their heritage value. This landform, represented in Figure 7, was discarded, therefore, in favour of a less development-efficient approach which would retain the designated features.

3.4.2 Access
Due to the need for the diversion of existing access routes (Farm Road), the reclamation proposals, tied in with the Masterplan for subsequent development, largely establish the future access points to the site. Torfaen CBC has indicated that a route will need to be established through the site which will become a permanent diversion of the B4246.

At present the southern access to the site is via the Big Arch. The Big Arch is a listed building and local landmark. Consideration was given to the potential for using the Big Arch and extensive reference was made to a structural survey carried out by consulting engineers Scott Wilson Kirkpatrick in 1993 which concluded that provision of a 7.3m carriageway with appropriate headroom, achieved by the lowering of the existing track, was not a practical or economic solution. The option to route existing B road traffic and traffic from the development through the Arch has, therefore, been discarded in order to retain its integrity. Accordingly, the reclamation scheme establishes an alternative southern access through the existing railway embankment (see also Figure 8).
4 Description of Development

4.1 Introduction

The final contoured landscape represented in Figure 8, indicates the proposed platforms for future developments, site infrastructure (road layout and surface water drainage arrangements), together with the strategic landscape areas. It forms the basis for the description of the proposed reclamation scheme within this chapter.

Consideration is also given to phasing and implementation issues, as well as access and movement, earthworks, drainage and ecology. The temporary conditions of the operative reclamation phase are illustrated in Figure 10.

4.2 Overview and Reclamation Proposal

4.2.1 Overview

The aim of the reclamation works is to generate land, suitable in profile, stability and safety, to accommodate future development on the British site. An indicative illustration of the final development (which does not form part of the application) is provided in Figure 11. Various options for reclamation were considered before identification of the preferred scheme and these were described in the preceding chapter.

The treatment of shallow abandoned mineworkings by open excavation is only considered suitable in the northern plateau of the site, where the extraction of high quality coal seams is an integral part of the reclamation. The coal will provide financing for reclamation restoration following the excavation works.

Ultimately, the earthworks reprofiling will aim to create a predominantly gently sloping landform (with exceptional accommodation for the protected structures) that will serve as a transition between the developed valley floors and surrounding uplands. In a more general context, the restored site will be linked to the wider regeneration proposals as part of the Torfaen Development Plan to diversify the local economy.

The scheme will facilitate the protection, enhancement and management of areas of high ecological value, such as reptile, bird and bat habitats, achieved by a combination of sympathetic reclamation and land use choices and appropriate translocation programmes.

Principally, there will be three phases to the reclamation works taking place over a period of up to 48 months; this represents the maximum estimated duration of the works, with efficiencies likely to shorten this period. These comprise one month set-up time, up to 42 months of bulk excavation and incidental coal recovery operation (subject to coal demand) representing the worst anticipated case, and five months of dismantling equipment, site restoration and final earthworks.

4.2.2 Bulk Extraction and Incidental Coal

A series of high quality coal seams sit beneath the northern plateau of the site. Where the coal is sufficiently close to the surface, it will be extracted as part of the reclamation process.

A summary plan of recorded workings has been provided by Onyx Land Technologies (OLT) who (as Clay Colliery Ltd) undertook detailed research into the mining records in the early 1990s (Reference 1). Table 4.1 indicates recorded workings in the following horizons which either outcrop beneath the site or lie within influencing distance (standard names in brackets).
Table 4.1 – Recorded workings and Coal Seams

<table>
<thead>
<tr>
<th>Seam</th>
<th>Mineral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Pins Mine Ground</td>
<td>Ironstone</td>
</tr>
<tr>
<td>Elled (Upper Four Feet)</td>
<td>Coal</td>
</tr>
<tr>
<td>Big (Lower Four Feet)</td>
<td>Coal</td>
</tr>
<tr>
<td>Threequarter (Upper Six Feet)</td>
<td>Coal</td>
</tr>
<tr>
<td>Black (Nine Feet)</td>
<td>Coal</td>
</tr>
<tr>
<td>Yard (Bute)</td>
<td>Coal</td>
</tr>
<tr>
<td>Meadow (U and L Seven Feet/Yard)</td>
<td>Coal</td>
</tr>
<tr>
<td>Old (Five Feet/Gellideg)</td>
<td>Coal</td>
</tr>
<tr>
<td>Bottom Vein and Spotted Vein Mine Ground</td>
<td>Ironstone</td>
</tr>
</tbody>
</table>

Overall the reclamation scheme will give rise to excavations of some 5,000,000m³ with an anticipated coal yield of approximately 350,000 tonnes. The extent of the bulk excavation is shown in Figure 10, together with other features of the temporary site layout during the reclamation operation. Typical cross-sections are illustrated in Figure 13. On completion of extraction, the workings will be backfilled and compacted to form stable development platforms.

4.3 Access and Movement

A key implication of the reclamation scheme is that the working area will ultimately subsume a section of Farm Road, a road that currently provides access to a number of residential properties. The operational and safety practicalities of the scheme mean that Farm Road cannot be retained in its current form throughout the duration of the works. It is therefore proposed to provide a new access road as part of the reclamation scheme that will be retained during subsequent development.

Farm Road will be closed along its existing route, within the site, to facilitate the reclamation works. However, new road diversions from the B4246 will provide access from the south for local residents, linking in with the through route of Mountain Road (See Figure 8). Temporary access to the reclamation site for coal lorries and other works vehicles from the B4246 will be via the retained section of Farm Road.

By inheriting the current road infrastructure at Lodge Road, and by using a priority arrangement T-Junction, a permanent access point to the site will be provided from the southern entrance. This will involve removing a segment of the rail embankment to provide a link with the B4246. This new access point will follow a line south of the protected industrial remains and to access Elizabeth Row and Mountain Road via a gradual gradient, minimising interference with established woodlands.

Access to Mountain Road properties will be facilitated by extending the new access road from British Road to Farm Road. This will involve a redefinition of the acute priority junction positioned to the north of Elizabeth Row as part of an overall improvement in road width and alignment.

The new road layout designed to support the reclamation works will be constructed to adoptable standards and lit to required illumination standards. Maximum use will be made of on-site materials to minimise movements to and from the site. Construction of the new access road will commence at the outset of the reclamation process to ensure that it is completed within the first 6 months of the scheme. This is essential to ensure that the southward progression of excavation is not delayed by the absence of an alternative route to Farm Road.
4.4 Phasing

For the purpose of the proposed reclamation scheme, five working phases, as shown in Table 4.2, have been established along with an approximate duration period. The excavation and restoration of this site will be a continuous process with essentially the same activities occurring across different areas of the site as the development progresses.

Table 4.2 – Full Programme of Reclamation Works

<table>
<thead>
<tr>
<th>Phases</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a &amp; b</td>
<td><strong>Set Up Site</strong>: Establishment, including fencing, screening and access works</td>
<td>Approx 1 month</td>
</tr>
<tr>
<td>2, 3, 4a</td>
<td><strong>Bulk Excavations</strong>: Includes excavation, transfer of material, coal extraction and backfilling of voids.</td>
<td>Approx 42 months</td>
</tr>
<tr>
<td>4b</td>
<td><strong>Return overburden to void</strong>: Final restoration of void.</td>
<td>Approx 3 months</td>
</tr>
<tr>
<td>5</td>
<td><strong>Restoration</strong>: Fill and compaction and demobilisation of plant and machinery</td>
<td>Approx 2 months</td>
</tr>
</tbody>
</table>

4.4.1 Phase 1a & 1b: Set Up (Month 1)

During Phase 1 the site will be fenced to ensure safety and security during the operations. In addition, fencing will be provided alongside the public accesses through the site, namely, along Farm Road, along the access tracks to Pant Glas and Bracken Lodge and along the public footpaths.

Translocation of soils/turves from ecologically sensitive areas (see Chapter 6) will be moved to suitable receptor sites prior to the soil stripping. This would be carried out in accordance with a detailed scheme to be agreed with Torfaen County Borough Council prior to translocation. Such a scheme will include for the works to be supervised and monitored by suitably qualified operatives and overseen by the British Ecological Steering Group. Ecological advance works will involve a low vegetation cut and species rescue and exclusion.

All available soils will be stripped from those parts of the site which are to be disturbed by the operations. Soil stripping will only be carried out when the soils are sufficiently dry so as to minimise damage. Where available, top-soils and sub-soils will be stripped and stored separately.

Temporary screen bunds and fencing will be established in advance of major site workings to protect the amenity of residential properties (see Figure 10). The height of screen mounds and fencing specifications are tailored to the receptors, detailed in Chapter 12. Mounds will be grassed with side slopes at about 1 in 2.

4.4.2 Phase 2, 3, & 4a: Bulk Excavations (Months 2 - 43)

Coal excavations will proceed in a north south direction. Coal excavation will commence with an initial excavation (“box cut”), the material of which is transferred to a temporary overburden storage area. For this operation, the principal storage mound (around 30m high) would be situated to the south of Cwm Sychan Brook. The resultant working void permits access to a succession of strips (commencing with cut no. 1).

As the scheme progresses the working void moves forward in strips. The previously opened box cut is backfilled with stored overburden, the working void moves on with further cuts until the final void is backfilled. All backfill will be compacted to enable the after-development to take place. This will be over-seen by an on-site consultant to enable the consultant to
issue a Development Certificate on completion of the works. Compaction trials will take place on site at the appropriate time.

Excavation will be subject to a detailed geotechnical design and that excavation depths and quantities might vary slightly from the values listed below:

- Excavation Volume: 5.0Mm³
- Excavation Depth: Average 28m, Maximum 40m
- Incidental Coal Tonnage: 390,000 Tonnes
- Overburden Storage Volume: 0.95Mm³

As the hydrology of the site is affected by the extraction operations, the new drainage pattern, designed to fit the restored and developed landscape, will be established. This aspect is described in Section 4.5 below.

4.4.3 Phase 4b & 5: Return Overburden to Void & Restoration (Months 44 - 48)

Following the coal excavation, conventional civil engineering plant will be used to compact the fill, in order to restore the surface to finished levels and to provide suitable bearing characteristics for development. Where bulk excavations have not been used to treat old mine workings, residual features will be dealt with using cut, fill and compaction techniques to complete the final landform.

The final restored landform will be to those general contours shown on Figure 8. The aim is to create a landscape which integrates with its surroundings and which will give variety and interest to the proposed after-development. The contours will have been progressively achieved during the working and backfilling, and most soils will have been progressively re-spread and seeded.

4.5 Drainage

To facilitate the reclamation scheme, significant diversion and realignment works to the drainage systems will be necessary.

North west of the excavation limit, the Blaengaefog Brook will be diverted into a new channel that will join the Cwm Sychan Brook. The latter will follow its existing route to Farm Road where it will be diverted into a new channel leading around the southern side of the proposed excavation. This channel will replace the existing surface water regime through the site with an open-water channel which will become the permanent watercourse for the Cwm Sychan and Blaengaefog Brooks within the reclaimed site and accordingly will be designed and engineered to meet modern standards, as agreed with the Environment Agency.

Flood storage will be provided to cater for peak flows produced by extreme events, the flood risk on the site will be mitigated through the redevelopment of the site and the design of new drainage systems that can cope with the peak flows generated, whilst not increasing flood risk downstream.

The Golynos watercourse is located some 20m beneath the base of the propose excavation. There is a low risk that it could be affected adversely by the proposed reclamation works. Further investigation and monitoring of the watercourse is warranted and, if necessary, appropriate measures will be implemented to safeguard its stability.

4.6 Utilities and Services

A high voltage transmission line which presently crosses the site will be diverted by Western Power in advance of the works, under a separate application using Section 37 of the Electricity Act.
4.7 Site Accommodation, Security and Plant

4.7.1 Office, Occupancy and workshop
Portacabin type single storey office buildings, together with a steel storage unit will be located within a site compound adjacent to the southern site access as indicated. The layout and content of the office area will be finalised once a contracting company has been appointed.

During the reclamation operations, the number of on-site staff will vary, with a maximum workforce at any one time of to 100. Local staff and contractors will be recruited wherever possible.

A coal washing plant may be necessary if there is too much coal in the old workings to be accommodated on-site, the washing plant will be used to cleanse the extracted coal before moving it off-site.

4.7.2 Mobile Machinery
It is anticipated that the following plant will be used to excavate, transport and place material within the site:

- 2 No. 360° Excavators (Prime Movers);
- 8 No. Dump Trucks;
- 2 No. Tractor Dozers;
- 2 No. Self-Propelled Compactors;
- 1 No. Grader; and
- 1 No. Water Bowser.

Ancillary plant such as diesel bowsers, pumps, drilling rigs etc will be fitted with modern noise suppression equipment.

Based on the drilling results, it is considered that the great majority of the strata can be excavated without the need to pre-loosen by blasting. The strata above the Elled Seam contain some sandstone bands. It is anticipated that to a large extent these bands will have been loosened already by the presence of faulting and old workings, sufficient to allow their mechanical excavation. Should this not prove to be the case, there may be some zones in this part of the sequence that would require loosening by blasting.

4.7.3 Lighting
The site would not require extensive lighting during operational hours. Work occurring after dark would be conducted by machinery headlight illumination with the exception that mobile lighting towers would be required in areas where tipping and backfilling take place. This is due to the reversing vehicles requirement for light and vision (as dictated by health and safety legislation).

4.7.4 Security and Safety
The site will be fenced, where, necessary, for security and safety; gates will be installed at points of egress and ingress. A log-in log-out system for all persons working or visiting the site will be implemented. During non-working hours when the site is closed, a security guard and ancillary surveillance will ensure that no unauthorised access to the site occurs.

During working hours, site security and safety will be maintained as required by the Health and Safety at Work Act 1974 and other relevant statutes.

4.8 Hours of Working and Community Liaison
Hours of working would be 08:00 – 18:00 Monday to Friday and 08:00 – 13:00 Saturday with no working on Sundays or Bank Holidays. No operations would take place outside these periods except for maintenance.
It is intended that there will be regular consultation with interested parties, local residents, Council Members and officers by means of a Site Liaison Committee. Members of the Committee would include representatives of the Principal Contractor and Spring (Talywain) Ltd. In addition there will be a site notice board with contact names, addresses and telephone numbers of people designated to deal with enquiries and complaints.

4.9 Landscape Restoration

The restoration proposals relate to landform only. This is because the applicant intends to move swiftly towards implementation of a development masterplan - an application for which is expected to be submitted during the determination period of the reclamation stage.

Where development is not intended to take place for a prolonged period, those areas will be hydro-seeded. Areas of permanent strategic landscaping (as indicated in Figure 8) will be the subject of advance planting schemes – the precise nature of which will be determined by the masterplan proposals.

4.10 References

Reference 1 - Information provided by Onyx Land Technologies Ltd:-

- Clay Colliery Co Ltd Drawings:-
  F46/139 Previous Mining and Borehole Location Plan, 3/6/97.
  F46/245 Boreholes and old Workings.
  F46/258 Elled Seam Contours, 25/3/97.
  F46/259 Big Seam Contours, 25/3/97.
  F46/263 Meadow Seam Contours, 25/3/97.
  F46/264 Old Seam Contours, 25/3/97.
  F46/273 Original Ground Level Survey


- Shaft Section, Peter’s Pt.

- Untitled, undated drawing showing collated mine plan information (Arup Incoming Document 51).

- OLT Drawings:-
  Un-numbered, 1:1250 Drawing, “Isopachytes of Fill, 1m intervals”.
  Un-numbered, 1:1250 Drawing, “Services and Drainage”.
  Un-numbered, 1:1250 Drawing, “Rockhead Contours”.

- Aerial Photograph Enlargement, un-dated.
Part B: Assessment
5 Ground and Groundwater Conditions

5.1 Introduction

This chapter describes the existing ground and groundwater conditions and considers how these would be affected by the reclamation scheme during its implementation or upon completion. Strategies for mitigating adverse impacts are described.

The northern area of the site will be bulk excavated to remediate shallow mine workings, closely followed by systematic backfilling with compacted fill. In the southern area of the site, ground improvement and re-profiling will be followed by construction of overburden mounds for the temporary storage of excavated materials from the northern area.

5.2 Assessment Methodology

5.2.1 Investigations

This chapter draws on:-

- A desk study of the site;
- A drilling investigation of coal seams and mine workings undertaken in September/October 2007 in the northern part of the site; and
- A geotechnical and geo-environmental site investigation undertaken on November/December 2007 in the southern part of the site.

The desk study used published information; previous reports and an Envirocheck Report covering the whole site and its surrounding area (see References 1 & 2). Information obtained from previous site investigations undertaken in the early 1990s was reviewed. Side-wide investigations at that time included 98 drill holes advanced into bedrock, 41 cable percussive boreholes into made ground and superficial deposits and 129 trial pits. Gas and groundwater monitoring was undertaken and selected samples were subject to a suite of chemical and physical testing.

Information from the early 1990s has been supplemented and updated by two additional investigations. The drilling investigation in September/October 2007 comprised 46 drill holes advanced into the bedrock beneath the northern area of the site. Gas monitoring was undertaken and geophysical logging was used to check the depths and condition of the coal seams and old workings encountered.

The geotechnical/geo-environmental site investigation in November/December 2007 included 45 trial pits and 23 boreholes sunk through the made ground and superficial deposits. In situ standard penetration tests and falling head permeability tests were conducted as the boreholes were advanced. Soil and ground water samples were subject to geotechnical tests and contamination analysis of metals, non-metal organics and a range of organics. Combined gas and groundwater standpipes were installed in 16 of the boreholes and routinely monitored over a period of over 3 months. Upstream and downstream water samples were taken from the 3 main watercourses and analysed for a suite of contaminants.

5.2.2 Contamination Assessment Method

A ‘suitable for use’ approach to contaminated land has been adopted for soil, groundwater and surface waters (Reference 3). In this approach, remedial action is required only where there are unacceptable risks to human health or the environment, taking into account the intended use of the land and its environmental setting. This approach allows the potential risks from any contaminants present to be assessed in relation to potential receptors, using the source-pathway-receptor methodology.

The purpose of the reclamation scheme is to prepare the site for future mixed development, predominantly low rise residential with gardens and amenity areas. Exposure scenarios
were assumed accordingly. Groundwater and leachate concentrations were considered in relation to UK freshwater Environmental Quality Standards (EQS).

### 5.3 Baseline Conditions

#### 5.3.1 Landform

The site is situated at the toe of three mountains which rise steeply to the west; Waun Wen to the north-west (504mOD), Byrgwm Mountain to the west (489mOD) and Mynydd Llanhilleth to the south-west (470mOD). These mountains are incised by the Cwm Sychan and Cwm Byrgwm Valleys which trend approximately west to east.

Ground levels at the proposed development site lie between 225mOD and 300mOD. Historically, the natural topography has been modified by industrial filling which has produced a lower plateau at 225mOD to 230mOD and an upper plateau at 250mOD to 255mOD separated by a steep tip face some 15m high. North west of the upper plateau and south-west of the lower plateau, the hillsides have been modified by tipping which has produced smaller plateau surfaces and localised steep faces up to about 10m high.

In the nineteenth century, the site was dominated by the British Iron Works (1826 to 1893) which comprised a large complex of buildings including blast furnaces, casting houses, workshops, coke ovens, lime kilns and so on. Extensive supporting works included railway lines, tramways, feeder ponds, aqueducts and culverts, coal and ironstone mines and tips. Coal mining continued after the closure of the ironworks, finally ending in 1984. Apart from the obvious tips, mining has left a legacy of old shafts, adits and subsidence risks from shallow workings. The lower plateau previously contained a railway wagon repair workshop and later a scrap yard. At its southern flank, a landfill site operated during the 1960s.

#### 5.3.2 Geology and Soils

The site is underlain by Middle and Lower Coal Measures strata comprising predominantly mudstones and siltstones that contain a series of workable coal seams and ironstone horizons (Black Pins, Elled, Big, Triquart, Black, Bute, Yard, Meadow, New Found Out, Old) explaining why the British Iron Works was developed at this location. The strata dip towards the south-west at a gradient of about 1 in 10. Beneath the western part of the site, they are affected by faults, which trend NNW-SSE, giving locally steeper dips.

Natural glacial deposits, typically some 3m to 4m thick, overlie the solid geology. They consist of boulder clays and glacial gravels.

Made ground is present over the majority of the site. In the northern area, it consists of colliery spoil, whilst in the southern area it also contains tipped wastes from the ironworks and from the 1960s landfill site. For assessment purposes, the southern area has been subdivided as shown on Figure 12.

- **Area 1** – 1960s landfill;
- **Area 2** – colliery spoil tips;
- **Area 3** – ironworks wastes in lower plateau.

**Area 1**

The 1960s landfill area extends north south for a distance of approximately 380m and is some 100m to 120m wide. Up to about 8m deep, the waste comprises a loose or medium dense heterogeneous mix of ashy silty sandy or gravelly materials containing a variety of artefacts such as pieces of plastic, metal, timber, concrete, bricks, masonry and so on. In places, the waste also contains bales of textile (probably nylon).

**Area 2**

Colliery tips, about 4m or 5m thick and locally up to 11m thick, flank the south western reaches of the site. Investigations proved a range of spoils, including finer-grained materials, well graded materials and coarse gravelly materials.
Area 3
The ironworks waste is up to about 8m thick and consists of a heterogeneous layered mixture of slag, ash, clinker, demolition, rubble and colliery spoil.

5.3.3 Stability
There are a number of potential mechanisms that could cause instability.

Slope Stability
Despite being generally steep, the tip slopes within the site show little evidence of instability. Locally, erosion gullies in the steep batter between the upper and lower plateau have produced near-vertical faces that are potentially unstable.

Natural slopes within the site do not show evidence of previous or ongoing instability. The mountain side to the south west contains two large dormant landslides. The debris aprons extend downhill but do not appear to encroach into the development site.

Mining Stability
The site contains numerous abandoned shafts and adits. Safety measures taken on abandonment vary and records of such works seldom exist. In the absence of documented preventive works, all mine entries must be regarded as significant potential threats to surface stability.

Underground workings in the nineteenth century often used partial extraction methods that would leave residual voids (roadways and stalls). Collapse and progressive upward migration of such voids can cause surface instability or local settlement. Owing to the frequency and distribution of the worked seams beneath the site, much of the area is considered at risk from this form of potential instability.

Culverts and Conduits
The Cwm Byrgwm Stream and the Cwm Sychan and Blaengaefog Brooks are conveyed beneath parts of the site in masonry culvert systems constructed when the British Ironworks was developed. Details can be found in the following chapter.

A mine water drainage roadway, known as the Golynos Watercourse, passes beneath part of the site and discharges to the Cwm Sychan Brook downstream of the site. It is understood that this was inspected and maintained by the National Coal Board until the 1970s. Part of it was inspected in the early 1990s and found to be stable and in relatively good order. The section beneath the site comprises an unlined roadway within rock, located at depths of 40m to 60m.

Stability of Fill Materials
The site contains a range of fill materials with variable densities and engineering properties.

Self-weight creep settlement of the colliery spoils and ironworks wastes, placed mainly during the nineteenth century, will be complete. Potentially, creep settlement of the 1960s landfill may be still active, although by now at a low level.

5.3.4 Hydrogeology
Beneath the northern area of the site, there was little evidence during drilling in September/October 2007 of groundwater in the superficial deposits or solid strata, including within abandoned mineworkings. Groundwater was encountered in drill holes located in closer proximity to the lower plateau. In this area, groundwater held in abandoned mine workings is likely to drain to the Golynos Watercourse and discharge to the Cwm Sychan Brook downstream of the site.

Beneath the southern area of the site, the drilling and subsequent monitoring of standpipes confirmed previous findings, showing local perched water tables in the base of the made ground or, in places, held within the glacial deposits. Local drainage towards the stream culvert system is likely to take place.
5.3.5 Contamination

The soil and groundwater chemistry found by the 2007 investigation proved to be similar to the early 1990s findings.

Soils

Area 1 – samples from the landfill contained elevated levels of arsenic, copper, lead, nickel, zinc and Polycyclic Aromatic Hydrocarbons (PAH). One sample also contained an elevated concentration of Poly-Chlorinated Bi-phenyls (PCB).

Leachate tests showed the materials in the tip to contain mobile contamination of copper and zinc, several samples producing leachate concentrations above the corresponding fresh water Environmental Quality Standards (EQS) or UK Drinking Water Standards (UKDWS).

Area 2 – the colliery spoil samples contained some elevated levels of arsenic and nickel. A localised area contained elevated levels of copper, lead and the PAH compound Benzo(a)pyrene, the latter exceeding the corresponding Generic Assessment Criterion (GAC).

The majority of the samples from Area 2 produced leachate concentrations below the corresponding standards. However, the leachates from several samples gave copper and zinc concentrations above the respective EQS values showing mobile contamination of copper and zinc to be present.

Area 3 – visual and olfactory evidence of hydrocarbon contamination, confirmed by site detection equipment (i.e. Photo Ionisation Detector or PID meter), was found in several trial pits into the lower plateau fill materials. A single result for Total Petroleum Hydrocarbons (TPH) in the range Carbon 21 to 35 exceeded the GAC soil screening value at one location.

Whilst concentrations of total PAH were low or below detection limits, concentrations of the PAH compound Benzo(a)pyrene were above the GAC soil screening value at several locations. Samples taken from this part of the site also contained elevated levels of arsenic, cadmium, copper, lead, nickel and zinc.

The majority of the samples from Area 3 produced leachate concentrations below the EQS or UKDWS. However, as with Areas 1 and 2, leachate from several samples produced copper and zinc concentrations above the respective EQS values, indicating the presence of mobile contamination of copper and zinc.

Groundwater

The Environment Agency Groundwater Vulnerability Sheet 36 classifies the soils at the site as having high leaching potential, a routine classification for sites containing extensive deposits of made ground. The solid strata beneath the site are classified as a minor aquifer of variable permeability.

Groundwater samples from monitoring standpipes installed across the southern part of the site showed pH values close to neutral. Concentrations of metals and organic compounds were low. Exceptions to the general pattern were concentrations of chromium, zinc and manganese which were elevated by comparison with the corresponding fresh water Environmental Quality Standards (EQS). Water samples taken from each of the main streams (Cwm Byrgwm Stream, Cwm Sychan and Blaengaefog Brooks) showed no evidence of contamination; either upstream or downstream of the site, by comparison with the fresh water EQS.

Ground Gases

Standpipes installed within and around the 1960s landfill were monitored for gas during a range of barometric pressures and weather conditions. On all occasions, the monitoring showed an absence of any gas pressures or flows. At all locations, methane was absent or at negligible concentrations. Within the landfill deposits, carbon dioxide was present a concentrations of up to about 12%, compared with concentrations of up to 3% in the surrounding areas. This is likely to be residual gas from previous decomposition of organic matter or could derive from products such as timber that are very slow to decay.
5.4 Assessment of Impact

5.4.1 Stability
The reclamation works will have positive impacts on site stability.

During its implementation, the site will be secured by the Contractor to restrict public access. This will minimise exposure to existing stability hazards at the site as well keeping people away from the ongoing works, including the Contractor's temporary works. Such temporary works, including the sides of the temporary excavation required to remediate mine workings (in the northern area of the site) and the slopes of temporary storage mounds (in the southern area of the site), will be subject to formal risk assessment and geotechnical design. This will be in accordance with the current industry guidance documents which specify the types of investigations required, analytical procedures and factors of safety to be achieved.

The reclamation profiles will remove steep, in places eroded, slopes that presently exist. These will be replaced by much gentler gradients. Whilst the design includes some new cutting slopes and embankment faces, these will not be steeper than 1 on 2 and will be designed to have acceptable factors of safety in accordance with modern standards.

The current hazards from abandoned mine shafts and adits will be removed. These will be located and remediated during the works, using methods and treatments that comply with published guidance (Reference 4). Excavation of the northern area of the site is designed to remove the hazard of potential instability from shallow abandoned mine workings which could otherwise have affected future development and site users.

All new fill embankments, including the backfill to the excavation in the northern part of the site, will be compacted to modern standards under the control of an earthworks specification and subject to quality control testing. The density of existing loose fill materials, including the 1960's landfill deposits, will be improved by similar means or by special ground improvement measures such as impact roller or dynamic compaction, together with surcharging by the temporary storage mounds.

The impact of the reclamation works on ground stability and remediation of mining hazards is major beneficial.

5.4.2 Hydrogeology
The progressive temporary excavation of the northern area of the site will have an impact on the hydrogeological regime. Rainfall on the excavation area, together with intercepted groundwater, will collect in the floor of the excavation where it will be pumped up to the water treatment area prior to discharge to the Cwm Sychan Brook, at the downstream side of the site. For surface water, this system will be slower than the existing flow paths, i.e. ditches, drains, culverts and open watercourses. For groundwater, it will be faster than existing flow paths, i.e. soil pores, rock joint systems, abandoned mine workings and mine drainage roadways.

Compacted backfill comprised largely of excavated mudstone fragments will have a low permeability, of similar order to that of the existing clayey glacial deposits and predominantly mudstone strata. Where the excavated ground contains locally more permeable strata, such as lenses of glacial gravel or bands of fractured sandstone, its replacement with mudstone-derived backfill will have the effect of removing storage and locally reducing transmissivity.

Excavation depths in the southern area of the site are limited and will not change groundwater flow paths significantly. However, by comparison with the existing site, near-surface materials will become compacted as a result of plant movement, ground improvement and reprofiling works. Together with the stripping of vegetation and the provision of temporary and permanent drainage ditches, this will locally increase the amount and velocity of run-off and produce corresponding reductions in infiltration and groundwater storage. These impacts will be off-set by the provision of storage and attenuation within the...
water treatment area (during works) and within the reclamation profiles and surface water drainage system (in the permanent works).

The potential for adverse impacts during reclamation can be moderated and controlled by the implementation of suitable temporary treatments and working practices. The overall impact on hydrogeology should be negligible but monitoring (see below) is prudent.

5.4.3 Contamination

The site will be secured by the Contractor. Access will be restricted to his workforce and approved visitors who will be subject to appropriate health and safety precautions. This will represent a considerable hazard reduction by comparison with the present situation, in which access to areas containing contaminated soils is in practice unrestricted.

Stripping of vegetation and excavation of soils will provide potential for soil erosion and sediment transport. In practice, this will be controlled by temporary bunds, ditches and water treatment areas subject to consented discharge limits.

Where it is required locally to excavate and expose contaminated soils, this will be a carefully-controlled operation subject to specific risk assessment and method statement that will be required to incorporate measures to minimise the potential for leaching and generation of polluted run-off.

Similar procedures and precautions will apply to the spillage/leakage of fuels/lubricants.

There is some potential for minor adverse impacts during the reclamation works which can be controlled by good working practices.

The reclamation works will be designed to produce a landform and surface suitable for the proposed end-uses. Where contaminated soils are to remain in place, they will be capped with a sufficient thickness of clean fill such that the hazards are reduced to an acceptably low level, consistent with current Government guidelines. The impact of the scheme when completed is regarded as major beneficial with regard to contamination.

5.5 Mitigation

The reclamation proposals are designed to achieve positive impacts on the ground and groundwater conditions at the site.

Potential negative impacts will be mitigated through good working practices and specific measures such as monitoring and special precautions during scheme implementation, as described in Section 5.4.

During the works, ground gases, surface water quality and groundwater quality will be monitored routinely at appropriate locations.

5.6 References


Reference 4 - CIRIA Special Publication 32 Construction over abandoned mine workings 1984, reprinted 2002
6 Surface Water and Drainage

6.1 Introduction

This chapter assesses the impact of the reclamation scheme on the surface water and drainage resources of the site and surrounding area, including aspects of hydrology, flooding, water quality and water supply.

The site has a series of complex drainage systems and features which ultimately discharge to the Afon Llwyd in Aberystwyth via the Cwm Sychan Brook. To facilitate reclamation, significant diversion and realignment works will be required to the drainage systems, including the diversion of the Blaengaefog Brook into the Cwm Sychan Brook in the northern part of the site.

Although a primary purpose of the works is to remedy existing defects in the drainage system and rationalise flows and flooding propensity, consideration is given to measures that can be adopted to mitigate any adverse effects of development.

6.2 Assessment Methodology

A sound understanding of surface water and drainage conditions at the site and the potential impacts from the reclamation scheme has been established from site investigations undertaken in August and October 2007, and a Flooding Consequences Assessment (FCA), in accordance with TAN15, prepared by Arup and submitted to the Environment Agency Wales (EAW) for review. The FCA accompanies the planning application and addresses the following:

- Assessment of catchment sizes and characteristics using the Flood Estimation Handbook (FEH);
- Peak catchment flows contributing to flows in the Blaengaefog and Cwm Sychan Brooks for the 1% and 0.1% Annual Probability Events (APEs);
- Total peak flows at the downstream extent of the site, including an additional 20% in accordance with EAW requirements;
- Sizing of on-site attenuation to limit site generated flows to the Cwm Sychan Brook to 10 l/s/Ha in accordance with EAW requirements;
- Assessment of capacities of the open channel and culverted sections of the Cwm Sychan Brook downstream of the site;
- Maintenance of existing groundwater culverts; and
- Development of a drainage strategy to convey peak 1% flows on the site and attenuate flows off the site to the current levels.

The proposed strategy for surface water and groundwater is to not increase flows discharged off the site, maintaining the current equilibrium and minimising the risk of flooding downstream.

6.3 Baseline Conditions

6.3.1 Surface Water Drainage Systems

The principal stream is the Cwm Sychan Brook, which rises in Waun Wen at a level of approximately 490m AOD and flows through the incised Cwm Sychan Valley west of the site. The stream is mostly culverted under the site, being conveyed in the Granary Culvert in the southern part of the site, which in turn flows into the Eastern Culvert before re-emerging in open channel at the toe of a steep, overgrown slope some 200m east of Big Arch.
Two tributary streams, the Cwm Byrgwm Stream and the Blaengaefog Brook, also enter culverts beneath the site where they discharge to the CWM Sychan Brook via a 1350mm diameter length of the Eastern Culvert. A further unnamed tributary stream, with a catchment in the Golynos Golf Range area also enters the Eastern Culvert via a masonry arch culvert to the north-east of the site. This culvert is heavily silted and observed flow rates through it are small.

Figure 3 shows the existing surface water drainage arrangements.

6.3.2 Groundwater Drainage Systems
The site is underlain by a number of groundwater drainage features. Site investigations have previously identified a water table near the base of the made ground and within the superficial deposits on the site. A separate, lower water table occurs in the coal measures strata and abandoned mine workings.

It is thought that the shallower groundwater table is controlled to some extent by drainage into the site culvert system, which is currently up to 15m deep in the south east part of the site. The deeper water table is controlled by the original mine workings drainage system, which comprises:

- A cross-measures tunnel known as the Lion Watercourse;
- A drainage tunnel in the Bottom Vein Ironstone horizon called the Golynos watercourse.

Both watercourses have shallow drainage gradients leading towards Big Arch, where both watercourses are at approximately 18m depth.

6.4 Assessment of Impacts

6.4.1 On Completion
A new surface watercourse will be constructed early in the reclamation scheme to convey the streams through the site. The existing Blaengaefog Brook will be diverted into the Cwm Sychan Brook to the north-west of the reclamation scheme excavation limit. This rationalisation will eliminate the need to maintain the existing complex arrangements of culverts and informal channels that carry the Blaengaefog Brook to the Eastern Culvert. Historically, the Blaengaefog Brook used to flow into the Cwm Sychan Brook.

The alignment of the Cwm Sychan Brook will follow its existing route to Farm Road where it will then be diverted into a new channel leading around the southern side of the proposed excavation.

This channel will become the permanent watercourse for the Cwm Sychan and Blaengaefog Brooks and will be designed to meet modern standards as advised by the Environment Agency (EA). It will have the potential to become part of a green corridor through the proposed development and its alignment south of the excavation will become its permanent route.

Flows from the new channel will be discharged off-site via a new culvert constructed under Lodge Road before discharging into the open channel section of the Cwm Sychan Brook downstream of the site. In accordance with EA requirements ultimate site generated discharges will be attenuated to 10 l/s/Ha on the site with flood storage being provided within lower lying land in the vicinity of Big Arch. Earth profiles are designed to accommodate this storage.

In the northern area of the site, the culvert system and its associated potential long term stability hazard will be removed by excavation. In the southern area of the site, the culvert system will be retained and converted into a ground water drain. It will be secured against instability by repair and stowing.

The permanent impact of the reclamation scheme on local hydrology is regarded as major beneficial. At this stage the surface remains permeable and storage for subsequent
development is designed into the landform; in addition the antiquated drainage system would be renovated. The proposed new outfall to the Cwm Sychan Brook downstream of the site will have little impact on the existing watercourse. Its route through the existing sports field will be co-ordinated through liaison with Torfaen CBC.

The existing Golynos Watercourse would continue to function as a mine water drain and would not be disturbed by the proposed works. The existing granary Culvert, which currently discharges the Cwm Sychan Brook off the site would be left in place and back stowed with stone to allow this to continue to function as a groundwater drain. The reclamation works are not expected to have any adverse impact on the Golynos Watercourse which will be separated from the base of the excavation by at least 20m of rock.

6.4.2 During Reclamation

A coal washing plant and water treatment facilities are likely to be required for the reclamation scheme to safeguard water quality in discharge to the realigned Cwm Sychan Brook. Water will be treated in a series of stilling ponds located within the southern part of the excavation, allowing water to be filtered prior to discharge to the realigned channel.

Subject to water treatment the impact upon water quality is considered to be minor adverse.

6.5 Mitigation

As a matter of prudence, the elevation of mine water in abandoned workings alongside the Golynos Watercourse at a position just upstream of the site will be monitored. This will be facilitated by sinking a borehole to the workings and installing a standpipe which can be manually dipped. The baseline conditions will be established by monitoring before the works. Monitoring will be continued during the works and for a suitable period after their completion.
7 Landscape and Visual

7.1 Introduction

This chapter has been prepared by David McQuitty and Rob Malcomson, of Anthony Jellard and Partners, Landscape Architects. It considers the impact of the reclamation scheme on landscape and visual amenity, on completion and during the works, and identifies measures to mitigate any adverse effects of development.

7.2 Assessment Methodology

7.2.1 General Approach


In addition, a review of the LANDMAP Study for Torfaen has been carried out as part of the assessment. LANDMAP survey methodology, as devised and promulgated by the Countryside Council for Wales, is current best practice for landscape character assessment work in Wales and is an important element of baseline information.

Site visits have been conducted during winter and spring in the course of preparing this assessment, together with review of a range of background information including mapping, land use, vegetation and relevant planning policy.

7.2.2 Landscape Impact

The sensitivity of the landscape to impacts can be defined as high, medium or low depending on its ability to accommodate change. Landscape sensitivity can vary according to the following:

- Existing land use;
- The pattern and scale of the landscape;
- The degree of openness and the distribution of receptors;
- The scope for mitigation within the context of the existing landscape character; and
- The value placed on the landscape.

It is likely that a combination of these will determine the ability of the landscape to accommodate change and, therefore, its overall sensitivity. In this chapter the significance of impact of the development on receptors uses the following terminology:

- **Minor** (Adverse/beneficial) Not noteworthy or material
- **Moderate** (Adverse/beneficial) Noteworthy, material
- **Major** (Adverse/beneficial) Extremely noteworthy/material

7.2.3 Visual Impact

The assessment of visual impacts considers how the character of the available views may change and how this will influence the amenity of the visual receptors. This is achieved by identification of the following:

- The extent of the view that would be occupied by the development;
- The proportion of the development that would be visible;
• The distance of the viewpoint from the development; and
• The nature of the view i.e. transient or part of a sequence.

The sensitivity of the visual receptors will then be dependent on the location and context of the viewpoint, the expectations, occupation and activity of the receptor and the importance of the view. The most sensitive receptors are likely to be:

• Occupiers of residential properties with affected views;

• Inhabitants of communities where the development will change valued settings or views; and

• Users of outdoor facilities whose attention may be focused on the landscape.

Less sensitive receptors include people at their places of work, people engaged in other outdoor recreation or sports and people travelling through or past the landscape that is affected. The magnitude of visual impact uses the same terminology as set out in Section 7.2.2 above.

The Study Area for the landscape and visual assessment has been determined by the Visual Envelope Map (see Figure 14), which outlines the area of land within which there is a potential view of any part of the proposed development. It has excluded the incidence of intervening buildings, vegetation and other screening factors, and is therefore the maximum theoretical area of inter-visibility around the site. A field assessment followed the desk-top study; a broad - brush assessment was made of the effect of intervening screening factors, and the resultant reduction in the area where visual impacts may occur. The results of this assessment are also shown in Figure 15.

7.3 Baseline Conditions

7.3.1 General
The site is located on the western margins of Abersychan in the Afon Llwyd valley. It occupies the former British works and encompasses a large tract of Brownfield land. A disused railway embankment runs along the eastern boundary separating the site, both physically and visually, from the urban areas located in the valley floor. The small settlements of Pantyglas to the south and Elizabeth Row to the south west are close to the site.

7.3.2 Topography
The site slopes generally from north west to south east. The surface is disturbed by many mine workings, but most of the level change is accounted for by a steep tip face between the general areas of upper and lower plateaux.

7.3.3 Existing Site Vegetation and Site Boundaries
The site is dominated by disturbed landscape with some natural regeneration, particularly around the boundaries. The vegetation habitats are chiefly acid grassland, heathland communities with few stands of mature trees, an exception being below Elizabeth Row where there is a block of beech woodland.

7.3.4 Existing Structures
The site has several industrial ruins of considerable heritage value, described elsewhere. Just off site to the north west is a group of former mining buildings which are prominent in the landscape. A less attractive built feature is a high voltage overhead electricity line crossing the eastern area of the site.

7.3.5 Landscape Character Assessment
Current best practice for landscape assessment work in Wales involves the application of the LANDMAP survey methodology, as devised by the Countryside Council for Wales. This involves 5 layers of data, of which the “Visual & Sensory” Aspect Area, often most informs
the baseline landscape character. The eastern site lies within the Derelict/Waste Ground of Visual & Sensory Area TRFNVS025, adjacent to its eastern boundary with the urban area of TRFNVS040 that includes Abersychan. The former is described as follows:

“British Works – a highly disturbed landscape in valleys and plateau – steep tops, industrial ruins, some regenerative vegetation, in contrast with the suburban character of Abersychan.”

The evaluation of this area is ‘low’, which equates to an area of ‘little or no’ importance, in part a result of the ‘detractive views both in and out of derelict land and urban edge’.

The western site lies within the Wooded Mosaic Upland Valleys of Visual & Sensory Area TRFNVS036, adjacent to its western boundary with the Upland Grazing area of TRFNVS024. The former is described as follows:

“Enclosed side valley, moorland slopes, field pattern in valley bottom. Some areas of derelict/regenerated former mining and scattered small quarries. Land ranges from 250m-410m AOD. Views out to urban fringe and from higher slopes to adjacent upland; generally quiet, separate, remote.”

The evaluation of this area is 'moderate', which equates to an area of “local” importance.

Other LANDMAP Aspects are Landscape Habitats, Geological Landscapes, Historical and Cultural Landscapes described below:

• Landscape Habitats – the northern and western area of the site falls within an area of Acid Grassland [TRFNLH056], described as ‘upland mosaic of bracken, dwarf shrub heath, acid grassland and purple moor grass’. It is valued as ‘high’ and contains two BAP habitats, Upland Heathland and Purple Moor Grass. The eastern and southern site falls within an area of Improved Grassland [TRFNLH036], described as ‘valley side farmland mosaic, including beech woodland, regenerating colliery spoil, bracken slopes and dwarf heath shrub. It is also valued as ‘high’ and contains three BAP habitats, Upland Heathland, Upland Oakwood and Purple Moor Grass.

• Geological Landscapes – the site lies within a larger area classified as Glacial Mountain Valley [TRFNGL016]. It notes the presence of mineral extraction including open cast mining, closed mine shafts and coal mine waste tips. The value is ‘moderate’ and the recommendations are to ‘restore any remaining workings’.

• Historical Landscapes – the site lies in the central part of the larger area of Irregular Fieldscapes [TRFNHL017], which stretches from Varteg in the north to Tranch in the south. It notes the ‘Archaeological Sensitive Areas of mineral extraction and processing of iron and coal’, valued as ‘outstanding’. However it describes the trend as ‘declining’ and recommends ‘consolidation/conservation of remains’.

• Cultural Landscapes – the site lies in the central part of the wider Industrial – Rural area of TRFNCL02. The value is ‘moderate’, but the condition is assessed as ‘poor’ as it is ‘not well cared for-mining has left a significant impact’.

7.3.6 Planning Policy Relating to Landscape and Visual Considerations

The majority of the Local Planning Authorities in Wales are using the Countryside Council for Wales LANDMAP information system as a basis for deciding the location and extent of various designations in their development plan. This approach is encouraged in PPW, and paragraph 5.3.13 advises as follows:

“CCW's LANDMAP information system methodology is an important information resource upon which local planning authorities can draw in making the landscape assessments needed to inform local policy, guidance and decision making in this field’

This assessment makes use of the LANDMAP system as a key part of the baseline information.
Of particular landscape relevance to the proposed development is the guidance contained in the Welsh Assembly Coal MTAN Consultation Draft 2006. This document sets out various best practice advice when assessing the landscape impact of coal related development, including the open cast operations being proposed at the British in the reclamation stage.

Paragraph 167 acknowledges that:

"Coal extraction is visually intrusive. Excavation can cut into a skyline; storage areas or screening mounds can obscure a distant view; plant, machinery and buildings, lighting and screening fences intrude into the landscape. There is often a loss of mature woodland, hedgerows and other small landscape features."

The document goes on to state the necessity of gathering sufficient information to evaluate the significance of the effects of the coal operation on both “landscape character and visual amenities.”

This assessment carried out for the British has followed best practice guidance and gathered the information necessary to make a robust assessment of the landscape and visual impacts of the proposed reclamation works.

7.4 Future Trends Without the Scheme

The landscape of the British is gradually altering as further vegetation is regenerating on the old tip slopes and particularly along the boundaries of the site on relatively undisturbed surfaces. This process would continue if the reclamation scheme did not occur and, in time, dense thickets and scrub woodland would cover substantial areas of the site. However, areas of shale will generally remain unvegetated due to the hostility of this material to plant establishment. These large grey areas are unattractive and a significant component of the appearance of dereliction. They are particularly visible from elevated positions around the site.

Unmanaged scrub woodland is a public safety issue. Not only does it mask dangerous level changes and other features of the former mining operations, but the increased vegetation cover is also likely to encourage the further growth of antisocial activities. Various built structures, some of which have significant heritage value are located on the site. Most of these are in a ruinous site and their future survival is in doubt if a reclamation scheme does not go ahead.

The transmission line crossing the site intrudes on the visual qualities of this part of the valley. Re-routing to allow for reclamation operations will give rise to visual change.

In general, the absence of a reclamation scheme would mean an increasingly vegetated site, but with large areas of shale remaining, at best sparsely covered. The air of dereliction would remain and this very large tract of land would become increasingly unsafe and an obstacle to connections between the valley communities and the natural landscapes of Byrgwm and Waun Wen to the west.

7.5 Assessment of Impacts

7.5.1 The Proposed Development

Bulk excavations will remove the problems of former mining features such as adits and shafts while generating revenue for future restoration and long-term maintenance. A gently sloping landform will be left in the northern part of the site at the end of extraction operations.

The steep tip faces at the southern edge of this northern plateau will be re-profiled to gentler, more manageable slopes where, in the next phase of development, planting can be established. The existing water culvert running east west below this escarpment will be replaced with an open water channel.
The disturbed surfaces of the southern site are will be re-graded to form a second gently sloping plateau. This area contains many of the listed Heritage structures which will be retained in situ.

The various extraction operations described in outline above will require a series of temporary features including overburden mounds, coal storage and water treatment areas. Much of the storage will take place south of the restored Cwm Sychan Brook.

Various screen mounds are proposed to shield properties from noise and dust. These are to be constructed along the boundaries with Castle Wood and elsewhere and will be removed at the end of the reclamation works.

Farm Road will be closed through the site and diversions put in place for local residents. The through route to Mountain Road, serving Elizabeth Road and other properties will be diverted through the site on a new highway. This highway will break through the railway embankment at a point just north of the Big Arch.

No landscape planting is included as part of this initial reclamation stage, as it would follow as part of the master plan for the future development. However, the site surfaces would be hydro-seeded.

The period of reclamation works will be approximately four years.

Landscape treatments are limited in the initial reclamation works. However, it is envisaged that there will be a comprehensive programme of infrastructure planting to accompany the future site development.

The reclamation phase will allow for hydro-seeding surfaces as ground remodelling operations proceed. The screen mounds would be seeded immediately after construction.

The replacement of the culverted Cwm Sychan Brook with an open channel watercourse will be a landscape and visual gain, although generally only visible in local views.

7.5.2 Landscape Effects and Mitigation

Landscape effects are defined as change in the elements, characteristics, and qualities of the landscape as a result of development. These effects can be positive or negative. When identifying and assessing landscape change, it is important to take into account the existing trends for change within the landscape, which may be due to natural processes or human activities.

The LANDMAP Landscape Character Assessment reviewed as part of this statement places the site within two Visual & Sensory aspects classified as ‘Derelict Waste Land’ and ‘Woody Mosaic Upland Valleys’ valued as ‘low’ and ‘moderate’ respectively. There are unattractive views within the site and out to the surrounding urban areas. Traffic noise from the roads and night-time light pollution further detract from the quality of the landscape.

Contribution of the Development to the Urban Fabric

The project presents an opportunity for reclamation of a large area of disturbed landscape. While it is only the initial phase of reclamation work, providing restored surfaces for future development, it will start to bring back into use a large area on the western edges of Abersychan. The scheme will allow connections to be established between the urban landscape and the natural environments of the valley sides and tops. These benefits will contribute to the development of the urban fabric of the area and it’s setting within the wider natural landscape.

Physical Landscape Impacts on Topography

During the reclamation phase there will be short term impacts on the ground topography across the site. It may be necessary to temporarily store mounds of excavated material that will be reused within the site. Careful attention will be given to the location of these in order to minimise visual impacts. The reclamation works include an initial phase of extraction from the northern sector of the site. This extraction will significantly reduce levels but there will
still be a steep scarp like slope running down to a lower level in the vicinity of the old ironworks building in the southern part of the site

The steeply sloping scarp will run above a narrow valley which will be occupied by the reinstated open watercourse.

The landform on completion of reclamation will consist of two main level spaces separated by a steep slope to the watercourse and as such this is somewhat different to what would have been the natural valley contours. However, spoil heaps will have been removed and contouring around the watercourse will be of a more natural character. There will, therefore, be a minor to moderate benefit to the landscape as a result of the works in terms of the physical topography.

The new access road from the B4246 north of the Big Arch will necessitate a breaking through of the railway embankment. Care will be taken to achieve comfortable profiles but there will still be a significant impact on the topography which is assessed as moderate to locally severe adverse.

**Vegetation**

There are areas of naturally regenerated scrub across the site, which will be lost. Generally mature tree cover is around the margins of the site and will not be affected by the reclamation operations. The areas of natural regeneration make a significant contribution to the landscape blending in, to a degree, the remnant working with the surrounding landscape. As such the loss of most of this vegetation will have a minor to locally moderate adverse impact on the landscape of this part of the valley.

**Landscape Capacity**

This urban edge area has a medium-high capacity to accept change by way of development without detriment to its landscape character. The key points are as follows:

- The site is on the urban fringe. The derelict character and presence of a hard urban edge along the north-eastern boundaries to the site results in a low landscape character sensitivity.
- The presence of the embankment along the eastern boundary means that the site is screened from the majority of the adjacent residential receptors that lie to the east. This results in a medium visual sensitivity.
- The absence of any national landscape designation and evaluated as ‘low’ and ‘moderate’ value by the Visual & Sensory Aspect indicates a low landscape value.

**7.5.3 Visual Effects including and assessment of the impact of Mitigation measures**

**Housing**

Residents are one of the most sensitive receptors to visual change.

Views A, B and H (Appendix B) are taken from some of the closest housing to the development, along the B4246 in the vicinity of Heol Waun and the junction with Farm Road, as well as from Castle Wood. The close proximity of the coaling operations to these residents has meant the need for noise and dust screen mounds. While these mounds will effectively screen most of the working areas from the site, they have the major visual disbenefit of cutting off long panoramic views across the valley, a major component of the aspect of these houses. Given the close proximity of the site and the cut off of the long views, residents of these housing areas will be severely affected by the visual change brought about during the construction period, experiencing a temporary major adverse impact; but will experience a minor beneficial impact when mounds are removed at the end of reclamation works and the hydro seeding of the restored surfaces has greened up. (It should be noted that the basic design of the baffle mounds is based on 1:2 slopes and this will need to be generally adopted for the efficient use of land).
Viewpoints E and F, close by the houses on Elizabeth Row, look out from an elevated position towards the lower area of workings where most of the temporary storage piles will be located. Mounds will partially shield the workings from view but again, during reclamation, the visual impact will be severe adverse. The impact would be temporary major adverse and after removal of the temporary mounds and greening up would be minor to moderate beneficial because the elevated position of the houses will reveal a greater change from the intrusive grey shale to a seeded surface.

Many other housing areas have views of the site, mostly partly screened by intervening woodland, topography or other housing. Typical of these generally longer views, are viewpoints I and J, from Rock Villas north of the site and from Trevithin to the south east respectively. In the case of the former viewpoint, intervening woodland will mean there is negligible impact from the temporary works during reclamation and negligible impact following greening up. The view from Trevithin is less impeded and as a result the impact during reclamation works will be minor to moderate adverse with a minor visual benefit after greening up.

Housing west of the B4246, in the vicinity of the proposed access road cut through the railway embankment, will experience a significant visual impact from this work which is assessed as moderate to locally severe adverse during construction becoming minor beneficial on greening up following completion of ground modelling.

**Valued Settings and Views**
The Brecon Beacon National Park comes to within 2.5km of the eastern site boundaries. Viewpoints were visited as part of this study at Myndd Garnwen in poor to moderate visibility conditions and it was concluded that the visual impact of the reclamation works would be negligible to minor adverse and the impact following greening up would be negligible. These low predicted impacts are a product of distance, angle of view and intervening urban areas and woodland.

**Outdoor Facilities**
Various public open spaces have views of the development. The most significant of these, in relation to the proposed development, is the Abersychan R.F.C. to the south. There will be a moderate adverse visual impact from this position during reclamation works, because, although at some distance, it is relatively close to the main storage stockpiles. After greening up there would be a minor benefit.

Other public open space areas are further away. For example, there is another rugby pitch on the edges of viewpoint I below Rock Villas. Here intervening woodland will mean a negligible visual impact both during reclamation works and on completion of hydro seeding.

**Road Users**
The site is surrounded by a complex and, in places, busy road network. One of the busiest roads is the B4246 running approximately north south along the eastern boundaries of the site. Substantial sections of the road have little or no view of the site because of the intervening railway embankment and areas of residential development. The section at the north eastern end of the site has views down the site but the baffle mounds on this section of the boundary will screen most of the working surfaces, at the same time closing off some of the long valley views. There will therefore be a moderate to severe adverse visual impact on views from these sections of road during reclamation works becoming minor beneficial impacts on removal of the baffle mounds and greening up of the surfaces. There will be similar impacts on users of the section of road adjoining the proposed embankment cut-through during and after the construction period.

There are longer, but unimpeded, views across the site from the minor road to St Lltyd, climbing the hillside to the south west. During the works the visual impact is assessed as moderate to major adverse but changing to minor to moderate beneficial after reclamation. By that stage the hydro seeding will have removed the appearance of grey
shale deposits, and the elevated position will disguise some of the relatively uniform platform character of the restored landform.

A significant change for road users will be the permanent opening through the railway embankment, providing a view of the site and beyond which is presently cut off from the B4246.

**Cyclists and Pedestrians**

The route of a national long distance cycleway follows the disused railway embankment along the eastern boundaries of the site. During reclamation works, both temporarily and permanently, the route of this cycleway will change due to the cut in the embankment. The effect during reclamation would be **major adverse**, moderating on completion.

A network of paths connects with parts of the site or runs close to boundaries. The visual impact will vary depending on distance from the reclamation works, angle of view and intervening screening features. Other visual detractors such as transmission lines lower the quality of existing views from some of these footpaths.

Some of the most significant adverse impacts during the reclamation works will be from Castle Wood and the paths rising up the hillside above Elizabeth Row. Impacts from these sections of footpath are assessed as **major adverse** but changing to **minor beneficial** or **minor to moderate beneficial** after seeding.

**Planning Policy**

Elements of planning policy relevant to the landscape appraisals of the proposed reclamation works have been described above.

Much of the landscape policy in the UDP and Local Plan documents is aimed at preserving and enhancing landscape and visual amenity; this reclamation scheme, on completion, will achieve landscape and visual benefits.

### 7.6 Summary of Effects

This study has been carried out in accordance with nationally agreed best practice standards of landscape and visual assessment. A detailed inspection has been made of the Proposed Development Site, looking at its present condition and the manner in which relates to the immediate urban area of Pontypool, and the wider rural landscape of Torfaen.

The site occupies the former British works and encompasses a large tract of brownfield land. A disused railway embankment runs along the eastern boundary separating the site, both physically and visually, from the urban areas located in the valley floor.

The site is dominated by disturbed landscape with some natural regeneration, particularly around the boundaries. It has several industrial ruins of considerable heritage value.

The site occupies an urban edge location, with an urban landscape character very much influenced by the adjacent housing and commercial development, which has enclosed the site on three sides.

The Torfaen LANDMAP study of the Visual and Sensory Aspect has identified the eastern part of the Proposed Development Site as being part of the Derelict/Waste Ground associated with “The British” former mining works. This is classified as being ‘Developed Unbuilt Land’ of ‘low’ landscape value. The western part is within the rural Visual and Sensory Aspect Area of Wooded Mosaic Upland Valleys, assessed as ‘moderate’ value. To the east of the Proposed Development Site lies the urban Visual and Sensory Aspect Area of Upland Grazing.

The site is effectively screened from much more distant views from the west by the ridge landform of Byrgwm and Waun Wen.
The site’s location and its local landscape character are such that no significant detriment to the landscape character and appearance of the wider locality would be likely to result from the proposed development. While there will be some modest gains to the landscape structure such as the restored watercourse of the Cwm Sychan Brook, these will be balanced up by the loss of scrub and heathland habitats.

This Study has concluded that from the wide range of typical viewpoints examined, the proposed site development will, on completion, have minor (and in the case of more elevated viewpoints a minor to moderate) beneficial visual impact due to the removal of unsightly workings and the greening up of derelict surfaces. There may be local situations where there is a neutral balance in terms of visual impact between the loss of natural revegetated surfaces and the new seeded contours.

The study has also concluded that there are number of locations where there will be major adverse visual impacts during reclamation, particularly for residential receptors adjoining the site at Castle Wood and the northernmost part of the site, as well as by Elizabeth Row. Although mounds will screen much of the working surfaces, these mitigation features will unfortunately cut off the majority of the long attractive views across the valley from these properties.

Many other housing areas have views of the site, mostly partly screened by intervening woodland, topography or other housing. Impacts from these are mostly minor adverse to negligible during works. At this greater range, the screen mounding will have some visual benefit because long views across the valley from the properties are not being impeded.

The Brecon Beacon National Park comes to within 2.5 km of the eastern site boundaries. The study has concluded that there would be negligible to minor adverse impacts during reclamation and the impact following greening up would be negligible. These low predicted impacts are a product of distance, angle of view and intervening urban areas and woodland.

Various public open spaces have views of the development. The most significant of these, in relation to the proposed reclamation works, is the Abersychan R.F.C. to the south. There will be a moderate adverse visual impact from this position during reclamation works, because, although at some distance, it is relatively close to the main storage stockpiles. After greening up there would be a minor benefit.

The site is surrounded by a complex road network. A section of the B4246 at the north eastern end of the site has views down the site but the baffle mounds on this section of the boundary will screen most of the working surfaces but close off some of the long valley views. There will therefore be a moderate to major adverse visual impact on views from these sections of road during reclamation works, becoming minor beneficial impacts on removal of the baffle mounds and greening up of the surfaces.

There are longer, but unimpeded, views across the site from the minor road to St Illtyd, climbing the hillside to the south west. During the works the visual impact is assessed as moderate to major adverse but changing to minor to moderate beneficial after reclamation.

The route of a national long distance cycleway follows the disused railway embankment along the eastern boundaries of the site. During reclamation works the visual impact from sections of this cycleway will be major adverse, moderating on completion.

A network of paths connects with parts of the site or runs close to boundaries. The visual impact will vary depending on distance from the reclamation works, angle of view and intervening screening features. Some of the most significant adverse impacts during the reclamation works will be from Castle Wood and the paths rising up the hillside above Elizabeth Row. Impacts from these sections of footpath are assessed as major adverse but changing to minor beneficial or minor to moderate beneficial after seeding.
During reclamation works there will be **minor adverse** visual impacts over substantial areas of the surrounding landscape, with **locally severe** visual impacts for some residential receptors closely adjacent to the site. However, this study concludes that the proposed reclamation works will make an overall **minor**, and in places, **minor to moderate beneficial** contribution to this part of the Afon Llwyn valley. The reclaimed landform will form an excellent basis for a masterplan where major landscape infrastructure proposals will form a key part of regenerating this part of the valley landscape.
8 Ecology and Nature Conservation

8.1 Introduction

This chapter addresses the potential ecological effects of the proposed reclamation of The British as described in Chapter 3. The assessment has been undertaken by Soltys Brewster Ecology Ltd and includes a summary of the current conditions found within the surveyed area, a valuation of the ecological features and an indication of impacts/mitigation associated with the proposed reclamation.

To aid the reader, some of the details of the full assessment are assigned to Appendix C.

8.2 Assessment Method

8.2.1 Scope

The scope of the ecology assessment for the scheme has been developed iteratively based on:

- Consideration of any ecological resources, focusing on those for which there is legal or planning policy in favour of protection or enhancement;
- Data on sites of national and county importance within 1km of the proposed reclamation boundary;
- Data on notable flora and fauna; for example, legally protected, nationally rare/scare, county rare/scarce, Local (Torfaen) and UK Biodiversity Action Plan, and other species of conservation concern within 1 km of the proposed reclamation boundary; and
- Ongoing review of proposed reclamation activities and their likely range of effect on ecological resources.

Where an ecological feature is likely to be subject to a significant effect both the value of the feature/resource and the likelihood of a significant effect occurring are considered. Where a significant effect is identified, the effect on the particular feature was evaluated as adverse or beneficial at the relevant geographical scale (local, district etc.).

The key activities during site preparation/mobilisation that may generate potentially significant effects on identified ecological receptors comprise:

- Direct loss of habitats during site clearance;
- Disturbance from noise and movement of onsite vehicles, machinery and people; and
- Changes in artificial light levels.

The key activities during operation of the coal extraction and reclamation works, estimated at up to 4 years duration, that may generate potentially significant effects on identified ecological receptors comprise:

- Changed disturbance levels from increased movement and noise of vehicles/machinery;
- Effects of soil movements;
- Changes in artificial lighting levels; and
- Routing of services and utilities (for example, drainage).

Potentially sensitive ecological receptors are identified through the collation of baseline data from surveys and existing records. Once the receptors are identified information on their legal and policy, conservation and distribution status, plus any known trends (i.e. population or migratory) are considered to measure their value.

At the time of reporting, no written response to scoping had been received from Torfaen County Borough Council (TCBC) or the Countryside Council for Wales (CCW) but both...
organisations indicated, at a meeting on 4 December 2007, that the scope of the ecological surveys undertaken to advise this ES was appropriate.

### 8.2.2 Approach

The assessment has been undertaken using best practice guidelines published by the Institute of Ecology and Environmental Assessment (IEEM). This guidance has been developed by the National Working Group on Ecological Impact Assessment convened under the auspices of the Institute of Ecology and Environmental Management (IEEM). These guidelines have been subject to extensive formal consultation with e.g. English Nature (Natural England from October 2006), the Environment Agency, the Institute of Environmental Management and Assessment (IEMA) and the Countryside Council for Wales. The final publication was published in June 2006 (Reference 1).

**Valuation of Ecological Features**

All ecological receptors are described (including conservation status, status on site, sensitivity, planning and legal protection etc) and assigned a value. The scale of value for ecological resources used in the present assessment is as follows:

- International
- UK
- National (Wales)
- Regional (South Wales)
- County (Torfaen)
- District (Pontypool)
- Local (Abersychan or within 1km of the reclamation boundary)
- Within immediate zone of influence or within the reclamation site boundary

All resources valued at above a given threshold of value (in this case within the immediate zone of influence is the lowest level) are considered in terms of whether any effects are likely to be ecologically significant or not.

Having identified the activities likely to cause significant ecological effects (see above) it is then necessary to identify associated changes and their implications in terms of scale, magnitude, duration, reversibility and timing for valued ecological resources.

**Ecological Significance**

For the purposes of this assessment, an ecologically significant effect is defined as an effect (adverse or beneficial) on the integrity of a defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, including cumulative effects (based on IEEM, 2006). In this context, integrity is defined as the “Coherence of a site’s ecological structure and function across its whole area that allows it to sustain the habitat, complex of habitats and/or levels of populations…”

Ecological significance of an effect is considered descriptively in terms of its nature (for example, beneficial or adverse). The ecological value of the resource and the planning policy and legal context are described and used to determine the scale (see above) at which the effect is considered. Finally, the residual effect of the scheme including consideration of any additional mitigation measures is presented.

### 8.2.3 Legislation and Planning Guidance

For each of the valued ecological features identified (for example, a habitat or species), any relevant planning policy, legislative protection or other conservation interest (for example, the UK or Torfaen Biodiversity Action Plan - BAP) is described. The main legislative considerations are those contained within the Wildlife and Countryside Act 1981 (as
amended), The Conservation (Natural Habitats, etc.) Regulations 1994 (amended 2007) and the Countryside and Rights of Way Act 2000.

In terms of planning policy, a number of over-arching policies are of relevance not least of which are those described within Planning Policy Wales (PPW) (Reference 2), Chapter 5 dealing with Conserving and Improving Natural Heritage and Coast. The advice contained within PPW is supplemented for some subjects by Technical Advice Notes (TANs), with TAN 5 addressing Nature Conservation. This TAN was subject to public consultation between January and 21 April 2006, with a revised version due to be published.

Under the proposed revisions to TAN 5, some of the key principles, which the town and country planning system in Wales should incorporate, are:

- work to achieve nature conservation objectives through a partnership between local planning authorities, CCW, the Environment Agency, voluntary organisations, developers, landowners and other key stakeholders (PPW 5.1.5 and 5.2.5);
- integrate nature conservation into all planning decisions looking for development to deliver social, economic and environmental objectives together over time (PPW 5.1.3 and 5.1.4);
- ensure that the UK’s international obligations for site, species and habitat protection are fully met in all planning decisions (PPW 5.3.8-10);
- look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally (PPW 5.1).

The Torfaen County Plan was adopted in July 2000 and was due to be superseded by a Unitary Development Plan (UDP). However, work on this document was suspended in February 2005 in light of the new regulations published by the Welsh Assembly Government, which provide for a new system of Local Plans in Wales. This document (Torfaen Local Development Plan) is currently in preparation.

Within the adopted County Plan, section 7 addresses the environment, with the overall aim of protection and enhancement and in this respect; Policy E8 is of general relevance to any development affecting features of ecological interest. This policy states:

Proposals for development in areas not formally designated as being of nature conservation importance will only be permitted where they satisfy all of the following criteria:-

A- Trees considered as being of high amenity value, on the site, are retained as far as is reasonably practicable and are protected during any construction periods.

B - The existing hedgerows on the site are retained as far as is reasonably practicable and are protected during any construction periods.

C - Wetlands habitats, watercourses, geological features and other important natural features or habitats are retained as far as is reasonably practicable and are protected during any construction periods.

D- Landscaping schemes, submitted as part of the Proposals, include appropriate native species, except where special requirements in terms of purpose and location dictate otherwise.

Where trees, hedgerows, wetland habitats and other important natural features or habitats are inevitably required to be lost as a result of the development, proposals will only be permitted where compensatory provision will be made as part of the proposal to a minimum standard of that has been lost.

For locally designated Sites of Importance to Nature Conservation, Policy E7 is of relevance, which states:
Proposals for development on non-statutory sites of wildlife, geological or geomorphological importance will only be permitted where they satisfy all of the following criteria:-

Proposals shall preserve as far as possible the site’s conservation value.

Wherever possible, proposals shall provide for replacement habitats or features where damage is unavoidable.

Proposals shall comply with other policies in this Local Plan.

The County Borough Council will consider the attachment of conditions or enter into agreements that would overcome the potentially damaging effects of development on the habitats of species of conservation importance.

8.3 Consultations

In order to provide an ecological context for the site, ecological records were requested from relevant organisations including:

- South East Wales Biodiversity Records Centre (SEWBReC)
- Torfaen County Borough Council (TCBC)
- Gwent Bat Group
- CCW – Information available via the website and the Phase I of Wales (Reference 3) data-set.

Much of the desk-based data was supplied by SEWBReC, which included the locations of important statutory designated sites (for example, Sites of Special Scientific Interest SSSI). TCBC was able to provide information on the non-statutory designated sites (Sites of Importance for Nature Conservation) and copies of previous ecological and environmental studies undertaken.

Habitat and species action plans listed in the UK Biodiversity Action Plan (BAP) were also consulted with regards to species or habitats that are potentially present on the site or in the surrounding area. Biodiversity Action Plans represent the UK Governments response to the 1992 Convention for Biodiversity (the Rio Summit). They describe the UK biodiversity resource and detail plans at a national and local level to protect priority habitats and species. Relevant local plans within the Torfaen BAP were also consulted.

In addition to the record requests, regular contact with the ecologist at Torfaen and the relevant conservation Officer at CCW was maintained and both organisations received copies of the Phase I Habitat survey report and Phase 2 Summary reports shortly after these were prepared (June and October 2007 respectively).

8.4 Establishing Baseline Conditions

The ecological baseline was established by identifying the valued and sensitive ecological resources within the boundary of the reclamation scheme and in adjoining areas by a combination of desk study and field surveys. The desk study consultation included the proposed development site and the surrounding 1 km area whilst the field surveys were largely confined to the habitats within and immediately adjacent to the proposed reclamation extending into the valley of Cwm Sychan to the North West and Cwm Byrgwm to the south west.

The land area within the current reclamation boundary covers an area of approximately 50 ha whereas the area included within the initial habitat survey (Extended Phase I Habitat survey) was some 150 ha.
8.4.1 Extended Phase 1 Habitat Survey

An Extended Phase 1 Habitat Survey of the proposed development site was undertaken between 20/21 November 2006 and completed in late March 2007.

The survey methodology followed the standard JNCC guidelines (Reference 4) as amended by the Institute of Environmental Assessment (Reference 5) to include protected and/or notable species. Within the surveyed areas habitats and other ecological features were described and mapped and target notes used to identify features of particular interest/note.

The survey incorporated a search for any evidence of certain protected species such as Badger *Meles meles*, Otter *Lutra lutra* and incidental recording of birds seen or heard. Trees, buildings and other structures such as tunnels/culverts (where access was possible) were also subjectively assessed from the ground for their suitability to support roosting bats.

In consideration of its nuisance status and the legal considerations under the Wildlife and Countryside Act 1981, the survey also made note of any stands of Japanese Knotweed *Fallopia japonica*. Under section 14 (Schedule 9) of the Wildlife and Countryside Act, it is an offence to introduce or cause this species to spread into the wild.

As part of the reclamation proposals, a new diversion to maintain the link between Mountain Road and Farm Road is proposed. Although the Extended Phase I Habitat survey (March 07) included this area and the grounds of the old Abersychan House, a supplementary survey incorporating smaller scale mapping of ecological features was undertaken in December 2007. The survey also incorporated a ground based check of mature trees and small tunnels in the area to assess their potential for roosting bats. This was supplemented by a tree-climbing inspection of trees considered above no/low potential to bats within and immediately adjacent to the footprint of the road diversion (route confirmed late March 2008) by a suitably licensed bat worker in April 2008. These trees were climbed and cavities, splits etc examined for current or historical evidence of use by bats (e.g. droppings, staining etc).

8.4.2 Stage 2 Ecological Surveys

Following completion of the Extended Phase I Habitat survey, a number of targeted Stage 2 surveys were identified and subsequently undertaken within recognised surveys windows using standard or best practice guidelines where appropriate. These surveys are described in subsequent sections. Copies of both the Phase I Habitat survey and Stage 2 summary report have been made available to the ecologist at Torfaen CBC and CCW.

**Botanical (National Vegetation Classification) Surveys**

In order to characterise and map the different habitats on site in greater detail as well as identifying rare or protected plant species within these habitats, a series of National Vegetation Classification (NVC) surveys were conducted in August 2007.

Stands of potentially botanically valuable homogenous vegetation identified in the course of the Phase 1 Habitat Survey were sampled using methodology adapted from standard NVC protocol. All communities relevant to NVC categories were assigned and all those habitats not covered by the NVC were sampled and mapped. Stands of vegetation considered to be of low botanical value were not sampled and included extensive areas of species-poor neutral grassland and scrub.

Habitats considered to fall within the remit of the local (Torfaen) or UK Biodiversity Action Plan (BAP) were also identified.

**Amphibians**

The Extended Phase 1 habitat survey identified five ponds in the area surveyed considered potentially suitable to support amphibians. In order to confirm the presence of breeding amphibians, including Great Crested Newts *Triturus cristatus* within these ponds, a series of four evening surveys were conducted between early and late May 2007. Surveys included...
refuge searching, egg searching, torching, netting and bottle trapping (where possible) following guidelines and methodologies recommended by English Nature (2001).

**Birds**

The ornithological importance of the survey area was assessed following a Breeding Bird Survey (BBS), supplemented by incidental observations of bird activity during the course of the Extended Phase I Habitat survey. The bird survey was based on the Breeding Bird Survey (BBS) methodology which was adapted (Reference 6) to include three visits between early May and early July 2007 with transect routes selected to enable complete coverage within the proposed reclamation boundary and the Cwm Sychan/Cwm Byrgwm valleys.

**Bats**

A daytime assessment of possible roost sites was incorporated into the Extended Phase I Habitat survey. In order to supplement this appraisal and to determine the levels of bat activity within and immediately adjacent to the proposed reclamation boundary, a series of three evening ultrasound surveys were undertaken between late July and early September 2007 with a dawn survey visit in late August 2007. These surveys involved observations of possible emergence from roosts for 15 minutes before sunset and 90 minutes after (the dawn survey involved observations from 90 minutes prior to sunrise and 15 minutes after), using Pettersson D-240x ultrasound detectors. Following this emergence period, transects which covered the main body of the survey site were walked.

On each survey visit, weather conditions were appropriate for bat activity and did not constrain the survey effort.

**Reptiles**

In order to establish the presence of reptiles on the site, a series of surveys were conducted using methods described in the Herpetofauna Workers Manual (Reference 7) and by FrogLife (Reference 8).

The land within the proposed reclamation boundary was divided into representative habitat areas considered suitable for reptiles and artificial refugia (in the form of 0.5m² of roofing felt). The survey involved a series of eight visits during August and September 2007 to check under and around theses refuges for basking and sheltering reptiles under suitable environmental conditions.

**Terrestrial Invertebrate Survey**

To establish the existing invertebrate interest within the proposed reclamation boundary, a series of three surveys were conducted between mid July and late September 2007. Each survey consisted of a day time visit to actively sample the site by means of sweep nets and beating trays, supplemented by direct observation and active searching. A small level of pitfall trapping was also undertaken throughout this period.

The survey also involved light trapping for nocturnal moths and other night-flying insects using mercury-vapour (mv) light bulbs mounted over catching chambers filled with cardboard egg trays.

In addition, targeted searches were undertaken for two species recently listed as of Principal Importance for Biodiversity in Wales - the Grayling Moth *Hipparchia semele* and the Silurian Moth *Eriopygodes imbecilla*, which may find suitable habitat in this site.

### 8.5 Description of Baseline Conditions

An overview of baseline conditions is provided in Chapter 2. A detailed description follows.

#### 8.5.1 Statutory Designated Sites

There are no sites with statutory nature conservation designations, such as SSSIs identified within 1 km of the proposed development site, although one such site was present outside this boundary. Blorenge Mountain lies 3 km to the north of the site and is listed as a SSSI on
account of its locally distinct heathland community and calcicole vegetation assemblage. The Brecon Beacons National Park boundary lies to the east of the village of Abersychan.

Given the physical separation of both of these sites, the nature of their ecological interest and the extent of the proposals, neither would be considered of ecological relevance and no further consideration is given.

### 8.5.2 Non-Statutory Sites

Three SINC s were within the reclamation scheme boundary and included The British, The British Meadows and Castlewood. Whilst descriptions of these sites and their constituent habitats were available from Torfaen CBC (Appendix C1), no boundary mapping to indicate their extent was available at time of reporting. Based on interpretation of the SINC descriptions, The British and Castlewood occupy relatively large areas to the south and north-west of Farm Road respectively, with the British centred on the remaining coal office buildings west of the Big Arch. In contrast, The British Meadows occupies a clearly defined area of three fields within the Castlewood area.

In consideration of their status (designated by TCBC), each of these sites could be considered of ecological value at a **County geographical scale**. However, surveys have identified that the ecological interest at the British Meadows had been negatively affected by agricultural improvement and as a consequence, this site was considered to be of **value locally**. Ty'r Belli Wood and Pant Glas Slip SINC s are located close to the northern and southern boundaries of the wider survey area respectively but are not considered of ecological relevance to the current proposal.

### 8.5.3 Habitats and vegetation communities

In general the site was found to support a wide range of habitat types including bare ground, spoil, mature broadleaved woodland and scattered trees, scrub, acid and neutral grassland, bracken, dwarf shrub heath and various buildings. The distribution of these habitats and their relative extent within the proposed reclamation boundary and in the surrounding area is illustrated on Figure 5 and Table 8.1 with target notes included in Appendix C2. Within Table 8.1, habitats with no clear physical boundaries (e.g. scattered scrub or bracken) have not been included in the area calculations.

**Table 8.1 – Habitat and Vegetation distribution and extent**

<table>
<thead>
<tr>
<th>Habitat type</th>
<th>Within reclamation boundary</th>
<th>Outside reclamation boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad-leaved woodland</td>
<td>1.63 ha</td>
<td>8.07 ha</td>
</tr>
<tr>
<td>Dense scrub</td>
<td>5.32 ha</td>
<td>0.81 ha</td>
</tr>
<tr>
<td>Unimproved acid grassland</td>
<td>8.44 ha</td>
<td>2.75 ha</td>
</tr>
<tr>
<td>Semi-improved acid grassland</td>
<td>0 ha</td>
<td>16.52 ha</td>
</tr>
<tr>
<td>Semi-improved neutral grassland</td>
<td>3.1 ha</td>
<td>0 ha</td>
</tr>
<tr>
<td>Poor semi-improved grassland</td>
<td>11.7 ha</td>
<td>2.58 ha</td>
</tr>
<tr>
<td>Improved grassland</td>
<td>0 ha</td>
<td>0.18 ha</td>
</tr>
<tr>
<td>Continuous bracken</td>
<td>2.68 ha</td>
<td>15.45 ha</td>
</tr>
<tr>
<td>Marshy grassland</td>
<td>0.98 ha</td>
<td>4.18 ha</td>
</tr>
<tr>
<td>Acid dwarf shrub heath</td>
<td>4.6 ha</td>
<td>8.93 ha</td>
</tr>
<tr>
<td>Dry Heath/acid grassland mosaic</td>
<td>5.26 ha</td>
<td>6.77 ha</td>
</tr>
<tr>
<td>Acid / neutral flush</td>
<td>0 ha</td>
<td>0.17 ha</td>
</tr>
<tr>
<td>Acid / neutral scree</td>
<td>0 ha</td>
<td>5.79 ha</td>
</tr>
<tr>
<td>Standing water</td>
<td>0.05 ha</td>
<td>0.09 ha</td>
</tr>
<tr>
<td>Bare ground</td>
<td>6.75 ha</td>
<td>0.26 ha</td>
</tr>
<tr>
<td><strong>Area Totals</strong></td>
<td><strong>50.51 ha</strong></td>
<td><strong>72.55 ha</strong></td>
</tr>
</tbody>
</table>

As previously described within the Extended Phase I Habitat survey report, several of these habitat types were considered to meet the descriptions for UK and Torfaen BAP Priority.
Habitats, and this was further highlighted for the heathland and grassland habitats by the NVC surveys, mapping and tabulated field notes included as Appendix C3.

**Broadleaved Woodland**

There are several different areas of woodland present within the surveyed area which vary in size and composition. Of these, two Beech woodlands lie outside the reclamation boundary within the Cwm Byrgwm and Cwm Sychan valleys. The former lies remote from the proposed reclamation boundary and was not considered further as part of the assessment process.

The Beech *Fagus sylvatica* woodland at the lower end of Cwm Sychan valley was characterised by large standard trees, some of which had been pollarded with Birch *Betula* sp and Pedunculate Oak *Quercus robur* also noted.

The remaining woodlands within the reclamation boundary comprised wet woodland in the south eastern corner, with Goat Willow *Salix caprea* as the dominant species, and an area of wood pasture/parkland situated in the grounds of the old Abersychan House. The extent of woodland (and other habitats) within this latter area, which would accommodate the proposed diversion of Farm Road/Mountain Road are illustrated on Appendix C4. The nature of the woodland in this area varied between immature Ash *Fraxinus excelsior*, Sycamore *Acer pseudoplatanus* and Pedunculate Oak in the southern part with a mixed stand of mature planted trees in to the north including Larch *Larix* sp., Scots Pine *Pinus sylvestris*, Sycamore, Beech, Pedunculate Oak and Horse Chestnut *Aesculus hippocastanum*.

All three of the woodlands considered as part of this assessment were considered representative of habitat types for which UK and local (Torfaen) BAPS have been prepared. On this basis, each could theoretically be valued at a UK or County scale although based on their limited extent (ranging from 1 – 3 ha) and condition (ground flora in all three cases was typically species poor) a lower valuation was considered more appropriate. The wet woodland in particular was considered particularly impoverished, with the ground cover comprising Common Nettle, Cleavers *Galium aparine* and Bramble and this was considered a poor example of the habitat type.

The Torfaen BAP estimates that the habitat resource for Beech woodland, Wood pasture/Parkland as 279ha 1,075 ha respectively in Greater Gwent. On this basis, the blocks of corresponding woodland types within or immediately adjacent to the proposed reclamation boundary would represent < 1% of the habitat resource in Gwent and were therefore considered of value at a District scale. The Wet Woodland resource in Gwent is estimated at 200-500 ha with the area in the reclamation boundary covering 1.2 ha. In view of its poor existing condition, this woodland was considered of ecological value locally.

**Acid grassland**

Acid grassland is an abundant habitat found across the site (Figure 5) although it varied in quality and diversity. The most botanically diverse communities and those meeting the descriptions for Priority Habitat in the UK and Local BAPS (e.g. NVC type U2a and U4) were primarily distributed within the proposed reclamation boundary, having established over colliery spoil in a mosaic with dwarf shrub heath. Grassland representing a transition between acid and neutral was also associated with areas of flat colliery spoil, notably immediately south of Farm Road.

With the exception of a stand of U4 grassland south of Cwm Sychan pond, much of the acid grassland outside the reclamation boundary was represented by relatively species-poor sheep grazed pastures within the Cwm Sychan valley.

The Torfaen BAP indicates that acid grassland represents a low conservation priority within the County Borough as it is relatively common. However, good quality acid grassland is a
UK BAP Priority Habitat with the resource in the UK estimated at 30,000ha, of which 1,900 is estimated to occur in Gwent.

The Extended Phase I Habitat survey at the site estimated the acid grassland resource within the proposed reclamation boundary at 8.4 ha (although no distinction between the specific community types was undertaken) representing 0.4% of the Gwent resource. In consideration of these factors, the UK and local BAP communities (U2a and U4) at The British were considered to be of ecological value at a District (Pontypool) geographical scale with the less diverse and transition communities of importance within boundary of the proposed reclamation.

Neutral grassland
Much of the neutral grassland habitat on the site was characterised by a species poor semi-improved sward (Figure 5) that was prevalent along the railway embankment and within the flat expanse between the Big Arch and the derelict coal offices. This grassland was considered of low intrinsic interest (although does support common reptiles as described in subsequent sections) and of ecological value within the reclamation site boundary.

Two additional community types were identified during the NVC surveys (Appendix C3) including the species-rich MG5c within Castlewood meadow and a species-poor MG9 in areas south of Farm Road. The former is typical of unimproved neutral grasslands and within the small pockets identified in Castlewood a diverse range of species was noted with an acidic influence suggested by species such as Heath-grass Danthonia decumbens, Devil’s-bit Scabious Succisa pratensis and Tormentil Potentilla erecta. The pockets within Castlewood were the only areas of this habitat type recorded and the community is characteristic of those included within the Lowland Meadow action plan of the UK and Torfaen BAPs where it is considered a high conservation priority. The extent of this habitat resource in Wales is estimated at 2000 ha, of which 440 ha occurs in greater Gwent. Although the extent of the community at Castlewood was small (<1ha), its high intrinsic importance and absence from other parts of the surveyed area is considered to represent a feature of ecological value at the County scale.

Acid dry dwarf shrub heath
Dry dwarf shrub heath is another vegetation type that frequently appears on site. It is generally comprised of two types. The first and most common is dominated by Heather Calluna vulgaris and is abundant on spoil heaps. Where vegetation is more established the species diversity tends to improve and Bell Heather Erica cinerea, Bilberry Vaccinium myrtillus and bryophytes and lichens become common.

The heath habitats recorded within the proposed reclamation boundary were primarily associated with colliery spoil/slag heaps and frequently occurred as mosaics with other habitats such as acid grassland, gorse scrub and bracken. Within these areas, two distinct heathland communities (NVC H10 and H12) were identified with the H10 community the more common dominated by Heather.

The diversity of stands varies across the site with some areas being more species-rich than others. Species-poor stands tend to be associated with areas where there are more disturbances (for example from quad biking) and high levels of erosion. The H12 community differs in that Bilberry is much more prominent and Crowberry Empetrum nigrans can be locally frequent with the community typically occurring on higher ground or on the more exposed north and east facing slopes of slag heaps.

Heathland habitats outside the boundary of the reclamation were not subject to NVC survey although based on the Phase I survey data, the communities at British Top Tip and Cwm
Byrgwm Tips were considered comparable to those within the reclamation boundary. Dwarf shrub heath associated with the exposed valley sides (Cwm Byrgwm valley and Cwm Sychan valley) tended to be dominated by Bilberry with occasional stands of Crowberry, Bell Heather and Heather. These latter areas are remote from the proposed reclamation boundary and are not considered further as part of this assessment.

Within the boundaries of the reclamation site, dwarf shrub heath occupied an area of 4.6ha although the area covered by acid grassland/heath mosaic was considerably greater (Figure 5). Within Torfaen County Borough, dwarf shrub heath is listed as of medium conservation importance as it is a distinctive, though often isolated feature of the landscape. The estimated resource within the County Borough is 829 ha, representing 1.3% of the Welsh resource (62,500 ha.), with the area within the reclamation boundary contributing 0.5% of the County resource. In consideration of these factors and the presence of similar quality habitat of greater extent outside the proposed reclamation scheme, the Dwarf Shrub Heath communities were considered of ecological importance at a District (Pontypool) scale.

**Marshy grassland**

Marshy grassland was limited in its distribution within the reclamation boundary to small areas north of the Big Arch, around Cwm Sycahn Pond and Castlewood and in the south eastern corner. Larger and more established stands were associated with the British Heath and within the Cwm Sychan Valley. The stand associated with the British Heath was dominated by Purple Moor-grass *Molinia caerulea* and was very tussocky in nature within a matrix of other habitats, particularly bracken and acid grassland communities. Species associated include *Sphagnum*, Soft rush *Juncus effusus*, Heath Bedstraw *Galium saxatile*, Tormentil *Potentilla erecta* and Green-ribbed sedge *Carex binervis*. This area is sufficiently remote from the proposed reclamation such that the likelihood of adverse impacts would be negligible although enhancement measures to control the spread of Bracken have been identified as part of a scheme mitigation strategy (presented as a separate document in support of this chapter).

Within the proposed reclamation site, three different community types were recorded during the NVC survey including:

- M23 – *Juncus effusus/acutiflorus* – *Galium palustre* Rush pasture
- M24b – *Molinia caerulea* – *Cirsium dissectum* fen meadow
- M25 – *Molinia caerulea* – *Potentilla erecta* mire

These communities were located west of the Cwm Sychan Pond, within Castlewood Meadow and in the south eastern corner of the site respectively and all three would meet the description of Purple Moor Grass and Rush Pasture within the UK and Torfaen BAPs. The latter lists the habitat type as a high conservation priority although its extent within the County Borough is unknown (Wales resource estimated at 1,200 ha with 420ha in Gwent).

Although restricted in extent, the three described communities were each considered of some ecological value. The M23 community within the reclamation boundary was limited to very small, discrete areas and was not noted as particularly diverse – this was considered of ecological value locally. The remaining communities were similarly limited in extent although as examples of more diverse and less well distributed communities (within the County Borough), a valuation at a District geographical scale is considered appropriate.

**Standing and running water**

There were a number of small watercourses running through the proposed reclamation boundary, mainly in the form of small fast flowing rocky streams with limited aquatic vegetation. These are primarily seasonal in nature, responding to rainfall and run-off from the sparsely vegetated spoil mounds although more permanent streams were noted in the
bases of the Cwm Sychan and Cwm Byrgwm valleys. In addition a number of ponds were identified within the proposed reclamation footprint.

Both types of water-body are included within the Torfaen BAP although their extent and condition in the area surveyed was limited. On this basis, they were considered to be of ecological value locally.

**Scrub**

Scrub was a relatively common feature within the proposed reclamation boundary (covering ca. 5 ha.) and along the railway embankment to the east. Typically, species composition in these areas was dominated by Gorse Ulex europeaus with vegetation having established over colliery spoil of fill material. Other shrub species noted included Willow Salix sp. Hawthorn and Blackthorn. Outside the boundary of the reclamation site, with the exception of the railway embankment, scrub was rare or absent.

The local BAP includes a plan for Scrub Woodland and consultation with the Torfaen ecologist has identified the importance of Gorse scrub in particular for breeding birds such as Yellowhammer Emberiza citrinella and Linnet Carduelis cannabina. The local BAP lists scrub woodland, a description that incorporates stands of Gorse, as of medium conservation priority and based on its extent within the reclamation boundary was considered to be of local ecological value.

**Other habitats**

Additional habitat types recorded intermittently from the surveyed area included scattered scrub, acid flush acid scree, bare ground and dense stands of Bracken Pteridium aquilinum. The latter two would be considered of negligible ecological interest although the others are likely to be of some value within the reclamation boundary.

**Japanese Knotweed**

Several stands of this invasive species were noted within and adjacent to the reclamation boundary, particularly associated with the railway embankment, with smaller, discrete stands south of Mountain Road. Japanese Knotweed Fallopia japonica is listed as a pernicious weed under Schedule 9, Section 14 of the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to plant or otherwise cause the species to grow in the wild. Its presence on-site was considered to be of negligible ecological interest. Further consideration of this species would be required for any proposed activities resulting in disturbance of surrounding soil.

**8.5.4 Badgers**

Only limited evidence of Badgers was found on site and no setts or other indication of permanent or regular presence were noted. A number of guard hairs and a single dung pit were found on the railway embankment along the eastern boundary and were the only field signs of this species found in the surveyed area. A similar lack of field evidence was reported in earlier studies.

On this basis, the area within the proposed application boundary was considered to be of limited importance to any local Badger Social groups and of ecological value within the immediate zone of influence of the scheme. Badgers and their setts receive statutory protection under the Protection of Badgers Act 1992 and are included in the Torfaen BAP.

**8.5.5 Amphibians**

The combination of survey methods revealed that all of the ponds holding water at the time of the survey in May 2007 supported small numbers of Palmate Newts Triturus helveticus and only the pond to the south of farm road supported small numbers of Smooth Newts T. vulgaris. There was no evidence to suggest the presence of Great Crested Newts in any of the ponds (Reference 9).

During the course of the surveys, Common Frog Rana temporaria was found to be breeding in some of the ponds and most supported a population of Three-Spined Stickleback
Gasterosteus aculeatus, particularly the pond complex at Cwm Sychan. The conservation status of all the ponds was limited by the general absence of aquatic/marginal vegetation and the presence of predatory fish. Consequently the amphibian resource considered to be of ecological value at a local scale.

8.5.6 Birds
A total of 49 species were recorded within the surveyed area (Appendix C7) of which, 36 were confirmed to be breeding on site based on the presence of singing males or observations of nesting behaviour. The bird assemblage at the site represented species typical of scrub, open woodland and grassland and included a number of species of conservation concern. For example, Bullfinch Pyrrhula pyrrhula, Skylark Alauda arvensis and Song Thrush Turdus philomelos are all included within the Torfaen and UK BAPs with Linnet, Yellowhammer, Dunnock Prunella modularis, Starling Sturnus vulgaris and House Sparrow Passer domesticus also included in the latter (Reference 10). In all instances, the aims of the action plans are broadly similar to halt the decline in populations and restore each to a more favourable conservation status.

Other species of conservation concern in Wales listed on the RSPB/BTO Red and Amber (Reference 11) Lists included Green woodpecker Picus viridis, Kestrel Falco tinunculus and Stonechat Saxicola torquata. A single record of Goshawk, Accipiter gentiles, which is specially protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) was also made although this species predominantly nests in larger blocks of woodland or forestry. Also of note were a number of Cuckoo Cuculus canorus and it is likely that this species breeds in close vicinity to the surveyed area which is probably an integral part of their hunting and foraging territory. Meadow Pipits Anthus pratensis, were frequently recorded on site and are one of the principal host species of the Cuckoo.

In consideration of the range of habitats and resources available to birds within the surveyed area and the presence of several species of BAP importance/conservation concern (11 species in total representing 22% of the total) the bird assemblage was considered to be of District ecological value.

8.5.7 Bats
The buildings on site that were subjectively assessed for their potential to support roosting bats as part of the Phase I survey were generally in a poor state of repair with no roof and were exposed to the elements. The buildings did have substantial gaps in the masonry and around window lintels, although none showed any evidence of use by bats (e.g. droppings, staining). These buildings were considered of low potential value to roosting bats. A number of mature trees were considered capable of supporting roosting bats, which were generally associated with woodlands or field boundaries. The ultrasound surveys did not reveal any emergence or re-entry to and from these features.

A total of six bat species were found to be present within the area surveyed which included Common and Soprano Pipistrelle Pipistrellus pipistrellus/P. Pygmaeus, Noctule Nyctalus noctula, Serotine Eptesicus serotinus, Natterers Bat Myotis nattereri and Daubenton’s bat Myotis daubentonii.

Bat activity was evident across the survey area particularly along existing track ways and other linear features. Activity was concentrated along the main Farm road, within the Castle Wood area and the Cwm Sychan pond.

There were other built structures considered of high potential value for roosting bats that were outside the reclamation boundary such as a reservoir culvert in the north western valley and a tall brick chimney in the Cwm Byrgwm valley. The stone tunnels along the old track way that runs alongside the grounds of the old Abersychan house have been
confirmed recently (December 2007) as a hibernation roost for unidentified (Myotis) bats as well as being previously confirmed as a roost for Brown long-eared bats.

For the road diversion route west of Abersychan house, preliminary ground-based and targeted tree climbing surveys of trees within and immediately adjacent to the diversion footprint (Figure 5) were undertaken in December 2007 and April 2008. Most trees were considered of no/low potential and of those climbed; none showed any evidence of use by bats and in general supported few roosting opportunities (i.e. few splits/cavities noted). The tunnels to the south-west of the road diversion, both confirmed roosts for individual bats were located a minimum of 66m and 78m respectively from the diversion route, with scrub/woodland in the intervening area (see Figure 5).

The distribution of bat species across South Wales varies with Common Pipistrelle widespread throughout. Of the species recorded during the 2007 surveys, the records of Serotine are of some interest as their distribution range is typically restricted to southern England with few records in south east Wales. The Torfaen BAP contains a group action plan for all bat species, amongst the stated objectives of which are to ‘maintain the extent of woodland, avoid fragmentation of woodland and preserve and enhance adjacent linear features that lead to foraging areas’. Based on the activity and species recorded over the course of the surveys, the surveyed area would be considered of District ecological value for bats.

8.5.8 Reptiles
The survey confirmed the presence of two species of reptile within the surveyed area; these were Common Lizard _Lacerta vivipara_ and Slow-worm _Anguis fragilis_. Common lizard was present within all targeted areas across the study area, where as Slow-worm was found in fewer areas in lower numbers.

Interpretation of the reptile records based on the highest number of sightings in a single visit indicated that the surveyed area supports a low to medium-sized reptile population with the railway embankment and acid grassland/heathland mosaic considered as key site features.

The Torfaen BAP includes an action plan for Common Lizard with the aims of halting the probable species decline and seeking opportunities for habitat enhancement. Based on the results of the presence/absence survey, it is considered that the surveyed area is of local ecological value for reptiles.

8.5.9 Terrestrial Invertebrates
A total of 347 species (including 142 moths) of terrestrial invertebrate was recorded during the survey (Appendix C8). No species that are protected under any UK or European legislation or listed in British Red Data Books (Reference 12) or which has been elevated to the status of Nationally Endangered, Nationally Vulnerable or Nationally Rare by subsequent formal reviews were encountered during the survey. In addition no species were found that are included in the UK or Torfaen BAP or that are formally placed in Nationally Notable category Na (Appendix C9).

The only notable species recorded are listed within the Nationally Notable Nb category and included the longhorn beetle _Phytoecia cylindrica_, The Scarce Silver Y Moth _Syngrapha interrogationis_ and the Solitary Wasp _Tiphia minuta_. Seven of the recorded species (3 weevils, two flies, hoverfly and moth) are listed formally as Nationally Local. The Torfaen BAP includes an action plan for Longhorn Beetles, incorporating 4 species – none of which were recorded during the survey.

It is important to note that the site was examined at a relatively late stage in the year, and in a year that was characterised by atypically wet and cold weather and that this may have had some influence on the number of species recorded. However, the data that was obtained was considered to provide an indication of the likely overall importance of the invertebrate fauna in the surveyed areas.
Based on the findings of the survey, which suggested a relatively poor invertebrate assemblage generally lacking in species of conservation interest, the terrestrial invertebrate resource was considered of **local ecological value**.

### 8.5.10 Summary of Valued Ecological Features

A summary of the ecological features described as part of the baseline and their value at a geographical scale are summarised in Table 8.2. Only those features identified at a value of within the site boundary or above have been included and are considered further in this assessment.

**Table 8.2 – Valued Ecological Features**

<table>
<thead>
<tr>
<th>Resource/Feature</th>
<th>Value at geographical scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habitats</strong></td>
<td></td>
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<tr>
<td>Locally designated sites</td>
<td>British, Castlewood – County</td>
</tr>
<tr>
<td></td>
<td>British Meadows - Local</td>
</tr>
<tr>
<td>Broadleaved Woodland</td>
<td>Cwm Sychan Beechwood, Grounds of Abersychan House – District</td>
</tr>
<tr>
<td></td>
<td>Wet Woodland – Local</td>
</tr>
<tr>
<td>Acid Grassland</td>
<td>Diverse U2 and U4 communities – District</td>
</tr>
<tr>
<td></td>
<td>Poor SI acid grassland – Within reclamation boundary</td>
</tr>
<tr>
<td>Neutral Grassland</td>
<td>MG5c – County</td>
</tr>
<tr>
<td></td>
<td>Poor SI and MG9 communities - Within reclamation boundary</td>
</tr>
<tr>
<td>Acid Dry Dwarf Shrub Heath</td>
<td>District</td>
</tr>
<tr>
<td>Marshy Grassland</td>
<td>M24, M25 Communities – District</td>
</tr>
<tr>
<td></td>
<td>M23 Community – Local</td>
</tr>
<tr>
<td>Dense Scrub</td>
<td>Local</td>
</tr>
<tr>
<td>Standing and running water</td>
<td>Local</td>
</tr>
<tr>
<td>Scattered scrub, acid flush, acid scree</td>
<td>Within reclamation boundary</td>
</tr>
<tr>
<td><strong>Species</strong></td>
<td></td>
</tr>
<tr>
<td>Badgers</td>
<td>Within reclamation boundary</td>
</tr>
<tr>
<td>Bats</td>
<td>District</td>
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<tr>
<td>Birds</td>
<td>District</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Local</td>
</tr>
<tr>
<td>Amphibians</td>
<td>Local</td>
</tr>
<tr>
<td>Terrestrial Invertebrates</td>
<td>Local</td>
</tr>
</tbody>
</table>

### 8.6 Assessment of Impact

The ecological impacts associated with the proposed reclamation scheme are described in the following sections based on the IEEM Guidelines (2006) for stages including site preparation/clearance, bulk extraction and restoration. Restoration in this context is described as the process of providing a contoured landscape (with the new watercourse and access arrangements) in preparation for future development.

In considering the likelihood of a significant ecological impact on each of the valued ecological receptors, consideration has been given to factors such as whether the impact is likely to be positive or negative, magnitude (size) of the impact, extent, duration, timing and frequency and reversibility. Where an impact is identified, the likelihood of occurrence is also indicated based on a four-point scale:

- Certain/near-Certain: probability estimated at 95% chance or higher.
- Probable: probability estimated above 50% but below 95%.
- Unlikely: probability estimated above 5% but less than 50%.
• Extremely Unlikely: probability estimated at less than 5%.

For each of the valued ecological receptors, the assessment of likely impacts has been considered for three different stages of the overall reclamation process, which for the purposes of this chapter are 1) Site preparation, 2) Bulk excavation and 3) Restoration. The sequence, timing and description of these activities are described in Chapter 4. In practical terms there is likely to be a considerable degree of overlap between these three phases particularly 2 and 3, as the scheme progresses.

In order to maintain consistency with the approach used to value ecological features, the assessment of impacts on habitats and associated flora/fauna has been based on the area covered by the Extended Phase I Habitat survey (Figure 5) incorporating areas within and outside the proposed reclamation boundary.

The assessment of impacts presented below is in the absence of any mitigation measures.

The first stage of the proposed reclamation is likely to incorporate most of the activities resulting in the direct loss of habitats and is likely to be undertaken over a timescale of 3 - 6 months. Activities associated with this stage, would involve:

• Breaking through the railway embankment north of Big Arch to create the new access road;
• Soil strip from the initial void (Castle Wood) and overburden mounds and creation of baffle embankments;
• Commencement of road diversion and stream diversion; and
• Set up of contractor’s compounds and site security fencing.

8.6.1 Site Preparation

In considering the likely impacts on ecological features during site preparation, a ‘worst case’ scenario has been assumed that all vegetation within the excavation limit north of Farm Road and in areas identified for road diversions, screen embankments and overburden mounds would be removed (i.e. direct habitat loss). However, based on current programme, no works in the largely flat plateau area south of Farm Road would be undertaken during site preparation, with the exception of creation of an access route between the Castlewood excavation and overburden mounds. The railway embankment along the eastern boundary would be retained together with its associated habitats.

The railway embankment would have to be breached north of the Big Arch as part of the road diversion and it is likely that works at the southern, mid and northern limits of the road diversion would commence simultaneously during site preparation.

Locally designated sites

Both the British and Castlewood SINCs, considered of County value, lie wholly or partially within the reclamation boundary. In view of the activities associated with site preparation, it is probable that a significant negative impact would result on both SINCs. Both the Castlewood and British SINCs cover an area larger than that to be directly impacted during site preparation although the extent of habitat loss (e.g. in terms of %) cannot be clarified in the absence of a clear (SINC) boundary.

It is considered unlikely that a significant impact would result at the British Meadows SINC as no direct habitat loss would affect this area and its southern extent is defined by a clear boundary feature (exposed rock face). Due to their physical separation from the scheme, Ty’r-belli Wood and Pant Glas Slip SINCs have not been considered.

Habitats and vegetation communities

Within the areas identified for soil strip (Castlewood, overburden mounds, road diversion and baffle embankments) it is certain that a significant negative impact would result representing a permanent and irreversible loss of virtually all of the existing habitat
resource. This impact would affect a range of habitat types such as dwarf shrub heath, acid, neutral and marshy grassland, dense scrub and woodland of varying ecological value from ‘Within’ the reclamation boundary to ‘County’.

Within the plateau south of Farm Road, the mixture of bare ground, acid grassland and dwarf shrub heath would remain largely unaffected during site preparation although areas of dense scrub would be cleared/ felled. The impact on retained habitats is unlikely to be significant in the short term although a negative impact is probable due to the need to define an access track/haul route through this area (likely along the eastern edge).

At a geographical scale incorporating the area surveyed as part of the Extended Phase I survey (Within immediate zone of influence – Local), it is probable that a significant negative impact would also result for those habitats/communities where all or most of the resource was located within the reclamation boundary. For example, the total surveyed resource of dwarf shrub heath and acid grassland/heath mosaic was 25.56ha, of which most of the 9.86ha within the reclamation boundary (38%) would be lost during site preparation. Similarly, a significant negative impact is probable for scrub, wet woodland, acid grassland, and poor semi-improved grassland.

However, the loss of marshy grassland habitat was not considered significant at this geographical scale based on a loss of several small isolated areas totalling 18% (0.98 ha) of the available resource.

For those habitats located wholly or predominantly outside the reclamation boundary but within the surveyed area, including areas of broad-leaved Beech woodland, it is unlikely that a significant negative impact would result as no direct loss of habitats would occur. However, it is likely that a negative impact in the short term (6-12 months) would result on immediately adjoining habitats ranging in value from District (e.g. Beech Woodland) to Within the immediate zone of influence (e.g. poor semi-improved grassland) as a result of increased dust deposition, construction activity etc. This is likely to be a greater consideration for faunal groups associated with these areas (see subsequent sections).

**Badgers**

Only limited evidence of use by Badgers was associated with the area surveyed (value within reclamation boundary) although it seems likely that Badgers are present locally. It is considered unlikely that a significant impact would result during site preparation works although a short-term negative impact within the immediate zone of influence is probable based on increased levels of disturbance and loss of potential foraging habitat.

**Bats**

No evidence to suggest the presence of roosting bats within the proposed reclamation boundary was recorded during the surveys and of the buildings present (NCB Offices and Cornish Engine House) these were generally considered of Low potential. A total of six bat species were noted foraging across the site although activity was highest along linear features (Farm Road, railway embankment) or particular areas (Cwm Sychan pond). Bat activity at the site was considered to be representative of a feature of District ecological value.

The presence of roosting bats was confirmed within two small tunnels west of the road diversion route to Mountain Road. No evidence of roosting bats was associated with the trees within and immediately adjacent to the road diversion footprint.

In consideration of the absence of roosting opportunities, dominance of bat activity by aerial hawking species such as Pipistrelles (Noctule and Serotine to a lesser extent) and the retention of adjacent habitats, including the railway embankment, Farm Road and Cwm Sychan pond, it is considered unlikely that the direct loss of habitats associated with site preparation would result in a significant negative impact. However, the potential for indirect impacts on retained areas through e.g. increased lighting could result in a significant effect in the absence of any mitigation measures.
For the proposed road diversion, no direct impacts on confirmed roosts would result and the trees to be removed were considered of no/low potential for roosting. In addition, scrub and woodland outside the footprint of the road diversion would not be subject to direct impacts. On this basis, a **significant negative impact is considered unlikely**. However, the potential for indirect impacts on retained areas through e.g. increased lighting, noise could result in a significant effect in the absence of any mitigation measures.

**Birds**

The bird assemblage across the surveyed area was considered to be of ecological value at a District Scale.

During site preparation, most of the existing nesting/foraging habitat within the reclamation boundary would be lost although some peripheral areas could be retained along with previously identified features (e.g. railway embankment). The direct loss of habitat and resources on this scale would be **certain to result in a significant negative impact** on the bird assemblage. Similarly, for any retained habitat immediately adjacent to the boundary of works (within ca. 20-30m), it is **probable that the indirect effects** of increased noise and human activity would result in a **significant negative impact** in the absence of any mitigation.

For areas outside or remote from site preparation works (such as British Heath and the Cwm Sychan/Cwm Byrgwm Valleys), significant effects are unlikely although some short-term negative impact is probable due to increased competition for resources.

**Reptiles**

Field surveys undertaken confirmed that at least two species of reptile (Slow worm and Common Lizard) of Local ecological value were present within the reclamation boundary. Based on the almost complete loss of habitat within this area (plateau south of Farm Road excepted) during site preparation works, it is **certain that a significant negative impact would result**.

For retained habitats immediately adjacent to the works, **a significant ecological impact is considered unlikely** since reptiles are typically cryptic in their behaviour and therefore less likely to be indirectly affected by noise or human activity than e.g. birds. However, for these areas (e.g. railway embankment), a short term negative impact locally is probable with habitats remote from site preparation works (e.g. British Heath) experiencing negligible impacts.

**Amphibians**

Field surveys undertaken indicated that the existing population of Smooth & Palmate newt and common frog were of ecological value locally. A total of three ponds/pond clusters were located within the reclamation boundary, none of which would be directly affected by the proposed site excavation works. Only Pond 5 (Appendix C6) is likely to be permanently lost during the bulk extraction phase.

Given that suitable aquatic habitat and associated terrestrial habitat lies outside the reclamation boundary, it is considered **unlikely that a significant impact** would occur during site preparation works. However, based on the loss of potentially suitable terrestrial habitat elsewhere within the reclamation boundary a negative impact on a feature of Local value in the short term is probable. The potential for indirect impacts on retained ponds through e.g. pollution would require consideration and in the absence of appropriate avoidance/protection measures a significant negative impact could not be precluded.

**Terrestrial invertebrates**

The invertebrate assemblage recorded within the reclamation boundary was considered of Local value although it was recognised that far greater potential interest may have been associated with off-site areas/habitats such as woodland and the heathland areas of Cwm Sychan/Cwm Byrgwm.
In common with the loss of habitats within the reclamation boundary and the impacts on other terrestrial fauna, a **significant negative impact** on the invertebrate assemblage at this geographical scale is **considered certain**. However, outside the boundary of the proposed works, it is considered unlikely that a significant impact would result, primarily due to the extent and potential value of the retained woodland and heathland areas.

### 8.6.2 Bulk Excavation

Following site preparation works, the process of extraction would commence with the first excavation in the Castlewood area, north of Farm Road.

Additional loss of habitat (direct impacts) within the plateau south of Farm Road would occur during this phase of the works as the excavation moved southwards. Indirect effects on adjoining habitats/species would require consideration. Tasks with the potential to result in significant ecological impacts during this stage of the reclamation include:

- On-going construction of road and stream diversions;
- Loss of habitats within plateau south of Farm Road;
- Increased levels of noise and dust associated with plant and soil movements;
- Increased levels of human activity across the site;
- Disturbance of retained habitats associated with the above and other factors such as site lighting; and
- Risk of pollution of surface watercourses (diverted stream) from soil movements.

**Locally designated sites**

On the basis that much of the habitat within the reclamation boundary would have been removed during site preparation, it is considered **unlikely that a significant negative impact** would result on the retained areas of Castlewood SINC or the British Meadow. The British SINC would largely have been lost during site preparation works with the exception of areas of bare ground, acid grassland and small area of heathland south of Farm Road. Removal of these habitats during site preparation is **unlikely to be significant** although would represent an additional **negative impact** over and above that resulting from site preparation.

The habitats within the retained British Meadow and Castlewood SINC s generally comprise pasture or a mixture of grassland with heathland and scrub. None of these habitat types would appear particularly at risk from indirect impacts (e.g. noise, dust deposition) and are sufficiently removed from the extraction works such that the risk of accidental pollution (e.g. diesel spill from plant) would be negligible. On this basis, a **significant impact is considered unlikely** and the overall impact is likely to be negligible particularly as the excavation will progress south away from these SINC s.

**Habitats and vegetation communities**

Site preparation work would effectively result in the removal of most of the features within the reclamation boundary such that little, if any features of ecological value would persist to the extraction stage, with the exception of the plateau south of Farm Road. On this basis, it **is unlikely that a significant impact would result** although the additional loss of habitats south of Farm Road would probably result in a **negative impact in the long term**.

For retained habitats adjacent to the works, such as the grassland and scrub associated with the railway embankment, whilst these would undoubtedly be subject to increased levels of noise and dust, these would seem **unlikely to significantly impact** upon the habitats themselves (potential impacts on birds etc is assessed separately). However, a negative impact on the habitats associated with the railway embankment and in other peripheral areas (mainly scrub and species-poor grassland of up to Local value) was considered probable over the duration of the coal extraction period (up to 2 years).
One possible exception would be the newly created surface watercourse through the site which would be at risk of pollution form either silt run-off or accidental spillages of fuel, construction materials etc. However, given that this would be a newly created watercourse, it is likely to have minimal, if any ecological interest in the short term and pollution incidents is more likely to require consideration from a water quality perspective. Over the proposed timescale of the coal extraction, a significant ecological impact on the watercourse is considered unlikely.

Retained habitats remote from the excavation boundary, for example British Heath, Cwm Sychan/Cwm Byrgwm valleys, are unlikely to experience any significant impacts during coal extraction and the overall impact on these areas is likely to be negligible.

**Badgers**

Site preparation works would result in the removal of any potential foraging habitat within the reclamation footprint for Badgers and on this basis, impacts associated with the coal extraction stage are unlikely to be significant. However, the increased levels of noise, plant movement and human activity would represent a disturbance factor for any badgers that may currently utilise peripheral areas for foraging and or sett construction. On this basis a negative impact over the duration of the bulk extraction is probable. In addition, in the absence of mitigation or consideration of animal welfare issues, the coal extraction stage would present risks to Badgers of e.g. falling into deep excavations which could contribute to the negative impacts associated with disturbance.

**Bats**

With the exception of Farm Road, site preparation works would result in the loss of existing foraging resources within the reclamation boundary. During the coal extraction phase, Farm Road would also be removed although the railway embankment on the eastern boundary and habitats surrounding Cwm Sychan pond would be retained – these latter features were utilised be several bat species for foraging. It is understood that bulk extraction activities would be limited to daylight hours and as such would seem unlikely to disturb bat foraging activity in peripheral habitats. However, in the absence of mitigation measures, particularly in relation to site lighting, the potential for a significant negative impact could not be precluded.

The road diversion is also likely to have progressed/be near to completion to the west of Abersychan house by the time coal extraction activity commences on site and it seems unlikely that any additional impacts over and above those described during site preparation would result.

Within 12 months of the start of site preparation works, it is envisaged that the road diversion would be complete and Farm Road removed as part of the coal extraction. Operation of the diverted road could pose both a direct (vehicle collision) and indirect (disturbance from lighting) impact on bats.

It is not anticipated that traffic speeds/volume along the diverted road would be significantly different to the existing situation and on this basis would seem unlikely to pose a risk of significant negative impacts through bat/vehicle collisions. However, it is understood that much of the diverted route would require street lighting in order to meet safety standards.

On this basis the potential for significant indirect impacts relating to disruption of flight/feeding areas in the area west of Abersychan House could not be precluded in the absence of appropriate mitigation.

**Birds**

During the bulk excavation phase, disturbance activities associated with plant/human activity are certain to persist and it would seem probable that a significant negative impact on birds attempting to use immediately adjoining habitats (within ca 20-30m) would continue throughout the duration of this stage.
For birds in areas remote from the extraction area, (such as British Heath and the Cwm
Sychan/Cwm Byrgwm Valleys), significant effects are unlikely although some negative
impact is probable over the duration of works due to increased competition for resources.

**Reptiles**
Site preparation works are likely to result in the removal of most, of the suitable reptile
habitat within the reclamation boundary. Small isolated areas may persist into the start of
the excavation stage (e.g. south of Farm Road) and it is certain that these would be subject
to removal (significant negative impact). Reptiles present in adjoining off-site habitats (e.g.
railway embankment) would seem likely to experience increased levels of disturbance
although this is unlikely to be significant. A negative impact on a locally valuable resource
over the duration of the extraction is probable.

**Amphibians**
Field surveys undertaken indicated that the existing population of Smooth & Palmate newt
and common frog were of ecological value locally. A total of three ponds/pond clusters were
located within the reclamation boundary although only one of these (Pond 5, Appendix C6)
would be directly affected by the proposed excavation. The loss of a single shallow pond
would be unlikely to represent a significant ecological impact although it is certain that a
negative impact would result following removal of this pond. In the absence of appropriate
avoidance/protection of the retained ponds, the potential for a significant impact could
not be precluded.

**Terrestrial Invertebrates**
The removal of much of the terrestrial habitat during site preparation works was considered
to represent a significant impact on a locally valuable resource. However, the additional site
clearance during bulk excavations was considered unlikely to result in a significant impact
over and above that already described. It is probable that the additional loss of habitat
associated with excavation would result in a negative impact at least over the duration of
this stage of works.

Outside the boundary of the proposed works, it is considered unlikely that a significant
impact would result, primarily due to the extent and potential value of the retained woodland
and heathland areas to the west.

8.6.3  **Site Restoration**
Restoration of the site to create a contoured landform suitable for future development would
be likely to overlap with the extraction phase. For example as the excavation proceeded
south of Farm Road, the area to the north would be in-filled and profiled as required. It is
envisioned that reclamation of the site to the desired landform, would take up to 4 years from
the commencement of site preparation works.

No additional loss of habitats would be associated with the restoration phase, previous site
preparation and extraction works having resulted in clearance of existing features within the
reclamation boundary. Indirect effects on adjoining habitats/species would persist through
this stage. Tasks with the potential to result in significant ecological impacts during this stage
of the reclamation include:

- Disturbance of adjoining habitats via noise and dust associated with plant and soil
  movements;
- Continued human activity across the site associated with reclamations works;
- Disturbance of retained habitats associated with the above and other factors such as
  site lighting;
- Risk of pollution of surface watercourses (diverted stream) from soil movements; and
- Provision of new planting along new watercourse and in peripheral areas following re-
  profiling.
**Locally designated sites**

On the basis that much of the habitat within the reclamation boundary would have been removed during site preparation and bulk excavation, it is considered **unlikely that a significant negative impact** would result on the retained areas of Castlewood SINC or the British Meadow.

The habitats within the retained British Meadow and Castlewood SINC's generally comprise pasture or a mixture of grassland with heathland and scrub. None of these habitat types would appear particularly at risk from indirect impacts (e.g. noise, dust deposition) and are sufficiently removed from the reclamation works such that the risk of accidental pollution (e.g. diesel spill from plant) would be negligible. On this basis, a **significant impact is considered unlikely** and the overall impact is likely to be negligible particularly as the excavation will progress south away from these SINC's.

**Habitats and vegetation communities**

Site preparation and coal extraction would effectively result in the removal of most of the features within the reclamation boundary. On this basis, it is **unlikely that a significant impact would result** over and above that resulting from previous site activity. For retained habitats adjacent to the works, such as the grassland and scrub associated with the railway embankment, whilst these would undoubtedly be subject to on-going disturbance from e.g. noise and dust, these would seem **unlikely to significantly impact** upon the habitats themselves (potential impacts on birds etc is assessed separately). However, a negative impact on the habitats associated with the railway embankment and in other peripheral areas (mainly scrub and species-poor grassland of up to Local value) was considered probable up to the end of the reclamation process (up to 4 years following commencement of site preparation works).

The newly created surface watercourse through the site would be at risk of pollution from either silt run-off or accidental spillages of fuel, construction materials etc. However, given that this would be a newly created watercourse, it is likely to have minimal, if any ecological interest in the short to medium term. Over the proposed timescale of site reclamation, a **significant ecological impact on the watercourse is considered unlikely**.

Retained habitats remote from the excavation boundary, for example British Heath, Cwm Sychan/Cwm Byrgwm valleys, are unlikely to experience any significant impacts during ongoing reclamation activities, which in practical terms would be similar in magnitude to those associated with coal extraction and the overall impact on these areas is likely to be negligible.

**Badgers**

Works associated with site restoration would not result in any additional habitat loss over and above that from previous stages. However, the reclamation process would continue to represent disturbance to any Badgers that may be present in adjoining habitats and on this basis a **negative impact over the duration of the reclamation is probable**. In addition, in the absence of mitigation or consideration of animal welfare issues, the reclamation stage would present risks to Badgers of e.g. falling into deep excavations which could contribute to the negative impacts associated with disturbance.

**Bats**

Previous stages of the reclamation process would have resulted in the removal of much of the existing foraging resource within the reclamation boundary and no additional losses would be associated with the reclamation (re-profiling) stage. The railway embankment on the eastern boundary and habitats surrounding Cwm Sychan pond would be retained – these latter features were utilised be several bat species for foraging. It is understood that coal extraction and reclamation activity would be limited to daylight hours and as such would seem unlikely to disturb bat foraging activity in peripheral habitats. However, in the absence of mitigation measures, particularly in relation to site lighting, the **potential for a significant negative impact could not be precluded**.
As part of the restoration stage, the diversion of the watercourse would be completed and this has the potential to provide additional foraging habitat for bats in the long term. However, until such time as marginal planting and boundary planting is provided and invertebrate colonisation of the watercourse occurs, the impact over the duration of the reclamation works is unlikely to be significant.

**Birds**

Restoration activity is anticipated to be similar to that involved with extraction with disturbance activities associated with plant/human activity. These are certain to persist and it would seem probable that a significant negative impact on birds attempting to use immediately adjoining habitats (within ca 20-30m) would continue throughout the duration of this stage.

For birds in areas remote from the reclamation, (such as British Heath and the Cwm Sychan/Cwm Byrgwm Valleys), significant effects are unlikely although some negative impact is probable over the duration of works due to increased competition for resources.

**Reptiles**

No additional habitat loss over and above that resulting from site preparation and bulk excavation is anticipated during the restoration phase. Reptiles present in adjoining off-site habitats (e.g. railway embankment) would seem likely to experience continued levels of disturbance although this is unlikely to be significant. A negative impact on a locally valuable resource over the duration of the reclamation is probable.

**Amphibians**

No additional habitat loss over and above that resulting from site preparation and bulk excavation is anticipated during the reclamation phase. In the absence of appropriate avoidance/protection of the retained ponds, the potential for a significant impact could not be precluded.

**Terrestrial Invertebrates**

The removal of much of the terrestrial habitat during site preparation and bulk excavation was considered to represent a significant impact on a locally valuable resource. However, no additional site clearance during reclamation works would occur and a significant impact over and above that already described was considered unlikely.

Outside the boundary of the proposed works, it is considered unlikely that a significant impact would result, primarily due to the extent and potential value of the retained woodland and heathland areas to the west.

### 8.7 Mitigation and Residual Effects

In identifying the type and extent of mitigation through the site preparation, coal extraction and reclamation stages, consideration has been given to the extensive scale of the works within the reclamation boundary, the need to protect adjoining habitats and the potential of the wider land holding within the area surveyed for habitat enhancement/mitigation.

Early consultation with the local authority ecologist and Countryside Council for Wales established the principle that habitat loss within the excavation footprint and areas needed for screen embankments, overburden mounds and road diversions would be an inevitable consequence of the scheme. Protection of adjoining habitats/features, enhancement of areas outside the scheme boundary and the use of measures to limit indirect impacts as far as practicable were discussed as the key points in mitigating the effects of the scheme.

The mitigation strategy developed for the reclamation stage of the scheme is presented separately in a report to accompany this chapter and includes further details in relation to the evolution of the strategy (Appendix C5). An overview of the mitigation proposed is illustrated in Figure 16 and incorporates the following key features:
• Retention and protection of the railway embankment along the eastern boundary (breach for new road diversion excepted);
• Enhancement of grassland areas off-site at Hay Meadow and in Cwm Sychan valley;
• Enhancement of off-site heathland at British Top Tip and lower Cwm Byrgwm Tip using turves from on-site heathland;
• Control of Bracken within British Heath and Cwm Byrgwm Valley; and
• Translocation of reptiles from within the reclamation boundary to the railway embankment, Cwm Byrgwm and British Heath.

The impact assessment presented above was on the basis that no mitigation would be applied. The following sections address each of the valued ecological receptors and describe the measures to minimise, as far as practicable, the adverse effects of the scheme.

It should be noted that for an operation of this scale and duration (i.e. direct effects on up to 50 ha over 3-4 years) that negative impacts and an overall loss of biodiversity locally are inevitable. Similarly, replacement of habitats on a like for like basis would not be practicable in view of the intention to develop the reclaimed site for residential and mixed use. The mitigation presented includes measures adopted up to the end of the reclamation period – longer term on-site mitigation as part of residential/mixed use development would form part of a separate application.

Locally designated sites
The activities associated with site preparation and coal extraction would probably result in a significant negative impact (without mitigation) on Castlewood and The British SINCs as part or all the area respectively, would be lost. For both these sites, mitigation measures to provide a like for like replacement would not be practicable although the enhancements proposed at British Heath, which based on the habitat descriptions lies within Castlewood SINC, would control Bracken over an area of approximately 3ha, potentially allowing an extension of adjoining acid grassland/heathland mosaics and marshy grassland habitats. Whilst control of Bracken would be of benefit to biodiversity, it is unlikely to result in a significant impact in the short-medium term and would not outweigh the net loss of habitat area at both the British and Castlewood SINCs.

Overall, it is considered certain that a significant negative impact would apply to the British SINC. However, given the uncertainties over the extent of the Castlewood SINC and the adoption of measures to control Bracken and transfer important grassland habitats (see below) the likelihood of a significant negative impact is reduced and would be considered unlikely although a negative impact locally is probable.

The British Meadows SINC (Hay Meadow) would not be subject to any direct effects from site preparation and a significant impact was considered unlikely. However, in view of its currently degraded state and the intrinsic value of the neutral grassland community within parts of Castlewood, the British Meadows SINC would be improved through enhancement of the existing sward via seeding with hay cut from the horse paddock immediately west of the Castlewood properties (the MG5c and transition communities). This hay cut would be undertaken in late summer/autumn prior to any site preparation works (associated with the reclamation process). Further details relating to the methods and timing of grassland enhancement and appropriate management are described in the Mitigation Strategy (Appendix C5).

The process of diversifying The British Meadow SINC would not only contribute to retaining a valuable grassland community (albeit in a different location) but would also improve the condition of the British Meadow SINC. Selection of the hay-cutting method for enhancement of the meadow has been based on methods that have met with success on other sites in the past (Reference 13) and on this basis, it is considered probable that a significant positive impact on the British Meadow would result.
Habitats and Vegetation communities

Activities associated with site preparation and coal extraction would be certain to result in a significant negative impact. Mitigation for habitat loss on this scale would not be practicable and has instead focused on identifying the more valuable features to be lost and enhancing comparable habitat types outside the reclamation boundary – for example grassland and dwarf shrub heath.

The process of hay cutting from Castlewood Meadow as described above would transfer the existing MG5c neutral grassland community to an alternative location and based on the reported success rate of this method, a significant impact is considered unlikely. The best outcome would be a negligible impact on this community type although a precautionary view would be that some species might be lost representing a negative impact locally in the short – medium term (duration of the reclamation scheme).

In order to retain (or transfer) some of the existing dwarf shrub heath resource to similar habitats outside the reclamation boundary, turves would be cut and laid into pre-prepared receptor areas at Cwm Brygwm Tips and British Top Tip (Appendix C5). Turves would be cut and moved in autumn in advance of site preparation works. Site preparation and coal extraction would result in the loss of ca.9ha of acid grassland/heathland mosaic, although due to the favourable condition of off-site heathland at the reception sites and the difficulties associated with access to Cwm Brygwm tips, only small areas at British top tip (circa 300m2) and at the base of the lower Cwm Brygwm Tips would receive cut turves (See Appendix C5). The existing condition of the dwarf shrub heath/acid grassland mosaic at British Top Tip and Cwm Brygwm was considered at least equivalent to those areas within the reclamation boundary. On this basis, more wide scale turve translocation was not considered. Within the boundary of the survey area (Figure 16), 25ha of this habitat type was identified of which ca. 16ha would remain. In the context of the area surveyed, it is considered probable that a significant negative impact would result (loss of up to 38% of existing resource).

Discussion with the local authority and CCW indicated that consideration could be given to the creation of new colliery spoil areas outside the reclamation boundary that could over time develop into heathland/grassland. A candidate area for this type of habitat creation has been identified (Appendix C5). However, the implementation of this measure is dependent on the availability of excess material following site reclamation, which is currently unknown at this stage. Accordingly, for the purposes of impact assessment, no consideration has been given to habitat creation of this type.

Of the other habitat types located within the reclamation boundary, loss of acid grassland would be mitigated by diversification (via commercial native meadow mix) of areas within the Cwm Sychan valley. Given that elements of this resource would be retained within the reclamation boundary (for example in areas close to Cwm Sychan Pond) and that off-site areas would be enhanced, it is considered unlikely that a significant negative impact would result. However, there would be a net loss overall and on this basis a negative impact in the short-medium term is probable within the local area.

As part of the enhancements proposed for the British Heath area (bracken control) this could allow colonisation by adjoining marshy grassland communities. The overall effect on this habitat type was unlikely to be significant although a negative impact locally in the short term would be probable.

The reclamation stage of the scheme (i.e. following coal extraction) would result in the creation of a new surface watercourse although it is understood that no marginal or shrub planting would be associated with this feature up to the end of the reclamation stage. Creation of the watercourse and any associated planting does represent an opportunity to mitigate in part for the loss of scrub and wet woodland within the reclamation boundary although this has not been considered for the purposes of the current assessment.
No specific mitigation measures are identified for the loss of scrub, poor semi-improved grassland and it is certain that these features would be subject to a significant negative impact from the reclamation scheme.

With the exception of the breach to accommodate the road diversion, no direct impacts would affect the railway embankment and similarly no direct impacts are anticipated to habitats surrounding Cwm Sychan pond. Similarly, retained woodlands at Cwm Sychan and Abersychan House would be clearly demarcated as ‘no go areas’. In order to prevent the use of these areas as temporary storage or turning areas, the boundary of the excavation footprint and ancillary works (e.g. overburden mounds) would be clearly demarcated by fencing. This fencing is also likely to be a requirement on health & safety grounds to discourage members of the public from entering an active site. For these retained areas, a negative impact locally is probable for the duration of the works associated with minor loss of area and disturbance issues.

**Badgers**
During the site preparation, extraction and restoration phases, any potential Badger foraging habitat within the scheme boundary would be largely removed and any Badgers in adjoining habitats subject to increased levels of disturbance associated with noise, plant movement etc. In the absence of mitigation it was considered unlikely that a significant impact would result. However, in order to address animal welfare considerations, good site practice measures would be employed wherever practicable. For example where deep excavations are required, these would either be fenced off or graded such that the slope was $\leq 45^\circ$. Fencing could be standard Heras fencing but would require some modification e.g. board fitted along the base to discourage any Badgers from digging under it. For small excavations e.g. trenched these should either be covered at night or a means of escape provided (e.g. 300mm board placed at an angle of $\leq 45^\circ$).

Overall, a negative impact within the immediate zone of influence is probable over the duration of the reclamation scheme due to a combination of habitat loss and disturbance.

**Bats**
In the absence of mitigation, significant impacts on bats during site preparation, extraction and reclamation were considered unlikely on the basis that key habitat features would be retained (e.g. railway embankment, Cwm Sychan pond and peripheral features) and that no confirmed roosts (or trees with high potential) would be directly affected. However, in the absence of mitigation, the potential for significant indirect impacts could not be precluded. It is understood that site activity would be largely confined to daylight hours although the extent of required site lighting at night has yet to be confirmed. Similarly, in order to meet highway safety standard it is likely that much of the road diversion would have to be lit. Appropriate design of site lighting through the use of directional lanterns or cowled lantern hoods to minimise illumination of adjacent habitats would be incorporated. This would be a particular consideration adjacent to retained landscape features such as the railway embankment, the woodland edge west of Abersychan House and all other peripheral areas adjacent to the reclamation boundary. In addition, the surveys confirmed that the greatest levels of bat activity were associated with those species tolerant of some degree of artificial lighting, further reducing the potential that a significant impact would result. It is understood that the initial site preparation and road-construction activity would be undertaken over winter at a time when bats are in hibernation.

The design of site lighting is considered critical to mitigating the potential impacts of the scheme and should allow bats to continue to utilise landscape features adjoining the mitigation boundary. On the basis that the design is appropriate, a significant impact is considered unlikely although the loss of foraging resources would probably result in a negative impact within the reclamation boundary. However, the potential for significant impacts arising from inappropriate lighting design could not be completely precluded at this stage in the design of the scheme.
Additional measures that would be adopted include the provision of Schwegler woodcrete bat boxes suitable for use by Pipistrelle, Myotis and Long-eared species within retained woodland habitats surrounding Abersychan House and Cwm Sychan pond.

**Birds**
The activities associated with site preparation, extraction and reclamation are certain to result in a significant negative impact on birds due to loss of nesting/foraging habitat and disturbance of retained habitat adjacent to the boundary. For a scheme of this size, mitigation to replace habitat would not be practicable.

In order to minimise impacts as far as practicable and comply with the legislation, clearance of scrub and grassland areas within the reclamation boundary would be undertaken outside the bird breeding season which typically runs from March to August inclusive. In addition, nest boxes of differing designs (Schwegler Woodcrete Type) would be provided within retained areas of woodland at Cwm Sychan and Abersychan House. The habitat enhancements proposed in off site areas, such as at British Heath and Cwm Byrgwm valley could also be of long-term benefit to birds.

Best practice noise suppression techniques are likely to be a requirement in terms of public nuisance but this is unlikely to have a significant effect in reducing the impacts on birds.

Overall, it is **probable that a significant negative impact** on birds within the immediate zone of influence would result over the duration of the reclamation works (up to 4 years).

**Reptiles**
The loss of habitat associated with the scheme would be certain to result in a significant negative impact in the absence of mitigation. All common reptiles are protected against killing and injury under the Wildlife and Countryside Act 1981 (as amended) and typically this translates to exclude them from areas of development where they could be at risk or to capture and transfer them to areas outside the development. For the British, the latter is the only viable solution.

The mitigation strategy is based upon the protection and enhancement of off-site areas principally along the railway embankment, at British Heath and on the south facing slopes of the Cwm Byrgwm valley. These habitats are likely to support reptiles at present so in order to increase the carrying capacity; control of nuisance species such as Bracken would be undertaken over summer 2008 and features such as log-piles provided from autumn 2008 to coincide with scrub clearance. The location of the receptor site would also mean that any reptiles transferred would be free to move into adjacent areas of heathland and grassland in surrounding area – for example British Top Tip, Cwm Byrgwm valley.

Prior to site preparation and excavation works, reasonable capture effort would be expended to transfer as many reptiles as practicable from within the reclamation boundary to these retained areas (details set out in Appendix C5). Transfer of animals would be undertaken in two phases, the first in advance of site preparation works in Castlemeadow, the overburden mounds, rail embankment and road diversion route. The second phase would incorporate the plateau and scrub embankments south of Farm Road in advance of the coal extraction works moving into this area. Temporary exclusion fencing would be deployed along the base of the railway embankment (western side) and along the northern boundary of the reclamation scheme in advance of site preparation works to prevent immigration of reptiles into the works area.

On the basis reasonable efforts would be expended to transfer reptiles to suitable habitats off-site, **a significant impact is considered unlikely**. However, it is perhaps inevitable that some reptiles could be killed or injured during the process of transfer and that some may subsequently not survive within the retained areas due to increased competition for resources. Overall it is considered that a **negative impact within the immediate zone of influence** would result over the duration of the reclamation scheme.
Amphibians

Of the ponds included within the 2007 surveys, only one would be lost during the excavation phase south of Farm Road. The remaining ponds surrounding Cwm Sychan pond would be retained and protected by means of temporary fencing as appropriate. In addition, best-practice site practice would be employed to ensure that the risk of polluting discharge (e.g. silt, oil, fuel etc) into these retained ponds was minimised.

None of the ponds were identified as habitat for Great Crested Newts and as such no statutory obligation to mitigate for loss of the pond south of Farm Road would apply. However, ponds have recently been added to the UK BAP and mitigation to improve the quality of the retained ponds (through planting of marginal and aquatic macrophytes) would be appropriate. Similarly, as part of the reptile translocation exercise, refuges would be placed around the pond to be lost and any amphibians found transferred to retained ponds.

Overall, the scheme is unlikely to result in a significant impact on the amphibian resource locally and the loss of one pond could be off-set by improving the condition of the retained ponds. A negligible impact over the duration of the reclamation scheme is probable.

Terrestrial invertebrates

The activities associated with site preparation, extraction and reclamation are certain to result in a significant negative impact on the invertebrate assemblage due to the associated loss of habitats. No rare or protected species were noted within the reclamation boundary and it was acknowledged that established woodland and heathland habitats outside the boundary were likely to support a more diverse assemblage.

No specific mitigation measures were devised in relation to invertebrates over and above the enhancements to off-site areas. For example, transfer of the flower-rich meadow from Castlewood to The British Meadow and diversification of pastures within the Cwm Sychan valley would provide additional resources to a range of nectar feeding insects. Similarly, control of Bracken within the British Heath and Cwm Byrgwm valleys would allow the re-establishment of various grassland/heathland communities likely to be of benefit to invertebrates. Retention of features such as the railway embankment and habitats surrounding Cwm Sychan ponds would also retain some invertebrate interest in the area immediately adjoining the reclamation.

Within the boundary of the reclamation scheme, it is certain that a significant negative impact would result from the scheme although in a local context, this is unlikely to be significant given the extent and quality of retained habitats.

8.8 Summary of Impacts

Having regard to the mitigation measures described above, the overall impact of the reclamation scheme through the various stages is summarised in Table 8.3 overleaf. The impacts and mitigation relate only to the duration of the reclamation scheme (estimated at up to 4 years) and excludes any consideration of habitat creation, new planting etc associated with the future mixed-use development of the site.
### Table 8.3: Summary of Ecological Impacts

<table>
<thead>
<tr>
<th>Ecological Feature</th>
<th>Value at geographical scale</th>
<th>Characterisation of unmitigated impact</th>
<th>Significance of unmitigated impact</th>
<th>Mitigation measures</th>
<th>Residual impact and confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habitats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locally designated sites</td>
<td>(1) British and Castlewood SINC – County (2) British Meadows SINC - Local</td>
<td>(1) Complete or partial loss of habitat during site preparation/coal extraction. (2) No direct impacts (lies to north of reclamation boundary)</td>
<td>(1) Significant negative impact probable (2) Not significant</td>
<td>(1) British – No specific mitigation proposed (2) Castlewood – Transfer of MG5 grassland to British Meadows, control of Bracken in British Heath area. (3) British Meadow – Diversified with hay cut from MG5 and managed appropriately.</td>
<td>(1) Significant negative impact certain. (2) Likelihood of significant negative impact reduced – considered unlikely. (3) Significant positive impact probable.</td>
</tr>
<tr>
<td>Broad-leaved woodland</td>
<td>(1) Cwm Sychan Beechwood &amp; Abersychan House – District (2) Wet Woodland - Local</td>
<td>(1) No direct impact on Beechwood but minor habitat loss along western edge of Abersychan for road diversion (2) Complete loss within reclamation boundary</td>
<td>(1) Not significant (2) Significant negative impact certain</td>
<td>(1) No specific mitigation apart from clear demarcation and protection during works.</td>
<td>(1) Unlikely to be significant. Negative impact within reclamation boundary probable.</td>
</tr>
<tr>
<td>Acid grassland</td>
<td>(1) Diverse U2 and U4 communities – District (2) Poor SI acid grassland – Within reclamation boundary</td>
<td>(1) Loss of much of existing resource during site preparation and excavation (2) Largely situated outside reclamation limit so no direct impacts</td>
<td>(1) Significant negative impact certain (2) Not significant</td>
<td>(1) &amp; (2) Diversification of existing species-poor grassland in Cwm Sychan valley and retention of areas around Cwm Sychan pond.</td>
<td>(1) &amp; (2) Unlikely to be significant. Negative impact within reclamation boundary probable.</td>
</tr>
<tr>
<td>Ecological Feature</td>
<td>Value at geographical scale</td>
<td>Characterisation of unmitigated impact</td>
<td>Significance of unmitigated impact</td>
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<tr>
<td>Neutral grassland</td>
<td>(1) MG5c – County (2) Poor SI and MG9 communities - Within reclamation boundary</td>
<td>(1) Complete loss during site preparation (2) Complete loss within reclamation boundary but retained along e.g. railway embankment</td>
<td>(1) Significant negative impact certain (2) Significant negative impact probable</td>
<td>(1) Transfer via hay cut to British Meadow SINC. (2) None proposed</td>
<td>(1) Potential for negligible impact but precautionary view of negative impact locally. (2) Significant negative impact probable</td>
</tr>
<tr>
<td>Dwarf shrub Heath</td>
<td>District Loss of much of existing habitat resource within the reclamation boundary. Areas outside reclamation boundary unaffected</td>
<td>Significant negative impact certain</td>
<td>Transfer of up to 1.3ha to receptor sites at British Top Tip &amp; Cwm Byrgwm</td>
<td>Significant negative impact probable. Potential for creation of new spoil mounds identified but not assessed</td>
<td></td>
</tr>
<tr>
<td>Marshy grassland</td>
<td>M24, M25 Communities – District M23 Community – Local Complete loss of existing habitats within reclamation boundary. Habitats outside boundary unaffected</td>
<td>Significant negative impact certain within reclamation boundary</td>
<td>Enhancements at British heath through Bracken control and retention of areas around Cwm Sychan pond.</td>
<td>Unlikely to be significant. Negative impact within reclamation boundary probable.</td>
<td></td>
</tr>
<tr>
<td>Dense scrub</td>
<td>Local Complete loss of existing habitats within reclamation boundary</td>
<td>Significant negative impact certain within reclamation boundary</td>
<td>None proposed.</td>
<td>Significant negative impact certain within reclamation boundary.</td>
<td></td>
</tr>
<tr>
<td>Standing and running water</td>
<td>Local Loss of single pond south of Farm Road. Diversion of stream to create new surface watercourse.</td>
<td>Not significant</td>
<td>Creation of new surface watercourse. New planting to retained ponds.</td>
<td>Unlikely to be significant. Potential for positive impact within the reclamation boundary</td>
<td></td>
</tr>
</tbody>
</table>

**Species**
<table>
<thead>
<tr>
<th>Ecological Feature</th>
<th>Value at geographical scale</th>
<th>Characterisation of unmitigated impact</th>
<th>Significance of unmitigated impact</th>
<th>Mitigation measures</th>
<th>Residual impact and confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badgers</td>
<td>Within reclamation boundary</td>
<td>Loss of potential foraging habitat and disturbance of peripheral areas</td>
<td>Unlikely to be significant</td>
<td>Deep excavations fenced or means of escape provided.</td>
<td>Unlikely to be significant. Negative impact within reclamation boundary probable.</td>
</tr>
<tr>
<td>Bats</td>
<td>District</td>
<td>Loss of foraging habitats within reclamation boundary and indirect effects from lighting</td>
<td>Direct impacts unlikely to be significant. Potential for significant negative effect via indirect impacts.</td>
<td>Retention of rail embankment and Cwm Sychan pond. Appropriate design of site lighting and provision of bat boxes within woodland/edge habitats.</td>
<td>Unlikely to be significant. Negative impact within reclamation boundary probable.</td>
</tr>
<tr>
<td>Birds</td>
<td>District</td>
<td>Loss of nesting/foraging habitats within boundary. Disturbance of retained areas.</td>
<td>Significant negative impact certain within reclamation boundary</td>
<td>Clearance of scrub outside nesting season. Retention of adjoining scrub along railway embankment. Use of bird boxes within woodland/edge habitats.</td>
<td>Significant negative impact probable within immediate zone of influence.</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Local</td>
<td>Loss of habitat within reclamation boundary. No habitat loss outside this area</td>
<td>Significant negative impact certain within reclamation boundary</td>
<td>Capture and transfer to receptor areas.</td>
<td>Unlikely to be significant. Negative impact within reclamation boundary probable</td>
</tr>
<tr>
<td>Amphibians</td>
<td>Local</td>
<td>Loss of single pond and terrestrial habitat south of Farm Road</td>
<td>Unlikely to be significant</td>
<td>New planting to retained ponds. Capture and transfer of animals from pond to be lost.</td>
<td>Unlikely to be significant. Negligible impact probable.</td>
</tr>
</tbody>
</table>
Ecological Feature | Value at geographical scale | Characterisation of unmitigated impact | Significance of unmitigated impact | Mitigation measures | Residual impact and confidence
---|---|---|---|---|---
Terrestrial invertebrates | Local | Loss of habitat within reclamation boundary. No habitat loss outside this area | Significant negative impact certain within reclamation boundary | No specific measures proposed other than via enhancements described for areas outside reclamation boundary. | Significant negative impact probable within immediate zone of influence.

8.9 Cumulative Impacts

At time of writing, no other planning submissions in close proximity to the site that could contribute to the impacts described in preceding sections were known. In view of the almost complete habitat loss within the reclamation boundary during site preparation, coal extraction and reclamation, it is likely that should such an application(s) come forward, the only potential impacts would relate to those retained habitats/features adjoining the reclamation boundary.

It is understood that under a separate system of consent and approval, Western Power Distribution intend to divert one of their overhead power lines to the north and west of the reclamation boundary. Currently an overhead line crosses the site from Castlewood towards The Big Arch. Given that the timing of this operation is unknown, that it is not associated with the reclamation scheme and that it would be considered under a separate system of consent/approval, no further consideration has been included within this ES.

Discussion with the local authority ecologist has indicated that there has been a gradual loss of brownfield habitats within the County Borough, including former colliery sites, to development. The reclamation scheme at the British is certain to contribute to this loss although the significance of such an impact beyond a local geographical scale would depend on the current extent, condition and distribution of this broad habitat type within the County Borough – this was unknown at time of writing.

8.10 Conclusions

The ecological surveys undertaken at the British have identified that valuable ecological resources exist within and adjacent to the reclamation boundary. A far greater habitat resource, exists within the wider area incorporated into the Extended Phase I Habitat survey and within the valleys to the west – these areas all lie outside the reclamation boundary and would not be affected by the proposed works.

Early consultation with the local authority ecologist and Countryside Council for Wales established the principle that habitat loss would be an inevitable consequence of the scheme. Protection of adjoining habitats/features, enhancement of areas outside the scheme boundary and the use of measures to limit indirect impacts as far as practicable were discussed as the key points in mitigating the effects of the scheme.

Within the reclamation boundary, a range of habitats and species was recorded in addition to two locally designated SINCs. Several habitat types such as dwarf shrub heath, acid and neutral grasslands were identified as BAP Priorities and of the species noted, several are protected by national and European legislation – for example nesting birds, reptiles and foraging bats.
Within the reclamation boundary, most of the existing ecological features would be lost during the process of site preparation, excavation and reclamation although notable habitats in the west surrounding the Cwm Sychan pond would be retained. However, a significant negative impact within the reclamation boundary was considered likely for features such as the British SINC, dwarf shrub heath, wet woodland and acid grassland. Mitigation on a like-for-like basis was not considered practicable although the presence of similar habitats outside the reclamation boundary has allowed the opportunity for targeted mitigation measures.

8.11 References


Reference 2 - National Assembly for Wales. 2002. Planning Policy Wales


Reference 9 – Ponds 6 & 7 (Appendix C6) were within private ownership remote from the application site and were not included in the survey.

Reference 10 – Yellow hammer, Dunnock, Starling and House Sparrow as recent additions in 2007.


Reference 13 - British Wildlife October 2007. Volume 19, Number 1, pg 18 - 19
9 Archaeology and Heritage

9.1 Introduction

9.1.1 Background and Objectives

This chapter prepared by Cambrian Archaeological Project Ltd and reviewed and augmented by CgMs Ltd, presents an archaeological and cultural heritage assessment of land at The British, Pontypool.

Previous archaeological studies of the site have been extensive and it is intended in this assessment to review the previous reports and to include this material as appendices. A new study of the significance of the sites, impacts of the proposed development and mitigation proposals is included within this Chapter.

The main scope and objectives of the archaeological assessment were to reveal by desk-based study, the nature, date and significance of the archaeology within the area of the proposed development, as well as to gather material relating to archaeological sites associated with the former ironworks within a 1km radius from the edge of the survey area boundary.

The purpose of the desk-based assessment, in accordance with standards and guidance as laid down by the Institute of Field Archaeology, is to gain information about the known or potential archaeological resource within the given area (including presence or absence, character and extent, date, integrity, state of preservation and relative quality of the potential archaeological resource), in order to make an assessment of its merit in context, leading to one or more of the following:

- The formulation of a strategy to ensure the recording, preservation or management of the resource;
- the formulation of a strategy for further investigation, whether or not intrusive, where the character and value of the resource is not sufficiently defined to permit a mitigation strategy or other response to be devised; and
- The formulation of a proposal for further archaeological investigation within a programme of research.

All gathered material from the desk-based study were to be combined and assessed, in order to identify areas where the proposed development may directly impact on the recognised archaeology or elements of the historic landscape, and depending on the results of the study, any potential mitigating circumstances that may arise.

Potential Direct Impacts

- Location of known archaeological sites and landscapes within the proposed development area;
- Potential for palaeo-environmental samples within the proposed development area;
- Previous disturbance or truncation on the site, which may have affected archaeological remains, including any significant changes in levels from those indicated on old Ordnance Survey maps; and
- Where information is available, the physical impact of the proposed development including the full extent of ground-works.

Potential Indirect Impacts

- The density of archaeological sites in the surrounding area to a radius of 1km from the edge of the survey boundary and the potential that comparable sites may continue into the site; and
• The density of Scheduled Ancient Monuments (SAM’s) and Listed Buildings within a 1km radius from the edge of the survey boundary.

With the above in mind the assessment addresses the following:

• A detailed assessment of the proposed development area;

• An assessment of the known archaeological sites within a 1km radius from the edge of the survey area boundary in order to get an understanding on the wider range of archaeological sites in the surrounding area with reference to the HER held at the Glamorgan-Gwent Archaeological Trust (GGAT) and the Royal Commission on Ancient and Historic Monuments of Wales (RCAHMW). The assessment will consider the potential for comparable sites within the development area;

• An assessment of all Scheduled Ancient Monuments (SAMs) and Listed Buildings within a 1km radius from the edge of the survey boundary in order to aid the assessment of the visual impact of the development on high value sites; and

• Produce mitigation proposals for the preservation of sites in situ, or for the investigation, recording and recovery of remains and the publication of results.

9.1.2 Planning Background

In considering any planning application for development, local planning authorities are guided by the policy framework set by government guidance, in this case Welsh Office Circulars 60/96 and 61/96, by current Development Plan policy and by other material considerations.

Torfaen District Council has statutory duties regarding the control of development and, with regard to archaeological remains and historic landscape resources, Torfaen District Council, as well as Gwent County Council, have drawn up policies in the Torfaen Local Plan and the Gwent Structure Plan respectively that seek a balance between necessary development and the protection of archaeological resources.

Until the new Local Development Plan is adopted the following policies from the Torfaen District Local Plan are relevant and still in force:

Until the new Local Development Plan the following policies in the Gwent Structure Plan are

H5 - Development on or adjoining a scheduled ancient monument will not be permitted except where the proposals would not have an adverse impact upon its respective setting and character.

H6 - In determining applications for development, account will be taken of archaeological considerations where planning approval is to be granted, for development on a site known to contain archaeological remains, conditions will be imposed to require that adequate provision is made for the conservation and/or recording of the site during the period of development.

BC3 - The County Council will favour the protection and enhancement of scheduled ancient monuments and sites of archaeological and/or historic interest, and their settings.

BC4 - Where development proposals are submitted which are likely to affect sites of archaeological interest or their settings, an archaeological evaluation of the impact of the proposal may be required.

BC5 - Where there is a justified need for development on sites or archaeological importance sufficient to override their protection under Policy BC3:

i) Facilities for investigation and recording may be required;

ii) Preference will be given to the minimisation of areas of conflict; and

iii) The preservation of remains in situ will generally be preferred to excavation.
9.2 Method of Assessment

The Cultural Heritage assessment is based on previous desk based assessments and evaluations of the land that once formed the British Ironworks site at Talywain, Abersychan, near Pontypool, Gwent, South Wales (NGR: SO 257 037). Between the years 1992-2007 six separate reports have been commissioned by various bodies to investigate the archaeological, architectural and historical resource of the site.

- 1994 – The British Joint Venture by Dr Philip Riden – ‘Historical, Topographical and Archaeological Assessment of the Implications of the British Reclamation Scheme, Abersychan, Gwent’.

9.2.1 Summary of Earlier Assessments

The 1992 report undertaken by the Ironbridge Institute and the RCAHMW provides a detailed account of the rise and decline of the ironworks, as well as publishing detailed written descriptions and elevation drawings of the standing remains within the bounds of the site.

The Archaeological Assessment by AC Archaeology in 1993 was an assessment of the archaeological implications of proposals for reclamation of the British Ironworks site. The report included descriptions of those structures that remain on site and concluded that only a small proportion of the late 19th century industrial and other buildings survive, but wherever possible these remains should be retained.

The 1994 report by Philip Riden focused mainly on the economic and political development of the site based on the readily available historical sources. However, little attention is given to the value of the archaeological and historical resource that remains on the site.

Following the archaeological reports from 1992-1994, several of the standing remains at the site were either Scheduled or else were given Grade II Listed Building status. The Scheduled Ancient Monuments (SAM) sites within the survey area include the remains of the Cornish Pumping Engine House (SAM: MM216) and the Air Furnace within the office complex (MM 221) The Listed Buildings include the Big Arch (Record No. 14871) and the Office quadrangle (Record No. 14870).

The 1996 desk based assessment by GGAT however addresses the value of the archaeological resource of the site, but no on-site investigation in terms of evaluation was undertaken.
In 1997 Babtie (now Jacobs) were commissioned by Clay Colliery Company Ltd and Torfaen Borough Council to undertake an archaeological evaluation within defined areas of the site that focused on the location of the 19th century forge, furnaces and mill complexes. The evaluation showed that substantial sub-surface remains belonging to the forge and mill exists.

In 2007 a draft Archaeological and Cultural Heritage chapter for a larger Environmental Impact Assessment was written up by SLR Consulting for the Tamar Group Ltd as part of a speculative regeneration scheme. The assessment drew together all previous archaeological assessments and concluded that the unique industrial heritage remains of the 19th century British Ironworks complex constituted an important archaeological, architectural and historical resource.

The studies investigated the following:

- Historic Environment Record (HER), Glamorgan-Gwent Archaeological Trust, Swansea;
- National Monuments Record (NMR), Royal Commission on Ancient and Historical Monuments of Wales, Aberystwyth;
- Map Regression analysis;
- Cadw, Historic Monuments, Cardiff. List of Scheduled and Listed Buildings; and
- The assessment methods used follow those detailed in the Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, part 2 HA 208/07).

### 9.2.2 Evaluating the Cultural Heritage Resource

The value of all the known and potential assets that may be affected by the scheme should be ranked, whether they are archaeological remains, historic buildings or historic landscapes, according to the following scale:

**Very High**
- World Heritage Sites (including nominated sites).
- Assets of acknowledged international importance.
- Assets that can contribute significantly to acknowledged international research objectives.

**High**
- Scheduled Monuments (including proposed sites).
- Undesignated assets of schedulable quality and importance.
- Assets that can contribute significantly to acknowledged national research objectives.

**Medium**
- Designated or undesignated assets that contribute to regional research objectives.

**Low**
- Designated and undesignated assets of local importance.
- Assets compromised by poor preservation and/or poor survival of contextual associations.
- Assets of limited value, but with potential to contribute to local research objectives.

**Negligible**
- Assets with very little or no surviving archaeological interest

**Unknown**
- The importance of the resource has not been ascertained

### 9.2.3 Magnitude of Impact

The following provides an indication as to the predicted impact the proposed development will have on individual archaeological features. The magnitude of the impact needs to be viewed in conjunction with the value of the monument, in order to appreciate the overall significance the development will have on a given archaeological feature.
The magnitude of the impact (degree of change) can be negative or positive, and should be ranked without regard to the value of the asset. The total destruction of a Low Value asset will have the same magnitude of impact on the asset as the total destruction of a High Value asset; the value of the asset is factored in when the significance of the effect is assessed. The magnitude of impact should be ranked according to the following scale:

- **Major**
  - Change to most or all key archaeological materials, such that the resource is totally altered.
  - Comprehensive changes to setting.

- **Moderate**
  - Changes to many key archaeological materials, such that the resource is clearly modified.
  - Considerable changes to setting that affect the character of the asset.

- **Minor**
  - Changes to key archaeological materials, such that the asset is slightly altered.
  - Slight changes to setting.

- **Negligible**
  - Very minor changes to archaeological materials, or setting.

- **No Change**
  - No change.

### 9.2.4 Significance of Effects

Assessing the significance of the effects of the scheme brings together the value of the resource and the magnitude of the impact (incorporating the agreed mitigation) for each cultural heritage asset, using the matrix illustrated in the table below. The adverse or beneficial significance of effect should be expressed on the following scale:

- Very large
- Large
- Moderate
- Slight
- Neutral

<table>
<thead>
<tr>
<th>VALUE</th>
<th>Very High</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Negligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnitude</td>
<td>Neutral</td>
<td>Slight</td>
<td>Neutral/Slight</td>
<td>Neutral/Slight</td>
<td>Neutral</td>
</tr>
<tr>
<td>Impact</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The survey area has already been party to six earlier assessments undertaken from 1992 – 2007. What follows is a summary of the historical and archaeological results of these earlier reports including a chronological history of the British Ironworks site.

The survey area is not within any Registered Historic Landscape, nor are there any historic Parks and Gardens or Battlefield sites within the survey area.
9.3 Baseline Conditions

The following section details the results of the desk based assessment within the bounds of the 58.45 hectares survey area. This includes all of the HER data collected from the following repositories; the regional Sites and Monuments Record (SMR), the National Monuments Record (NMR), maps from the National Library of Wales (NLW), details of Scheduled Ancient Monuments (SAM) from Cadw, and details of all Listed Buildings (LB’s) from Torfaen County Council.

Within the survey area of the proposed development, the desk based assessment recorded a total of 34 individual sites; see Figure 6. Of this number the Sites and Monuments Record database had a total of 15 site data points, two being Grade II* Listed and Grade II Listed Buildings. The SAM sites include the remains of the Cornish Pumping Engine House (SAM: MM216), the Air Furnace within the office complex (MM 221). The Listed Buildings include the Office quadrangle ((Id No.1 / PRN: 4596) and the Cornish Pumping Engine House. Although not on the site the Big Arch (Id No.9 / PRN: 34968) is also listed at Grade II.

Outside the survey area but within the 1km radius of the edge of the area there are a further 27 known data points within the HER. Of this total number one is a SAM site (Cwmbrgwm Colliery Water Balance Tower Id No.31 / SAM MM 163) and two sites are Grade II Listed Buildings (Cwmbyrgwm colliery Chimney Id No. 26 /PRN: 4017 and Lower navigation Colliery Engine House Id No. 27 ). There are also two historic Parks and Gardens sites, (Hawthorn Gardens Id No 45 / PRN: 26605 and Abersychan House and Garden Id No.44 / PRN: 266004)) There are no known battlefield sites within the area.

9.3.1 Chronology of sites within Survey Area

**Upper Palaeolithic (35,000-10,000 cal. BC) and Mesolithic (10,000 – 4,000 cal. BC)**
Based on the Historic Environment Record and additional research there are no known upper Palaeolithic or Mesolithic sites within the survey area, however there have been lithic find spots located near Llanwonno (PRN: 03809g), Coed Duon, Usk (Ref: 89.76f/12) and coed y Bwnydd (Ref: 89.76H/25).

**Neolithic period (4,000 – 2,000 cal. BC)**
Based on the Historic Environment Record and additional research there are no known Neolithic sites within the survey area. However within a 5km radius of the site there are records of 8 Neolithic find spots. These include flint tools and several axe heads.

**Bronze Age Period (2,000 – 700 cal. BC)**
Based on the Historic Environment Record and additional research there are no known Bronze Age sites within the survey area. However within the uplands areas to the west and north of the site there are numerous Bronze Age ritual burial sites, all within the Abersychan parish boundary. These burial sites include both round barrows and cairns (e.g PRN: 06385g / 67653g)

**Iron Age Period (700 – 55 cal. BC)**
Based on the Historic Environment Record and additional research there are no known Iron Age sites within the survey area or within the close surrounding landscape.

**Roman Period (55 BC – 410 AD)**
Based on the Historic Environment Record and additional research there are no known Roman sites within the survey area. However there is the line of a possible Roman Road just to the south of the area which marks the course of the Rhiw Frank. The line of this road is marked on the OS First Edition map of 1880 and runs east to west along the upland ridge between Cwm Byrgwm and Cwm Du. However, whether this road is actually Roman in date is speculative.

**Medieval Period (410 AD – 1500 AD)**
Based on the Historic Environment Record and additional research there are no known sites within the survey area that are medieval in date. However historical sources state that the
The study area was in the possession of Llandaff Cathedral by 1291 and was still Church property by 1535. However by this date the study area had become the property of the Cistercian Abbey of Llantarnam.

Glamorgan and Gwent Archaeological Trust (GGAT) in the 1996 report identified a possible early mill complex that may date to the medieval period which underlies the existing mill at Abersychan (1996, p14). It has also been suggested that the name Abersychan may well have medieval origins.

Research undertaken within and around the areas of the Clydach Gorge and Blaenavon has suggested that by at least the 16th century coal and mineral extraction was likely taking place within the surrounding valleys.

**Post Medieval Period (1500 AD – 1799 AD)**

For the early post medieval period the area is poorly represented. By this time, although there was likely small scale coal and mineral extraction taking place, much of the landscape was still open to agriculture with several small farmsteads and hafod sites in the uplands areas. Within the survey area there is however one site that likely has 17th century origins, that of Old Castle Farm (Id No. 28 / PRN: 20525). The RCAHMW in 1992 inspected this site and suggested that some of standing fabric may well be early 17th century in date. This house is still inhabited and has even been extended in modern times.

**19th and 20th centuries (1799 AD – 1999 AD)**

For the 19th century the area is primarily by the British Ironworks which will be discussed in the following section. However there is one further site to the far north of the survey area, an abandoned farmstead, that of Cwm Sychan Place (Id No. 61). On the 1826 map this small farmstead is described as Joshua James’ farm. On the 1879 map the farm is depicted as much larger. The building now is completely abandoned and almost entirely destroyed with only a few surviving areas of stone and rubble. As this farm is shown on the 1826 map it may even be that this farmstead was 18th century in date.

Throughout the last century South Wales grew rapidly into an industrial landscape that focused mainly on coal and iron extraction. For the landscape surrounding the areas of Pontypool the Industrial Revolution had arrived in full force. The British Ironworks (Id No. 17 / PRN: 0251g) at Abersychan was one of three large ironworks that were constructed in the Eastern Valley during the 1820s. The other sites were at Pentwyn and at Golyvos.

The British Ironworks at Abersychan began construction in 1826 on land that belonged at the time to the manorial estates of Bryngwyn and Wentsland. The land was leased to the British Iron Company for 60 years. The architect commissioned to undertake the works was Decimus Burton. A few engravings and photographs of c. 1866 have survived of the site showing the main range of the casting house and forge buildings.

Although construction for the ironworks complex started in 1826, iron production didn’t begin until 1827. Construction of the ironworks not only entailed the construction of the various processing buildings such as the blast furnaces, the forge, the mill, the blowing house and the Pumping Engine House, but also the construction of an accompanying brickworks with both a lime kiln (Id No. 51) and brick kilns (Id No. 19/21). Also constructed were several workers cottages, the earliest being those still standing in Elizabeth Row located to the west of the survey area (Id No. 2 / PRN: 36680). Other workers Cottages associated with the ironworks have since been demolished in the last 30 years or so.

Documentary sources of 1835 state that there were originally only 5 blast furnaces at the site (Id No.3 / PRN; 85063), however by 1852, when the company was taken over by the Ebbw Vale Company, the site is known to have had a total of six blast furnaces. The predominant output produced by the ironworks at this time was rolled iron rails, for railways at home and abroad. In 1845 the ironworks had installed a new Cornish pumping engine to deal with problems of flooding in the mines and by the late 1840’s a series of new coke ovens had replaced the earlier open coke heaps.
Inevitably, once most of the railway lines had been put in place, the ironworks saw a decline in work; however it did resurface briefly in the 1860s with conversion to steel making. However by the 1870s the Abersychan ironworks fell again into a slow decline and by 1881 it had closed. Not long after closure the majority of the buildings were demolished, leaving only the office and workshop complex known collectively as ‘the Quadrangle’  (Id No. 1 / PRN: 4596) and the Cornish Engine House (Id No. 4 / PRN: 85065) still standing.

In 1900, the Lower Navigation Colliery sank a pit into the area in the northern extremities and later in the 1920s various Wagon repair yards and sheds and also a public swimming baths were constructed. Following nationalisation of the coal industry, the lease of the site passed to the National Coal Board, two private drift mines continued working until 1984. This all done however, the ‘Quadrangle’ and the ‘Cornish Engine House’ is still standing to this day along with small exposed sections of coke ovens and some minor ancillary buildings.

9.3.2  Chronological Summary of the development of the British Ironworks
The following chronological summary of the British Ironworks has been adapted from the AC Archaeology Report on the Ironworks undertaken in 1993.

1826  Construction of the iron works begun in April by Messrs Small, Shear, and Donaldson, trustees of the British Iron Company founded the previous year. Two beam blowers were supplied to the ironworks by the Neath Abbey Iron Company. The back wall of the furnaces collapsed, allegedly having been wrongly constructed. By 31 August the sum of £74,252 had been spent without the foundations being completed or a single furnace finished.

1827  Ironworks opened.

1829  The British Iron Company formally assumed responsibility from the partnership of trustees.

1830  Works reached full production. By this date there were only 5 blast furnaces with refineries, puddling train, intermediate tram for mill bars, three rolling mill trains, and collieries. The costs of the works, including transport links to the canal and company housing was £300,000.

1839  Works reported to have made a profit for the first time. Action by Chartists shut down the blast engine, but it was restarted before damages to the furnaces could occur.

1840  Production of iron rails for railways began. The Company's annual report referred to a flood at Abersychan which occasioned severe loss.

1843  The British Iron Company went bankrupt but was reformed as the New British Iron Company from 22 November.

1844  A drop in the price of iron caused all but one of the blast furnaces to be shut down in June.

1845  A Cornish beam engine was built in the centre of the works, probably as a probably as a winding engine.

1848  The process of applying hot air to the blast furnace was first applied at the works.

1850  By this date iron rails had become almost the sole product of the works. About this time coking ovens were first used at the works.

1851  The New British Iron Company went bankrupt.

1852  The works were purchased by the Ebbw Vale Company in January. It was claimed that £150,000 was spent on improvements, including the provision of an inclined plane from Tal-y-wain to Twy-y-Frwd, connecting with the railway in the valley bottom. Also, at this time a sixth blast furnace was built.

1853  A railway link was provided from the works to the Newport - Blaenavon railway. A strike from November 1853 to May 1854 closed the furnaces; production continued with imported iron.
1855 Cups and cones were applied to the blast furnaces, and waste gases were used to heat air stoves and blast engine boosters. This was to be the last significant investment made to the works.

1873 A ten week strike affected the works.

1875 A five week strike affected the works.

1876 The Ebbw Vale Company centralized steel production at its Victoria Works, Ebbw Vale. Production was discontinued at Abersychan, and the works were shut down between September 1876 and April 1877.

1877 The works were reopened in April, producing an iron compound (spiegeleisen) used in the steel-making process.

1879 The upper railway (which ran across the Big Arch) was constructed by the Great Western Railway.

1882 All production at the Abersychan Works ceased at end of the year. The poverty resulting from the closure led at about this time to the construction of Union Road as a public work to alleviate distress. The labourers were paid one shilling per day, and the road was nicknamed “Bob-A-Day”.

1890 The equipment at the works was put up for sale, and in this year (and those immediately following) many buildings were demolished.

1900 Mining operations continued after the closure of the ironworks; at about this time Powell Duffryn leased much of the site and sank the Navigation Pit.

1945 Following nationalisation of the coal industry, the lease of the site passed to the National Coal Board, Two private drift mines continued working until 1984.

9.3.3 Surviving Elements of the British Ironworks

- The Blast Furnace Complex, Forge and Mill;
- Office Quadrangle and Workshops;
- Cornish Pumping Engine House;
- Chimney Base;
- Coke Ovens;
- The tram road and railway network; and
- Old Castle Farm.

9.3.4 Summary of 1997 Archaeological Evaluation

In 1996 Glamorgan and Gwent Archaeological Trust advised Torfaen County Borough Council and the Clay Colliery Company Ltd. Joint Venture that a series of evaluation trenches should be undertaken in areas of open cast, in order to determine the survival and archaeological potential of the coke ovens and other parts of the 19th century industrial complex which no longer survive above ground.

In total 12 trenches were excavated by the Babtie Group in May – June 1997. These trenches were strategically placed in areas of the former industrial complex with a view to investigate the furnaces and the foundations of the casting house, the forge and mill, the engine blowing house, the brickworks and the coke ovens.

Each of the trenches was machine dug measuring 20m long x 1.8m wide to a depth of 1.2m. Trenches 1-5 were excavated in the north-western extent of the blast furnaces and the possible charging areas toward the rear of the furnaces. Trenches 6-10 were excavated to investigate the brickworks, limekiln, forge/mill and related tramways. Trenches 11-12 were excavated to assess the potential survival of the coke ovens.
Table 9.2 – Summary of Evaluation Trenches

<table>
<thead>
<tr>
<th>Trench</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench 1</td>
<td>An internal foundation between blast furnace Nos. 5/6 and the remains of a furnace flue and ventilation Eastern part of trench exposed remains of a masonry wall probably the external furnace wall east of furnace 6.</td>
</tr>
<tr>
<td>Trench 2</td>
<td>Possible lower courses and foundations of external rectangular columns forming part of an arcade along the front façade of the casting house opposite furnaces 5 and 6.</td>
</tr>
<tr>
<td>Trench 3</td>
<td>No recognised features or structures in trench possibly due to considerable overburden.</td>
</tr>
<tr>
<td>Trench 4</td>
<td>Possible wall of the tapping arches and walls of furnaces 3 and 4 located at east end of trench.</td>
</tr>
<tr>
<td>Trench 5</td>
<td>Base and foundations of an elaborate square structure, possibly a chimney base that served the blowing house for the blast furnaces.</td>
</tr>
<tr>
<td>Trench 6</td>
<td>Floors of the forge and mill complex with a brick structure possibly being the base of a small chimney or an air furnace.</td>
</tr>
<tr>
<td>Trench 7</td>
<td>Deep stratified rubble deposit with possible wall structure. Overburden is greater than 3.0m</td>
</tr>
<tr>
<td>Trench 8</td>
<td>Deep stratified rubble deposit. Overburden greater than 3.5m</td>
</tr>
<tr>
<td>Trench 9</td>
<td>Limestone structure probably the base of one of the many stone chimneys for the brick-working process</td>
</tr>
<tr>
<td>Trench 10</td>
<td>Limestone wall that may relate to either the railway platform or ancillary building associated with the brickworks</td>
</tr>
<tr>
<td>Trench 11</td>
<td>Coke Oven base with substantial remains of coke deposits</td>
</tr>
<tr>
<td>Trench 12</td>
<td>Brick lined drain and wall in eastern corner of trench with possible railway track bed and platform wall for charging furnaces to the south.</td>
</tr>
</tbody>
</table>

In its entirety the evaluation identified the location of the main structures relating to the furnaces, the façade of the casting house, the engine blowing house and the forge and mill. It also identified the possible southern extent of the brickworks.

The depth of the overburden across the site in the context of the evaluation trenches varied from between 0.50m to as much as 3.5m in places possibly even deeper in others.

9.4 Assessment of Impacts

9.4.1 Archaeological Sites and their significance

High Value Sites
From the results of the desk-top assessment and the accompanying field survey, a total of 8 Scheduled Ancient Monuments (SAM) have been identified within bounds of the survey area. A further two sites or features have been identified that are related to these SAM sites being the listed Office quadrangle and the Cornish Pumping Engine House. Each of these sites are classified as being of High Value. A list of all of these is given below.

Medium Value Sites
In total 38 sites within the survey area may be categorised as Medium Value sites. All of these sites may be understood as having regional or county importance. These sites include all standing stones, unscheduled cairns, find-spots, deserted rural settlements, major track ways, marsh bog areas and house platforms.

Low Value Sites
In total 25 sites within the survey area may be categorised as Low Value sites. These include most of the track ways, areas of peat-cutting, field systems, footbridges a few post medieval house sites in very ruinous condition and other less significant sites.
Negligible Value Sites
In total 7 sites within the survey area may be classified as having Negligible Value sites. These include all quarry sites and place-names.

Unknown Sites
In total 4 sites within the survey area may be classified as having an Unknown Value. These include two un-located standing stones and one un-located stone setting and an area of crop mark identified from aerial photos.

9.4.2 Potential Direct Impacts
The bulk excavation will remove any archaeological features that currently survive within the extraction area, potentially including:

- The Coke Ovens: These features are located on the northwest side of the Iron Works, nearest to the furnaces. They were built in the late 1840s and comprise stone rubble foundations on which are laid red fire-bricks. The 1880 Ordnance Survey shows five batteries of coke ovens three aligned northeast-southwest two northwest to southeast. Brick walls comprising the back line of the most westerly of the three northernmost Coke Ovens have been recorded in detail by the Ironbridge Institute and RCAHMW in 1992. This report noted that the battery probably comprised 32 ovens (16 back to back). No evidence for the chimney or for flues underneath the ovens was noted, though the latter would not be a necessity. Further evidence that these features survive was noted in 1991 (AC Archaeology, 1991, 7). The trial trenching exercise undertaken in 1997 revealed that significant truncation of the structures had already taken place but that the base of the central Coke Oven did partially survive. Trench 11 was located between the two eastern batteries of Ovens depicted on the 1880 Ordnance Survey, but are not shown on the 1901 publication. The structure was approximately 3m wide and comprised a raised brick and stone floor supported by a brick wall. It is likely that open coke heaps were located in the same area prior to the construction of those shown on the Ordnance Survey. Taylor’s plan of 1926 shows two lines of narrow structures running parallel to the main block. It is likely that these represent earlier coke ovens. Given these results it is likely that parts of the coke ovens survive and the coal extraction will remove these structures and associated deposits. The coke ovens are an archaeological asset of local importance and as such have been identified as a site of Low Value. The extraction will remove the remains of this asset in its entirety and is therefore a Major impact. The significance of the effect can therefore be identified as Slight/Moderate.

- The Brickworks (including Limekiln): The buildings and structures associated with the brickworks are located on the northwest part of the Iron Works. The brickworks are shown on the 1880 Ordnance Survey, but are no longer depicted on the 1901 plan. Trenches 9 and 10 of the 1997 trial trenching exercise were located to establish the extent and survival of the brickworks. Both trenches revealed that significant truncation of the structures associated with brickworks had already taken place, but did find partial remains, both structural and products. The structures were buried in excess of 2.5m below present ground level. Therefore it is likely that the remains of the brickworks will be removed by the reclamation scheme. The 1880 map also depicts a limekiln located on the west side of the brickworks. There is no evidence to date confirming whether or not and to what extent the limekiln survives. However, given that there are partial remains of the brickworks it is possible that the base of the lime kiln also survives. If so the extraction of the coal would have a direct impact on such remains. The Brickworks are an archaeological asset of local importance and as such have been identified as a site of Low Value. The extraction will remove the remains of this asset in its entirety and is therefore a Major impact. The significance of the effect can therefore be identified as Slight/Moderate.
Tramways and mineral railways: Multiple track systems are depicted on the 1880 Ordnance Survey within the area to be extracted for coal. These tracks are located in both area of the coke ovens and the brickworks. Evidence for a dwarf signal stand was recorded in Trench 10 during the 1997 evaluation. The Big Arch is the only above ground surviving features relating to the rail links. It is listed Grade II but lies outside the area of extraction. The tramways and mineral railways are an archaeological asset of local importance and as such have been identified as a site of Low Value. The extraction will remove the remains of this asset that lie within the extraction area in its entirety, though those that lie outside of the extraction area will be preserved in situ and are therefore a **Moderate impact**. The significance of the effect can therefore be identified as **Slight**.

As part of the site restoration and coal extraction there will be a requirement to construct new access roads into and across the site. The Big Arch currently serves as the access onto the site however the height and width of the arch fall short of the requirement for modern vehicles. This will necessitate the construction of a new access through the embankment compliant with modern highway standards and construction. There will be an impact upon the embankment and the setting of the Big Arch. The embankment forms part of the now disused Great Western Railway branch from Pontypool to Cwmffrwd. The railway line is a feature of Local importance and as such is identified as an asset of Low value. The removal of a section of the embankment is considered a **Moderate Impact** on the asset as the majority of the railway will remain in situ. Therefore the significance of effect on the railway is **Slight**. The removal of a section of the embankment will have a **Moderate impact** on the setting of the Big Arch. The significance of the effect is therefore **Moderate/Large**.

The construction of 7.3m wide roads with 2m pavements to each side as stipulated by the Highways Authority across the site will have an indirect impact upon the setting of the listed buildings.

There will be no direct impact from the coal extraction process on those features which lie outside this area including the two Scheduled Ancient Monuments (the Cornish Pumping Engine House (SAM: MM216) and the Air Furnace within the office complex (MM 221)) and the Listed Buildings include the Office quadrangle (Record No. 14870) and the Cornish Pumping Engine House. Remains of the main part of the Iron Works which are not scheduled or listed, including the blast furnaces, the blowing-engine house, the surviving chimney base, the forge and mill will not be directly impacted by the reclamation scheme. The impact on the Scheduled Monuments and Listed Buildings other than the Big Arch will be **Negligible** and therefore the significance of the effect can be identified as **Slight**. The impact on the remains of the main part of the Iron Works which are not scheduled or listed but lie outside the extraction area is **negligible**. The significance of effect can therefore be identified as **Neutral/Slight**.

### 9.4.3 Summary of Potential Direct Impacts

The coal extraction will remove any archaeological features that currently survive within the extraction area (Figure 10). These features comprise the Coke Ovens, the Brickworks, lime kiln, tramways and mineral. There will be no direct impact from the coal extraction process on those features which lie outside this area including the two Scheduled Ancient Monuments, the Listed Buildings and the main complex of the Iron Works. Table 9.3 summaries the Value, magnitude of impact and the significance of affect for each asset within the reclamation scheme area.
### Table 9.3 – Summary of Reclamation Scheme Impact on Archaeological Features

<table>
<thead>
<tr>
<th>Asset</th>
<th>Value</th>
<th>Impact</th>
<th>Significance of effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornish Pumping Engine House</td>
<td>Very High</td>
<td>Negligible</td>
<td>Slight</td>
</tr>
<tr>
<td>Air Furnace</td>
<td>Very High</td>
<td>Negligible</td>
<td>Slight</td>
</tr>
<tr>
<td>The Quadrangle</td>
<td>Very High</td>
<td>Negligible</td>
<td>Slight</td>
</tr>
<tr>
<td>The Big Arch</td>
<td>Very High</td>
<td>Major</td>
<td>Moderate/Large</td>
</tr>
<tr>
<td>The Coke Ovens</td>
<td>Low</td>
<td>Major</td>
<td>Slight/Moderate</td>
</tr>
<tr>
<td>The Brickworks</td>
<td>Low</td>
<td>Major</td>
<td>Slight/Moderate</td>
</tr>
<tr>
<td>The Tramways</td>
<td>Low</td>
<td>Moderate</td>
<td>Slight</td>
</tr>
<tr>
<td>Railway Embankment</td>
<td>Low</td>
<td>Moderate</td>
<td>Slight</td>
</tr>
<tr>
<td>Blast Furnaces</td>
<td>Low</td>
<td>Negligible</td>
<td>Neutral Slight</td>
</tr>
<tr>
<td>Blowing Engine House</td>
<td>Low</td>
<td>Negligible</td>
<td>Neutral Slight</td>
</tr>
<tr>
<td>Surviving Chimney Base</td>
<td>Low</td>
<td>Negligible</td>
<td>Neutral Slight</td>
</tr>
</tbody>
</table>

#### 9.4.4 Potential Indirect Impacts

The extraction of coal will not, as stated above, have a direct impact upon the physical structure of the listed buildings/SAMs located within the site but there may be an indirect impact in regard to the setting of those features as well as the need to implement protection measures from ongoing works and excavation.

The construction of service and access roads across the site will impact upon the setting of the listed buildings/SAMs.

#### 9.5 Mitigation

It has been established that those features of the highest value will be preserved in situ and that the reclamation scheme has been designed so it will have no direct impact upon them. However, the extraction of coal from part of the site will involve the removal of archaeological remains relating to the Coke Ovens, the Brickworks and the Tramway and rail links. Archaeological fieldwork has established that these structures have been significantly truncated by previous activity within the site. As such the surviving remains do not warrant preservation in situ, but do merit preservation by record. This could be achieved through a programme of archaeological works. Accordingly, it is anticipated that any planning permission for development on the site will incorporate a planning condition relating to archaeology and that this condition will require a programme of archaeological investigation phased ahead of extraction. The implementation of the programme of investigation would mitigate the adverse effects of the proposed development and enable the reclamation scheme to proceed in accordance with development plan policy on archaeology.

The impact of the access and service roads may be mitigated by the use of landscaping and siting. Further reduction in impact may be achieved by down-scaling the classification of some roads.
9.6 Conclusions and Residual Impact

It has been established that the current evidence indicates there are no archaeological sites within the proposed reclamation scheme that pre-date the Post-Medieval period. The various studies undertaken to date have also established that there are a number of features relating to the 19th century Iron Works known as the British, including Scheduled Monuments and listed buildings with the site. However, the reclamation scheme has been designed to ensure that there is no direct impact upon these structures. The current evidence indicates that the extraction of coal will directly impact on the surviving remains of the Coke Ovens, the Brickworks, lime kiln, tramways and mineral railways. These surviving remains do not warrant preservation in situ, but do merit preservation by record. This could be achieved through a programme of archaeological works undertaken prior to extraction and secured through a planning condition attached to the planning permission.

9.7 References

9.7.1 Cartographic Sources

All maps investigated spanned the years 1825 – 1953. These included the OS Surveyors drawings from 1817-1822 and the Tithe Award maps of 1839/45 and all early OS 1st and 2nd edition Ordnance Survey 1:10560 maps and the Provisional Edition 2 1/2 inch map of 1948. Aerial photos investigated spanned the years 1946 – 2006.

OS Surveyors Drawings of 1817-1822

The 2" OS Surveyors drawings of the area spanned the years 1817-1822 and covered three index sheets, no's. 198/ 311 and 321. This map series shows only the two summit cairns of Pegwyn Fawr, Pegwyn fach within the survey area and calls the summit cairn known today as Crugyn Llwyd, as ‘Crugyn terfyn’. Farmsteads and settlements within the survey area shown on this early map series include, Bryn Gwaun, Draenllwynglas, Bryn Dadley, Lluest, Waun-Cwm-yr-Ynys, Garn Fach and Digwm. Also marked is the Giants Grave, shown as ‘Bedd y Milwr’ or the ‘Soldiers Grave’.

Aerial Photographs

Aerial photos investigated for this project spanned the years 1948-1963, however aerial photos investigated for the earlier wind-farm assessment in 1991 and 2000 spanned the years 1948-1984, which included obliques held on archive by CPAT. No new sites were noted on any of the aerial photos inspected.

9.7.2 Other Sources

Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, part 2 HA 208/07).
10 Transport and Accessibility

10.1 Introduction

This chapter summarises the content of the Transport Statement prepared to assess the traffic and transportation implications of the reclamation scheme.

The scoping parameters of the Transport Statement were agreed in advance with Torfaen CBC to ensure that it provides an appropriate basis for presenting the site access proposals, a quantification of traffic impact on the network and a package of complementary measures to be implemented as part of the overall scheme.

10.2 Baseline Conditions

Two-way traffic flow data for the B4246 has been obtained through reference to the Capita Symonds 'North Torfaen Strategic Highway Improvement' study (November 2006) commissioned by Torfaen County Borough Council.

The study included classified traffic count data collected at various points along the B4246 during 2004. This has been factored up to 2008 using NRTF medium growth factors to provide an understanding of current traffic flows, as shown in Table 10.1.

Table 10.1 - B4246 Existing 12 Hour Two-Way Traffic Flows

<table>
<thead>
<tr>
<th>B4246 Link</th>
<th>All traffic</th>
<th>Goods vehicles with 3+ axles only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emlyn Road</td>
<td>4095</td>
<td>13</td>
</tr>
<tr>
<td>Commercial Road</td>
<td>5110</td>
<td>28</td>
</tr>
<tr>
<td>Church Road</td>
<td>6408</td>
<td>35</td>
</tr>
<tr>
<td>Lodge Road</td>
<td>5421</td>
<td>30*</td>
</tr>
</tbody>
</table>

* Assumed in the absence of classification data

The figures show there to be variations in traffic volume, with flows at their highest along Church Road. The classified data also indicated that goods vehicles represent less than 1% of the total traffic volume, peaking at 35 on Church Road.

10.3 Assessment of Impact

Traffic generation associated with the reclamation scheme has been sub-divided into the following key elements:

- Exportation of coal;
- Staff journeys;
- Equipment set up, repair and other ancillary site activities; and
- Potential variability.

These collectively provide a basis for determining the overall number of vehicle movements that could typically be expected to occur over the duration of the scheme.

The calculations have been based on a number of assumptions that account for the total coal tonnage the scheme is expected to yield and the labour/equipment resources considered necessary to achieve effective implementation.

Each element of the traffic generation has been subjected to a 10% test of sensitivity to allow for potential variations in vehicle loading capacities, the rate of extraction and operational contingencies.
Table 10.2 below presents the overall traffic generation projections for each phase of the scheme.

### Table 10.2: Projected Reclamation Scheme Daily Vehicle Movements

<table>
<thead>
<tr>
<th>Scheme Phase</th>
<th>Traffic Element</th>
<th>Vehicle Type</th>
<th>Typical Daily Vehicle Movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Up</td>
<td>Coal Exportation</td>
<td>Goods</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Staff Journeys</td>
<td>Car</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>Equipment/Ancillary</td>
<td>Goods/Car</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>226</strong></td>
</tr>
<tr>
<td>Excavation</td>
<td>Coal Exportation</td>
<td>Goods</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Staff Journeys</td>
<td>Car</td>
<td>66 - 220</td>
</tr>
<tr>
<td></td>
<td>Equipment/Ancillary</td>
<td>Goods/Car</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>109 – 263</strong></td>
</tr>
<tr>
<td>Restoration</td>
<td>Coal Exportation</td>
<td>Goods</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Staff Journeys</td>
<td>Car</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>Equipment/Ancillary</td>
<td>Goods/Car</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>223</strong></td>
</tr>
</tbody>
</table>

The traffic projections indicate that flows could peak at up to 263 daily vehicle movements during the bulk excavation phase of the work. Most of these would be attributable to staff car journeys to and from work rather than the exportation of the coal by heavy goods vehicles, which account for only 42 daily vehicle movements.

### 10.4 Cumulative Effects

The cumulative effects of the projected vehicle movements have been determined through a comparison against existing vehicular traffic using the B4246.

In accordance with the requirements of Torfaen CBC, it is proposed to route all coal exportation goods vehicles to and from the south. This ensures that the goods vehicles would use roads of a suitable designation and avoid the World Heritage site at Blaenavon.

Table 10.3 presents the comparison of traffic flows as proportionate increases in two-way traffic flows for each phase of the scheme.

### Table 10.3 - Traffic Impact on B4246

<table>
<thead>
<tr>
<th>Link</th>
<th>2008 Existing</th>
<th>Set Up % Impact</th>
<th>Excavation % Impact</th>
<th>Restoration % Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emlyn Road</td>
<td>4095</td>
<td>4208</td>
<td>2.8%</td>
<td>4129 – 4206</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.8 – 2.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4207</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.7%</td>
</tr>
<tr>
<td>Commercial Road</td>
<td>5110</td>
<td>5223</td>
<td>2.2%</td>
<td>5144 – 5221</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.7 – 2.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5222</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.2%</td>
</tr>
<tr>
<td>Church Road</td>
<td>6408</td>
<td>6521</td>
<td>1.8%</td>
<td>6442 – 6519</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.5 – 1.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6520</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.7%</td>
</tr>
<tr>
<td>Lodge Road</td>
<td>5421</td>
<td>5534</td>
<td>2.1%</td>
<td>5497 – 5574</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.4 – 2.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5533</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.0%</td>
</tr>
</tbody>
</table>

Note: Staff and ancillary journeys assumed to be split 50% north and 50% south based on existing directional traffic flows.
The figures demonstrate a consistently low level of impact on the B4246, with projected traffic increases of up to 2.8%. These are predominantly the result of staff journeys to and from the site by car, rather than relatively small number of coal exportation goods vehicles.

Having regard to the robust methodology applied in deriving the projections, it has been conclusively shown that the minor traffic increases would not have any discernible implications on the operation of the B4246. Further afield across the wider highway network the impact would be further diluted and have a negligible impact.

10.5 Mitigation

On account of the low level of traffic impact, no off-site highway works are required to mitigate the impact of the scheme.

A Transport Implementation Strategy has been devised to provide a formal basis for securing safeguards regarding vehicle routing and road condition, as well as a means of outlining commitments to ensuring any local disruption is minimised. It includes the following package of measures:

- Provision of access arrangements onto B4246;
- Vehicle Routing Agreement;
- Road condition surveys;
- Exercising a duty of care; and
- Advance repairs to Foundry Road as agreed with Torfaen CBC.

10.6 Conclusion and Residual Effects

The analysis of traffic impact has been founded on a sound and robust methodology. This provides confidence in the overall findings, which demonstrate negligible impact on the surrounding highway network.

Potential residual effects, such as possible damage to roads, will be identified and resolved through the measures proposed within the Transport Implementation Strategy and to be agreed with the Highway Authority.
11 Noise

11.1 Introduction

This chapter considers the potential noise impact of the proposed reclamation scheme for The British. Consideration is given to target noise levels and what measures can be taken to deliver these levels during normal site working, to mitigate adverse effects and avoid noise nuisance.

11.1.1 Noise Sources

The noise sources associated with the reclamation activities can be categorised within each of the phases as shown in Table 11.1.

Table 11.1 – Full Programme of Reclamation Works

<table>
<thead>
<tr>
<th>Phases</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a &amp; b</td>
<td><strong>Set Up Site</strong>: Establishment, including fencing, screening and access works</td>
<td>Approx 1 month</td>
</tr>
<tr>
<td>2, 3, 4a</td>
<td><strong>Bulk Excavations</strong>: Includes excavation, transfer of material, coal extraction and backfilling of voids</td>
<td>Approx 42 months</td>
</tr>
<tr>
<td>4b</td>
<td><strong>Return overburden to void</strong>: Final restoration of void</td>
<td>Approx 3 months</td>
</tr>
<tr>
<td>5</td>
<td><strong>Restoration</strong>: Fill and compaction and demobilisation of plant and machinery</td>
<td>Approx 2 months</td>
</tr>
</tbody>
</table>

The excavation and restoration of this site will be a continuous process with essentially the same activities occurring across different areas of the site as the development progresses. The phasing assumptions which have informed the assessment and noise sources below are illustrated in Figure 9.

**Phase 1a and 1b**: Site preparation and soil stripping with construction of screening bunds – noise of earth moving equipment, loading/unloading trucks and site road traffic noise, standby generators.

**Phases 2, 3 and 4a**: Excavation, extraction and backfilling – noise of excavators, tractor dozers, loading/unloading trucks and site road traffic noise, off site HGV movements, standby generators.

**Phase 4b**: Soil reinstatement – the noise of excavators, compactors, the grader, as well as loading and unloading trucks and site road traffic noise will characterise the noise climate during this phase.

**Phase 5**: Final soil reinstatement and compaction – noise of excavators, compactors and grader.

11.1.2 Relevant Guidelines and Statute

Planning Guidance – Technical Advice Note (TAN) 11 Noise (October 1997) is the highest level document relating to noise and has to be used in conjunction with Planning Guidance (Wales): Planning Policy. TAN 11 describes the assessment of environmental noise sources and refers to the assessment procedures and control methods.

The purpose of the scheme is site reclamation not coal extraction. Coal recovery would be incidental and is a preferred alternative to making-safe former mineworkings and associated features by other, equally intrusive, means such as drill and grout. Nonetheless, the minerals technical advice note for coal extraction is likely to be regarded as having relevance. This document provides specific guidance on coal extraction, although this is still in draft form.
The Draft Minerals Technical Advice Note 2 (Wales) Coal (January 2006) confirms (32) that “Coal extraction may always be permitted for reasons of health and safety; or for stabilisation of shallow mine workings or mine waste for ground remediation associated with built development or infrastructure, where coal extraction is the most suitable option and meets the tests in MPPW.” The scheme falls into this category. The ‘TAN sets out detailed guidance on planning conditions for noise limits at noise sensitive properties, best practice and operational controls which might be applied.

BS 5228: Noise and Vibration Control on Construction and Open Sites

BS 5228 provides guidance on the assessment and control of noise from construction operations. The Standard contains detailed information on noise reduction measures and promotes the ‘best practicable means’ approach to control noise and minimise the impact on local residents and construction workers.

Environmental Protection Act 1990

The Environmental Protection Act describes the duty of the Local Authority to take steps to abate any noise impact, including that from a construction site, deemed to be causing a statutory nuisance.

Control of Pollution Act 1974

The Control of Pollution Act gives the Local Authority powers to serve a notice to the developer requiring the control of site noise under Section 60 of the Act. This may include specific controls to restrict certain activities identified as causing particular problems. Conditions regarding hours of operation will generally be specified and noise and vibration limits at certain locations may be applied in some cases. All requirements must adhere to established guidance and be consistent with best practicable means to control noise only as far as is necessary to prevent undue disturbance.

11.2 Methodology

11.2.1 General Approach

The potential noise sources are set out above. The assessment of effects has been concentrated at the closest noise sensitive receivers to the site boundary. The methodology which has been used is to compare the predicted noise levels for each potential source with the expected noise levels if the new noise source were not introduced.

The assessment is then made according to the predicted change in noise level in relation to an appropriate assessment criterion, as defined by local or national policy, or by established practice. Significance criteria for this assessment are discussed in Section 11.4 below.

11.2.2 Noise from Bulk Excavation

Noise from the extraction activity has been determined using British Standard 5228: – Noise and Vibration Control on Construction and Open Sites Part 1 and Part 3 Code of practice applicable to surface coal extraction by opencast methods [British Standards Institute (1997)]. The Standards provide information on the prevention and control of noise and vibration from coal extraction, and includes a procedure for predicting noise. Calculations of noise levels at selected receivers have been based on source noise levels, propagation distance, details of the intervening ground cover, topography and screening.

The assessment relies on the description of development in Chapter 4 and the phasing illustrated in Figure 9. The assumptions regarding the type of plant and operations are considered representative of the activity that would take during reclamation, and provide a sufficient level of accuracy for this assessment.

11.2.3 Traffic Noise

For traffic noise effects, prescribed prediction methodologies set out below, have been used to predict the likely noise changes based on forecast vehicle movements. The noise exposure arising from new or altered roads associated with the proposed development, as
well as resulting changes in traffic flow on existing roads, can be calculated using the Calculation of Road Traffic Noise (CRTN) method [Department of Transport Welsh Office (1988)], to derive the absolute noise levels at noise sensitive locations.

For the purposes of this assessment it was not necessary to calculate absolute noise levels. Instead, the relative changes in road traffic noise levels as a direct result of the proposed reclamation have been analysed, to permit assessment of the likely effects on the surrounding area. The variations in traffic speeds and composition were sufficiently small as to be insignificant to the traffic analysis. Therefore, it was only necessary to analyse the change in traffic flow. The relevant parts of the CRTN methodology were used to determine the likely change in noise levels.

11.3 Baseline Conditions

The assessment method relies upon a comparison of future noise exposure with the situation were the development not to proceed. The present day situation is regarded as the “do minimum”. A baseline survey was carried out to measure these conditions.

The noise survey was conducted around the application site on the 12th, 13th and 14th February 2008 to measure existing noise levels. The site visit also identified existing noise sources and provided an impression of the overall noise climate in each area. Although potential noise monitoring locations were identified from map information prior to the survey, the final selection was made based on observations of the most exposed noise sensitive locations. Sample noise measurements were taken at 5 locations during the daytime, evening and night to establish typical ambient noise levels.

Figure 17 is a plan showing the positions of the baseline measurement survey positions.

11.3.1 Instrumentation

The instrumentation used to carry out the noise survey was as follows;

- Brüel & Kjær 2260 Type 1 Precision Sound Level Meter (SLM)
- Brüel & Kjær Type 4231 Sound Pressure Level (SPL) Calibrator
- Kestrel 1000 Anemometer
- Compass

Immediately before and after each series of measurements the calibration of the SLM was checked. All noise measuring instrumentation owned and used by Arup Acoustics is checked for correct calibration to traceable national and international standards on an annual basis. Routine ‘in-house’ spot checks are also carried out at regular intervals as part of Arup Acoustics’ QA policy.

11.3.2 Measurement Locations

The measurement locations were chosen to assess off site noise levels on all site boundaries adjacent to the most sensitive receivers as shown in Figure 17.

Off site measurements

Location F1 – Bracken: Bracken is a dwelling on the south-western boundary of the site. The topography at this location offers a clear line of sight east to Abersychan. The noise climate was dominated by traffic noise from the town. Bird noise from surrounding trees was also significant during daytime measurements.

Location F2 – Elizabeth Row: Elizabeth Row is a small terrace of residential properties off British Road to the west of the site. The SLM was placed at the southern end of the properties’ gardens, away from intermittent construction work being carried out at the northern most property. Livestock including chickens, ducks, geese and sheep were enclosed in each garden along the row the noise from which dominated daytime measured
L_{eq} levels. Similar to F1 the topography offers a clear line of sight to Abersychan and traffic noise from the town dominated background levels.

**Location F3 – Castle Wood Road:** The SLM was placed beyond the northern site boundary approximately 50m from the junction of Farm Road and the road to Castle Wood. Commercial Road runs north-south approximately 150m west of Commercial Road. Traffic noise from Commercial Road dominated the noise climate although occasional traffic on Farm Road boosted L_{eq} levels.

**Location F4 – Commercial Road:** There are several residential properties at the corner of Commercial Road and Pisgah Road. The SLM was placed at a position representative of the western façade of these properties on the eastern side of Commercial Road approximately 8m from the kerbside. The noise climate was entirely dominated by traffic on Commercial Road. During daytime hours approximately 100 vehicles passed every 10 minutes. In late evening these numbers were reduced to between 50 and 60 cars every 10 minutes.

**Location F5 – Heol Waun:** This location was chosen to represent the noise climate at the western façade of properties on Heol Waun. For daytime and peak hour measurements the SLM was placed on a small private road that ran parallel with Commercial Road between Heol Waun and the footpath at the eastern site boundary. This road was closed in the late evening so measurements were taken at Heol Waun, on an island in the middle of the cul-de-sac.

The noise climate was dominated by traffic on Commercial Road although some bird noise from the site was at times audible in the background.

### 11.3.3 Baseline Survey Results

Measurements were taken day and night at the sensitive receivers. The daytime background noise levels which are of significance here are detailed in Table 11.2 below.

**Table 11.2 – Background Noise Measurements**

<table>
<thead>
<tr>
<th>Location</th>
<th>Background noise measurements L_{90} dB(A)</th>
<th>Background noise measurements Leq dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Bracken</td>
<td>36</td>
<td>39</td>
</tr>
<tr>
<td>2 Elizabeth Row</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td>3 Castle Wood Rd</td>
<td>40</td>
<td>46</td>
</tr>
<tr>
<td>4 Commercial Rd</td>
<td>44</td>
<td>65</td>
</tr>
<tr>
<td>5 Heol Waun</td>
<td>39</td>
<td>47</td>
</tr>
</tbody>
</table>

As can be seen from the table, the measured locations around the site are all relatively quiet. The observer noted that at Bracken, during the background noise measurement, the noise environment was dominated by traffic noise from Abersychan, as was the background noise measurement at Elizabeth Row. Castle Wood Road was dominated by traffic noise, as was at the survey location on Commercial Road. The background noise climate was also dominated by Commercial Road traffic noise at Heol Waun.
11.4 Assessment of Impact

11.4.1 Significance Criteria

Guidance on significance of noise effects is given in the consultation draft of the *Guidelines for Noise Impact Assessment* produced by the joint working party of the Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA) [IEMA, 2002].

The factors affecting the assessment of significance will vary depending on the type of noise source. In some cases the combination of different parameters can be complex, such as for construction noise. For more uniform noise sources, such as traffic noise, the assessment is likely to be based on fewer variables. The Guidelines recommend that some or all of the following factors, in no particular order, will be relevant when assessing the significance of noise effects:

- **Averaging time period**
  The length of time over which the average noise exposure is assessed could give very different results, for example whether it is relevant to consider one hour periods, or take a longer average over the whole day or the night-time period.

- **Time of day**
  Clearly the acceptability of a noise change will vary according to exposure during the day or night. Further to this, the sensitivity to noise may be different for different periods of the day or night. For example, it follows that noise is more disturbing in the evening than it would be earlier in the day.

- **Nature of the noise source**
  The character of the noise source, such as any impulsive characteristics or frequent changes in noise level, may cause more disturbance than a source with the same average noise level but with a less distinctive nature.

- **Frequency of occurrence**
  The number of times the event occurs within a period is relevant. For example, if noise is generated every day for seven days it might be judged as less acceptable than the same noise level generated for only one day a month for seven months.

- **Spectral characteristics**
  Tonal characteristics can cause a noise source to be more distinctive than other sources. Also, changes to the spectral balance of frequencies relative to the existing noise may give rise to greater effects than suggested simply by the difference in A-weighted noise levels.

- **Absolute level**
  The IOA/IEMA Guidelines considers not only the noise change, but the resulting noise level in relation to any guidance levels for the noise source in question. The conclusion of this discussion in the Guidelines is that a given noise change above the relevant guideline threshold (whether the existing baseline level is below or above the threshold) would be rated as a greater effect than the same change resulting in a noise level below the guidance threshold.

- **Noise indicator**
  The metric used to assess the noise change should be chosen to reflect the actual disturbance that may result. For example, the relevance of average noise exposure or changes in maximum noise levels should be considered. In many cases the appropriate indicator is defined by the relevant guidance or Standards associated with a particular noise source.
Excavation Noise

When assessing coal extraction noise, the guidance in BS 5228 [British Standards Institute (1997)] Parts 1 and 3 ‘Noise and vibration control on construction noise and open sites’ and the associated ‘Code of practice applicable to surface coal extraction by opencast methods’ identify a number of key factors in relation to the acceptability of noise (and vibration) to people living and working around such a site. Many of these reflect the considerations of the IOA/IEMA guidance for the assessment of significance. The factors cited in BS 5228 are set out below with comments on each.

- **Existing ambient noise levels**
  
  To cause a perceptible effect in terms of average noise exposure over a given period, noise levels would have to be increased by at least 3dB(A) over the existing ambient noise level prior to the commencement of the works. A change of less than 3dB(A) is not generally perceptible [Department of the Environment, 1994] and it follows that a significant effect, in terms of average noise exposure would not occur if the change is not perceptible.

- **Duration of the reclamation site operations**
  
  The duration of the noise exposure is also an important factor and it follows that an increase in noise (below the agreed limit value) for only a few weeks during the works would not be considered to represent a significant effect. It is usual, in such cases, to define a minimum period over which the noise exposure is perceptibly increased in order to classify the temporary change as significant to those affected.

- **Hours of work**
  
  The hours when works can take place are strictly controlled by local policies, typically 08:00 to 18:00 weekdays and 08:00 to 13:00 at weekends with exceptions only by agreement with the local authority. Clearly, any work outside these hours is more likely to cause disturbance, and even within this daytime period people may be more or less sensitive to noise at different times.

- **Attitude to the site operator**
  
  Public liaison is very important to keep local residents and businesses informed of the timing and nature of any activities that could potentially cause disturbance. Coaling reclamation noise is more likely to be tolerated if those affected understand when they are most likely to be disturbed and that all measures are being taken to minimise noise and the duration of noisy activities.

- **Noise (and vibration) characteristics**
  
  Different reclamation activities may generate the same noise level but one may be judged to be more disturbing than the other due to its impulsive or tonal characteristics. For example, percussive activities may be considered less acceptable than a constant noise source generating the same noise energy over an equivalent period of operation.

The issues raised above will affect the acceptability of the introduced noise.

When considering a minimum period beyond which the temporary noise increase might be rated as significant, it is useful to note the guidance given in the ODPM document ‘Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England, Annex 2: Noise’ [ODPM (2005)]. This document provides some advice on noise from earth moving and construction activities arising from minerals working. The guidance recommends that short-term increases in noise level limit associated with construction works should be permitted where this would also facilitate certain improvements to the site and environs. This could include the formation of screen (noise attenuation) mounds during site preparation. Specifically, a noise limit of 70dB LAeq,1h (free
field) is proposed for periods of up to 8 weeks in any one year at noise sensitive receptors. This represents an operational noise limit.

Noise change would only be rated as significant if the resulting noise exceeded the daytime external noise level recommended in WHO Guidance [WHO, 1999] to avoid serious annoyance. This Guidance recommends an external noise limit of 55dBA_{eq,16h}, ie over the full 16 hour daytime rather than just the working day. In setting this minimum threshold for the on-set of significant effects it should be noted that the WHO guidance is not specific to construction noise. It may be argued, therefore, that for a temporary noise disturbance this minimum threshold is conservative.

The guidance levels given in the draft Coal MTAN, for everyday coal extraction operations (noting that this differs from a reclamation scheme with incidental coal extraction such as this) are as follows:

- An outdoor sound level from steady continuous noise would need not to exceed 55dBA_{eq,1 hour} on balconies, terraces and outdoor living areas.

Discussions have been held with officers of Torfaen Borough Council who have requested that the target criteria for the operation should be set at a noise limit of 55dBA_{eq,1 hour}.

**Traffic Noise**

Traffic noise, particularly from freely flowing traffic, is a relatively uniform noise source without strong tonal or impulsive characteristics. The significance of traffic noise effects is commonly assessed simply on the degree of change anticipated. A 3dB (A) change in traffic noise is associated with a halving or doubling of traffic flow. Many of the guidance documents (past and present) relating to traffic noise assessment note that a change of less than 3dB (A) is not generally perceptible and it follows that a significant effect cannot occur if the change is not perceptible. The threshold, at which traffic noise change becomes noticeable, and therefore significant, is generally accepted as being a noise change of approximately 3dB (A).

### 11.4.2 Excavation/Reclamation Impact Predictions

To achieve the target noise level at the nearest residential receivers, the outdoor sound level from steady continuous noise should not exceed 55dBA_{eq,1 hour} on balconies, terraces and outdoor living areas.

The calculations of the impact of each phase of the reclamation activity have taken into consideration the proposed scheme phasing, working arrangements and site set-up described in Chapter 4. They account for the acoustic benefit of the proposed screening bunds.

Tables 11.3 – 11.8 below show the resulting noise level at each location, during each phase.

#### Table 11.3 – Phase 1b

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
<th>Mobile Plant</th>
<th>Haul Road</th>
<th>Total in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>dBA</td>
<td>Screening</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Distance</td>
<td>dBA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Screening</td>
</tr>
<tr>
<td>1</td>
<td>390</td>
<td>57.0</td>
<td>partial</td>
<td>57</td>
</tr>
<tr>
<td>2</td>
<td>225</td>
<td>61.4</td>
<td>partial</td>
<td>61</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>69.3</td>
<td>full</td>
<td>69</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>69.3</td>
<td>full</td>
<td>69</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>69.3</td>
<td>full</td>
<td>69</td>
</tr>
</tbody>
</table>
Table 11.4 – Phase 2

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Total in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>580</td>
<td>55.4</td>
<td>partial</td>
<td>200</td>
<td>38.9</td>
<td>partial</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>770</td>
<td>54.9</td>
<td>partial</td>
<td>220</td>
<td>35.2</td>
<td>partial</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>65.8</td>
<td>full</td>
<td>170</td>
<td>36.1</td>
<td>Full</td>
<td>66</td>
</tr>
<tr>
<td>4</td>
<td>230</td>
<td>57.5</td>
<td>partial</td>
<td>450</td>
<td>34.4</td>
<td>partial</td>
<td>58</td>
</tr>
<tr>
<td>5</td>
<td>320</td>
<td>54.7</td>
<td>partial</td>
<td>500</td>
<td>34.2</td>
<td>partial</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 11.5 – Phase 3

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Total in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>620</td>
<td>55.8</td>
<td>partial</td>
<td>400</td>
<td>30.9</td>
<td>partial</td>
<td>56</td>
</tr>
<tr>
<td>2</td>
<td>450</td>
<td>56.9</td>
<td>partial</td>
<td>220</td>
<td>33.2</td>
<td>partial</td>
<td>57</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>67.7</td>
<td>full</td>
<td>50</td>
<td>37.7</td>
<td>partial</td>
<td>68</td>
</tr>
<tr>
<td>4</td>
<td>80</td>
<td>63.7</td>
<td>full</td>
<td>150</td>
<td>33.3</td>
<td>partial</td>
<td>64</td>
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<td>5</td>
<td>90</td>
<td>62.6</td>
<td>full</td>
<td>130</td>
<td>36.8</td>
<td>partial</td>
<td>63</td>
</tr>
</tbody>
</table>

Table 11.6 – Phase 4a

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Total in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>390</td>
<td>57.5</td>
<td>partial</td>
<td>400</td>
<td>36.8</td>
<td>partial</td>
<td>58</td>
</tr>
<tr>
<td>2</td>
<td>220</td>
<td>59.7</td>
<td>partial</td>
<td>280</td>
<td>37.6</td>
<td>partial</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>305</td>
<td>57.0</td>
<td>partial</td>
<td>340</td>
<td>32.8</td>
<td>partial</td>
<td>57</td>
</tr>
<tr>
<td>4</td>
<td>265</td>
<td>58.3</td>
<td>partial</td>
<td>320</td>
<td>28.2</td>
<td>partial</td>
<td>58</td>
</tr>
<tr>
<td>5</td>
<td>120</td>
<td>65.1</td>
<td>partial</td>
<td>200</td>
<td>32.6</td>
<td>partial</td>
<td>65</td>
</tr>
</tbody>
</table>

Table 11.7 – Phase 4b

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Total in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>390</td>
<td>57.0</td>
<td>partial</td>
<td>185</td>
<td>39.4</td>
<td>partial</td>
<td>57</td>
</tr>
<tr>
<td>2</td>
<td>225</td>
<td>59.9</td>
<td>partial</td>
<td>255</td>
<td>33.7</td>
<td>partial</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>67.4</td>
<td>partial</td>
<td>540</td>
<td>28.8</td>
<td>partial</td>
<td>67</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>72.4</td>
<td>partial</td>
<td>475</td>
<td>28.1</td>
<td>partial</td>
<td>72</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>72.4</td>
<td>partial</td>
<td>270</td>
<td>29.8</td>
<td>partial</td>
<td>72</td>
</tr>
</tbody>
</table>

Table 11.8 – Phase 5

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Distance</th>
<th>dBA</th>
<th>Screening</th>
<th>Total in dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>55</td>
<td>67.3</td>
<td>full</td>
<td></td>
<td></td>
<td></td>
<td>67</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>68.2</td>
<td>full</td>
<td></td>
<td></td>
<td></td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>320</td>
<td>57.0</td>
<td>partial</td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>4</td>
<td>270</td>
<td>58.5</td>
<td>partial</td>
<td></td>
<td></td>
<td></td>
<td>59</td>
</tr>
<tr>
<td>5</td>
<td>110</td>
<td>66.3</td>
<td>partial</td>
<td></td>
<td></td>
<td></td>
<td>66</td>
</tr>
</tbody>
</table>

The target criteria of 55 dB(A) is exceeded at almost every location for every phase and confirms that the presumed bunding design, in conjunction with the working arrangement and plant presumed, is insufficient to achieve the target noise levels at each of the receiver locations. Without further mitigation this must be regarded as a major adverse impact of the scheme.

Table 11.9 summarises the key noise impacts for each phase.
Table 11.9 - Summary of key impacts of coal excavation

<table>
<thead>
<tr>
<th>Phases</th>
<th>Description</th>
<th>Nature of impact</th>
<th>Duration of impact</th>
<th>Significance of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a &amp; b</td>
<td>Site Set Up</td>
<td>Negative</td>
<td>Short Term</td>
<td>Minor</td>
</tr>
<tr>
<td>2, 3, 4a</td>
<td>Bulk Excavations</td>
<td>Negative</td>
<td>Long Term</td>
<td>Major</td>
</tr>
<tr>
<td>4b</td>
<td>Return overburden</td>
<td>Negative</td>
<td>Medium Term</td>
<td>Major</td>
</tr>
<tr>
<td>5</td>
<td>Restoration</td>
<td>Negative</td>
<td>Short Term</td>
<td>Minor</td>
</tr>
</tbody>
</table>

11.4.3 Traffic Noise Impact Prediction

The proposed reclamation activity would generate road traffic from coal export, staff journeys, equipment set up, repair and other ancillary site activities, with some variability forecast. The typical daily movements are described in Chapter 10 which confirms that all goods vehicles will be routed southward along the B4246 and onward to the M4 and M50 motorways.

The increase in traffic in total along this route is estimated to be up to 2.8% over the duration of the scheme. This would give rise to a change in noise exposure of a fraction of a dB and is, therefore, not expected to be of significance.

11.5 Mitigation

To aid understanding and inform mitigation an optimisation exercise has been conducted to identify what height screening would be needed to meet the target criteria for each location during each phase. This has the effect of focussing attention on what additional mitigation is required where and during what phase of the works. The results are shown in Tables 11.10 – 11.15 below.

Table 11.10 – Phase 1b

<table>
<thead>
<tr>
<th>Location</th>
<th>Bracken</th>
<th>Elizabeth Row</th>
<th>Castle Wood Rd</th>
<th>Commercial Road</th>
<th>Heol Waun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final dB(A)</td>
<td>55</td>
<td>53</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Barrier Height (m)</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Distance in m from reclamation boundary</td>
<td>55</td>
<td>30</td>
<td>10</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Ground Height @ Receiver</td>
<td>265</td>
<td>255</td>
<td>260</td>
<td>255</td>
<td>250</td>
</tr>
<tr>
<td>Ground Height @ Source</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
</tbody>
</table>

Table 11.11 – Phase 2

<table>
<thead>
<tr>
<th>Location</th>
<th>Bracken</th>
<th>Elizabeth Row</th>
<th>Castle Wood Rd</th>
<th>Commercial Road</th>
<th>Heol Waun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final dB(A)</td>
<td>53</td>
<td>53</td>
<td>55</td>
<td>54</td>
<td>55</td>
</tr>
<tr>
<td>Barrier Height (m)</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Distance in m from reclamation boundary</td>
<td>55</td>
<td>30</td>
<td>10</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Ground Height @ Receiver</td>
<td>265</td>
<td>255</td>
<td>260</td>
<td>255</td>
<td>250</td>
</tr>
<tr>
<td>Ground Height @ Source</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>260</td>
<td>260</td>
</tr>
</tbody>
</table>

Table 11.12 – Phase 3

<table>
<thead>
<tr>
<th>Location</th>
<th>Bracken</th>
<th>Elizabeth Row</th>
<th>Castle Wood Rd</th>
<th>Commercial Road</th>
<th>Heol Waun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final dB(A)</td>
<td>54</td>
<td>53</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Barrier Height (m)</td>
<td>4</td>
<td>0</td>
<td>8</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Distance in m from reclamation boundary</td>
<td>55</td>
<td>30</td>
<td>10</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Ground Height @ Receiver</td>
<td>265</td>
<td>255</td>
<td>260</td>
<td>255</td>
<td>250</td>
</tr>
<tr>
<td>Ground Height @ Source</td>
<td>255</td>
<td>255</td>
<td>255</td>
<td>255</td>
<td>255</td>
</tr>
</tbody>
</table>
### Table 11.13 – Phase 4a

<table>
<thead>
<tr>
<th>Location</th>
<th>Bracken</th>
<th>Elizabeth Row</th>
<th>Castle Wood Rd</th>
<th>Commercial Road</th>
<th>Heol Waun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final dB(A)</td>
<td>54</td>
<td>48</td>
<td>53</td>
<td>55</td>
<td>54</td>
</tr>
<tr>
<td>Barrier Height (m)</td>
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<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Distance in m from reclamation boundary</td>
<td>55</td>
<td>30</td>
<td>10</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Ground Height @ Receiver</td>
<td>265</td>
<td>255</td>
<td>260</td>
<td>255</td>
<td>250</td>
</tr>
<tr>
<td>Ground Height @ Source</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
</tr>
</tbody>
</table>

### Table 11.14 – Phase 4b

<table>
<thead>
<tr>
<th>Location</th>
<th>Bracken</th>
<th>Elizabeth Row</th>
<th>Castle Wood Rd</th>
<th>Commercial Road</th>
<th>Heol Waun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final dB(A)</td>
<td>54</td>
<td>50</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Barrier Height (m)</td>
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<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Distance in m from reclamation boundary</td>
<td>55</td>
<td>30</td>
<td>10</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Ground Height @ Receiver</td>
<td>265</td>
<td>255</td>
<td>260</td>
<td>255</td>
<td>250</td>
</tr>
<tr>
<td>Ground Height @ Source</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
</tbody>
</table>

### Table 11.15 – Phase 5

<table>
<thead>
<tr>
<th>Location</th>
<th>Bracken</th>
<th>Elizabeth Row</th>
<th>Castle Wood Rd</th>
<th>Commercial Road</th>
<th>Heol Waun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final dB(A)</td>
<td>54</td>
<td>55</td>
<td>55</td>
<td>54</td>
<td>54</td>
</tr>
<tr>
<td>Barrier Height (m)</td>
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<td>5</td>
<td>2</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Distance in m from reclamation boundary</td>
<td>55</td>
<td>30</td>
<td>10</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Ground Height @ Receiver</td>
<td>265</td>
<td>255</td>
<td>260</td>
<td>255</td>
<td>250</td>
</tr>
<tr>
<td>Ground Height @ Source</td>
<td>255</td>
<td>255</td>
<td>255</td>
<td>255</td>
<td>255</td>
</tr>
</tbody>
</table>

Each table shows the optimum barrier height for each phase, relative to the receiver height, which would need to be installed (in the event of no change to working arrangements or plant) to mitigate the noise to target levels. The numbers in bold are the achieved noise levels and barrier heights required to ensure all phases of the reclamation activity are sufficiently attenuated. This represents a conservative calculation for conservative criteria.

For location 1, Bracken, to achieve sufficient mitigation during all phases, screening needs to be 5 metres high above the receiver location height.

For location 2, Elizabeth Row, to achieve sufficient mitigation during all phases, screening needs to be 7 metres above the receiver location height.

For location 3, Castle Wood Road, to achieve sufficient mitigation during all phases, screening needs to be 8 metres above the receiver location height.

For location 4, Commercial Road, to achieve sufficient mitigation during all phases, screening needs to be 10 metres above the receiver location height.

For location 5, Heol Waun, to achieve sufficient mitigation during all phases, screening needs to be 11 metres above the receiver location height.

All phases with the exception of 2, 3, 4a – the bulk excavations, which may stretch to 42 months, are short.

Negotiations will be pursued with Torfaen Borough Council, during the course of consideration of the planning application, regarding the appropriate height and nature of the screening to attenuate the longer term noise levels of phases 2 – 4a. Of necessity, for each location, there is likely to be a trade-off between noise protection, visual intrusion and potential amendments to the working arrangements and/or use of plant and equipment. Finalisation of the screening to be installed is contingent upon consideration of all these factors cumulatively.
11.5.1 Additional Mitigation

In order to keep maximum noise levels, due to normal site working, below 55dB (A) Leq, 1 hour as agreed with Torfaen County Borough Council, the following additional attenuation measures will be implemented and incorporated into the working proposals:

- Haul roads will be carefully sited within the working void and below ground level wherever possible. This factor will reduce the maximum predicted noise levels irrespective of increased screening.
- Earthmoving plant will not operate on the construction and removal of the perimeter screening mounds before 8.00am or after 16.00pm on Mondays to Fridays and before 8.00am or after 13.00pm on Saturdays.
- Operations will be carefully planned so that, wherever possible, vehicles need not reverse directly towards any nearby properties.
- Haul roads and access roads will be maintained free of bumps and pot-holes.
- All site plant will be properly maintained to ensure that no unnecessary noise is generated. Particular attention will be paid to the lubrication of bearings, the sharpness of cutting edges and the integrity of silencers.
- Pumps, generators and compressors will be sound reduced models. Where they need to run constantly they will be fitted with properly lined and sealed acoustic covers which will be kept closed when in use.
- Regular noise monitoring will be undertaken at agreed monitoring stations throughout the operations to ensure that the agreed noise levels are adhered to.
- Site vehicles will adhere to the prescribed speed limits.
- The starting up of vehicles in the morning will be staggered.
- Double handling will be minimised by progressive backfilling and restoration.
- A complaints response system will be established, in addition to the proposed Liaison Committee, to deal with noise incidents. Pro-active management systems should prevent the occurrence of such incidents.

11.6 Conclusion and Residual Effects

The conclusions of this assessment are that the effect of the reclamation activity will, variably during the duration of the operation, give rise to effects which must continue to be regarded as major adverse but have the potential to be moderated by the application of additions to the proposed barrier installations and closer tailoring of the working arrangements to address localised sensitivities.

This finding, as with others in this Environmental Statement, should be read in the context of the wider objectives of the scheme – to remediate shallow mining hazards and facilitate redevelopment in accordance with development plan allocations. It should also take into account the impact of the alternative techniques which might otherwise be employed to achieve these ends – reclamation of the site using drill and grout methods together with re-profiling earthworks would have an equally adverse noise impact albeit over a more concentrated period.

The increase in traffic movements associated with that reclamation is likely to be negligible in noise terms.
12 Air Quality

12.1 Introduction

The findings of an air quality assessment of the reclamation scheme are presented in this Chapter. It comprises:

- A review of applicable policy and legislation, to identify appropriate assessment methodologies and criteria.
- Description of air quality conditions in the Talywain area.
- An assessment of potential air quality impacts from the scheme on nearby sensitive receptors using a dispersion model.
- An assessment of potential local air quality impacts due to changes in traffic flow.
- A qualitative assessment of the potential for odour arising from the site.
- Identification of measures to prevent and reduce any adverse effects.

The reclamation scheme will entail substantial earthmoving and excavation activities which would give rise to dust emissions. Dust is defined in British Standard document BS 6069 (Part Two) as particulate matter in the size range of 1-75µm (micrometres) in diameter. The fraction of dust comprised of particulates with a mean diameter of less than 10µm is referred to as PM$_{10}$ and has demonstrable human health impacts as the particulates are sufficiently small to pass into the alveoli of the human lung.

There is growing concern regarding particulates with a mean diameter of less than 2.5µm, referred to as PM$_{2.5}$, with a proportionately greater impact on human health. However, the air quality standards for this pollutant are not applicable until 2020 – 2025 and hence have not been assessed in detail. In any event, meeting the air quality objectives for PM$_{10}$ is widely considered sufficient to ensure the air quality objectives for PM$_{2.5}$ are also achieved. A proportion of dust once emitted will settle out due to gravity. If this dust deposits on clean surfaces, such as cars, windows or washing, it can give rise to nuisance. The potential for dust nuisance has been included in this assessment.

The reclamation phase will require a number of off-road and on-road vehicles. The main pollutants that are produced by such vehicles powered by internal combustion engines and which can lead to poor air quality include oxides of nitrogen (NO$_x$), comprising mainly nitric oxide (NO) and nitrogen dioxide (NO$_2$), carbon monoxide (CO), volatile organic compounds (VOCs), particularly benzene and 1,3-butadiene and fine particulate matter (PM$_{10}$). For the purpose of this air quality assessment only NO$_2$ and PM$_{10}$ are referred to as these are the key pollutants associated with vehicles powered by internal combustion engines.

Section 12.2 of the report describes applicable mineral planning policies and guidelines, including the current Welsh and EU air quality standards. Section 12.3 describes the methodology of the assessment and Section 12.4 outlines baseline conditions and the existing local air quality. Section 12.5 discusses air quality effects and their significance during the reclamation phase; the results of the assessment are also presented in Section 12.5 (with proposed mitigation measures as appropriate).

12.2 Air Quality Related Policy and Legislation

The policy and legislation described below is only directly relevant to coal excavation activities. As indicated in the preceding chapters the primary purpose of the reclamation is to clear the site of shallow mining hazards by bulk excavation with incidental coal recovery; this has the dual effect of preparing the site for redevelopment and providing income to help pay for it.
12.2.1 Mineral Planning Policy Wales

Minerals Planning Policy Wales (MPPW) (Reference 1) sets out the land use planning policy guidance of the National Assembly for Wales in relation to mineral extraction and related development in Wales, which includes all minerals and substances in, on or under land extracted either by underground or surface working. The MPPW is based on a number of key principles, including to:

“…limit the environmental impact of mineral extraction”

Specifically by:

“…the control of dust, smoke and fumes”.

The MPPW refers to UK government guidance on this matter (Reference 2).

12.2.2 Draft Coal Technical Advice Note

The draft Coal TAN (referenced in Chapter 11) identifies the key legislative controls regarding dust (considered here to include PM$_{10}$, PM$_{2.5}$ and nuisance dust):

- Quarrying and coal handling processes are regulated by LAPPC (Local Authority Pollution Prevention Control). Prescribed processes such as the crushing or grinding of extracted minerals are subject to the Pollution Prevention and Control (PPC) Regulations.

- Site haulage is controlled under LAPPC. PPC and the Control of Pollution Act (CoPA) apply only to specified processes.

- Dust (from parts of the coal sites not regulated under LAPPC, for example earthworks), and noise and odour can be controlled using the statutory nuisance provisions of the Environmental Protection Act 1990. These are now encompassed within the Environmental Permitting (England and Wales Regulations) 2007.

The draft Coal MTAN refers to the need for a Health Impact Assessment (HIA). The results of this air quality assessment provide a direct input to an HIA as the air quality standards and objectives for NO$_2$, PM$_{10}$ and PM$_{2.5}$ are themselves based on the protection of human health. Nuisance dust does not impact directly on health but has the potential to induce stress if experienced over prolonged periods by compromising the wellbeing and quality of life of local residents. A separate HIA in respect of the scheme is underway and reported separately.

The draft Coal TAN cites a study by the University of Newcastle-upon-Tyne into the potential health impacts of particulate matter from opencast sites, funded by the Department of Health and endorsed by the Committee of Medical Effects on Air Pollutants (COMEAP) (Reference 3). This work concluded that, although fugitive PM$_{10}$ particles from opencast sites reached the communities they were not constant in composition or concentration. Moreover, this work considers it to be relevant to assess the contribution of opencast coal sites to PM$_{10}$ levels in communities up to 1000m from a site and to assess whether:

- This is likely to lead to breaches of the Air Quality Objectives;
- The impact is significant; and
- It merits refusal.

Air quality standards and objectives for PM$_{10}$ and PM$_{2.5}$ are described in Section 12.2.3.

The draft Coal MTAN lists nuisance dust impacts as including: visible plumes and haze; the soiling of surfaces; contamination of soils, vegetation and water-bodies; and effects on personal comfort, amenity and health.
The dispersal of dust is highly weather-dependent and the extent of gravitational settling is significant. Large particulate matter (over 30μm) returns to surface quite quickly; medium-size particles (10-30μm) will generally travel 100-250m from the source under normal conditions. In adverse weather conditions, coarse dust travels 500m from the source. Residents can potentially be affected by dust up to 1km from the source, but... continual or severe concerns about dust are most likely to be experienced near to dust sources (generally within 100m).

Assessment criteria for nuisance dust are described in Section 12.2.4.

Appendix J of the draft Coal MTAN sets out the scope for a dust assessment:

- Establish baseline conditions by a dust-monitoring programme;
- Record ambient conditions over a period sufficient to identify seasonal variations;
- Identify the principal existing dust sources from urban and industrial areas, mineral operations, agricultural activities and construction activities;
- Locate residential areas, schools and other dust-sensitive land uses in relation to the proposed site;
- Identify likely sources of dust emission at different times from within the site;
- Assess the potential to emit dust with respect to the duration of the activity or the potential of dust to become airborne and the likelihood of dust leaving the site;
- Explain how topography and woodland may affect the emission and dispersal of site dust;
- Provide an analysis of data from the UK Meteorological Office on wind conditions, local rainfall and ground moisture conditions; and
- Use computer-modelling techniques to assess how dust could disperse from a site.

The draft Coal MTAN also sets out requirements for monitoring and mitigation for dust, including the need for a more sensitive monitoring protocol that will indicate short-term episodes of high nuisance dust levels, which could be otherwise lost by techniques using monthly or annual averaging.

12.2.3 Air Quality Objectives and Limit Values

Air quality limit values and objectives are quality standards for clean air. They can be used as assessment criteria for determining the significance of any potential changes in local air quality resulting from the development proposals.

European Union (EU) air quality policy sets the scene for national policy. The air quality ‘framework’ Directive on Ambient Air Quality Assessment and Management came into force in September 1996 and is intended as a strategic framework for tackling air quality consistently, through setting European-wide air quality limit values in a series of daughter directives, superseding and extending existing European legislation. The first four daughter directives have already been placed into national legislation. These EU limit values were consolidated in the Air Quality Standards (Wales) Regulations 2007 (Reference 4).

In a parallel national process, the Environment Act was published in 1995. The Act required the preparation of a national air quality strategy setting air quality standards and objectives for specified pollutants and outlining measures to be taken by local authorities (through the system of Local Air Quality Management (‘LAQM’)) and by others ‘to work in pursuit of the achievement’ of these objectives. A National Air Quality Strategy (NAQS) was published in 1997 and subsequently reviewed and revised in 2000, and an addendum to the Strategy published in 2002. The current Strategy is that published in July 2007; The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Reference 5). The objectives which are relevant to local air quality management have been set into Regulations
(Reference 6) (Air Quality Regulations 2000 and 2002). The objectives of relevance to this study are for NO\textsubscript{2}, PM\textsubscript{10} and PM\textsubscript{2.5}.

Table 12.1 sets out the EU air quality limit values and national air quality objectives for NO\textsubscript{2}, PM\textsubscript{10} and PM\textsubscript{2.5}. Proposed changes to the EU limit values have recently been announced (Reference 7). These changes result in the extension of five years to the attainment dates for all the limit values and the proposed Stage 2 limit values for PM\textsubscript{10} are likely to be abandoned, therefore these are not included in Table 12.1.

Performance against these objectives is monitored where people are regularly present and might be exposed to air pollution and it is the responsibility of each local authority to undertake such duties. Each local authority is required to undertake a review and assessment of local air quality. The process considers the current air quality situation and the likely future air quality situation, assessing whether the prescribed objectives are likely to be achieved by their target dates.

### Table 12.1: EU Air Quality Limit Values and National Air Quality Objectives for Relevant Pollutants

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Objective/ Limit Value</th>
<th>Compliance Date</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen dioxide (NO\textsubscript{2})</td>
<td>1 hour mean</td>
<td>200 µg/m\textsuperscript{3}, not to be exceeded more than 18 times a year (99.8\textsuperscript{th} percentile)</td>
<td>31\textsuperscript{st} Dec 2005</td>
<td>National</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1\textsuperscript{st} Jan 2010*</td>
<td>EU</td>
</tr>
<tr>
<td></td>
<td>Annual mean</td>
<td>40 µg/m\textsuperscript{3}</td>
<td>31\textsuperscript{st} Dec 2005</td>
<td>National</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1\textsuperscript{st} Jan 2010*</td>
<td>EU</td>
</tr>
<tr>
<td>Particulate matter (PM\textsubscript{10})</td>
<td>Daily mean</td>
<td>50 µg/m\textsuperscript{3}, not to be exceeded more than 35 times a year (90\textsuperscript{th} percentile)</td>
<td>31\textsuperscript{st} Dec 2004</td>
<td>National</td>
</tr>
<tr>
<td>Measurement technique: Gravimetric</td>
<td>Annual mean</td>
<td>40 µg/m\textsuperscript{3}</td>
<td>31\textsuperscript{st} Dec 2004</td>
<td>National</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>None specified</td>
<td>EU</td>
</tr>
<tr>
<td>Particulate matter (PM\textsubscript{2.5})</td>
<td>Annual Mean</td>
<td>25 µg/m\textsuperscript{3}</td>
<td>2020</td>
<td>National</td>
</tr>
<tr>
<td>Measurement technique: Gravimetric</td>
<td>Annual Mean</td>
<td>15% reduction at urban background locations</td>
<td>Between 2010 and 2020</td>
<td>National</td>
</tr>
</tbody>
</table>

*Changes have been proposed but are not yet included in regulations.

#### 12.2.4 Dust Nuisance

Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990, dust nuisance is defined as a *statutory nuisance*. There are currently no standards or guidelines for the nuisance caused by dust in the United Kingdom, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology, and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance.

Although not formally adopted, assessments of this type of development often refer to the custom and practice UK guideline of 200mg/m\textsuperscript{2}/day, expressed as a monthly mean.
The draft Coal MTAN suggests that this “unofficial” UK guideline is too high for amenity purposes, referring to consultation that suggests a value of 80mg/m²/day as a weekly mean, measured at affected properties, is appropriate. The draft Coal MTAN guideline is reported to be based on consultation although details of this are not readily available at present.

Reference has been made to both these guideline values in this assessment. Although numerically different both these guidelines attempt to provide a measure for assessing dust nuisance and the need for additional mitigation. Maintaining dust deposition rates within these guidelines does not guarantee a dust nuisance event would not occur.

Reference is made to the sensitivity of different land uses and facilities to dust, of which examples are shown in Table 12.2. A review of land uses in the area immediate to the site indicates medium sensitivity.

### Table 12.2: Example of Dust Sensitive Facilities

<table>
<thead>
<tr>
<th>High Sensitivity</th>
<th>Medium Sensitivity</th>
<th>Low Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals and Clinics</td>
<td>Schools</td>
<td>Farms</td>
</tr>
<tr>
<td>High-tech industries</td>
<td>Residential areas</td>
<td>Light and heavy industry</td>
</tr>
<tr>
<td>Painting and finishing</td>
<td>Food Retailers</td>
<td>Outdoor storage</td>
</tr>
<tr>
<td>Food processing</td>
<td>Greenhouses and nurseries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Horticultural land</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offices</td>
<td></td>
</tr>
</tbody>
</table>

Reference 8

### 12.3 Methodology

#### 12.3.1 Baseline Data Sources

The following data sources have been employed in the assessment of baseline conditions, including the identification of sensitive receptors:

- Air Quality Progress Reports 2003 - 2006;
- Updating & Screening Assessment of Air Quality – Torfaen County Borough Council 2006; and
- National Air Quality Archive.

Dust deposition rates are not generally monitored in the UK. For the purposes of this assessment, reference has been made to national surveys undertaken by the Warren Spring Laboratory.

#### 12.3.2 Reclamation Assessment

The main phases as described in Chapter 4 involve:

- Erection of fences, establishment of site access and site clearance;
- Soil stripping, forming bunds on the eastern perimeter of the site;
- Removal of overburden at northern end of the site to form a working void, overburden transported to form two mounds at the southern end of the site;
- Working of void southwards, with coal extracted, washed and exported off site by road;
- Dismantling of overburden mounds to infill working void at southern end of site; and
- Compaction and soil reinstatement.
A number of assessment scenarios have been developed to determine dust emissions from key activities. These emissions have been estimated using emission factors developed for the United States Environmental Protection Agency (Reference 9) and commonly applied in the UK. The dust emission rates were included as input to the advanced dispersion model ADMS 4 (Reference 10) along with representative meteorological data from St Athan weather station for the year 2007.

The model was set up with a variable emissions file with the following criteria:

- Emissions from all sources assumed to be zero during hours with rainfall;
- Emissions from ‘active’ sources (i.e. those associated with moving plant) were assumed only during hours/days of working; and
- Emissions from ‘inactive’ sources (i.e. wind erosion from unmade ground) were assumed to occur during all ‘dry’ hours.

The site is assumed to operate Monday to Friday 08:00 – 18:00, Saturday 08:00 – 13:00 with the site closed on Sundays and Bank Holidays; for the assessment it also assumes closure for one week during Christmas and the first two weeks of August.

Mitigation by application of water during dry periods was assumed to be 80% on haul roads and 50% for all other activities. This is in line with industry best practice.

The model was run to generate weekly mean dust deposition rates and weekly and daily PM$_{10}$ concentrations for the worst case weather week (see section 12.4.6). The model cannot be used to estimate maximum monthly or weekly mean deposition rates. For the purposes of this assessment, the weekly mean deposition rate was compared to the dust nuisance guidelines of 80 to 200 mg/m$^2$/day (see section 12.3.3 below).

To illustrate the potential air quality impact of the proposed development a number of residential properties were selected along the site boundary to determine the maximum potential impacts:

- Castle Wood;
- Commercial Road;
- Hoel Waun;
- Church Road;
- Brook Cottage;
- Elizabeth Row; and
- ETM Steel Works.

The location of these representative receptors is illustrated in Figure 17.

The potential air quality impact of increased traffic on the local road network has been undertaken with reference to scoping criteria developed by the Welsh Assembly Government (Reference 11):

- Road alignment will change by 5 m or more; or
- Daily traffic flows will change by 1,000 AADT or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- Daily average speed will change by 10 km/hr or more; or
- Peak hour speed will change by 20 km/hr or more.

Development schemes that would result in these scoping thresholds being exceeded are subject to further assessment in terms of potential local air quality impact.
12.3.3 Significance Criteria

Dust Nuisance

For the purposes of this assessment, the custom and practice UK guideline of 200mg/m²/day, expressed as a monthly mean, and the draft coal TAN suggested value of 80mg/m²/day as a weekly mean, measured at affected properties, have been used to assign significance descriptors for nuisance dust. These are included in Table 12.3.

Table 12.3: Significance Descriptors for Nuisance Dust

<table>
<thead>
<tr>
<th>Significance</th>
<th>Weekly mean (mg/m²/day)</th>
<th>Monthly mean (mg/m²/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible</td>
<td>&lt;60</td>
<td>&lt;150</td>
</tr>
<tr>
<td>Slight adverse</td>
<td>60 – 80</td>
<td>150 – 200</td>
</tr>
<tr>
<td>Moderate adverse</td>
<td>80 -100</td>
<td>200 – 250</td>
</tr>
<tr>
<td>Substantial adverse</td>
<td>100 - 120</td>
<td>250 – 300</td>
</tr>
<tr>
<td>Very substantial adverse</td>
<td>&gt;120</td>
<td>&gt;300</td>
</tr>
</tbody>
</table>

Note: These significance criteria have been prepared based on professional judgement in the absence of specific guidance. Both the draft Coal MTAN guideline of 80 mg/m²/day and UK custom and practice guideline of 200 mg/m²/day have been considered the threshold between the significance of dust nuisance impacts being slight and moderate adverse.

Particles as PM₁₀

Significance criteria for this pollutant are included in NSCA guidance (Reference 12). This approach uses textual descriptors of significance which are contained within a flow chart as shown in Drawing 12.1 overleaf.

The approach assumes that the air quality impacts have been assessed and quantified. The significance of the impacts is then assessed through a series of questions with closed (yes and no) answers. Each question is addressed in descending order until the arrow points to one of the outcomes in the right hand column. This gives the relative priority which air quality considerations should be afforded with respect to the development proposal.

The NSCA guidance also provides further details on how to describe the significance of the impacts predicted from the air quality modelling for PM₁₀.

Two tables are presented that set out examples of descriptors for magnitude of change and significance (as shown below in Tables 12.4 and 12.5). The first step is to identify the descriptor of change in ambient concentrations for PM₁₀ (Table 12.4) according to the percentage change in annual mean concentrations and change in the forecast number of days greater than 50µg/m³. The descriptor can then be used to assess the impact significance for PM₁₀ in relation to changes in the absolute concentration forecast from the modelling with the proposed development in place (Table 12.5).
### Table 12.4: Descriptors for Changes in Ambient Concentrations of PM$_{10}$

<table>
<thead>
<tr>
<th>Magnitude of Change</th>
<th>Annual Mean PM$_{10}$</th>
<th>Days PM$_{10}&gt;50$ ug/m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very large</td>
<td>Increase/decrease &gt; 25%</td>
<td>Increase/decrease &gt; 25 days</td>
</tr>
<tr>
<td>Large</td>
<td>Increase/decrease 15-25%</td>
<td>Increase/decrease 15-25 days</td>
</tr>
<tr>
<td>Medium</td>
<td>Increase/decrease 10-15%</td>
<td>Increase/decrease 10-15 days</td>
</tr>
<tr>
<td>Small</td>
<td>Increase/decrease 5-10%</td>
<td>Increase/decrease 5-10 days</td>
</tr>
<tr>
<td>Very Small</td>
<td>Increase/decrease 1-5%</td>
<td>Increase/decrease 1-5 days</td>
</tr>
<tr>
<td>Extremely Small</td>
<td>Increase/decrease &lt; 1%</td>
<td>Increase/decrease &lt; 1 days</td>
</tr>
</tbody>
</table>

### Table 12.5: Examples of Descriptors for Impact Significance for PM$_{10}$

<table>
<thead>
<tr>
<th>Air Quality Impact Significance Criteria</th>
<th>Extremely Small</th>
<th>Very Small</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
<th>Very Large</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decrease with development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Standard with development</td>
<td>Slight beneficial</td>
<td>Slight beneficial</td>
<td>Substantial beneficial</td>
<td>Substantial beneficial</td>
<td>Very substantial beneficial</td>
<td>Very substantial beneficial</td>
</tr>
<tr>
<td>Above Standard without development</td>
<td>Slight beneficial</td>
<td>Moderate beneficial</td>
<td>Substantial beneficial</td>
<td>Substantial beneficial</td>
<td>Very substantial beneficial</td>
<td>Very substantial beneficial</td>
</tr>
<tr>
<td>Below Standard without development</td>
<td>Negligible</td>
<td>Slight beneficial</td>
<td>Slight beneficial</td>
<td>Moderate beneficial</td>
<td>Moderate beneficial</td>
<td>Substantial beneficial</td>
</tr>
<tr>
<td>Below Standard without development, but not Well Below</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Slight beneficial</td>
<td>Slight beneficial</td>
<td>Slight beneficial</td>
<td>Moderate beneficial</td>
</tr>
<tr>
<td><strong>Increase with development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Standard without development</td>
<td>Slight adverse</td>
<td>Slight adverse</td>
<td>Substantial adverse</td>
<td>Substantial adverse</td>
<td>Very substantial adverse</td>
<td>Very substantial adverse</td>
</tr>
<tr>
<td>Below Standard without development</td>
<td>Slight adverse</td>
<td>Moderate adverse</td>
<td>Substantial adverse</td>
<td>Substantial adverse</td>
<td>Very substantial adverse</td>
<td>Very substantial adverse</td>
</tr>
<tr>
<td>Below Standard with development, but not Well Below</td>
<td>Negligible</td>
<td>Slight adverse</td>
<td>Slight adverse</td>
<td>Moderate adverse</td>
<td>Moderate adverse</td>
<td>Substantial adverse</td>
</tr>
<tr>
<td>Well Below Standard with development</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Slight adverse</td>
<td>Slight adverse</td>
<td>Slight adverse</td>
<td>Moderate adverse</td>
</tr>
</tbody>
</table>

Well Below standard = <75% of the standard (air quality objective or Limit Value in question).
Drawing 12.1: Assessing the significance of air quality impacts

**EFFECT OF DEVELOPMENT:**

1. Assemble the air quality impacts (from Air Quality Assessment)

2. **DOES IT:**
   - Lead to a breach or significant worsening of a breach of an EU Limit Value? This could include introduction of new exposure to cause a breach?
     - **YES:** AQ an overriding consideration
     - **NO:**
       - Lead to a breach of significant (1) worsening of a breach of an AQ Objective, or cause a new AQMA to declared (2)?
         - **YES:** AQ a high priority consideration
         - **NO:**
           - Interfere significantly (1) with or prevent the implementation of an AQ action plan?
             - **YES:** AQ a high priority consideration
             - **NO:**
               - Interfere significantly (1) with the implementation of a local Strategy?
                 - **YES:** AQ a medium priority consideration
                 - **NO:**
                   - Lead to a significant (1) increase in emissions, degradation in air quality or increase in exposure, below the level of a breach of an AQ Objective?
                     - **YES:** AQ a medium priority consideration
                     - **NO:**
                       - Request additional mitigation

3. **OUTCOME:**
   - **NO**
   - Reach decision
   - Are mitigation measures, where required, adequate?

**NOTES:**

1 Where the term significant in used, it will be based on the professional judgment of Local Authority officer.
2 This could also include the expansion of an existing AQMA or the introduction of new exposure to cause a new AQMA to be declared.

**DOES IT:**

1 Lead to a breach of significant (1) worsening of a breach of an EU Limit Value? This could include introduction of new exposure to cause a breach?
2 Lead to a breach of significant (1) worsening of a breach of an AQ Objective, or cause a new AQMA to declared (2)?
3 Interfere significantly (1) with or prevent the implementation of an AQ action plan?
4 Interfere significantly (1) with the implementation of a local Strategy?
5 Lead to a significant (1) increase in emissions, degradation in air quality or increase in exposure, below the level of a breach of an AQ Objective?
6 Request additional mitigation
12.3.4 Odour Nuisance
A qualitative assessment of potential odour nuisance was undertaken based on the likelihood of odorous materials being present on site. This was limited to materials contained within surface soils (i.e. oils) and pockets of methane or de-oxygenated air within coal seams.

12.4 Baseline Conditions

12.4.1 Air Pollution Sources

Industrial Processes
Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases are minimised or rendered harmless. Regulated (or prescribed) industrial processes are regulated through the Environmental Permitting (England and Wales) Regulations 2007 in which regulated industrial processes are classified as Part A (A1 and A2) or Part B installations. Part A processes have the potential for release of prescribed substances to air, land and water and are regulated by either the Environment Agency (Part A1 processes) or the local authority (Part A2 processes). Part B processes are smaller in scale than Part A processes and have the potential for release of prescribed substances to air only. Part B processes are regulated by the local authority.

There are no industrial processes regulated through the 2007 Environmental Permitting Regulations in the vicinity of the proposed development. For the purposes of this assessment any smaller industrial processes are included within background concentrations.

Road Traffic
The proposed development site is bounded on all sides by a number of minor roads. The largest of these is the B4246 (Commercial Road/Foundry Road) to the east, which runs parallel to the A4043, joining approximately 5km to the north and 1km to the south. All coal recovery and construction traffic would be required to travel south along the B4246 to join the A4043 at Abersychan Village. The majority of operational traffic is assumed to travel the same route.

12.4.2 Dust Deposition
A baseline dust deposition rate of 43 mg/m$^2$/day has been used for the purposes of this assessment with no account taken of changes over time. This is based on previously published assessments of dust deposition in the local area (Reference 13).

12.4.3 Review and Assessment of Air Quality

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment in which the development is to be located – these are present from sources such as industrial processes, commercial and domestic activities, agriculture, traffic and natural sources.

Under the requirements of the Environmental Act 1995 Part IV, local authorities are required to periodically review and assess air quality in their areas. If it is predicted that air quality concentrations will exceed national air quality objectives the local authority is required to declare an Air Quality Management Area (AQMA) around the area where the exceedance is predicted to occur.

Torfaen Borough Council undertook its first and second review and assessment, published in December 1999 and June 2000 respectively, which concluded that all pollutants would meet the relevant air quality objectives in the relevant years. Updated screening assessments in 2003 and 2006 have not changed this conclusion. No air quality management areas have been designated although monitoring of nitrogen dioxide, a key pollutant related to road traffic, continues at 12 sites.
12.4.4 Local Air Quality Monitoring
An automatic air quality monitoring station is located within the grounds of a school in Cwmbran. This site is classed as an ‘urban background’ location and monitors a number of pollutants, including PM$_{10}$. The station was affiliated within the UK network in 2001. Details of the monitoring station and monitoring data are included in Tables 12.6 and 12.7.

Torfaen BC does not undertake any monitoring for PM$_{10}$.

These data show that both the annual mean and daily mean PM$_{10}$ were achieved in Cwmbran over the period 2002 – 2006.

Table 12.6: Cwmbran Air Quality Monitoring Site

<table>
<thead>
<tr>
<th>Monitoring Site</th>
<th>Grid/Site Reference</th>
<th>Type</th>
<th>Approx. Dist to OPA Site Boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Site:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cwmbran</td>
<td>ST 305 955</td>
<td>Urban background</td>
<td>10 km SSE</td>
</tr>
</tbody>
</table>

Table 12.7: PM$_{10}$ Concentrations at Cwmbran (µg/m$^3$)

<table>
<thead>
<tr>
<th></th>
<th>Air Quality Objective</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual mean</td>
<td>40</td>
<td>18</td>
<td>21</td>
<td>18</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>90$^{th}$ percentile of daily means</td>
<td>50</td>
<td>28</td>
<td>35</td>
<td>28</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

12.4.5 Background Pollution Concentrations
In the National Air Quality Archive operated by the National Environmental Technology Centre (NETCEN), the Department of Environment, Food and Rural Affairs (DEFRA) has produced estimated background pollution data for 2004 and projections for future years, for pollutants NO$_x$, NO$_2$ and PM$_{10}$, for each 1km by 1km grid square across the UK. Estimated annual mean PM$_{10}$ concentrations in the area of the proposed development site for the years 2008 to 2010, assuming the coal recovery phase would be undertaken within this time, have been collated for the 21 grid squares that include and surround the site. The range and mean concentrations for these grid squares are included in Table 12.8 below.

Results show that the background concentrations taken from the Archive for the assessed pollutants are well below the relevant objective of 40 µg/m$^3$ for PM$_{10}$ and some 3 – 4 µg/m$^3$ lower than those observed at Cwmbran.

Table 12.8: PM$_{10}$ Background Concentrations (µg/m$^3$)

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$ – mean</td>
<td>16.7</td>
<td>16.0</td>
<td>15.8</td>
<td>15.7</td>
</tr>
<tr>
<td>PM$_{10}$ – range</td>
<td>16.2 – 17.8</td>
<td>15.5 – 17.1</td>
<td>15.3 – 16.9</td>
<td>15.2 – 16.8</td>
</tr>
</tbody>
</table>

Note: mean and range reported for the annual mean PM$_{10}$ concentrations for grid squares (323500,201500), (324500,201500), (325500,201500), (326500,201500), (327500,201500), (324500,202500), (325500,202500), (326500,202500), (327500,202500), (324500,203500), (325500,203500), (326500,203500), (327500,203500), (324500,204500), (325500,204500), (326500,204500), (327500,204500), (324500,205500), (325500,205500), (326500,205500) and (327500,205500).

12.4.6 Meteorology
Hourly sequential meteorological data were obtained for 1997 based on observations made at St Athans. The annual windrose is presented in Drawing 12.2. Winds are predominantly
from the northwest – southwest quadrant with a secondary distribution of winds from the east northeast.

Analysis of the meteorological data was undertaken to identify the ‘worst case week’ – when dry conditions occurred with winds blowing from the site to receptors to the east. This was between julien days 26 and 32. The windrose for this worst case week is presented in Drawing 12.3. Further analysis was undertaken of the meteorological data to determine that dry conditions with winds within the sector 225° to 315° (southwest to northwest) occurred for 43% during 1997.

**Drawing 12.2 - Annual Windrose (1997) – St Athans**

![Annual Windrose (1997) – St Athans](image-url)
12.5 Assessments of Effects and Mitigation

The section outlines the potential air quality impacts and measures to mitigate possible negative impacts on air quality during the reclamation works, particularly the bulk excavation phase.

Predicted Impacts – dust emissions
Atmospheric emissions from construction activities will depend on a combination of the potential for emission (the type of activities) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- Fugitive dust emissions from site activities; and
- Exhaust emissions from site plant, equipment and vehicles, including those on the public highway.

Fugitive dust emissions from coal recovery activities are likely to be variable and would depend upon type and extent of the activity, soil conditions (soil type and moisture), surface condition and weather conditions. Soils are inevitably drier during the summer period and periods of dry weather combined with higher than average winds have the potential to generate the most dust. The activities that are the most significant sources of fugitive emissions are:
• Soil stripping, including excavation by scraper, haulage and dumping by truck, and spreading of soil by a bulldozer to form bunds;

• Overburden excavation, haulage and dumping by truck, and spreading of overburden by a bulldozer to form mounds;

• Working of void, including excavation of overburden from front of void, haulage and dumping by truck at rear of void, coal extraction, internal haulage and tipping by truck, washing and export off site by truck;

• Filling of exhausted working void with overburden, including dismantling of overburden mound, haulage and dumping by truck, spreading of overburden by bulldozer and compaction; and

• Soil reinstatement, including dismantling of bunds, haulage and dumping by truck, and spreading of soil by a scraper.

Dust emissions have been calculated for each scenario in terms of total dust and PM$_{10}$.

**Predicted Impacts – dust nuisance**

The results of modelling potential dust deposition rates at the selected receptors are presented in Table 10 overleaf. The results are expressed in milligrams per square metre per day (mg/m$^2$/day) during the driest week during 1997 with winds blowing from the site towards residential properties to the east. These are considered to be the worst case conditions giving rise to the greatest potential dust nuisance impacts. Note that these conditions, dry hours with winds blowing from the southwest to northwest quadrant, occurred for 43% in 1997. The deposition rates have been evaluated with reference to the two dust nuisance guidelines described in section 12.2.4.

The impact of applying standard dust mitigation measures (damping down of haul roads and use of water sprays on working areas) is evident and, for the purposes of this assessment, are assumed to be in place.

The model results indicate that, with standard dust mitigation measures in place, there is little or no potential for dust nuisance at receptors 2, 5, 6 or 7 (Commercial Road, Brook Cottage, Elizabeth Row or ETM Steel Works, respectively).

Dust deposition rates at receptor 1 (Castle Wood) may fall within and exceed the range of dust nuisance criteria (80 – 200 mg/m$^2$/day) if soil stripping, excavation of the initial void, backfill and soil reinstatement takes place within close proximity and during worst case conditions. Whether this occurs in practice is dependent on the weather conditions at the time. The model results indicate that careful management would be required to mitigate this potential impact sufficiently. This is particularly the case during backfill and soil reinstatement when modelled dust deposition rates exceed the higher nuisance criterion during backfill and soil reinstatement.

At receptor 3 (Hoel Waun) modelled dust deposition rates during worst case conditions would fall within the range of nuisance criteria during excavation of the initial void, its extension, recovery of coal and backfill within close proximity. Again, careful management would be required to mitigate this potential impact sufficiently.

At receptor 4 (Church Road) excavations of the final void and backfill near to the receptor has the potential to result in dust nuisance if this occurs during worst case weather conditions. As for receptors 1 and 3, careful management would be required to mitigate this potential impact sufficiently.

With reference to the significance criteria presented in Table 3 for the monthly mean criterion of 200 mg/m$^2$/day, dust deposition rates at receptors 2, 5, 6 and 7 may be slight adverse or negligible. At receptors 1 and 4 there is the potential for a very substantial adverse impact if careful management is not adhered to (see section 12.2).
Table 12.10: Predicted Dust Nuisance

<table>
<thead>
<tr>
<th>Receptor 1 – Castle Wood</th>
<th>Dust Deposition</th>
<th>‘Worst Case’ Weekly Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nuisance threshold</td>
<td>80 - 200 mg/m²/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unmitigated</td>
</tr>
<tr>
<td>Soil stripping</td>
<td>304</td>
<td>139</td>
</tr>
<tr>
<td>Excavate initial void</td>
<td>376</td>
<td>136</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
<td>707</td>
<td>375</td>
</tr>
</tbody>
</table>

Receptor 2 – Commercial Road

<table>
<thead>
<tr>
<th>Receptor 2 – Commercial Road</th>
<th>Dust Deposition</th>
<th>‘Worst Case’ Weekly Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nuisance threshold</td>
<td>80 - 200 mg/m²/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unmitigated</td>
</tr>
<tr>
<td>Soil stripping</td>
<td>84</td>
<td>60</td>
</tr>
<tr>
<td>Excavate initial void</td>
<td>152</td>
<td>78</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
<td>51</td>
<td>45</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
<td>71</td>
<td>57</td>
</tr>
</tbody>
</table>

Receptor 3 – Hoel Waun

<table>
<thead>
<tr>
<th>Receptor 3 – Hoel Waun</th>
<th>Dust Deposition</th>
<th>‘Worst Case’ Weekly Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nuisance threshold</td>
<td>80 - 200 mg/m²/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unmitigated</td>
</tr>
<tr>
<td>Soil stripping</td>
<td>80</td>
<td>72</td>
</tr>
<tr>
<td>Excavate initial void</td>
<td>177</td>
<td>83</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
<td>320</td>
<td>126</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
<td>118</td>
<td>58</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
<td>56</td>
<td>49</td>
</tr>
</tbody>
</table>

Receptor 4 – Church Road

<table>
<thead>
<tr>
<th>Receptor 4 – Church Road</th>
<th>Dust Deposition</th>
<th>‘Worst Case’ Weekly Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nuisance threshold</td>
<td>80 - 200 mg/m²/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unmitigated</td>
</tr>
<tr>
<td>Soil stripping</td>
<td>61</td>
<td>59</td>
</tr>
<tr>
<td>Excavate initial void</td>
<td>122</td>
<td>62</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
<td>99</td>
<td>58</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
<td>818</td>
<td>271</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
<td>435</td>
<td>122</td>
</tr>
</tbody>
</table>

Receptor 5 – Brook Cottage

<table>
<thead>
<tr>
<th>Receptor 5 – Brook Cottage</th>
<th>Dust Deposition</th>
<th>‘Worst Case’ Weekly Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nuisance threshold</td>
<td>80 - 200 mg/m²/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unmitigated</td>
</tr>
<tr>
<td>Soil stripping</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Excavate initial void</td>
<td>129</td>
<td>61</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
<td>48</td>
<td>44</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
<td>81</td>
<td>54</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
<td>212</td>
<td>78</td>
</tr>
</tbody>
</table>

Receptor 6 – Elizabeth Row

<table>
<thead>
<tr>
<th>Receptor 6 – Elizabeth Row</th>
<th>Dust Deposition</th>
<th>‘Worst Case’ Weekly Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nuisance threshold</td>
<td>80 - 200 mg/m²/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unmitigated</td>
</tr>
<tr>
<td>Soil stripping</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Excavate initial void</td>
<td>59</td>
<td>47</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
<td>51</td>
<td>45</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
<td>171</td>
<td>46</td>
</tr>
</tbody>
</table>
Dust Deposition

<table>
<thead>
<tr>
<th>Nuisance threshold</th>
<th>‘Worst Case’ Weekly Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unmitigated</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
<td>54</td>
</tr>
<tr>
<td>Receptor 7 – ETM Steel Works</td>
<td></td>
</tr>
<tr>
<td>Soil stripping</td>
<td>48</td>
</tr>
<tr>
<td>Excavate initial void</td>
<td>67</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
<td>43</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
<td>43</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
<td>44</td>
</tr>
</tbody>
</table>

Note: includes background level of 43 mg/m$^2$/day.

Predicted Impacts – PM$_{10}$

The results of modelling potential concentrations of PM$_{10}$ at the selected receptors are presented in Table 12.11 overleaf. The results are expressed in microgram’s per cubic metre (µg/m$^3$) during the driest week during 1997 with winds blowing from the site towards residential properties to the east. These are considered to be the worst case conditions giving rise to the highest concentrations of PM$_{10}$. The PM$_{10}$ concentrations have been evaluated with reference to the criteria presented in Table 4 and 5.

Modelled weekly mean PM$_{10}$ concentrations reach 40 µg/m$^3$ at receptor 1 during worst case conditions but are expected to be 30 µg/m$^3$ or below at other receptors. The annual mean objective for PM$_{10}$ is 40 µg/m$^3$ and hence, is not expected to be breached as a result of the coal recovery operations.

PM$_{10}$ concentrations at receptors 2, 5, 6 and 7 are not expected to exceed 50 µg/m$^3$ as a daily mean during worst case weather conditions with activities near to the receptors. The air quality objective, expressed as a daily mean of 50 µg/m$^3$ not to be exceeded more than 35 times in a calendar year, is not expected to be breached at these receptors as a result of coal recovery operations.

The modelled daily mean PM$_{10}$ concentrations during the worst case weather and operating conditions were in excess of 50 µg/m$^3$ at receptors 1, 3 and 4. At receptor 1 this is expected during backfill and soil reinstatement, at receptor 3 during void extension, extraction of coal and backfill, and at receptor 4 during excavation of the final void and coal recovery.

Assuming a background PM$_{10}$ concentration of 16 µg/m$^3$, the magnitude of impact is generally very large during worst case conditions (i.e. an increase greater than 25%) but expected to be very small over the year (increase of 1-5%). The number of days with PM$_{10}$ greater than 50 µg/m$^3$ is expected to be very small (i.e. an increase of 1-5 days). The significance of PM$_{10}$ impacts is either negligible or slight adverse.

Table 12.11: Predicted PM$_{10}$ Concentrations

<table>
<thead>
<tr>
<th>Receptor 1 – Castle Wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$ Concentration</td>
</tr>
<tr>
<td>Air Quality Objective</td>
</tr>
<tr>
<td>40 µg/m$^3$</td>
</tr>
<tr>
<td>Soil stripping</td>
</tr>
<tr>
<td>Excavate initial void</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
</tr>
<tr>
<td>Receptor 2 – Commercial Road</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>Soil stripping</td>
</tr>
<tr>
<td>Excavate initial void</td>
</tr>
<tr>
<td>Extend void, extract coal and backfill</td>
</tr>
<tr>
<td>Excavate final void and extract coal</td>
</tr>
<tr>
<td>Backfill and soil reinstatement</td>
</tr>
</tbody>
</table>

| Receptor 3 – Hoel Waun | | | | |
|------------------------|------------------------------|------------------------------|------------------------------|
| Soil stripping         | 20                           | 19                           | 23                           | 22                           |
| Excavate initial void  | 28                           | 20                           | 53                           | 27                           |
| Extend void, extract coal and backfill | 55               | 30                           | 123                          | 56                           |
| Excavate final void and extract coal | 19               | 17                           | 25                           | 18                           |
| Backfill and soil reinstatement | 17               | 17                           | 20                           | 18                           |

| Receptor 4 – Church Road | | | | |
|--------------------------|------------------------------|------------------------------|------------------------------|
| Soil stripping           | 19                           | 18                           | 21                           | 20                           |
| Excavate initial void    | 24                           | 18                           | 38                           | 21                           |
| Extend void, extract coal and backfill | 24               | 18                           | 35                           | 22                           |
| Excavate final void and extract coal | 57               | 30                           | 136                          | 57                           |
| Backfill and soil reinstatement | 30                  | 19                           | 54                           | 24                           |

| Receptor 5 – Brook Cottage | | | | |
|-----------------------------|------------------------------|------------------------------|------------------------------|
| Soil stripping              | 16                           | 16                           | 17                           | 17                           |
| Excavate initial void       | 26                           | 18                           | 70                           | 27                           |
| Extend void, extract coal and backfill | 17               | 16                           | 23                           | 18                           |
| Excavate final void and extract coal | 19               | 17                           | 36                           | 22                           |
| Backfill and soil reinstatement | 26                  | 18                           | 80                           | 30                           |

| Receptor 6 – Elizabeth Row | | | | |
|-----------------------------|------------------------------|------------------------------|------------------------------|
| Soil stripping              | 16                           | 16                           | 17                           | 17                           |
| Excavate initial void       | 19                           | 17                           | 34                           | 20                           |
| Extend void, extract coal and backfill | 18               | 16                           | 27                           | 19                           |
| Excavate final void and extract coal | 17               | 16                           | 22                           | 18                           |
| Backfill and soil reinstatement | 17           | 16                           | 22                           | 17                           |

| Receptor 7 – ETM Steel Works | | | | |
|------------------------------|------------------------------|------------------------------|------------------------------|
| Soil stripping               | 17                           | 16                           | 21                           | 18                           |
| Excavate initial void        | 20                           | 17                           | 41                           | 20                           |
| Extend void, extract coal and backfill | 16               | 16                           | 16                           | 16                           |
| Excavate final void and extract coal | 16               | 16                           | 16                           | 16                           |
Concentration 'Worst Case' Weekly Mean 'Worst Case' Daily Mean

<table>
<thead>
<tr>
<th>Air Quality Objective</th>
<th>40 µg/m³</th>
<th>50 µg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backfill and soil reinstatement</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

Note: includes background concentration of 16 µg/m³.

**Predicted Impacts – vehicular emissions**

The operation of vehicles and equipment powered by internal combustion engines results in the emission of waste exhaust gases containing the pollutants NOx, PM$_{10}$, VOCs, and CO. The quantities emitted depend on factors such as engine type, service history, pattern of usage, and composition of fuel. The operation of site equipment, vehicles and machinery would result in emission to the atmosphere of unquantified levels of waste exhaust gases but such emissions are unlikely to be significant - particularly in comparison to levels of similar emissions from road traffic. This is demonstrated in Table 12.12 below using the threshold criteria described in section 12.3.2.

Vehicular emissions are not considered to be significant and no further assessment is required.

**Table 12.12: Scoping of Road Traffic related Local Air Quality Impacts**

<table>
<thead>
<tr>
<th>Scoping Threshold</th>
<th>Baseline (B4246)</th>
<th>Maximum Expected</th>
<th>Proceed to Further Assessment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road alignment will change by 5 m or more</td>
<td>-</td>
<td>No change</td>
<td>No</td>
</tr>
<tr>
<td>Daily traffic flows will change by 1,000 AADT or more</td>
<td>8000</td>
<td>8263</td>
<td>No</td>
</tr>
<tr>
<td>Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more</td>
<td>40</td>
<td>82</td>
<td>No</td>
</tr>
<tr>
<td>Daily average speed will change by 10 km/hr or more</td>
<td>48</td>
<td>48</td>
<td>No</td>
</tr>
<tr>
<td>Peak hour speed will change by 20 km/hr or more</td>
<td>48</td>
<td>48</td>
<td>No</td>
</tr>
</tbody>
</table>

**12.5.1 Predicted Impacts – odour nuisance**

The potential for odour nuisance is dependent on the presence of oil deposits found in the surface soils and pockets of methane / de-oxygenated air, the proximity of such materials to nearby sensitive receptors and the extent to which such materials are left exposed. The presence of such odorous materials cannot be determined at this time and hence, the assessment of potential odour impact is limited to identifying the need for an established and rapid site management response to such materials if uncovered.

**12.6 Conclusions and Mitigation**

**12.6.1 Conclusions**

Bulk excavations would take place close to residential properties. Application of standard dust mitigation measures would reduce the potential impact in terms of dust nuisance and elevated PM$_{10}$ concentrations to within acceptable limits for the majority of the time. The significance of dust nuisance and elevated PM$_{10}$ would be negligible to slight adverse. However, during periods of dry conditions when workings are very close to receptors, the significance of dust deposition could be very substantial adverse and dust nuisance would be expected to occur. Careful management is required to avoid this potential impact (see section 12.6.2 below). The significance of PM$_{10}$ impacts remains either negligible or slight adverse.
The increase in road traffic on local highways would have no significant air quality impact.
The potential for odour nuisance exists but can be adequately addressed through rapid response procedures to remove and / or cover odorous materials if found.

12.6.2 Mitigation
This assessment has assumed the application of the following standard dust suppression measures:

- Hard surfacing of the site access road;
- Obligatory wheel wash for all vehicles leaving the site;
- Road sweeping of the site access road and local roads;
- Damping down of internal haul roads;
- Provision of hard stone aggregate materials for use on highly trafficked internal haul roads;
- Imposition of a 20 km/h speed limit on all site roads; and
- Use of water sprays in working areas.

For the majority of conditions such measures would be sufficient to avoid dust nuisance and minimise the extent of elevated PM$_{10}$ concentrations. However, as reported above, this assessment has identified that, during worst case conditions, there is a likelihood that dust nuisance would occur. To minimise such impacts the following additional mitigation measures are recommended:

- Dust Prevention: The adoption of a site design to incorporate effective dust prevention measures forms the basis of a dust control strategy. Environmental sensitivity analysis will be incorporated into the development of the site design and will result in a working method which provides mitigation against potential dust nuisance.

- Dust Suppression: Specific dust suppression measures will be introduced to deal with the following dust raising activities: haulage on un-paved haul roads, haulage on paved haul roads, overburden mound construction and removal, and soil bund construction & removal. The mitigation measures will include:
  - Haul road discipline;
  - Haul road grading;
  - Speed control on haul roads;
  - Watering of haul roads in dry weather using mobile water bowsers;
  - The dampening of coal stocks with sprayed water when necessary;
  - The progressive seeding of soil and overburden mounds;
  - Forming the outer faces of overburden mounds first to shield subsequent activities and removal in reverse sequence;
  - Minimising the amount, and duration of, coal stocking;
  - The site access road will be hard surfaced and swept regularly;
  - The use of upward facing exhausts;
  - The fitting of all relevant heavy plant with radiator deflector plates;
  - Avoidance of overloading to minimise spillage from vehicles;
  - All loaded coal lorries will be sheeted before leaving the site;
- Construct mounds so that their shape minimizes the accentuation of surface wind speeds and hence the potential for pick-up of dust;
- Coal processing plant to incorporate dust suppression measures (e.g. screen boarding, stockpile aprons);
- Progressive restoration and vegetation of existing bare spoil;
- Minimise drop heights;
- The use of machines of sufficient capacity in order to minimise disturbance and break-up of soils and overburden;
- Provide mud-flaps and wheel washing facilities prior to use of public roads; and
- Provide and maintain a sufficient supply of water on site and ensure a sufficient rate of application to haul roads.

- On-site measurement of weather conditions and daily review of forecast weather conditions to establish working arrangements for the day, this may require working away from residential properties during very dry conditions.
- Measurement of PM$_{10}$ concentrations and dust deposition rates at residential properties with thresholds established to trigger immediate action to either suppress dust emissions, move working activities or cease operations during worst case conditions.
- Establishment of a local community liaison group to report regularly on the proposed working activities, results of monitoring, extent of dust impacts and response to them.

These recommended measures would provide sufficient feedback mechanisms for effective management of dust and avoidance of dust nuisance.

12.7 References

Reference 1 - Minerals Planning Policy Wales, National Assembly for Wales, December 2000
Reference 3 - Do particulates from opencast mining impair children's respiratory health? University of Newcastle-upon-Tyne (DoH, 1999)
Reference 4 - The Air Quality (Wales) Standards Regulations 2007 No.717 (W.63), HMSO
Reference 6 - Air Quality (Wales) Regulations 2000 c.1940 (W.138) and Air Quality (Amendment) (Wales) Regulations 2002 No. 3182 (W.298).


**Reference 13** - Torfaen County Borough Council, the British Reclamation Scheme Report on Dust Modelling for Opencast Reclamation, Halcrow, June 1999
13 Social and Economic Impacts

13.1 Introduction

This Chapter provides an assessment of the socio-economic effects of the British reclamation scheme. It considers how and to what extent the condition of local communities might be affected by the proposals. The assessment focuses on the potential of the scheme to unlock the regeneration potential of the site, through job creation and investment.

Other community impacts may be regarded as the accumulation of the amenity factors considered in preceding chapters – in particular those relating to noise, dust and the potential for visual intrusion from the bulk excavations and earthworks re-profiling. They are not considered in detail here but consideration is given below to the potential impacts on health and safety from the reclamation operations and their completion.

13.2 Assessment Method

13.2.1 General Approach and Objectives

The main objective of the socio-economic assessment is to:

- Set out the baseline socio-economic conditions in the immediate area;
- Identify any significance of the British reclamation proposals on the local environment and communities during the operation of the scheme; and
- Comment on further opportunities for mitigation where appropriate.

This chapter assesses the effects of the presence of the reclamation scheme as described in Chapter 3. Effects considered include direct effects such as disruption to access, communities and amenity uses, housing, and occupation profiles. The significance rating assigned to impacts is based on the generic criteria in Table 1.1.

13.2.2 Data Analysis

The analysis has taken the form of a desk top review of existing data sources including:

- Census 2001;
- Welsh Index of Multiple Deprivation 2005;
- StatsWales(WAG) 2005; and
- The Land Registry.

Other relevant sources/strategies have also been considered, including:

- Welsh European Funding Office website;
- Consultation on the European Structural Funds Convergence Programmes (ERDF and ESF) for west Wales and the Valleys 2007–2013; and
- Commuting in Wales, Welsh Assembly Government.

13.3 Baseline Conditions

13.3.1 Community

The British site falls within the Abersychan and Garndiffaith Ward of Torfaen County Borough Council. It is surrounded by small villages and communities that were first developed to house those working in the iron and coal industries, including workers on the British site. The closure of iron and coal operations led to a decline in the population and has left the area with a legacy of high unemployment and poor environmental conditions.

13.3.2 Demographics

Analysis of the 2001 Census identifies several demographic trends:
• Torfaen has a total population of 90,949 of which 6,826 (8%) reside in Abersychan.
• Abersychan has a higher concentration of children up to the age of 16 (24%) than Torfaen (23%) and Wales as a whole (22%).
• Abersychan has a lower concentration of elderly people aged 60-74 (13%) compared to Torfaen (14%) and Wales as a whole (14%).
• Abersychan is predominantly white with a low ethnic diversity; similarly, Torfaen also has a very low ethnic diversity. Based on current trends, the ethnicity in the area is likely to remain reasonably constant in the future due to the low levels of population transience.

13.3.3 Deprivation
The Welsh Index of Multiple Deprivation (WIMD) 2005 is one of the key indicators used to benchmark an area’s social and economic well being. It is also one of the key tools for identifying area based regeneration priorities. The WIMD is made up of a series of indicators which are used to score deprivation in defined geographic areas, known as Super output areas (SOAs).

There are 1896 SOAs in Wales. With a total of 60 SOA’s in Torfaen, only 2, Trevithin 1 and Blaenavon 2, are amongst the 10% most deprived areas in Wales. Nevertheless, 55% of Torfaen’s SOA’s experience higher than average levels of deprivation. Two areas in Torfaen are within the 10% most deprived in Wales.

The five SOAs of Abersychan have deprivation scores of 37.9, 31.9, 28.0, 22.2 and 16.5. The most deprived area in Torfaen has a deprivation score of 51.7. Abersychan is therefore not a particularly deprived area when compared to the national (Wales) average and the Torfaen area as a whole. The highest deprivation score in Wales is the Super Output Area of Butetown 2 with a deprivation score of 78.9. Abersychan’s five Super Output Areas rank 5th, 10th, 17th, 29th and 36th out of the 60 Super Output Areas in Torfaen.

13.3.4 Economy, Employment and Unemployment
The Torfaen Unitary Authority has been designated an Objective One area. Objective One is the highest priority designation for European aid and is targeted at areas where prosperity, measured in Gross Domestic Product (GDP) per head of population, is 75% or less of the European average. Torfaen has a relatively high rate of economic activity and the unemployment rate is broadly in line with the national average at around 3%. However, during the last 15 years the Welsh economy has experienced two recessions, one at the beginning of the 1980’s and the second at the beginning of the 1990’s. A fragile recovery from the latest recession is now occurring, and unemployment has fallen since April 1993. Unemployment in Torfaen has followed the national trend, in 2001 there 2,205 people unemployed, or 5.4% of the employee workforce.

Pontypool and Cwmbran today provide most of the employment options in Torfaen, being close to the M4 motorway and with good trunk road access. Opportunities elsewhere within the Borough are more limited. However, there are increasing employment opportunities in Newport and Cardiff, which are easily accessibly by car but an improvement is required to maximise opportunities for those who rely on public transport.

In 2001 there were 39,248 economically active persons in Torfaen. Of these, 2,709 people were economically active in Abersychan. The number of people in full-time employment in Torfaen slightly higher than the national average and there is a higher propensity for part

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2 The measures of deprivation that make up the WIMD include income (25%), employment (25%), health and disability (15%), education, skills and training (15%), geographical access to services (10%), housing deprivation (5%) and physical environment deprivation (5%). The figures in brackets illustrate the weighting given to each indicator to reflect its relative importance in forming the Indicator of Multiple Deprivation.

3 ‘Economically active’ refers to those people aged 16-74 who are able to work, not whether they are actually working. Those who are unemployed and actively seeking work are included in the calculation. Similarly, those who do not suffer from a limiting illness or disability are also included.
time employment. The percentage of people economically inactive in Torfaen from 2000-2005 was 13,600 people. This equates to 25.1% of the workforce, but this figure is below the Welsh average of 28.1%.

The north Pontypool and Blaenavon areas have historically been reliant upon coal and iron production. Whilst a small number of mines do still operate, providing small-scale employment, the overwhelming decline of the scale of these industries caused considerable social and employment problems for the area.

The major initiatives for alleviating these problems have been undertaken by the public sector, with new industrial units developed by the former Torfaen Borough Council, the former Gwent County Council and the Welsh Development Agency. Private investment in new industry has been minimal.

In 2001, the largest industries for employment in Abersychan were: Manufacturing (25% - 635 people), Wholesale and retail trade (14% - 364 people) and Health and Social Work (13% - 347 people). The southern part of the area benefits from good road access to the M4 corridor but road access to the northern part of the area is poor.

The steady decline in UK manufacturing since the 1980’s hit the South Wales Valleys hard but the area of Torfaen has responded positively in recent years. According to figures presented on the local authority website, over half a million pounds of funding has been ploughed into more than 160 businesses in the last two years. Over 440 jobs will be created and a further 470 have been safeguarded. Torfaen is fortunate to have been located in an Objective One area. The Council's grant schemes have proved to be an important source of support for local Small and Medium size Enterprises (SMEs), making a valuable contribution to developing the local economy and the regeneration of the area.

13.3.5 Housing

The Newport, Torfaen, and Monmouthshire Local Housing Market Assessment, August 2007 states that the British site and surrounding communities fall within the North Torfaen sub-region. North Torfaen is considered the least prosperous housing market in the sub-region.

The housing stock in Torfaen has suffered from a lack of investment for many years. The need for affordable housing is a key issue in Torfaen, average house prices have almost trebled in the period 2001-2008 with the average house price in January 2008 being £127,838, as shown in Table 13.1. Average house prices relative to income are also increasing with the average house price now being 5.3 times the average income. This is an important issue for economic growth, as many young people are forced to migrate out of the borough due to a lack of affordable homes.

<table>
<thead>
<tr>
<th>Month</th>
<th>Index</th>
<th>Average Price (£)</th>
<th>Monthly Change (%)</th>
<th>Annual Change (%)</th>
<th>Sales Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-01</td>
<td>98.4</td>
<td>49,128</td>
<td>1.9</td>
<td>-</td>
<td>73</td>
</tr>
<tr>
<td>Jan-02</td>
<td>113.5</td>
<td>56,681</td>
<td>1.3</td>
<td>15.4</td>
<td>76</td>
</tr>
<tr>
<td>Jan-03</td>
<td>139</td>
<td>69,441</td>
<td>1.9</td>
<td>22.5</td>
<td>86</td>
</tr>
<tr>
<td>Jan-04</td>
<td>169.6</td>
<td>84,732</td>
<td>1.1</td>
<td>22</td>
<td>82</td>
</tr>
<tr>
<td>Jan-05</td>
<td>213</td>
<td>106,402</td>
<td>-0.6</td>
<td>25.6</td>
<td>55</td>
</tr>
<tr>
<td>Jan-06</td>
<td>227</td>
<td>113,395</td>
<td>1.6</td>
<td>6.6</td>
<td>66</td>
</tr>
<tr>
<td>Jan-07</td>
<td>245.1</td>
<td>122,435</td>
<td>1.4</td>
<td>8</td>
<td>124</td>
</tr>
<tr>
<td>Jan-08</td>
<td>256</td>
<td>127,838</td>
<td>-0.3</td>
<td>4.4</td>
<td>-</td>
</tr>
</tbody>
</table>

(Source: HM Registry, 2008)

According to the Torfaen County Borough Council website, Abersychan has a lower proportion of owner occupied households at 64.6% than Torfaen 68.3% and Wales as a whole 71.3%. 27.0% of properties are rented from the local authority (Torfaen 22.8%, Wales 13.7%).

### 13.3.6 Commuting

The Office of National Statistics statistical bulletin on Commuting in Wales 2005 examined commuting patterns in Wales for those who are either employees or self employed. Torfaen has the 13th largest outflow of commuters in Wales with 13,300 residents commuting out of the area to work. Whilst 96% of its residents work in Wales 65% work in the Torfaen County Borough area. Table 13.2 indicates that 50% of residents in Abersychan who travel to work travel anywhere between 5km and 20km in commuting to work.

#### Table 13.2 – Distance travelled to work from Abersychan

<table>
<thead>
<tr>
<th>Distance Travelled</th>
<th>Number of People</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works mainly at or from home</td>
<td>169</td>
<td>7</td>
</tr>
<tr>
<td>Less than 2km</td>
<td>254</td>
<td>10</td>
</tr>
<tr>
<td>2km to less than 5km</td>
<td>460</td>
<td>18</td>
</tr>
<tr>
<td>5km to less than 10km</td>
<td>670</td>
<td>26</td>
</tr>
<tr>
<td>10km to less than 20km</td>
<td>599</td>
<td>24</td>
</tr>
<tr>
<td>20km to less than 30km</td>
<td>148</td>
<td>6</td>
</tr>
<tr>
<td>30km to less than 40km</td>
<td>47</td>
<td>2</td>
</tr>
<tr>
<td>40km to less than 60km</td>
<td>35</td>
<td>1</td>
</tr>
<tr>
<td>60km and over</td>
<td>40</td>
<td>2</td>
</tr>
<tr>
<td>No fixed place of work</td>
<td>119</td>
<td>5</td>
</tr>
<tr>
<td>Working outside the UK</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Working at offshore installation</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(Source: Census, 2001)

### 13.3.7 Education

Torfaen appears to suffer from low educational attainment when compared with the Welsh average. Torfaen has 36.7% of the population with no qualification compared to the Welsh average of 33%. Table 13.3 indicates the percentage of residents in Abersychan with certain levels of educational attainment. 77% of resident in Abersychan have Level 2 qualifications or less.

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4 No qualifications: No academic, vocational or professional qualifications
Level 1: 1+ ‘O’ level passes, 1+CSE/GCSE any grades, NVQ level 1, Foundation GNVQ
Level 2: 5+ ‘O’ level passes, 5+CSEs (grade 1), 5+GCSEs (grade A-C), School Certificate, 1+ A’ levels/AS levels, NVQ level 2, Intermediate GNVQ
Level 3: 2+ A levels, 4+AS levels, Higher School Certificate, NVQ level 3, Advanced GNVQ
Table 13.3 – Educational attainment levels of Abersychan

<table>
<thead>
<tr>
<th>Qualifications</th>
<th>Number of People</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No qualifications</td>
<td>1950</td>
<td>41</td>
</tr>
<tr>
<td>Level 1 qualifications</td>
<td>876</td>
<td>18</td>
</tr>
<tr>
<td>Level 2 qualifications</td>
<td>866</td>
<td>18</td>
</tr>
<tr>
<td>Level 3 qualifications</td>
<td>176</td>
<td>4</td>
</tr>
<tr>
<td>Level 4 / 5 qualifications</td>
<td>546</td>
<td>11</td>
</tr>
<tr>
<td>Other qualifications: Level unknown</td>
<td>362</td>
<td>8</td>
</tr>
</tbody>
</table>

(Source: Census, 2001)

There is also a lower proportion of 19 year olds with 5 GCSE’s (A-C) with 47.3% achieving this compared to the Welsh average of 56%. 25% of adults in Torfaen have no basic numeracy and literacy skills compared to 21% at an all Wales level. In terms of the percentage of 16 year olds staying on in education, Torfaen is comparable with neighbouring authorities, but they all generally fall below the Welsh average.

13.4 Assessment of Impacts

13.4.1 On Completion

The current implementation programme anticipates that the reclamation work would begin in 2009. The duration of reclamation works is expected to last up to 48 months.

The earthworks reprofiling will produce a stable contoured site ready for future development. There is intended to be only the briefest transitional stage between the completion of reclamation and commencement of development in accordance with the masterplan (subject of second application). The interim condition, for the community, will be that of a safe, tidied up site on the edge of the settlement. This will be a major benefit to local residents, given the hazardous nature of the existing site.

13.4.2 During the Reclamation Works

Employment

The reclamation works will provide opportunities for civil construction and extraction jobs during the period of the works. Up to 100 persons may be working on the site at any one time, including supervisory staff, plant operators, earthworks operatives and contractor staff. Wherever possible the Contractor will utilise local sub-contractors and suppliers for specialist inputs and consumable items. The need for specialist consultants e.g. ecologists, water scientists will be on a part time basis under the Contract. It is a policy of the developer to recruit locally for personnel at all stages, to enhance local employment and attention will be paid to the development of local initiatives in order to benefit the local economy.

Assuming that the reclamation works will be contracted to a company in South Wales, it will safeguard local construction workers’ jobs. The most recent census data indicates that about 7% of the Torfaen workforce can be found in the construction industry.

In addition to direct employment, the project will give rise to indirect benefits as businesses see construction monies being spent and invested in the local economy. Major construction jobs can, by means of the well known multiplier effect, generate significant additional employment in businesses that benefit from local spending of construction workers as well as sub-contracts, services and supplies needed by contractors.

In terms of employment and investment the impact of the reclamation scheme on the economy is wholly beneficial. Further benefits will flow from the subsequent investment in development on the site and the influx of a new residential population with spending power.
Property Impacts
The amenity impacts of the development on residential properties are covered in the other chapters of this statement including, inter alia, noise, dust and visual intrusion. They act cumulatively together to affect the residential amenity of properties, particularly those nearest to the site (Castle Wood, Elizabeth Row, Commercial Road, Church Road, Pisgah Road, Church Road and Heol Waun) There is no systematic evidence of the impact of reclamation schemes on house prices but, for the temporary duration of the works, it is likely that the impact will be major adverse. This will be counteracted by the benefits, on completion, of the presence of a restored landscape which has removed safety hazards, dereliction and unsightliness.

There may be some concern from the local community that, on an already weak road network, the impact of increased traffic may exacerbate the safety of certain road, journey times and journey reliability along main commuter and through roads; indirectly discouraging visitors and inward investment to the area.

Health Impacts
A separate Health Impact Assessment is being prepared to accompany the planning application which deals with the impact of the reclamation operation on health and well being. The heritage of heavy industry, with both steel making and coal mining significant in the first part of the 20th century has, in common with other industrialised areas of South Wales, and had an impact on health. Some aspects relating to the general health of the Torfaen area are summarised below:

- Surveys have been done on people's perception of their health (and by implication, their well-being) and Torfaen does have significant proportions of the population reporting fair (24%) to poor health (14%) in comparison to the perception in England and Wales as a whole which are 22.2% and 9.2% respectively.
- The Welsh Health Survey (Reference 1) asks people questions about their perceptions of their physical and mental health. The mean Mental Component Summary (MCS) score of 48.5 (for 2006/2007) for Torfaen is the 5th lowest score of all local authorities in Wales. This score is statistically significant and suggests that adults in Torfaen experience poorer mental health than a majority of adults across the rest of Wales.

Whilst correlations may be drawn between mental and physical well-being and the success and confidence of communities, no such correlation is made here but there is the potential to affect long term health perceptions through regeneration projects like the British.

Findings from previous studies into similar reclamation schemes suggest that, from extrapolation of epidemiological evidence, it is most unlikely that the incidental coal recovery component would have any long-term effects on the health of local communities (Reference 2).

13.5 Mitigation
Potential enhancements to the social and economic benefits that can be derived by the community from the scheme include:

- Early liaison with local people for their training and potential employment once the scheme is completed;
- Local labour agreements to encourage employment of local people and businesses;
- The use of local purchasing initiatives, where possible, to capture the maximum benefits of the scheme to Torfaen construction firms and product manufacturers;

Delivery of an inclusive set of community benefits can form the basis for a Community Action Plan for increased wealth creation and sustainability.
13.5.1 Residual Effects
A Community Action Plan for the reclamation phase and subsequent development should be developed to ensure that benefits are delivered and net additional impact maximised through an integrated package of actions including construction initiatives, cluster and supply chain development, temporary employment and training and inward investment. With this in place the significance of the impact on completion will be beneficial. For the duration of the works the impact on employment is moderate beneficial and on wider community amenity, moderate adverse.

13.6 References


Part C: Conclusions
14 Conclusions

14.1 Introduction

The conclusions drawn from the assessment of likely impacts of the reclamation scheme have been assembled in the Tables Below. This chapter draws together the conclusions of the individual assessment chapters to provide an overview of the effect of the reclamation scheme as a whole on the environment.

14.2 Summary of Potential Effects and Significance

The first table summarises the impacts associated with the active period of bulk excavation and reclamation and potential mitigation measures.

Table 14.1 – Temporary Impacts and Assessment of Significance

<table>
<thead>
<tr>
<th>Topic/Resource</th>
<th>Nature of Impact</th>
<th>Mitigation</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground and Groundwater</td>
<td>Potential contact with contaminated material through dermal contact, ingestion or inhalation.</td>
<td>Training, good site management and hygiene practices and appropriate use of personal protective equipment.</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excavations will result in faster groundwater flows.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Storage and attenuation</td>
<td></td>
</tr>
<tr>
<td>Surface Water and Drainage</td>
<td>Potential impacts on surface water quality.</td>
<td>Water treatment/Stilling ponds</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td>Visual intrusion of temporary screen bunds and storage mounds.</td>
<td>Careful design and positioning of screen bunds. Strategic planting.</td>
<td>Major Adverse</td>
</tr>
<tr>
<td>Archaeology and Heritage</td>
<td>Loss of archaeology during bulk excavations.</td>
<td>Preservation by record</td>
<td>Slight –Moderate Adverse</td>
</tr>
<tr>
<td>Topic/Resource</td>
<td>Nature of Impact</td>
<td>Mitigation</td>
<td>Assessment</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Transport and Accessibility</td>
<td>Additional trips on local transport network due to heavy good vehicles travelling to and from the reclamation site.</td>
<td>Traffic management measures and agreed routing of heavy vehicles away from residential areas. Transport Implementation Strategy.</td>
<td>Negligible</td>
</tr>
<tr>
<td>Noise</td>
<td>From excavation/earthworks, infrastructure and construction.</td>
<td>Control of working hours and within relevant guidance on acceptable noise levels and air quality standards. Temporary screening mounds and fences and careful layout of the site.</td>
<td>Major Adverse</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Fugitive dust and dust deposition.</td>
<td>Good working practices and dust suppression measures.</td>
<td>Slight Adverse – Substantial Adverse</td>
</tr>
<tr>
<td>Social and Economic</td>
<td>Jobs associated with reclamation works. Cumulative impacts on amenity of nearby residents.</td>
<td>Local employment Community liaison and responsiveness.</td>
<td>Minor Beneficial</td>
</tr>
</tbody>
</table>

The second table below summarises the permanent impacts associated with the reclamation scheme and potential mitigation measures.

### Table 14.2 – Permanent Impacts and Assessment of Significance

<table>
<thead>
<tr>
<th>Topic/Resource</th>
<th>Nature of Impact</th>
<th>Mitigation</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology, Soils and Water</td>
<td>Changes to the landform to accommodate development plots – stabilisation of slopes. Excavation of shallow mineworkings/hazards. Remediation of contaminants.</td>
<td>n/a</td>
<td>Moderate – Major Beneficial</td>
</tr>
<tr>
<td>Surface Water and Drainage</td>
<td>New surface water channel and culverts and provision of flood storage.</td>
<td>n/a</td>
<td>Major Beneficial</td>
</tr>
<tr>
<td>Topic/Resource</td>
<td>Nature of Impact</td>
<td>Mitigation</td>
<td>Assessment</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Landscape and Visual</td>
<td>Transformation from derelict Brownfield site to gently contoured reclaimed land ready to accommodate suitable development. Change to the fabric, character and quality of the landscape.</td>
<td>Sensitive layout and earthworks formation taking the SAMs/Listed Buildings into consideration. Advance structural planting.</td>
<td>Minor – Moderate Beneficial</td>
</tr>
<tr>
<td>Ecology</td>
<td>Creation of new on-site habitats following loss during reclamation works. Enhancement of off-site habitats.</td>
<td>Retention of important habitats. Habitat creation and management.</td>
<td>Minor Adverse</td>
</tr>
<tr>
<td>Archaeology and Heritage</td>
<td>Retention of historic industrial buildings and structures. Potential for subsequent beneficial use and/or interpretation within developed site.</td>
<td>Programme of archaeological works to ensure that features of the highest value will be preserved in situ.</td>
<td>Moderate Adverse</td>
</tr>
<tr>
<td>Transport and Accessibility</td>
<td>Establishment of new diverted routes and access points for the permanent development.</td>
<td>Junction improvements. Road alignment improvements. Long term potential to traffic calm existing B4246.</td>
<td>Moderate Beneficial</td>
</tr>
<tr>
<td>Noise</td>
<td>Interim restored site pending development. No principal noise source/generators except for diverted through traffic.</td>
<td>n/a</td>
<td>Neutral</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Interim restored site pending development. No principal air pollution source/generators except for diverted through traffic.</td>
<td>n/a</td>
<td>Minor Beneficial</td>
</tr>
<tr>
<td>Social and Economic</td>
<td>Interim restored site pending development. Permanent resolution of on-site safety hazards.</td>
<td>n/a</td>
<td>Moderate Beneficial</td>
</tr>
</tbody>
</table>

The summary assessment tables demonstrate that most of the temporary environmental impacts during the duration of the reclamation scheme fall into the range minor to major adverse whilst the permanent environmental impacts are overwhelmingly beneficial. This is
what would be expected of a reclamation scheme of this type, in which a period of disruption and loss of amenity is a necessary pre-requisite to remediation of dereliction, regeneration and revitalisation of the area.

Having regard to the scale and nature of the development and those receptors open to adverse environmental impacts - primarily those of noise, dust and visual intrusion – there is a counterweight afforded by the social and economic benefits (particularly in the long term) of new jobs and the financial injection into the local economy, together with the community benefits of remediation of an unsafe site.

As with all developments, however, the costs and benefits are not evenly distributed and are not necessarily balanced for individuals. Clearly, the nearest residents and receptors will experience the greatest impacts and some of these will be cumulative regardless of magnitude eg loss of view, increases in noise and disturbance, changes to amenity and so on. Whilst the cumulative impacts upon them should not be underestimated or disregarded, nonetheless, for the wider community the reclamation of The British is a key component of sustainable regeneration and growth.