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ENERGYBUILD LTD

Planning Application for 25 year Life of Mine Operations Development at Aberpergwm Mine

Environmental Statement – Volume 1

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Energybuild LTD

PROPOSED PLANNING APPLICATION FOR 25 YEAR LIFE OF MINE OPERATIONS

DEVELOPMENT AT ABERPERGWM MINE

Environmental Statement – Volume 1

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PART A – INTRODUCTION

1 INTRODUCTION AND BACKGROUND TO THE ES

1.1 Introduction

1.1.1 This Environmental Statement (ES) has been prepared on behalf of Energybuild Ltd in connection with an minerals and waste planning application for works undertaken at Aberpergwm Mine, located at Glynneath in the Neath Port Talbot County Borough.

1.1.2 The boundary of this application area is shown on drawing number CA10605/001. The application area is centred on approximate grid reference E 284800, N 208200. The Aberpergwm Surface Mine operations are located north of the B4242 and approximately 400m north of the A465 in a semi-rural area centred on approximate grid reference E 286585 N 206027. The village settlement of Morfa Glas is located to the north east (north of the B4242), Glynneath to the east, and Blaengwrach and Cwmgwrach settlements south of the A465.

1.1.3 In summary, the application comprises three elements as follows:

- A consolidation and time extension of existing planning permissions for surface development and operations at Aberpergwm Mine;
- Use of land for a mine waste repository (MWR), with associated haul road, to dispose of colliery mine waste and discard from coal preparation at Aberpergwm Mine;
- Extension to and development of the underground coal workings at Aberpergwm mine.

1.1.4 There are substantial reserves of high quality Anthracite Coal that can be accessed and extracted by underground methods from Aberpergwm Mine. Energybuild's proposals are therefore to significantly develop and grow the mining business in the long term – i.e. 25 years and beyond.

1.1.5 To achieve this significant investment is needed to develop the mine. The investment will take place in stages. Initially it is dependent on having the security of a grant of

planning permission providing for the extraction of circa 70 million tonnes of coal, the deposition of 10+ million cubic metres of spoil and having long term permission to operate surface mine plant/infrastructure. Future phases of investment will then be related to the progressive increases in mine output and the need for more manpower and infrastructure to enable increases in coal production and export.

1.1.6 The Company is planning for growth in the mine's annual 'run of mine' output from 233,000 tonnes in 2014 to 1 million tonnes in 2019 and maximum output, at 2.5 million tonnes, from 2020 onwards.

1.1.7 The expansion of the underground workings will lead to a need for improved emergency egress from the workings. The higher levels of output from 2020 onwards may generate the need for additional/alternative transport infrastructure to assist with the intensification of the operations.

1.1.8 Therefore, there is the potential for Planning Applications to be brought forward in the future for:

- Potential re-opening of the existing Treforgan Colliery Main Intake and Main Return, and to use the drifts as emergency egress for the Aberpergwm Mine underground workings.

- Movement of mine waste to mine waste repository – potential overland conveyor; potential pipeline; potential to utilize a mix of methods in combination with use of an improved haul road.

- Coal exports – overall potential to increase movements of coal by rail, via Unity Mine Rail Head. Possible options for accessing the rail head – overland conveyor route; pipeline; overland haul route; or a mix of methods.

1.1.9 The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 require that, before consent is granted for certain types of development, an Environmental Imapct Assessment (EIA) must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments, which are either to be carried out in sensitive locatons or those which satisfy a threshold or criterion in Column 2 (Schedule 2 development) which may require an EIA if it is likely to have significant effects on the environment.

1.1.10 The proposal falls under the terms of Schedule 2, Part 2(b) Extractive industry, of the Town and Country Planning (Environmental Impact Assessment) Regulation 1999, for which EIA is not mandatory but depends on the scale and nature of the project. Due to the scale and nature of the proposals, Energybuild has submitted an Environmental Statement (this report) to support and facilitate determination of the planning application.

1.1.11 The purpose of the EIA process is to inform decision-makers and the public of the environmental consequences of implementing a proposed project. The EIA assesses the possible environmental effects of the proposal and identifies how those impacts can be controlled and/or suitably mitigated. The ES has been prepared to comply with the requirements of Part 1 of Schedule 4 of the Regulations, 1999.

1.1.12 In accordance with good practice and the guidance provided by the Department of Environment, Transport and the Regions (DETR) in Circular 02/99 entitled 'Environmental Impact Assessment' the Applicant has sought the Mineral Planning Authority's (MPA) Scoping Opinion. To assist the MPA in their judgment a report was prepared which provided an outline of the development proposal and broad consideration of its likely impacts. The Scoping request was submitted to Neath Port Talbot County Borough Council in February 2013 (Ref P20130304). Although the scheme is reduced from that set out in the scoping request (which was for a larger scheme, including two land conveyors and the re-opening of Treforgan) the responses received from the statutory consultees have been taken into account in the development of the proposal. In particular, the Authority raised concerns in respect of the increased use of the haul road. In response to these concerns a separate assessment of the haul road is provided in this ES.

1.1.13 The Environmental Statement comprises of a suite of technical assessment work presented as individual chapters and/or appendices. Each technical assessment considers the potential impacts of the development and the scale of these impacts i.e. whether they are minor/major etc. Each assessment then considers the significance of the potential impacts in accordance with relevant significance thresholds. The cumulative impact of the proposal, including the potential totality of the project, has also been considered as part of each technical assessment. This includes the consideration of successive effects (i.e. the potential impacts of the proposed development combined with the effects of past development, present development and development that is foreseeable in the future) and the

consideration of simultaneous effects (i.e. the impacts arising from multiple developments, occurring at different locations in the locality). An assessment of the cumulative impact of the whole project is included at Chapter 20. In addition to considering the successive and simultaneous effects, the chapter considers the combined environmental effects of the proposed development of Aberpergwm Mine.

1.1.14 Given there is a reasonable prospect of some future development options being fully considered and resultant proposals brought forward (i.e. the potential re-opening of the existing Treforgan Colliery Main Intake and Main Return, employment of alternative methods of transportation of waste to the MWR, employment of alternative or additional means of export of coal from the mine site and potential additional accommodation facilities), the EIA on the current Planning Application has considered the potential cumulative effects (both positive in terms of potential mitigation and negative in terms of further impacts) of this potential additional development. As these elements are potential options at this stage, with a whole series of variables in terms of approach, siting, design, etc - the assessment of these cumulative affects takes the form of a more desk based approach.

1.1.15 The planning application, which includes this ES, has been submitted to Neath Port Talbot County Borough Council as the authority responsible for determining the application.

1.2 Background to the proposal

1.2.1 Aberpergwm Mine, located at Glynneath in the Neath Port Talbot County Borough, is being successfully operated and developed by Energybuild Ltd. Coal production has fluctuated over the period 2007 to 2013 due to the re-focussing of production operations to complete the new drift phase 1 development.

1.2.2 Energybuild Ltd operates the Aberpergwm Drift Mine at Glynneath under a series of planning permissions granted during the period 2003 to 2013.

1.2.3 Operations at Aberpergwm colliery were scaled back during quarter 4, 2012 with the loss of 240 quality jobs. The mine was placed on care and maintenance from December 2012 to the end of May 2013.

1.2.4 Production operations were tentatively resumed at the mine during July 2013 at a reduced capacity and in support of the care and maintenance operation. Manpower during this period was increased from 31 to 65 and multi entry operations within the 18ft seam were restarted. An incremental re-employment of personnel is proposed, which, if the mining plan is allowed to reach full fruition, will eventually culminate with the employment of 529 employees. Coal production within the second half of 2013 was approximately 55,000 tonnes (ROM)

1.2.5 Energybuild is currently extracting coal from the 18ft seam (also called 6ft seam) and the 9ft seam is currently being developed by main underground development broadways for longwall mining proposals.

1.2.6 The majority of identified underground coal resources are located to the west of a major geological fault known as the Pentreclwydau Fault, within an extensive area of coal resources situated between Aberpergwm and Treforgan mines.

1.2.7 The overall mine production life is anticipated to be 25 years. Therefore, it is necessary to apply for a new planning permission for the anticipated life of the mine after 2013.

1.2.8 Energybuild is seeking a composite and consolidated 'life of mine' planning permission to secure the future of the mine and its workforce and to continue to attract investments.

1.2.9 During the period 2010 to 2012 Energybuild's focus concerned the development of the Aberpergwm New Drift and the development of underground tunnels to access the target mining area within the 9ft seam. Additionally a multi entry section was established and equipped during 2011 in the 18ft North area located immediately to the west of the Pentreclydau fault

1.2.10 An extensive development programme was initiated at the mine in 2010 which incorporated substantial underground tunnelling works to access the 9ft seam, the formation of a multi entry production section with the 18ft seam, installation of new production mining machinery and development of a new drift.

1.2.11 In 2008 it was established that the mine surface area and facilities did not have sufficient capacity to cater for the development of the mine, the planned increases in underground coal production and all necessary surface infrastructure.

1.2.12 Therefore new surface infrastructure developments including a new coal preparation plant and associated facilities, buildings, storage, new car parking and water attenuation pollution control facilities were identified as required.

1.2.13 Planning permission for the new surface developments at Aberpergwm Mine and upon the adjacent former Cae Capel field was granted by Neath Port Talbot County Borough Council on 23th November 2010 (Reference No P2010/0498). However, upon procurement of the surface developments approved under that planning permission, design changes were necessary in the location, appearance and dimensions of some of the buildings, structures and features granted planning permission. Further elements such as a run of mine (ROM) conveyor bunker and coal loading silo were introduced to improve operational efficiency and to reduce the level and dependence on the use of power loading shovels for the handling of ROM coal and coal products, thus reducing both noise and dust levels within the site.

1.2.14 Notwithstanding environmental improvements brought about by the design changes and the developments constructed, the County Borough Council requested Energybuild to submit a fresh application to regularise the planning permission to (1) retain the buildings, structures, landform and features constructed and (2) for proposed further developments at Aberpergwm Mine.

1.2.15 The Regularisation of the Cae Capel application was submitted in October 2012 and has been approved in August 2013 (Planning Permission 2012/0995).

1.2.16 However, the regularisation of the development at Cae Capel is limited to the extent of the existing planning permission by which Energybuild operates Aberpergwm Drift Mine at Glynneath (September 2013).

1.2.17 Therefore, Energybuild is seeking for planning permission to consolidate the existing operations, to extend the underground coal workings at Aberpergwm Mine and to secure a long term location for the deposit of mine waste at Forest Quarry 2 Extension (FQ2E).

1.2.18 The planning application boundary is shown on drawing number CA10605/001. The scope of the project is shown on the Scope Plan. The relevant planning authority is Neath Port Talbot County Borough Council (NPTCBC).

2 DESCRIPTION OF THE DEVELOPMENT

2.1 Introduction

2.1.1 A planning application for the continued, long-term development and operation of Aberpergwm Mine, Glynneath, Neath and Port Talbot County Borough, including:

- An extension to and reconfiguration of the underground coal workings;
- Creation of a mine waste repository with the retention and improvement of the associated haul road (to dispose of mine waste and discard from coal preparation at the mine) and the delivery of further peat habitat mitigation works;
- Mine Surface development, including - regularisation and time extension of existing mine related operations and mine surface development, consolidation of existing planning permissions and planning controls, construction of infrastructure/buildings, formation of materials storage and stocking areas, drainage works, and landscaping.

2.2 Extension to and reconfiguration of underground coal workings at Aberpergwm Mine

2.2.1 Energybuild proposes to extend their planning permission for underground coal workings to facilitate the long-term development of the mine business. An extension to the underground workings will enable maximum exploitation of the coal resources from the 18 Ft Seam and the 9ft Seam and secure the supply of high quality coals.

2.2.2 The underground application area is approximately 2,318 ha and contains in excess of 70 million tonnes of coal and is shown on drawing number CA10605/001.

2.2.3 Aberpergwm Colliery mines high quality Anthracite coal from the 18 Ft Seam and 9Ft Seam resource situated between the Neath and Dulais valleys in the County of Neath and Port Talbot. The customer base for the product includes metallurgical coal for use in pulverised coal injection techniques at the nearby Tata steel works at Port Talbot (which will be transferred by road to Port Talbot). Coal may also be transferred to Aberthaw.

2.2.4 To allow maximum exploitation of the coal resource and to allow sufficient flexibility in negotiating geological/hydrogeological conditions, Energybuild proposes to employ a mixture of underground working methods. Specifically longwall mining methods in association with multi-entry gate-road developments will be employed, although, for the purposes of maintenance of flexibility of underground mining systems shortwall, multi-entry and multi-entry pillar working will be utilized wherever underground conditions give rise to a need for such methods.

2.2.5 The development of the underground workings will be designed to sustain coal extraction and supply in the long-term and to increase the levels of coal production in a phased manner. Although the underground development and increases in tonnages will be influenced by the prevailing geological conditions, the plan's are to increase production of coal year on year from 2014 – 2020, with maximum production being sought and sustained beyond 2020. There is therefore the potential for "Run of Mine" coal output from the underground operations to increase as follows:

- 2014 – 233,000 tonnes
- 2015 – 233,000 tonnes
- 2016 – 670,000 tonnes
- 2017 – 833,000 tonnes
- 2018 – 1,000,000 tonnes
- 2019 – 1,000,000 tonnes
- 2020 – 2,500,000 tonnes

2.2.6 The duration of the underground development will depend upon the progress and development of the mining operations and the levels of output that are achieved. Based on current projections, but subject to the uncertainties of both underground conditions as well as the functioning of world coal markets, it is anticipated that the proposed extension to the underground workings will provide at least 25 years life for the mine.

2.2.7 The proposed underground extension is programmed to be implemented on a phased basis to include works in the zoned areas Z1, Z2 and Z3 in the initial years up to 2024, with zones Z4, Z5 and Z6 to follow. The extent of the proposals and the sub-division into underground zones are shown on Figure 9.9.

2.2.8 Table 2.1 below outlines the anticipated coal outputs (Run of Mine - ROM) up to 2020.

Table 2.1 – Anticipiated coal output

	Annual ROM (tonnes)	Product		Discard
		Product to Aberthaw	Product to Tata (Port Talbot)	
Year 1 - 2014	233,000	83,880	55,920	93,200
Year 2 – 2015	233,000	83,880	55,920	93,200
Year 3 – 2016	670,000	241,200	160,800	268,000
Year 4 – 2017	833,000	299,880	199,920	333,200
Year 5 – 2018	1,000,000	360,000	240,000	400,000
Year 6 – 2019	1,000,000	360,000	240,000	400,000
Year 7 - 2020	2,500,000	900,000	600,000	1,000,000

2.2.9 The underground development includes Treforgan west and south west coal resources and focuses on the Treforgan drifts and subsequent formation of an Aberpergwm – Treforgan underground link. As the underground development progresses, the proposed underground working will reach a stage where, for the purposes of underground logistics, ventilation and safety of access, consideration must be given to the provision of a second surface connection to the expanding Aberpergwm mine workings. A potential solution is the re-opening of the existing Treforgan Colliery Main Intake and Main Return and to use the drifts as emergency egress for the Aberpergwm Mine underground workings since these two tunnels extend toward the proposed Aberpergwm Mine underground workings. This aspect of the underground development will be the subject of a separate Planning Application to be submitted in the near future (potentially 2014) to allow recovery works and implementation to commence during 2016 – 2018.

2.2.10 In association with the progression of underground development the manpower at the mine is expected to increase from 166 in 2014 to 529 in 2020. Over this period and as part of the workforce the mine will employ between 23 and 44 trainees/apprentices.

Potential for Subsidence

2.2.11 The underground workings of the 9ft and 18ft seams of coal will cause varying magnitudes of ground movement within the planning application area and in part of the immediately adjacent area. The northern boundary of the planning application area has been purposely designed to avoid ground movement extending into the administrative area covered by Powys County Council.

2.2.12 The surface area overlying and immediately adjacent to the planning application area is predominantly not sensitive to mining induced movement. A Mining Subsidence assessment has been conducted to identify the potential for the mining works to pose a risk to existing communities, existing sensitive receptors such as Schedule Monuments and future land use proposal such as the Hirfynydd windfarm. The subsidence assessment is provided as a separate stand alone report which accompanies the proposal. A summary of the report is provided in section 7 of this ES.

2.3 Use of land for a mine waste repository, with associated haul road, to dispose of colliery mine waste and discard from coal preparation at Aberpergwm Mine

2.3.1 To ensure the long-term production and supply of coal, and the planned increases in output, a long term location needs to be secured for the deposit of colliery mine waste, including discard from coal preparation and waste rock from underground mining development.

2.3.2 The application therefore includes a long term mine waste repository (MWR) capable of accommodating approximately 10.4 million m3 of material. The deposition of discard at the MWR will be carried on in conjunction with the continued use and improvement of the existing haul road, including water pollution control measures, and also the provision of an associated inspection and maintenance regime which will ensure that discard haulage operations are carried out in an environmentally acceptable manner.

2.3.3 For the purposes of maximising the use of land previously disturbed by surface mining operations and consequently minimising potential negative environmental impacts it is planned to construct the repository on the now defunct Forest Quarry series of opencast sites.

2.3.4 The proposed mine waste repository location is situated on high ground on the Hirfynydd mountain to the south of the Sarn Helen Roman Road, 2km west of the village of Glynneath and 3km to the east of Seven Sisters.

2.3.5 Approximately 70% of the mine waste repository site has been surface mined whilst the remainder of the proposed repository area is comprised of rough part harvested commercial forestry. Peat deposits exist at the eastern area of the site which will be translocated to the mitigation area as deposition proceeds.

2.3.6 It is proposed that the mine waste repository will accommodate the entire necessary environmental protection infrastructure comprising of three separate purposely designed runoff water treatment settling and attenuation pond systems, armoured water collection channels and associated drainage ditches and catch pits and a winter storage area for use in inclement weather when deposition may be difficult.

2.3.7 During the early years of operation the discard material will be transported from Aberpergwm Colliery to the repository by means of articulated dump trucks via the existing haul road which interconnects the sites. The deposition of discard at the repository will be carried on in conjunction with a programme of improvement of the existing haul road and associated water pollution control measures and also the provision of an enhanced inspection and maintenance regime which will ensure that discard haulage operations will be carried on in an environmentally acceptable manner. With regard to the planned incremental increase in mine production and hence the associated increased volumes of discard generation the haulage of discard by articulated dump truck has the potential to be replaced by or supplemented by alternative means of transport which would limit the impact of haulage of discard to the repository as the mine moves to maximum planned production levels.

2.3.8 On site structures will be comprised of a standard portakabin welfare and site office cabin, Portaloo, and bunded diesel tank. These will not be permanent features and will be moved to suit the deposition of the waste.

2.3.9 The mine waste repository is designed to accommodate the mining waste and coal processing discard during the full anticipated operational life of Aberpergwm Colliery. The facility is an intrinsic and critically important aspect of the overall mine development and operational programme and will enable the exploitation of in excess of 70 million tonnes of valuable Anthracite coal resource. Only inert mining

and processing mineral waste product will be deposited at the mine waste repository during its operational life.

2.3.10 Discard mineral will be deposited on site in a phased and controlled manner over the anticipated life of the repository. The methodology of deposition will conform to best practice, geotechnical design and monitoring, within the requirements of the Mines and Quarries (Tips) Act. The deposition will produce a domed section land form with a maximum elevation of 486 AOD. The northern extremity of the structure will blend into the existing elevated topography which is comprised of a restored surface mining area and overburden mound associated with previous open cast mining operations.

2.3.11 Opencast operations on the site have ceased and a final void of approximately 470,000m³ has been formed by virtue of the mining operation together with the initial on site access roads and drainage requirements for the phase one deposition operations.

2.3.12 Development of the MWR will commence in the Phase 1 area (final void of the opencast site- Years 0 - 5) and then progress to the southern half of the eastern boundary. Deposition of colliery spoil will then progress in a southerly direction creating an outer (completed) flank to the MWR structure. Operations will then progress in a northerly direction into the Phase 3 area as shown in Drawings No. JA-034-012-003.3 and 003.4

2.3.13 The overall scheme of development will, in general terms, be from south to north – as shown in the phase drawings JA-034-012-003.3 to 003.5 and deliver the final scheme as shown in Drawing No. JA-034-012-001.

2.3.14 Undisturbed peat and soil resources which exist on site, mainly at the southern and eastern areas, will be excavated prior to the deposition of discard. Soils and inferior peat will be utilised to provide early restoration of the southern flank and progressive restoration of the repository as deposition proceeds. Existing excavated soils currently maintained in storage mounds on the eastern side of the site will be utilised in a similar fashion.

2.3.15 Ultimate full restoration of the repository site will include areas of mixed coniferous plantation/acid grassland heathland mosaic and commercial forestry plantation which will promote suitable habitats for Skylark and Meadow Pipit. The coniferous

plantation will be beneficial for Nightjar during the post planting and post felling periods. The creation of ephemeral ponds will promote colonisation by frogs and newts which in turn will be beneficial for Honey Buzzards.

Haul Road

2.3.16 Aberpergwm colliery development and coal processing discard will be transported to the proposed mine waste repository by means of articulated dump trucks via the existing haul road.

2.3.17 The haul road is 5.4 km in length and is generally of a robust construction surfaced with compacted stone and having a nominal width of between 6 and 12 metres. It is serviced by the requisite environmental protection facilities in the form of two runoff water treatment systems comprised of a total of nine water settling and attenuation ponds and associated armoured channels, collection channels and edge protection which run adjacent to the roadway line. Treated runoff water is discharged via two consented discharge points, one serving the lower sections of the haul road and one servicing the upper reaches. Control of dust is achieved by the use of a bowser to water down the roadway surface during periods of excessively dry weather.

2.3.18 The haul road winds in a north westerly direction from the Aberpergwm Colliery site through areas of commercial forestry plantation and over sections of previous restored and part restored open cast mine sites to the repository. It rises from an elevation of 46m AOD at the Aberpergwm Colliery surface to a maximum elevation of approximately 453m AOD having an average positive hauling gradient of 1:13, the steepest sections being in the region of 1:5 for short stretches. Central sections and areas of the lower sections of the haul road are visible from some residential areas of Glynneath and villages on the eastern flank of the valley. The haul road has served to carry operational opencast coal site traffic and licensed mine traffic for the past 20 years.

2.3.19 In keeping with the proposal to expand underground mining operations at Aberpergwm Mine, it is consequently proposed to increase the number of articulated dump truck movements utilising the haul road for the purpose of the disposal of mine and processing discard at the repository site. The potential progressive increase in truck movements in relation to the forecast coal production levels are shown in the table below.

Table 2.2 -Transportation of Mine Discard by ADT and Haul Road (Revised Production Schedule)									
	2013	2014	2015	2016	2017	2018	2019	2020	
ROM (Tonnes)	55,500	233,000	233,000	670,000	833,000	1,000,000	1,000,000	2,500,000	
PROCESSING DISCARD	22200	93200	93200	268000	333200	400000	400000	1000000	40% DISCARD
DEVELOPMENT DISCARD	0	138,000	0	0	0	0	0	0	100% DISCARD
TOTAL DISCARD TO MWR	0.195	2.033	0.819	2.356	2.929	3.516	3.516	8.791	35T ADT LOADS PER HOUR
NOTE.	The truck movements quoted refers to the average one way loaded truck movements anticipated per hour based on a 65 hour working (Hauling) week. Elevated discard levels during 2014 are a consequence of the planned initiation of underground developments which in the main will be driven in rock.								

2.3.20 Prior to the onset of maximum production as a result of the utilisation of longwall mining, other methods of transportation of discard may be introduced to offset the haulage levels on the haul road, which may be beneficial in operational and environmental terms.

2.3.21 During the period to 2019 (approx) it is recognised that additional operational demand will be placed on the haul road in relation to increased articulated dump truck movements, i.e. above recent and past levels of movements. To ensure that a robust environmental protection regime is maintained throughout the utilisation period it is planned to initiate a programme of haul road improvement and instigate a rigid inspection and routine maintenance programme.

2.3.22 A study of the existing haul road and associated environmental protection measures has been carried out. This has considered existing conditions and suitability for purpose, including:

- Mapping of existing haul road and existing water treatment facilities.

- Survey, including lagoon areas, pipework, haul road surfaces, gradients, cross gradients, etc

2.3.23 In turn specific consideration has been given to:

- Potential shortfall in water treatment capacity and effectiveness of water treatment systems

- Roadway surface suitability and durability, including texture, gradients, layout, catchments

2.3.24 As a consequence of this survey and review of the haul road it is proposed to modify the haul road to provide a suitable operational width and surface (including a crushed stone surface with additional roadway fabric on high wear areas), with sufficient inter visibility, to allow increased usage by haulage dumper traffic. The proposals also include modification and upgrading of existing water treatment facilities as well as additional water treatment facilities and additional discharge points.

2.3.25 It is also proposed that a regime of inspection and routine maintenance is implemented to ensure the short and long term preservation of the integrity of the haul road system for the life of the mine.

2.3.26 Besides the additional physical features and regime of maintenance, Energybuild would operate a regime of water bowsing during periods when weather and climatic conditions give rise to an increased potential for dust generation.

2.4 A consolidation and time extension of existing planning permissions for surface development and operations at Aberpergwm Mine

General

2.4.1 The planning history for the surface developments and operations at Aberpergwm Mine is complex, with numerous planning permissions for a whole range of both large scale and small scale developments and operations.

2.4.2 The application proposes the consolidation of the existing permissions and planning controls for the surface development and operations into a single set of planning conditions covering a defined area of the site. The application therefore includes a

red line boundary around the area of surface development/operations that are necessary to operate the mine taking account of the planned underground development and the use of the associated MWR and haul road.

2.4.3 Details of existing structures to be retained and structures to be developed are set out in detail below and shown on plan ref JNP/SRP/13 – Rev01:

- Access Roads and concrete hard standings;
- Stores building – 15.2m (max) x 9m x5.8m (max) high. Kinspan KS1000RW composite cladding finished in RAL 160 20 10 Juniper Green;
- Security Gatehouse Cabin – 4.5m x 2.5m 3.6m high
- Terrace of 4 x sized product bins (total length 73.8m), precast concrete;
- Wheelwash;
- coal loading hoppers – each 3.2m x 3.2m x 4.6m high constructed of steel and painted green;
- Timber acoustic barrier – 3m high pressure treated softwood;
- Run of Mine (ROM) Coal loading bunker and Coal Preparation Plant in-feed conveyor (approximately 117m x 7.5m x 14.9m high) open sided steel with corrugate steel roof, painted;
- Coal Preparation Plant (CPP) 45.3m x 42.4m 19.5m high dark green corrugated profile cladding on a plinth;
- Laboratory and Welfare Building - approximately 11.5 x 5.4 x 5.8m high Kingspan KS1000RW composite cladding finished in RAL 160 20 10 Juniper Green with galvanized steel external walkway and steps;
- Coal loading silos - 15 x 16.4 x 14.5m high, constructed of steel and painted green;
- Surface water and foul drainage facilities;
- Surface water attenuation and settlement facilities;

- Water discharge points;
- CPP Substation & Transformers - 5.1 x 12.5 x 4m high, Kingspan KS1000RW composite cladding finished in RAL 6002 Heritage Green with a transformer in a 3.6 x 12.5m, 2m high galvanized steel palisade fence enclosure to the rear;
- Coal stocking and materials storage;
- Weighbridge;
- Weighbridge Control Building– approximately 6.3 x 7.7 x 6m high Kingspan KS1000RW composite cladding finished in RAL 160 20 10 Juniper Green with concrete steps and tubular galvanized handrail;
- Rainwater harvesting facilities;
- Fan-house substation and cable duct;
- FSV Garage;
- New drift substation;
- Boiler house, and
- Electrical substation.

2.4.4 A number of items that already have the benefit of planning permission are either under construction or are programmed for construction as follows:

- the permitted overland ROM conveyor and spiral chute bunker infrastructure are currently under construction, and
- the transfer building components are programmed for installation in 2015.

2.4.5 The Phase 1 drainage works, which are already permitted, are also programmed for early delivery as is the car parking and highway improvements on the B4242. These elements are capable of being the subject of specific planning controls requiring their delivery.

2.4.6 In terms of operations at the surface, and in particular the processing of coal, it is envisaged that there is sufficient capacity for processing the progressively increasing tonnages of coal and that the existing operating hours are sufficient and, other than the highest planned outputs which have the potential to be realised from 2020 onwards, provide sufficient capacity for dealing with the increasing outputs from the mine. Therefore, this Planning Application and the consolidation of the existing planning permissions do not propose any change or extension to the existing planning controls over operating hours at the site.

2.4.7 The operation of the recently installed coal washery provides both substantial capacity for the mine (up to 400 tonnes per hour) and the cladding/sound insulation on this plant, along with the surface site's internal acoustic fence, ensures that the plant is able to operate without causing exceedances of the existing noise controls/limits.

"Run of Mine" Material Handling and Stocking

2.4.8 As the mine moves out of its current recovery phase improved operating systems will be implemented based around the new infrastructure.

2.4.9 The handling of run of mine output will involve the following sequence:

- Run of mine material will arrive at the surface via the new drift. The material will be transported to the Coal Preparation Plant via the Transfer House, the Overland Conveyor, the Spiral Chute Bunker and the Coal Preparation Plant Feeder Bunker.

- There may be occasions when, as a contingency, there is a need to temporarily store run of mine material – for instance in the event of a plant breakdown or as a result of overnight production. The surface structure plan, Ref..., identifies an area in the vicinity of the Coal Preparation Plant Feeder Bunker (Item 44) to accommodate these contingency stocks. Whilst there is capacity within this area to store up to around 35,000 tonnes of run of mine material, it is more likely that stocking of run of mine material will not exceed 10,000 tonnes at any one time. It is therefore proposed to provide for temporary run of mine stocking in the area identified on the surface structure plan and unless otherwise agreed with the Mineral

Planning Authority up to a limit of 10,000 tonnes and a maximum stockpile height of 12 metres.

Run of Mine Processing and Colliery Discard Handling and Management

2.4.10 The current recovery phase at the mine is allowing the operating Company to fully commission and operate the coal preparation plant.

2.4.11 Recent refinements of the process and the plant operation have demonstrated that, with the employment of systems management, discard shales and filter cake can be produced such that they are capable of being handled and transported in an environmentally satisfactory fashion. The composition of the discard is generally 70% shales (zero to 65mm size) and 30% filter cake (zero to 500 micron size).

2.4.12 The operation is outlined as follows:

- Run of Mine output is fed into the processing plant via a crusher which reduces the raw input to zero mm to 65mm max size. After crushing the raw input is fed via a succession of deslime and other screens into the cyclone separator. The cyclone separates the mineral into two factions 65mm to +1mm shale discard and 65mm to zero coal product/discard. At this point the 65mm to 500 micron shale discard is ejected from the process on the south west side of the plant out onto the yard by means of the discard belt. This discard is generally of a larger particle size and is free draining and does not present any constraints to transportation to the MWR.

- The remaining product stream then passes through a further cyclone and a series of spirals - a wet process, by virtue of which it is further refined by the removal of fine particle discard which is mainly composed of pulverised shales and mudstone of a wet zero to 500 micron consistency. The + 500 micron coal product which is derived from this section of the process is diverted to and subsequently discharged via a centrifuge into the product flow. The larger size factions are directed to the classifying screens for sizing and subsequent discharge to the product stockpiles.

- The zero to 500 micron material which is mainly composed of shale and mudstone particles is passed through a multi roll filter press where the water is squeezed out of the material leaving it with moisture content of

below 29%. This consistency is convenient and suitable for transportation to the MWR as an entity.

- To maintain discard quality an "Intermediate Discard Stocking Area" is proposed for the shale and filtercake – this is identified on the Surface Structure Plan ref JNP/SRP/13-REV01. to the west of the Coal Preparation Plant. This intermediate deposition area will be flanked on either side by stone filter bunds, and will hold approx 7500 tonnes of discard. Should any wet discard be produced in future it can be deposited in this area to drain prior to transportation to the MWR.

- The individual discard streams can then be loaded onto separate trucks for transportation to the MWR separately. The nature of both discard factions, following the adoption of the described system, allows their transportation to the MWR and deposition to take place efficiently and in an environmentally acceptable manner, without leakage or spillage.

Coal Stocking on the Mine Site

2.4.13 The current recovery phase at the mine includes the re-establishment of a customer base for the mine and the establishment of supplies of a variety of coal products. This includes new contracts and the supply of coal to overseas markets. In turn this has indicated a need for flexibility in terms of timing of exports off site and weather conditions have at times had a bearing on the ability to export overseas.

2.4.14 The mine therefore needs more substantial coal stocking capacity and the ability to hold stockpiles of a variety of coal types.

2.4.15 Bulk coal stocking areas are therefore identified on the surface structure plan number JNP/SRP/13- REV01.

2.4.16 Based on a potential maximum stockpile height of 12 metres, the identified areas have a total coal storage capacity of approximately 100,000 tonnes.

2.4.17 In practical terms the mine is unlikely to need to utilise the full potential storage capacity of these areas particularly as the customer base is re-established and coal supplies/export become more predictable. There will though still be a need for more substantial storage capacity than has been available previously (particularly in view

of the proposed development of the mine and increases in outputs) and the ability to store greater volumes to take account of any off-site constraints.

2.4.18 Whilst the mine site is well screened it is acknowledged that larger coal stocks have the potential to impact upon local amenity, particularly in relation to the potential for wind-blown fugitive dust and particularly during prolonged dry periods combined with windy conditions. The Company therefore accepts the potential for the employment of mitigation measures and the imposition of planning controls. Details can be agreed and then implemented under the requirements of planning conditions, which might include – dust suppression measures, screening and enclosure of the stocking areas.

Materials Storage

2.4.19 It is proposed to designate an additional materials storage area. This would provide some additional capacity for temporary storage of mining materials, machinery and scrap materials.

2.4.20 The mine has operated a series of materials storage areas throughout the mine surface site. The mine proposes to retain the use of most of these, along with a number of additional areas.

Workforce Car Parking

2.4.21 Whilst the mine remains in the recovery phased and manpower levels remain well below previous levels at the mine there are no immediate plans to deliver additional accommodation and facilities.

2.4.22 The existing arrangements, with the workforce utilising temporary car parking facilities to the south of the mine site and welfare/accommodation facilities on the mine site, are likely to be required for a period of around 4 years.

2.4.23 As stated elsewhere in the application documents there is planned growth for the mine, including potential significant increases in manpower. Potentially this will result in the development of new welfare and accommodation facilities in this area to the south of the mine site. The mine's planned growth of the mine would see proposals for this new development coming forward in the next 5 years.

2.4.24 Energybuild would accept a planning condition/planning controls that limits the temporary use of the car parking are to the south of the mine for a period of not more than 5 years.

2.4.25 A S278 agreement has already been drafted concerning the delivery of transport/crossing arrangements and covers – adjustment to speed limits, signage, new traffic lights and crossing point, road surfacing, drainage and street lighting.

2.4.26 The overall Planning Application is based on the phased development of the mine and the phased delivery of increasing outputs/tonnages. Therefore, additional infrastructure at the surface, including the dry coal store building permitted under existing planning permissions, would be subject to a phased delivery approach based on the outputs from the underground development and the performance and capacity of the existing surface plant and infrastructure.

2.4.27 The monitoring of noise outputs and levels will allow ongoing review of the effectiveness of existing mitigation and control as well as the effects of increasing plant throughput as tonnages increase.

2.4.28 If an increase in working hours were needed to provide future increases in surface site capacity, further noise assessment will be carried out and consideration will be given to further noise mitigation actions in accordance with the site's Noise Action/Management Plan. In the first instance, and if required as a result of the monitoring, review and assessment process, the Company would look to tackle and mitigate any potential increasing noise outputs at source. In other words, the first option would be the employment of acoustic treatment on the plant. If additional measures were required to allow increased plant throughout and resultant additional operating hours, additional noise baffling and screening measures, including the potential delivery of the dry coal store structure or a similar structure, would be considered.

2.4.29 The application proposes an extension of the overall timescale for the continued surface development for the mine and continued use of this land for operations associated with the underground working of coal. Whilst it is not possible to be precise on the overall timescale for underground operations, given the variables relating to geology, outputs and markets, there is a need to continue operations at the surface for at least 25 years.

2.4.30 As production, output/exports of coal and manpower increases over time there is the potential to reach a point where alternative or additional means of export/transport are potentially beneficial. Railway transportation is the most obvious potential method (potentially with associated conveyor), along with additional facilities for the increased workforce and some associated alterations or additions to the mine surface layout. These potential elements of the mine development would be the subject of future Planning Applications brought forward on the basis of increasing outputs and manpower.

2.5 Phased Development and Extensions to Operations

2.5.1 The timescale outlined in Table 2.1 shows the potential increases in coal supply from Aberpergwm mine which is linked to the progression of underground development and

2.5.2 The progression of the underground development and increases in output are likely to generate the need for further development to maintain coal output/supply and to mitigate and control potential impacts resulting from an intensification of the land use.

2.5.3 The following options could be considered and potential Planning Applications brought forward in the period to 2020 and beyond:

- A potential re-opening of the existing Treforgan Colliery Main Intake and Main Return, and to use the drifts as emergency egress for the Aberpergwm Mine underground workings.

- Potential employment of either alternative methods of transportation of waste to the MWR, for example a pipeline or overland conveyor, or a mixture of methods of transport to limit dumper haulage, which may be beneficial for operational and environmental reasons.

- Potential alternative or additional means of export/transport of coal from the mine site, with rail being the main potential method (potentially with associated overland conveyor), which may be beneficial in operational, commercial and environmental terms.

- Potential additional accommodation facilities for the increased workforce and some associated alterations or additions to the mine surface layout.

2.5.4 Given there is the prospect that some of these options being fully considered and resultant proposals brought forward, the EIA on the current Planning Application has considered the potential cumulative effects (both positive in terms of potential mitigation and negative in terms of further impacts) of this potential additional development.

2.5.5 As these elements are potential options at this stage, with a whole series of variables in terms of approach, siting, design, etc - the assessment of these cumulative affects takes the form of a more desk based approach contained within each of the ES chapters.

2.6 Development Operational Times

Table 2.3 – Development Operational Times

Period	Surface Operations	MWR Operations	Haulage Movement
Monday to Friday	07:00 – 19:00	07:00 – 19:00	07:00 – 19:00
Saturday	07:00 – 16:00 07:00 - 12:00 (Washery Operation only)	07:00 – 19:00	07:00 – 12:00
Sundays, Public Holidays	No activities proposed	No activities proposed	No activities proposed

2.7 Restoration

2.7.1 The proposal includes the restoration of the MWR and the surface works at Aberpergwm Mine at the end of the mine lifetime. The existing car park does not contain any permanent structure and as such will be clear of the temporary structures and retain as it is for future industrial use.

2.7.2 The details of the restoration and aftercare of the MWR and surface structures at Aberpergwm Mine are included in chapter 10 of this ES.

2.7.3 Overall, the Mine Waste Repository will be progressively restored as individual phases of tipping are completed. Restored areas within the Mine Waste Repository will be subject to aftercare in order to establish the arrangement of vegetation shown on Drawing number CA10649-007 'Proposed landscaping scheme'.

2.7.4 Conservation grassland, which will comprise a mosaic of wet and dry acidic grassland with scattered hawthorn, will be established using the seed mix presented in Appendix 10.1 - Table 7 'Seed mix for conservation grassland".

2.7.5 Additionally the restored area will include planted commercial forestry plantation and amenity woodland. Details of the management and aftercare are provided in Chapter 10.

3 THE APPLICATION SITE

3.1 Introduction

3.1.1 The Aberpergwm Mine surface area is approximately centred on National Grid Reference SN864060. The site lies at approximately 50m AOD and includes mine surface infrastructure, substations, workshops, offices, car park, coal storage areas, depots, loading facilities and direct sales points.

3.1.2 Water treatment features (including lagoons and attenuation ponds) are located within the southern sector of the mine site. The southern boundary of the existing mine site is screened from the B4242 by a tree belt.

3.2 Right of Ways

3.2.1 No right of ways will be affected by the proposed development. The existing footpaths and bridle ways are shown on drawings FP1. Correspondence with NPTCBC confirms that the proposal will not affect any right of ways (See Appendix 1.1).

3.3 Ecology and wildlife

3.3.1 Much of the application site has been significantly modified by former mining and forestry operations and the range of habitats present include deciduous woodland, coniferous plantation, scrub and secondary grassland on spoil, watercourses and bare ground along tracks and in areas of mining operations. Whilst woodland is the most prominent and significant of these habitats, the small areas of secondary grassland habitats on spoil provided the greatest diversity, most notably where the project edges onto the Maclean Tip and along the haul road verges. No species of special significance were recorded within the study site.

3.3.2 Surveys indicate that use of the site by Badger is likely to be very limited and that only seasonal hunting opportunities for Otters occur away from the Neath River and Neath Canal. Brown Hare was noted at very low density in open areas and roost opportunities for bats are limited to the extent that none were identified within the application area, the species recorded foraging were Pipistrelles, Whiskered, Daubenton's and Noctule. Fully protected bird species known to breed within the general area of the application site include Honey-buzzard, Nightjar, Goshawk,

Peregrine and Crossbill, but other than potential nesting habitat on the quarry face for Peregrine (not used), there is no suitable breeding habitat for these species within the application site

3.3.3 Away from the canal margins where the Slow-worm is well established much of the site provides poor habitats for reptiles and amphibians with only small numbers of Common and ubiquitous species being recorded.

3.4 Geology

3.4.1 The application area is approximately 2,318 hectares and mainly comprises undulating and mountainous woodland terrain.

3.4.2 The application area is split by the Hirfynydd Ridge which marks the watershed between the Neath Valley to the east and Dulais to the west.

Geological Setting

3.4.3 The southern boundary of the South Wales coalfield basin is marked by seams which dip towards the north and extends from around Pyle on the southern boundary to the northern boundary of the basin around Cwmllynfell where the strata dip is towards the south.

3.4.4 The Coal Measures are of Carboniferous Age and have been sub-divided into three divisions; the Lower, Middle and Upper Coal Measures. The principal coal seams which have historically been of very significant importance in the South Wales coal mining industry are generally contained within the Lower and Middle sections.

3.4.5 Within the Aberpergwm prospect the principal seams of interest are located in the Middle Coal Measures sequence and are the Eighteen and Nine Feet seams.

3.5 Water resources

3.5.1 The mine surface site, the Pwllfaron area (including the underground mine water discharge), the mine waste repository and the connecting haul road are all located within the River Neath catchment area. The River Neath contributes to the Tawe to Ogmore River Catchment in the southern part of the Western Wales River Basin District. This district extends across West Wales from the Vale of Glamorgan in the south to Denbighshire in the north with a total catchment area of 16,653km2.

3.5.2 The main river catchment boundary is defined to the north by a watershed formed by the Hirfynydd Ridge that runs in a north-east south-west direction. There are a number of watercourses that carry the run-off from the northern hillside and these all drain in a southerly direction with steep gradients towards the River Neath. The Nant Pergwm passes to the east of Cae Capel and the Nant Ysgwrfa passes to the west of the original coal yard, between the yard and Pwllfaron.

3.5.3 The Nant Ysgwrfa issues from the hillside approximately 3km to the north with an estimated catchment of around 217Ha. It flows rapidly at steep gradients towards the south and passes through a series of culverts adjacent to the existing coal processing area before joining with the River Neath. The Nant Pergwm flows through an existing culvert approximately 100m to the east of the car parking site before joining the River Neath. The River Neath follows the southern boundary of the car parking site and the B4242 forms the boundary to the north. Immediately adjacent to the north side of the B4242 is the Neath Canal.

3.5.4 The only watercourse that crosses the car parking site on the south side of the B4242 is the unnamed culverted watercourse that was routed through the site when the brown field land was remediated by the Welsh Development Agency for business use some years ago. To the south the culvert terminates within the bank of the River Neath with a concrete headwall arrangement. The bank of the River Neath has been reinforced with stone-filled gabions and block stone around the northern outer edge to protect the site from the effects of erosion.

3.5.5 Smaller unnamed watercourses collect the surface run-off from the areas between these main watercourses, and in particular from the area immediately to the north of the mine surface site. These watercourses are all fed by the natural surface water run-off and are typically supplemented by occasional groundwater seepages issuing from the hillside.

3.5.6 The existing ground topography falls steeply southwards towards the mine surface site, but then gently from the site towards the River Neath which is approximately 150m further to the south of the site.

3.5.7 The average annual rainfall in the immediate area is approximately 1900mm and is predominantly produced by frontal rainfall systems from the Atlantic Ocean. The Met Office classifies the months from October to January as significantly wetter than

from February to September and this reflects the high frequency of winter Atlantic depressions and the low frequency of summer thunderstorms that affect the area.

3.5.8 The Environment Agency Wales/National Resources Wales flood maps identify the River Neath and the lower reaches of some of its tributaries as being at risk of flooding during extreme rainfall events. The lower part of Cae Capel field, including the site access, and the Nant Pergwm which runs to the east of the site have been identified as being subject to some potential flood risk.

3.5.9 The current overall status of the River Neath is categorised in the Western Wales River Basin District documents as being good. The ecological quality of the river is generally classed as good with similar status for both the biological water quality and the chemical status. The river is predicted to achieve an overall good ecological and chemical status by 2015.

4 PLANNING POLICY CONTEXT

4.1 Introduction

4.1.1 The analysis of the planning policy context in relation to the proposal is provided in the separate stand-alone Supporting Statement, which accompanies this application. This section outlines national and local policies which are relevant in the consideration of the planning background of this planning application.

4.2 National Policy

4.2.1 Planning Policy Wales (PPW) (2012) sets out the land use planning policies of the Welsh Assembly Government. PPW is supplemented by Minerals Planning Policy Wales 2000 and a series of Technical Advice Notes.

Planning Policy Wales 2012 (5th Edition)

4.2.2 PPW does not include any specific minerals or coal guidance but relies on Minerals Planning Policy Wales and various TANs. Paragraph 7.1.1 recognises that:

> *"For planning purposes the Welsh Government defines economic development as development of land and buildings for activities that generate wealth, jobs and incomes. Economic land uses include the traditional employment land uses (offices, research and development, industry and warehousing), as well as uses such as retail, tourism, and public services. The construction and energy sectors are also important to the economy and are sensitive to planning policies."*

4.2.3 Therefore it is essential that the planning system considers, and makes provision for, the needs of the entire economy i.e. economic and employment growth alongside social and environmental considerations within the framework of sustainable development (paragraph 7.1.3).

4.2.4 The Welsh mining industry is vital in providing specialist jobs in the labour market. Paragraph 7.4.3 identifies that local planning authorities should take into account the possibility that certain kinds of businesses may be especially important in providing opportunities for social groups disadvantaged within the labour market.

4.2.5 With this in mind planning authorities should adopt a positive and constructive approach to applications for economic development, based on the likely economic / regeneration benefits of the development.

Minerals Planning Policy Wales 2001

4.2.6 Minerals Planning Policy Wales (MPPW) sets out the land use planning policy guidance of the Welsh Assembly Government in relation to mineral extraction and related development in Wales, which includes all minerals and substances in, on or under land.

4.2.7 Paragraph 5 of MPPW states that:

- extraction can only take place where the mineral is found to occur;
- it is transitional and cannot be regarded as a permanent land use even though operations may occur over a long period of time;
- wherever possible any mineral workings should avoid any adverse environmental or amenity impact; where this is not possible working needs to be carefully controlled and monitored so that any adverse effects on local communities and the environment are mitigated to acceptable limits;
- when operations cease land needs to be reclaimed to a high standard and to a beneficial and sustainable after-use so as to avoid dereliction, and to bring discernible benefits to communities and/or wildlife.

4.2.8 The objectives and principles of sustainable mineral development are set out in paragraph 10 of MPPW. The overriding objective is to provide a sustainable pattern of mineral extraction by adhering to 5 key principals that planning authorities must take into account in development control and when formulating unitary development plan policies. These key principles are:

- provide mineral resources to meet society's needs and to safeguard resources from sterilization (paragraphs 11 to 20)
- protect areas of importance to natural or built heritage (paragraphs 21 to 33)
- limit the environmental impact of mineral extraction (paragraphs 34 to 47)

- achieve high standards of restoration and beneficial after-use (paragraphs 48 to 45); and

- encourage efficient and appropriate use of minerals and the re-use and recycling of sustainable materials (paragraph 55 to 56)

4.2.9 Paragraph 11 of MPPW highlights the responsibility on the mineral planning authority to ensure that an appropriate contribution is made to meeting local, regional and UK needs for minerals which reflects the nature and extent of resources in the area subject to relevant environmental and other planning considerations.

4.2.10 The need to ensure that wider supply and need for coal is specifically emphasised in paragraph 61 which sets out the policy for coal as an energy mineral. This sections states the importance of delivering the Government's energy policies through a secure, diverse and sustainable supply of energy at competitive prices, and the important role that UK coal plays in contributing to energy diversity and supply.

4.2.11 With regards to Energy Minerals such as Coal, paragraph 62 states that:

"Proposals for deep-mine development or colliery spoil disposal will be expected to meet the following requirements otherwise they should not be approved:

- *The proposal should be environmentally acceptable or can be made so by planning conditions or obligations, and there must be no lasting environmental damage;*

- *If this cannot be achieved, it should provide local or community benefits which clearly outweigh the disbenefits of likely impacts to justify the grant of planning permission;*

- *In National Parks and Areas of Outstanding Natural Beauty (AONBs), proposals must also meet the additional tests set out in paragraph 21 above;*

- *within or likely to affect Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites must meet the additional tests set out in paragraphs 23 and 25 above;*

- *Land will be restored to a high standard and to a beneficial and suitable after-use."*

Minerals Technical Advice Note (Wales) 2: Coal (MTAN2) 2009

4.2.12 MTAN2 sets out the guidance for the development control of coal extraction by the mineral planning authorities and the coal mining industry. The MTAN also contains advice on best practice for sustainable coal working.

4.2.13 According to MTAN2, the MPA should set out in the Local Development Plan or in the Supplementary Planning Guidance (SPG) the criteria against which they will assess the impacts in considering an application. The MPA must consider the effects on the surrounding environment and communities. The proposals should be environmentally acceptable or can be made so by planning conditions or obligations, and there must be no lasting environmental damage. Where this cannot be achieved, the proposals should provide local or community benefits which clearly outweigh the likely impacts. Community benefits might include the remediation of damaged land or removal of hazards, the restoration of land to public amenity and creation of nature conservation and the demonstrable employment or economic benefits.

4.2.14 Mineral Policy Wales and MTAN2 enforce the requirement of restoration and aftercare conditions to be part of the planning permission for coal workings. A restoration condition requires that after operations for the winning and workings of minerals have been completed, the site shall be restored by the use of subsoil, topsoil and soil making materials. Once the restoration has been completed, and the MPA has issued a certificate of completion, a period of aftercare should start.

4.3 Local Planning Policy

Neath Port Talbot Unitary Development Plan (March 2008)

4.3.1 The Unitary Development Plan for Neath Port Talbot was adopted on the 26th March 2008. This document is now the development plan for the whole of the Neath Port Talbot area. It replaces the West Glamorgan Structure Plan, Minerals Local Plan, and the local plans that previously covered the area.

4.3.2 The Unitary Development Plan (UDP) remains in place until it is formally replaced by the adopted Local Development Plan (LDP) – this means that until such time as the LDP is adopted, decisions on planning permissions will be based on the policies contained in the UDP. When adopted in 2014 the LDP will constitute the development plan for Neath Port Talbot.

4.3.3 Section 16 of the UDP considers Minerals. The objectives of the Minerals chapter are:

- To ensure that prudent use is made of the area's minerals, taking into account the need to protect long term needs.
- To ensure that mineral extraction minimises adverse effects on communities, the landscape, water resources, wildlife and habitats.

4.3.4 Within the UDP, it is stated that virtually the whole of the County Borough is underlain by coal resources. The coal is recognised as being of high quality with anthracite in the north of the County Borough and, somewhat less widespread, steam coals in the southeast. The coal industry remains a significant part of the Country's energy source.

4.3.5 In paragraph 16.1.13 the Plan clearly states that Coal mining remains an important contributor to economic activity in the NPT area, and particularly in the Neath Valley. Furthermore this section sets out the aim of the Plan to provide the necessary framework to ensure that such development can occur in appropriate areas having due regard to environmental, social and economic factors.

4.3.6 Neath Port Talbot County Borough contributes significantly to the annual coal output in Wales. There is considerable interest in opencast coal mining, with significant reserves remaining in the Neath Port Talbot area which are capable of being worked. Coal mining remains an important contributor to economic activity in the area. It is the aim of the UDP to provide the necessary framework to ensure that such development can occur in appropriate areas having due regard to environmental, social and economic factors.

4.3.7 It is also important to note that the DDP Proposal Map shows land to the south of the Aberpergwm Mine (part of which comprises the application site) identified as part of the employment landbank of the Plan.

Neath Port Talbot County Borough Council Deposit Local Development Plan 2011-2016 (August 2013)

4.3.8 The Deposit LDP sets out the Council's planning policy for the next 15 years, identifying what can be built and where. Based on all the information gathered and responses to the previous stages of consultation, the Plan sets out:

- A strategy, including an overarching vision, objectives and key policies;
- Area based policies for development;
- Major allocations of land, including housing and employment;
- Policies and proposals for the protection of sensitive areas; and
- A Proposals Map.

4.3.9 Formal consultation on the Deposit Draft LDP ended on 15th October 2013. Once adopted, the LDP will become the Development Plan for Neath Port Talbot, superseding the current UDP, and be the primary document for use in the determination of planning applications. The LDP will act as the Development Plan over a rolling 15 year period (2011-2026) and will comprise a strategy, an integrated set of policies and site specific proposals that are linked to an overarching vision.

4.3.10 Subject to completion of the adoption process at this stage key relevant policies in this emerging development plan present a strong indication of the strategy and policy direction desired by the local planning authority as follows:

- Para 1.1.7 states: in the Valleys, the largest employers relate to the mineral extraction industries with the remainder being employed in small and medium sized enterprises
- Para 1.1.13 states: the County Borough contains mineral resources, both coal and aggregate, which are significant on a UK scale. They are also important both in terms of their contribution to the Welsh economy and more locally in terms of employment
- Para 1.1.14 states: virtually the whole of the County Borough is underlain by coal resources. The coal is recognised as being of high quality with anthracite in the north and, somewhat less widespread, steam coals in the southeast.

Coal has been mined extensively within the area for centuries and has contributed significantly to the creation and sustenance of many of the valley communities.

- Para 1.2.14 highlights the importance of economic development and job creation as set out in the Vibrant Economy strategy (2005). This document outlines the Welsh Government's strategic framework for economic development which aims to deliver strong and sustainable economic growth. The approach for realising this vision is built around Wales's core strengths, an increasingly skilled, innovative and entrepreneurial workforce; an advanced technology and knowledge base; strong communities; a stunning natural environment; and an exceptional quality of life. At the heart of the document is the objective of creating more employment and also raising the quality of employment available to both raise the employment rate and the average earnings within Wales.

- Para 1.2.34 is very relevant as it covers The Economic Growth Strategy for South West Wales (2013 - 2030). This strategic framework looks to support South West Wales and future economic development. The New South West Wales represents an ambitious new economic growth plan for the region. The strategy found that despite investment into infrastructure within the area, the region is under performing and focuses on the most important strategic challenges the region faces. he framework comprises of five complementary Strategic aims, as follows: 1. Business Growth, Retention and Specialisation; 2. Skilled and Ambitious for long-term success; 3. Maximising job creation for all; 4. Knowledge Economy and Innovation; and 4. Distinctive Places and Competitive Infrastructures.

- Para 2.1.1 sets out the LDP Vision as follows: The natural beauty and environmental importance of Neath Port Talbot's waterfront and coastal corridor area will be protected and conserved while previously developed, underused and unsightly former industrial and commercial areas are redeveloped, transforming the function and appearance of the whole coastal belt. Key sites at central Port Talbot, Baglan Bay, Coed Darcy and the Swansea University Science and Innovation Campus, coupled with the area's good and improving transport and communication links will help deliver a competitive, knowledge-based economy. New and expanded settlements

will provide sustainable housing and employment to meet the needs of local communities and the wider area. The County Borough's rural areas and valley communities will be supported and revitalised through encouragement of new and expanded economic activity through provision for sustainable small scale employment, including tourism initiatives capitalising on existing successes such as the Strategic Tourism Destinations at Margam Park and the Afan Valley. Benefits from natural resources will be maximised and the cultural, historic and natural heritage will be supported and enhanced. Economic growth and community cohesion will be promoted by concentrating development in key areas to provide benefits to a wider hinterland.

4.4 Planning Policy Analysis

4.4.1 The proposed development will allow Aberpergwm Mine to continue the sustainable handling, processing, sale and transportation of high quality anthracite coal resources, in line with the MPPW principles of sustainable mineral developments. The coal resources processed at Aberpergwm Mine will provide mineral recourses to meet society's needs both today and in to the future. The high quality coal resources at Aberpergwm will support locally and regionally important energy production at Aberthaw in the Vale of Glamorgan and service the strategically important Tata steel plant in Port Talbot. The ability to service both these facilities from a more local resource at Aberpergwm supports mutually beneficial economic benefits and a more locally sourced shorter supply chain.

4.4.2 The proposed development has been designed to limit the impact on the environment and built heritage. During the selection of the site layout, potential ecological, archaeological and cultural heritage resources and remains have been avoided or protected. The ES also outlines mitigation measures to ensure the development is sustainable.

4.4.3 The Neath Port Talbot Unitary Development Plan restates the principles reported within MPPW. This application ensures that mineral extraction and the associated processing operations are conducted in a way to minimise adverse effects on communities, landscape, water resources, wildlife and habitats.

4.4.4 As a region Neath Port Talbot County Borough contributes significantly to the annual coal output in Wales. Therefore as coal mining is an important contributor to economic activity in the area, Aberpergwm Mine plays an important role in terms of employment and contribution to the local economy.

4.4.5 Mineral applications and associated development will only be permitted by the Planning Authority when the impacts of the development on local communities and surrounding environment are considered acceptable in terms of planning policy and the assessment of the potential impacts have been carried out and properly mitigated (if required). In granting planning permission for mineral workings, the Mineral Planning Authority will follow the criteria based approach outlined in Policy M8 of the Unitary Development Plan.

4.4.6 The development(s) proposed at Aberpergwm have been assessed in accordance with Welsh national and local planning policy as well as regulations contained in the European Environmental Impact Assessment legislation. Due to the rigorous assessment of this scheme and additional mitigation that will be used this application is acceptable on planning policy grounds.

4.4.7 In accordance with the expectations set out in Planning Guidance, in particular MTAN 2, the Aberpergwm Mine will continue to operate in accordance with the highest environmental and amenity standards. The proposed application will continue to extract and process coal using current operating standards at the mine and current environmental requirements for an operation of this nature.

5 NEED FOR THE DEVELOPMENT AND CONSIDERATION OF ALTERNATIVES

5.1 Introduction and the Need for the Development

5.1.1 Walter Energybuild propose to invest in excess of £100million to develop Aberpergwm colliery to allow the production of 2.5 million tonnes of run of mine product for a period of 25 years. The onset of production will be phased over the period 2014 to 2020. The phased increases are based on the achievability of the deliverables associated with underground development and production plan and also on the forecast expansion of the demand for coal within the world coal market.

5.1.2 Aberpergwm Colliery mines high quality Anthracite coal from the 18 Feet and 9 Feet seam resource situated between the Neath and Dulais valleys in the County of Neath and Port Talbot. The area in general is long renowned for the production of the superior quality Anthracite coals.

5.1.3 Processed coal products range from 6mm to 22mm in size faction, the smaller sizes are normally used for industrial process and the larger sizes fulfilling the domestic market needs. The coal composition consists of a low volatile and high carbon content and consequently holds enhanced clean burn characteristics.

5.1.4 The customer base for the product includes metallurgical coal for use in pulverised coal injection techniques at the nearby Tata steel works at Port Talbot, thermal product used at Aberthaw power Station and a superior quality domestic fuel product for nationwide distribution for use in domestic fuel appliances and industrial boilers. The processing techniques employed by Energybuild at its Aberpergwm processing plant combined with the coal product flexibility, allows for its use for other industrial scenarios such as cement and brick making and water purification techniques.

5.1.5 All coal products produced at the mine constitute a very marketable commodity in all spheres of its potential utilisation.

5.2 Potential Alternatives to Coal Supply

5.2.1 The Anthracite coal mined at Aberpergwm Colliery has no alternative for its specialized metallurgical use and therefore it is important to sustain the supply of this resource.

5.3 Other Potential Sources of Coal Supply

5.3.1 There is limited supply in UK of domestic fuel and Anthracite. The alternative to the continuation of the mining at Abepregwm Colliery to supply existing domestic and industrial demand of high quality coal, would be to rely on imports. The preseservation of Abepergwm Colliery would therefore have a beneficial contribution to the UK balance of payments and and an overall beneficial effect on sustainability of coal supply by reducing the distances that coal has to travel.

5.4 Planning Policy and Coal Supply from Aberpergwm Mine

5.4.1 The Neath Port Talbot Unitary Development Plan (UDP) 2008 indicates “the County Borough still contributes significantly to the annual coal output in Wales”. At para 16.1.13 the UDP states “Coal mining remains an important contributor to economic activity in the area particularly in the Upper Amman, Neath and Dulais Valleys. It is the aim of the Plan to provide the necessary framework to ensure that such development can occur in appropriate areas having due regard to environmental, social and economic factors.

5.4.2 Additionaly, the emerging Neath Port Talbot CBC Local Development Plan (LDP) (Deposited August 2013) safeguards the coal at Aberpergwm Colliery as part of the Proposal Maps, in line with Minerals Planning Policy for Wales, December 2000.

5.4.3 In order to achieve the mine’s business objectives and secure a long term future for the mine, with the resultant economic and social benefits this entails, the company needs a planning permission that allows sufficient flexibility in terms of underground working. Therefore, the ability to carry out the most effective/efficient methods of working is critical to the mine’s plans and the achievement of the outputs needed to ensure asuccessful mine business.

5.4.4 To achieve consistent production levels development and extraction proposals seek to optimise resource recovery through the maintenance of a flexible outlook and

best fit principles. Longwall, shortwall, multi entry and multi entry with pillar extraction will ultimately be deployed where the prevailing geological and seam conditions will permit.

5.5 Benefits to local employment and economy

5.5.1 In Neath Port Talbot the numbers of economicly active people in employment are lower than the national average. Glyncorrwg, Onllwyn have a particularly low level and Blaengwrach and Glynneath have similar levels to NPT as a whole. The entire area has a higher percentage of unemployment than the rest of Wales. The population with no, or an unknown level of, qualifications is 31% in NPT, 35% in Glynneath, 38% in Onllwyn and 37% in Blaengwrach. These are all significantly higher than the rest of Wales. Glyncorrwg, Onllwyn and Blaengwrach are in the top 40 percent of most deprived wards in Wales. Parts of Glynneath are in the top 20 percent of most deprived wards in Wales.

5.5.2 It is estimated that the manpower at the mine is expected to increase from 166 in 2014 to 529 in 2020. Over this period and as part of the workforce the mine will employ between 23 and 44 trainees/apprentices per year. Up to September 2012, Energybuild employed 270 workers working at different stages of the coal production, including extraction, processing and disposal of the mine waste. According to Energybuild, approximately 8 percent of this workforce is resident in Glynneath. Approximately 20 percent of the workforce is resident in Neath Port Talbot. 100 percent of the workforce is resident in South Wales. Therefore, Energybuild operations have a beneficial effect on local employment.

5.5.3 When the activities at Aberpergwm Mine resume to the previous levels, the beneficial effect of the Mine on local employment will continue. Aberpergwm Mine has directly contributed in the past to local employment by 1.5 percent in Glynneath, and 0.09 percent in NPT. Assuming this will be resumed in the future it is considered that the continuation of the scheme would have major beneficial effects.

5.5.4 The mining industry in general has suffered from a lack of training and development of new labour for many years. The current available labour pool is ageing. The local communities are amongst the most deprived areas in Wales. One of the main thrusts of the Neath Port Talbot Health, Social Care and Well-being Strategy 2008-2011, entitled “Healthy Lives for All” is “Tackling the underlying causes of ill health

by providing better housing or helping people into work". The document affirms under the heading "Economic Prosperity" to "reduce the number of people who are economically inactive and/or unemployed; to prevent further job losses and to help local business remain viable". Energybuild has adopted a specific strategy and policy for the purposed of the development of a workforce to meet the needs of its long term life of mine business plan:

- To provide sufficient technologically skilled and competent personnel to suit the nature of the undertaking.
- To augment and replace the current ageing labour pool as it decays through natural wastage.
- To provide up to date and technologically advanced skill sets to complement the advances in technology and sophistication of mining systems.

5.6 Scope of the Proposals and Considerations of Design/ Operational Options

5.6.1 Energybuild is seeking a composite and consolidated 'life of mine' planning permission to secure the future of the mine and its workforce and to continue to attract investment.

5.6.2 Development has been carried in the 18 Ft Seam, along with the construction of new underground mining machinery followed by completion of the new ventilation drift and development of additional coal production in the 9Ft Seam.

5.6.3 In 2008 it was established that the mine surface area and facilities did not have sufficient capacity to cater for the development of the mine, the planned increases in underground coal production and all necessary surface infrastructure.

5.6.4 Therefore new surface infrastructure developments including a new coal preparation plant and associated facilities, buildings, storage, new car parking and water attenuation pollution control facilities were identified as required.

5.6.5 The retention of now constructed facilities at Aberpergwm and proposed development underground will allow Aberpergwm Colliery to continue the sustainable handling, processing, sale and transportation of anthracite coal resources.

The Underground Development

5.6.6 The investigations carried out have confirmed there are viable coal resources within the area which could be extracted from Abepergwm Mine. There are major coal supply benefits in maximizing the recovery of these high quality coals, with sustainability benefits in making the best use of the access that already exists to these coals and the investment that has taken place in the mine.

5.6.7 The extent of the proposed underground workings and the underground layout takes account of existing surface development including major surface features like settlements, as well as a limited number of areas of archaeological and cultural heritage interest. Potential surface constraints vary in both their extent and sensitivity and therefore the levels of mitigation or exclusion vary. The more sensitive the surface features are to subsidence the greater the potential need for mitigation in terms of mining methods (to minimize subsidence effects), with resultant impact on coal recovery. In terms of existing surface development and features, which have to be taken into account, the EIA has confirmed the limited number of potential constraints that are located above the proposed underground workings in mining zones 0-3 and their relatively low sensitivity to subsidence effects. Whereas zones 4-6 contain a greater number of surface constraints in terms of subsidence.

5.6.8 To allow maximum exploitation of the coal resource and to allow sufficient flexibility in negotiating geological/hydrogeological conditions it is proposed to employ a mixture of underground working methods. To develop the mine business in a competitive world market it is proposed to employ, wherever possible, working methods that maximise coal production and supply. Specifically longwall mining methods in association with multi-entry gate-road developments will be employed, although, for the purposes of maintenance of flexibility of underground mining systems shortwall, multi-entry and multi-entry pillar working will be utilized wherever underground conditions give rise to a need for such methods. This represents a sustainable approach to coal working, where coal recovery is maximised and best use made of infrastructure and investment, whilst taking account of geological conditions.

5.7 Potential Future Requirements

5.7.1 The proposed Aberpergwm Mine underground working will reach a stage where, for the purposes of underground logistics, ventilation and safety of access, consideration must be given to the provision of a second surface connection to the expanding Aberpergwm mine workings.

5.7.2 A logical solution is the re-opening of the existing Treforgan Mine Surface Access Drift and Main Return Drift and to use the drifts as emergency egress for the Aberpergwm Mine underground workings since these two tunnels extend toward the proposed Aberpergwm Mine underground workings.

5.7.3 Energybuild will investigate the reopening of Treforgan Mine to provide ventilation, maintenance and an emergency egress. However, the Treforgan Mine working have been closed since 1985 and additional investigation is required to establish the feasibility of the operation.

5.7.4 The focus of the underground investigation programme will be to access, dewater, repair where necessary and form the initial main ventilation circuit. The confirmation that this operation can be carried out safely, in an environmentally acceptable manner and efficiently is a keystone of the investigation scheme. This will be subjected to a separate planning application.

5.8 Disposal of the Mine Waste and the MWR

5.8.1 With the scale of projected mine waste output levels over the 20 to 25 year life of the mine, it will be necessary to secure a long term Mine Waste Repository facility

5.8.2 Therefore this application includes a long term mine waste repository (MWR) capable of accommodating approximately 10.4 million m^3 of material.

Preferred Location and Capacity to support coal supply

5.8.3 For the purposed of maximising the use of land previously disturbed by surface mining operations and consequently minimising potential negative environmental impacts, the proposed Future MWR incorporates the area known as Forest Quarry 2 Extension (FQ2E) as well as the former Forest Quarry opencast site plus additional land located to the east and to the south. The planning application area will also incorporate part of the Peat Conservation Area within the former Nant y Mynydd.

5.8.4 The proposed mine waste repository location is situated on high ground on the Hirfynydd mountain to the south of the Sarn Helen Roman Road. It sits in a location bounded by areas of partially harvested commercial forestry plantation and areas of open grassland. Its remote location together with the relatively low intensity operations proposed to be carried out on site indicate an ideal facility for the deposition of mine waste which is most unlikely to impinge on the amenity or wellbeing of residents residing within the local communities.

5.8.5 Due to its location which allows mine waste from the process at Abepergwm Mine to be deposited without using public roads, the proposed MWR is considered the best option. Additionally, the site has an existing void from previous works at Forest Quarry 2 Extension, now ceased, and will be subjected to extensive restoration which could be carried out while mine waste is deposited. This minimize the need to import additional material to the site.

5.8.6 A different site for the deposition of mine waste may have resulted in increase traffic on public road and the need to import additional material to FQ2E to complete the restoration.

Option for transport of mine waste to MWR

5.8.7 Discard material will be transported from Aberpergwm Colliery to the repository by means of articulated dump trucks via the existing haul road which interconnects the sites. The deposition of mine waste at the repository will be carried on in conjunction with a programme of improvement of the existing haul road and associated water pollution control measures and also the provision of an enhanced inspection and maintenance regime which will ensure that discard haulage operations will be carried on in an environmentally acceptable manner. With regard to the planned incremental increase in mine production and hence the associated increased volumes of discard generation the haulage of discard by articulated dump truck has, for operational, commercial and environmental reasons, the potential to be replaced by or supplemented by alternative means of transport.

5.8.8 At the highest levels of discard output there is potential for the employment of either alternative methods of transportation of waste to the MWR, for example – pipeline or overland conveyor, or a mixture of methods of transport.

5.8.9 These will be investigated by Energybuild and will be potentially subject to separate planning applications.

5.9 Mine Surface Development

5.9.1 Planning permission for the new surface developments at Aberpergwm Mine and upon the adjacent former Cae Capel field was granted by Neath Port Talbot County Borough Council on 23th November 2010 (Reference No P2010/0498). However, upon procurement of the surface developments approved under that planning permission, design changes were necessary in the location, appearance and dimensions of some of the buildings, structures and features granted planning permission. Further elements such as a run of mine (ROM) conveyor bunker and coal loading silo were introduced to improve operational efficiency and to reduce the level and dependence on the use of power loading shovels for the handling of ROM coal and coal products, thus reducing both noise and dust levels within the site.

5.9.2 The Regularisation of the Cae Capel application was submitted in October 2012 and has been approved in August 2013 (Planning Permission 2012/0995).

5.9.3 However, the regularisation of the development at Cae Capel is limited to the extent of the exiting planning permission by which Energybuild operates Aberpergwm Drift Mine at Glynneath (September 2013).

5.9.4 Therefore, Energybuild is seeking for planning permission to consolidate the existing operations.

Potential Future Requirements

5.9.5 As tonnage increases, it is likely that requirements for more manpower and a need for new facilities to accommodate the increased workforce will arise. This may result in the need for new office and administrative facilities located to the south of the B4242, opposite the existing Abepregwm Mine site. This would result in changes in the current Aberpergwm Mine layout, and will be subject to a future planning application.

5.10 Coal Exports and Transportation

5.10.1 Current coal production can be transported to its final destinations by road and rail. However, as production increases, there is the potential for a direct conveyor link to

the rail loading facilities at the Unity Mine site, to the south of Aberpergwm Mine. This option may be investigated in future to assist with increased supply to markets by rail.

5.10.2 Given that there is some prospect of these options being fully considered and resultant proposals brought forward the EIA on the current Planning Application has considered the potential cumulative effects (both positive in terms of potential mitigation and negative in terms of further impacts) of this potential additional development.

5.11 Mine Investment and the Phased Delivery of Development

5.11.1 Significant financial investment is needed to develop the mine. The investment will take place in stages. Nothwithstanding external factors the grant of planning permission – providing for the extraction of circa 70 million tonnes of coal, the deposition of 10 million cubic meters of spoil and having long term permission to operate surface mine plant/infrastructure – will establish a clearer and more substantial permission and development future for the mine than that which currently exists.

5.11.2 Future phases of investment will then be related to the progressive increases in mine output and the need for more manpower and infrastructure to enable increases in coal production and export.

5.11.3 The proposals therefore include planned growth in the mine's annual "run of mine" output from 233,000 tonnes in 2014 to 1 million tonnes in 2019 and maximum output, at 2.5 million tonnes, from 2020 onwards.

5.11.4 To achieve this planned growth there is a requirement for staged investment across a 5+ year period. This is needed to:

- Ensure maximum exploitation of the coal reserves through a mixture of underground mining methods and with higher levels of output requiring the carrying out of long wall mining methods in association with multi-entry gate-road developments;

- Enable phased increases in the mine's workforce with associated training and apprenticeships;

- Provide additional ventilation to the underground workings and improve emergency access and egress to the extended workings;

- Potentially deliver additional transport infrastructure to support the processing and disposal of increasing volumes of mine waste and the handling and export of greater volumes of coal.

5.11.5 The existing planning permissions for the mine contain planning conditions setting vehicle limits of 180 HGVs per day. These restrictions limit exports of coal to an absolute annual maximum of 1.5 million tonnes of coal productEnergybuild are aiming for such a level of coal export given their proposed run of mine output of 2.5 million tonnes from 2020, which would include 40% waste/discard. It should be noted that alongside the planning controls on the mine various planning permissions for opencast coal extraction have allowed for between 70 and 110 HGV movements per day to transport surface won coals from the site.

5.11.6 Energybuild accepts the need for controls over vehicle movements but these need to allow for the effective management of the fluctuations in output that will occur in any given year and the need to export up to 1.5 million tonnes of coal offsite.

5.11.7 As coal exports increase and at the highest levels of coal export there may be practical, operational and environmental benefits in delivering new transport infrastructure, to enable increased movements of coal by rail. In terms of haulage of waste to the MWR, Energybuild acknowledge that at higher levels of run of mine production there are potential operational and environmental benefits in employing additional or altering transport methods to reduce haulage by dumpers. Variables in discard volumes and ratios of dirt/discard to coal, as mining development progresses, will determine whether additional infrastructure/measures are needed.

5.11.8 In terms of measures and infrastructure that may be beneficial for progression to maximum run of mine output. Energybuild has identified a number of potential options. These can be briefly summarised as follows: potential (covered) overland conveyor; potential pipeline; potential to utilise a mix of methods in combination with use of an improved haul road.

5.11.9 A priority for the development of the mine underground will be the additional ventilation and emergency access and egress routes to serve the extended workings. Energybuild's preferred option is to achieve this using a new access via the former

Treforgan Colliery drift. The company currently intends to bring forward a planning application for this in 2014, as delivery is planned for in the period 2016-2018.

5.11.10 The phased increased mine output is also linked to increases in the workforce. Energybuild therefore plans to make provision for this through the provision of additional accommodation off the existing mine site. This would have the benefit of providing both increased and improved accommodation/facilities as well as providing more space and capacity for surface infrastructure in the existing mine site. Included in the options is a new office and welfare complex to be located on the land to the south of the mine site.

5.11.11 Given that the infrastructure and development described above all forms part of the whole planned mine development project, regard has been given to the potential effects of the options for additional development within the cumulative impact section of the Environmental Statement. Clearly the detailing of these potential developments and the full assessment of their potential environmental affects cannot be addressed until they are brought forward, but it is appropriate that the current EIA and Environmental Statement has regard to the potential totality of the project, which has already been outlined in EIA scoping.

6 CONSULTATION AND SCOPE OF THE EIA

6.1 Introduction

6.1.1 The proposal falls under the terms of Schedule 2, Part 2(b) Extractive industry, of the Town and Country Planning (Environmental Impact Assessment) Regulation 1999, for which EIA is not mandatory but depends on the scale and nature of the project. Energybuild has voluntarily submitted an Environmental Statement (this report) to support the planning application.

6.1.2 The present planning application has been prepared following the requirements set out in the Planning Policy Wales and the Mineral Planning Policy Wales. Mineral proposals should ensure that they do not have an unacceptably adverse impact on the environment and the amenity of nearby residents. Potential environmental effects should be taken into account, including:

- Access and traffic generation for minerals transportation;
- Noise (in terms of limits, type and noise source locations);
- The control of dust and emissions;
- Disposal of mineral waste;
- Land drainage, the impact on groundwater resources and the prevention of pollution of water supplies;
- Visual intrusion and general landscaping;
- Land stability;
- Impact on sites of nature conservation or historic and cultural importance;
- Restoration and aftercare.

6.2 Scope of the ES

6.2.1 The Environmental Statement (ES) describes the three main elements of this application:

- Extension to and development of underground coal workings at Aberpergwm Mine
- Use of Forest Quarry 2 Extension (FQ2E) for a mine waste repository, with associated haul road, to dispose of colliery mine waste and discard from coal preparation at Aberpergwm Mine
- A consolidation and time extension of existing planning permissions for surface development and operations at Aberpergwm Mine

6.2.2 This ES outlines the baseline conditions within the application site and identifies the principal environmental considerations.

6.2.3 The environmental effects of the proposed development are considered, together with measures included in the proposals to mitigate these effects, and the likely residual effects after the mitigation measures have been implemented.

6.3 Structure of the ES and consultant team

6.3.1 The ES comprises the following separately-bound parts:

- Volume 1 (this volume) – The text of the Environmental Statement;
- Volume 2 – Drawings, Figures and Appendices; and
- Non-Technical Summary.

6.3.2 The ES has been compiled by Wardell Armstrong LLP (WA) and the sections/technical chapters dealing with the assessment of environmental effects were prepared by the consultant team as follows:

Part A - Introduction	Heaton Planning /WA
Proposed Development	Heaton Planning /WA
Site and its Environment	WA
Planning Policy	Heaton Planning/ WA
Need for the development	Heaton Planning/ WA

Consultations and Scope of the EIA	WA

Part B - Assessment of environmental effects

Considerations on the Subsidence Assessment	WA
Geology, hydrogeology and geotechnical conditions (underground area and MWR)	James Associates
Hydrolgy and drainage proposals	UTC
Land use and soils	Progrest
Ground conditions of the car park	WA
Ecology and Wildlife	Pryce Consultancy
Archaeology and cultural heritage	Mike Tutton
Landscape and Visual Impact Assessment	WA
Transport and Access	Asbri Transport
Noise	Acoustic Ltd
Air quality and dust	WA
Waste Management	WA
Socio-economic impact assessment	WA
Cumulative Impact assessment	Team

6.3.3 The Planning Application is additionally supported by other documents, including the following:

Planning Supporting Statement	WA
Tree Survey	Hillside Ltd

Transport Assessment	Asbri Transport
Design and Access Statement	WA
Archaeological Reports	Mike Tutton
Health Impact Statement	BCA Health
Flood Consequences Assessment	UTC
Consultation Report	WA
Coal Mining Risk Assessment	WA
Subsidence Assessment Report	WA

6.3.4 Each assessment has been prepared with reference to the Welsh Assembly Government's Mineral Technical Advice Note 2: Coal (MTAN2). MTAN2 sets out how impacts should be assessed and what mitigation measures should be adopted for each potential environmental effect that might rise in connection with coal workings.

6.4 Consultations

EIA scoping opinion

6.4.1 A request of scoping opinion for a bigger scheme, including two land conveyors and the re-opening of Treforgan, had been submitted to Neath Port Talbot County Borough Council in February 2013 (Ref P20130304). Although the scheme is substantially changed, the responses received from the statutory consultees have been taken into account in the development of the proposal. In particular, concern for the increased use of the haul road has been raised by the Authority and therefore, a separate assessment of the haul road is provided in this ES. This is discussed in details in Appendix 9.2.

6.4.2 Following the freeze of the scope of the current planning application, as described in Section 2 of this ES, extensive engagement of the local community and the relevant authorities has been conducted by the project team.

6.4.3 To date, the project team has:

- Consulted with Neath Port Talbot Borough Council (NPTBC) on the strategy for the planning application.

- Participated in several meetings of the Aberpergwm Liaison Group and discussed the planning application proposals with the Aberpergwm Liaison Group.

- Carried out engineering design work, together with assessments to identify suitable surface sites needed to construct and operate the mine to enable a preferred scheme to be identified.

- Conducted a workshop on the health impacts of the development, which forms part of the Health Impact Assessment process.

- Liaised successfully with statutory bodies including Natural Resources Wales, and Brecon Beacons National Park Authority

- Undertaken dedicated public consultation exercises for the current development proposals.

- Engaged in community consultation related to previous development and applications which provides a strong base of local awareness for the current application and business plan objectives.

6.4.4 The details of the consultation strategy are reported in the stand alone Statement of Community involvement which accompany this application.

6.4.5 Comments and feedbacks received during the consultation process highlited how the present application is strongly supported by the members of the local community who attended the public exhibitions. Members of the public have noted the beneficial effect of the proposal on the local employment and economy. Details on the feedback to the proposal are included in the separate Statement of Community Involvement.

PART B – ENVIRONMENTAL CONSIDERATIONS

7 SUBSIDENCE ASSESSMENT

7.1 Introduction

7.1.1 The proposed mining activities at Aberpergwm Mine will result in varying magnitudes of movement of the overlying surface (subsidence). This section describes the mine design methodology, the estimated magnitude of movement that could occur as a result of mining activities, the potential impact on the surface features and relevant mitigation measures.

7.1.2 Mining activities will commence in the eastern part of the application area and generally work in a westerly direction. For the purposes of this section the application area has been divided into seven zones (Z0 to Z6), as indicated on Drawing No. CA10601-001, generally governed by the conjectured geological structure.

7.1.3 Each of the zones is addressed in turn. As the shorter term mining is envisaged to be within Zones Z1-Z3 these are addressed in more detail. In view of the long term prospect of mining in Zones Z4-Z6 and the limited available details regarding the geological structure in those zones, only an outline indication is able to be provided at this stage.

7.1.4 The mine layout considered in this section is based on the “indicative” layout for the Nine Feet and Eighteen Feet seams as shown on Drawing Nos. CA10601-001 and CA10601-002 respectively. This layout represents Energybuild’s business model and it is recognised that the plan will need to be reviewed and refined where necessary in consideration of the progressive proving of the geological structure of the mine and experience gained from the mining operations. Accordingly, the layouts shown on Drawing Nos. CA10601-001 and CA10601-002 cannot be regarded to represent fixed mining parameters.

7.1.5 In developing the “indicative” layout, consideration has been given to the comprehensive geological information which is available. The layout seeks to optimise resource recovery through the maintenance of a flexible outlook and includes for longwall, shortwall, multi-entry and multi-entry with pillar extraction

having due regard to advice provided with regard to the impact of subsidence. As part of this approach the northern planning application boundary has been fixed so as to ensure that ground movements resulting from the proposed mining do not extend into the administrative boundary of Powys County Council.

7.2 Assessment methodology

7.2.1 The "indicative" layout represents the basis of the subsidence impact assessment. As indicated, this layout incorporates a mixture of mining techniques at varying depths in areas with differing surface topographic features.

7.2.2 For ease of reference the application area has been sub-divided into seven zones. Each of these zones is addressed in turn in consideration of the relevant mining and subsidence parameters within those zones.

7.2.3 Initially estimates of ground movements relating to longwall and shortwall mining layouts have been prepared utilising the subsidence estimation model comprised within the Subsidence Engineers' Handbook. In relation to multi-entry layouts consideration has been given to pillar safety factors derived using various recognised techniques along with basic rock mechanics principles.

7.2.4 Having regard to the estimated ground movements generalised assessments have then been made with regard to impact on surface features.

7.2.5 The estimation of ground movements and its impact is not a complete and precise science and appropriate consideration has been given to variances that occur in practice compared with theoretical impacts derived from text book modelling procedures. In this regard, reliance has been placed on experiences gained in most of the coalfields in the UK over a period in excess of 40 years.

7.3 Baseline conditions

7.3.1 The surface area within the planning application boundary, Drawing No. CA10601-003 refers, largely comprises a significantly undulating and mountainous woodland terrain. Population communes are confined to a small area in the southern end of Zone Z4 and western part of Zone Z6.

7.3.2 The more elevated areas are contained within Zones Z1, Z2, Z3, Z5 and Z6. The lower elevated valley area is primarily contained within Zone Z4.

7.3.3 Historically, significant mining activities have been carried out within the overall area comprising underground and opencast activities. Further details regarding the previous mining activities in the Aberpergwm area are contained in the Hydrogeological report.

7.3.4 Current land uses predominantly include natural and cultivated woodland throughout the majority of the area with isolated structures. The lower lying valley area includes Crynant village (Zone 6), the River Dulais (Zone 4), a mineral rail line (Zone 4), and the A4109 highway (Zone 4).

7.4 Subsidence - general

7.4.1 As indicated, Energybuild's business objective includes for longwall, shortwall, multi-entry and multi-entry with pillar extraction. These methods of mining result in varying magnitudes of ground movement governed by a number of factors.

Longwall and Shortwall Mine Panels

7.4.2 The general principles regarding the inter-relationship between the varying parameters and mechanics of mining subsidence insofar as they relate to subsidence associated with longwall and shortwall mine panels are identified in the Subsidence Engineers' Handbook (SEH) as outlined at Appendix 7.1.

7.4.3 A review of Appendix 7.1 shows that mine panels are formed by the driveage of two parallel underground in-seam roadways and the establishment of a coal "face" formed by a cross driveage between the roadways. Hydraulic supports and a coal cutting machine are established at the coal "face". As the coal is extracted the face moves forward leaving a void behind the face known as "goaf". This void is then filled by the overlying strata and the resultant movement migrates to surface resulting in ground movement (subsidence).

7.4.4 Researches into mining subsidence behavioural trends have indicated that the magnitude and extent of ground movement is governed by the following mining layout parameters:

- Thickness of coal extraction (increasing extraction height giving increased subsidence);
- The extent of the worked area in terms of width and length (the more extensive giving greater subsidence);

- Depth of working (subsidence reducing with depth where the panel dimensions remain constant).

7.4.5 Of the above parameters for a given mine layout the most significant influencing factor is the depth of working, with the impact reducing as the depth increases.

7.4.6 The resultant ground movements take the form of:

- Subsidence – vertical displacement;
- Differential Subsidence – tilt;
- Differential Lateral Displacement – strain, represented by a change in the length of the ground, tensile (+) and compressive (-).

7.4.7 Tilt and strain are the primary forms of movement governing damage to structures/operations.

7.4.8 Further details relating to the mechanics of mining subsidence are contained in Appendix 7.1. These include the development of somewhat exceptional movements influenced by geology namely fissures and fault re-activation (Appendix 7.1, Section 6).

Multi-Entry

7.4.9 The multi-entry system of mining involves the driveage of underground roadways in a "grid" formation. The roadways are generally 3.5m in height and 6m in width and the intervening areas of coal are known as "pillars". Pillar dimensions vary significantly primarily dependent on depth.

7.4.10 The combination of roadway width and height in conjunction with the pillar dimensions and depth are used to derive stability factors for mine safety purposes and potential subsidence implications. These factors are determined using established techniques such as those developed by Solomon.

7.4.11 The SEH does not provide any means of determining the ground movements resulting from multi-entry methods of mining. Accordingly a cautious approach is adopted by having regard to the identified stability factor and assumed displacement of overlying strata in regard to void space formed by the roadway driveages.

Multi-Entry with Pillar Extraction

7.4.12 This system of mining initially involves the development of mined area by multi-entry and then the removal of the pillars. The assessment of ground movement associated with this method of mining is derived by equating the extraction area to an equivalent shortwall/longwall panel.

Mine Layout Advice

7.4.13 In the process of establishing their business objectives Energybuild consulted Wardell Armstrong with regard to avoiding significant subsidence implications and maximising production. The advice provided and incorporated in the mine's business model recognises the ground movements associated with the various mining options. The mine design options along with the mitigation measures described below have been adopted within the plan in order to avoid significant subsidence impact on identified sensitive receptors.

7.4.14 As part of the development of the mine's business objective regard has been given to the sensitivity of the surface features within the planning application boundary. The sensitive surface structures are identified on Drawing No. CA10601-004 and referenced at Appendix 7.2.

7.4.15 Indicative subsidence values associated with the mine layouts contained in Energybuild's business model have been included below. Changes in layouts could cause the values to change significantly, for example no layouts have as yet been identified in the Eighteen Feet within Zone 3. In the absence of any layouts for Zones 4, 5 and 6, no values have been identified.

7.4.16 Whilst no specific layouts have yet been formulated for Zones 4, 5 and 6 it has been recognised that the existing development and natural features within Zones 4 and 6 will constrain mine layouts providing the need to maximise production within Zones 1 to 3 where there is an absence of sensitive surface features.

7.5 Subsidence impact assessment

7.5.1 The mine layout varies throughout the planning application area, the topographic features also vary as do the depths of the coal seams. For ease of reference, the planning application area has been sub-divided into seven zones primarily governed

by the conjectured geological structure within the mine. The subsidence impact within these zones is described in turn as follows.

7.5.2 The surface features considered in relation to each of the zones are as shown on Drawing Nos. CA10601-003 and CA10601-004.

ZONE 0

7.5.3 This zone incorporates the mine access infrastructure comprising existing roadway driveages and the otherwise exclusion of coal extraction proposals. Accordingly this zone is free from any subsidence impacts associated with mine production.

ZONE 1

Topographic Description

7.5.4 The surface area overlying this zone predominantly comprises woodland over a significantly undulating terrain including a number of steep slopes. The area is otherwise undeveloped other than isolated structures including a couple of radio masts in the eastern area and part of the village of Tynewydd along with a mineral rail line confined to the northern extremity. There are also a number of minor watercourses throughout this zone along with minor unclassified highways.

Mining Parameters

7.5.5 In this area the currently proposed working seams are conjectured to be at depths of less than 50m (north) to 577 metres (south-west). The mine design in this zone includes for a mixture of multi-entry, shortwall and longwall panels in both the Nine Feet and Eighteen Feet seams.

Estimated Subsidence

7.5.6 The greatest magnitude of subsidence in this zone would be associated with the longwall/shortwall panels in the north and south western parts of this zone. The combined (Nine Feet and Eighteen Feet) workings could result in subsidence up to and in excess of 1.2m. Elsewhere the multi-entry method of working could result in up to say 0.75m of subsidence.

Subsidence Implications

7.5.7 The surface area over Zone 1 is not sensitive to subsidence mainly due to the absence of any development. The village of Tynewydd is located in the extreme north where the mine layout includes for multi-entry in the Eighteen Feet providing for low orders of ground movement. Otherwise the isolated buildings/structures generally occupy a small footprint and would be unlikely to be significantly affected by the mining.

7.5.8 A number of minor watercourses are present throughout the zone but the surface contours indicate that these have the benefit of steep gradients. Accordingly the surface watercourses are unlikely to be adversely affected by the proposed mining. Similarly land drainage regimes are unlikely to be impacted.

7.5.9 The highways in this area are minor unclassified roads and tracks and their function is unlikely to be significantly affected.

7.5.10 A mineral line is present at the northern extremity of the area. The mining in this locality is restricted to adjacent multi-entry in the Eighteen Feet seam and ground movements at the rail line would be expected to be minimal.

7.5.11 Landslip areas are present on the western and eastern boundaries of this zone. Mining on the eastern boundary is extremely limited and would not be expected to cause any significant change. Mining on the western boundary includes longwall panels which would tend to increase the landslip risk, however, there is no development at risk in this locality.

SUBSIDENCE ASSESSMENT – ZONE 2

Topographic Description

7.5.12 The surface area overlying this zone predominantly comprises woodland and a significantly undulating terrain including a number of steep slopes primarily in the eastern part of the zone. This area is not developed other than an isolated farm (Nant-y-cafn Isaf) at the northern boundary between Zones 2 and 3. A number of minor watercourses and unclassified roads/tracks traverse the area. A Scheduled Ancient Monument (SAM GM274) is located in the north-eastern part of this zone adjacent to the boundary with Zone 1. The proposed Hirfynydd wind farm straddles the western boundary between Zones 2 and 3.

Mining Parameters

7.5.13 The proposed working seams in this area are conjectured to be at depths between 225 metres (north) and 685 metres (mid south). The notional mining layout includes a mixture of multi-entry, shortwall and longwall panels.

Estimated Subsidence

7.5.14 The greatest magnitude of subsidence in this zone would be associated with the longwall/shortwall panels throughout this zone. The combined (Nine Feet and Eighteen Feet) working could result in subsidence up to and in excess of 2.7m of subsidence. Elsewhere the multi-entry method of working could result in up to say 0.60m of subsidence.

Subsidence Implications

7.5.15 The surface area over Zone 2 is not sensitive to subsidence mainly due to the absence of any development. The isolated buildings at Nant-y-canf Isaf occupy a small footprint and would be unlikely to be significantly affected by the mining.

7.5.16 The minor watercourses are present in the area but the surface contours indicate that these have the benefit of steep gradients. These watercourses are unlikely to be adversely affected by the proposed mining. Similarly land drainage regimes are unlikely to be impacted.

7.5.17 The highways in this area are unclassified roads/tracks and their function is unlikely to be significantly affected.

7.5.18 SAM GM274 is recorded as Hirfynydd Roman Earthwork and described as “a rectangular, ditched and banked enclosure with rounded angles, measuring 19.5m x 18.3m”. Mining in the vicinity of this earth feature is currently indicated as multi-entry which would have no adverse affect on this feature. Even if the mining were to be longwall panels, this type of feature would not be adversely affected.

7.5.19 Part of the footprint of the proposed Hirfynydd windfarm development by Wind Ventures extends over the western boundary of Zone 2. These structures are highly susceptible to mining induced movements. The notional mining layout for this area includes for longwall panels in both the Nine Feet and Eighteen Feet seams. Ground movement, in particular differential settlement and geologically influenced

movements, resulting from the future mining would most probably have an adverse effect on the verticality of the turbines and foundation integrity and render them unable to be operated. Amendments to the mine layout to avoid impacting on the turbines in the form of a support pillar or reduced mining would have a major impact on the plans for the mine business. The composite notional support area within which mining would need to be significantly constrained is shown on Drawing No. CA10601-004.

SUBSIDENCE ASSESSMENT – ZONE 3

Topographic Description

7.5.20 The surface area overlying this zone predominantly comprises a significantly undulating terrain including a number of steep slopes along the north western boundary. The area is not developed other than isolated buildings at Gelli-benuchel in the south west and Nant-y-cafn Isaf in the northern extremity. A number of minor watercourses and unclassified tracks traverse the area. Ancient Monuments (SAM GM275, SAM GM592 and SAM GM593) are present within the eastern and western sections of this zone. A mineral line also runs parallel to and outside the north western boundary. The proposed Hirfynydd wind farm straddles the eastern boundary with Zone 2.

Mining Parameters

7.5.21 The proposed workings in the Nine Feet seam in this area are at depths between 360 metres (north) and 685 metres (south west). The notional mining layouts include for a mixture of multi-entry and longwall panels. Similar layouts can be anticipated for the Eighteen Feet seam in the longer term.

Subsidence Estimate

7.5.22 The greatest magnitude of subsidence in this zone would be associated with the longwall panels in the Nine Feet seam. These workings could result in subsidence up to and in excess of 0.85m with similar magnitudes when the Eighteen Feet seam is worked in the longer term.

Subsidence Implications

7.5.23 The surface area over Zone 3 is not sensitive to subsidence mainly due to the absence of any development.

7.5.24 Minor watercourses are present in the south west, south east and north eastern parts of this zone with surface contours indicating that these have the benefit of steep gradients. These watercourses are unlikely to be adversely affected by the proposed mining.

7.5.25 The tracks in this area are unclassified and their function is unlikely to be significantly affected.

7.5.26 SAM GM275 is recorded as a Carn Cornel Round Cairn (or Round Barrow) and described as "a large round cairn measuring 20.4m by 17.7m and 0.9m high". Mining in the vicinity of this earth feature is currently indicated as multi-entry (Nine Feet) and longwall panels (Eighteen feet). Neither of these forms of mining would be likely to adversely affect this feature.

7.5.27 SAM GM592 is recorded as Coedd Ddu ring cairn and assumed to be an earth structure similar to GM275. Mining in the vicinity of this feature is currently indicated to include longwall panels which would not be likely to have an adverse affect on this feature.

7.5.28 SAM GM593 is recorded as Coedd Ddu platforms and enclosure. This feature comprises a buried retaining wall and platform. Mining in the vicinity of this feature is currently indicated to include longwall panels which would not be likely to have an adverse affect on this feature.

7.5.29 The rail line runs parallel to and some 100m outside the north western boundary. Once the geological structure has been proved by mining in the locality, the layouts may need to be amended to avoid any adverse impact. A private agreement has been adopted for mining in proximity to a number of rail lines and the parties could adopt that agreement with regard to the nature and extent of mining to take place along the north western perimeter of this zone. This rail line does not appear to be particularly sensitive and mining operations at other locations have not needed to be constrained.

7.5.30 Part of the footprint of the proposed Hirfynydd windfarm development by Wind Ventures extends over the eastern boundary of Zone 3. These structures are highly susceptible to mining induced movements. The notional mining layout for this area includes for longwall panels in both the Nine Feet and Eighteen Feet seams. Ground movement, in particular differential settlement and geologically influenced

movements, resulting from the future mining would most probably have an adverse affect on the verticality of the turbines and foundation integrity and render them unable to be operated. Amendments to the mine layout to avoid impacting on the turbines in the form of a support pillar or reduced mining would have a major impact on the plans for the mine business. The composite notional support area within which mining would need to be significantly constrained is shown on Drawing No. CA10601-004.

SUBSIDENCE ASSESSMENT – ZONES 4 TO 6

Topographic Description

7.5.31 Zone 4 includes the Dulais valley north of Crynant towards Seven Sisters comprising developed areas associated with the northern part of Crynant, Treforgan and Nant y Cafn villages. Also included within the valley is a rail line, River Dulais and A4109. Two listed buildings (82548 – Yns-y-Bont Bridge and 23080 – Godre'r Rhos Independent Chapel) are recorded within the village areas.

7.5.32 Zone 5 predominantly comprises woodland over a significantly undulating terrain. The area is otherwise undeveloped other than a few isolated small structures. There are also a number of minor watercourses within the area. Two listed buildings (11848 – Gelli Galed Farmhouse and 11849 – Walls of barn NW of Farm house) are recorded on the southern boundary of this zone.

7.5.33 Zone 6 comprises Crynant village in the west and woodland over a significantly undulating terrain in the west, central and eastern parts. Within Crynant is a rail line, the A4109, the River Dulais and to the east of the village are minor watercourses draining to the River Dulais. A listed building (82547 – Chapel of Ease - Crynant) is recorded in this zone in Crynant village. [changes made due confirmation that 11851 no longer exists].

Mining Parameters

7.5.34 No plans have been formulated for mining within Zones 4, 5 and 6 but it is likely that these will involve a mixture of multi-entry, shortwall and longwall. As the coal seams tend to dip in a westerly direction, the depths are likely to be similar or greater than the depths within Zone 3 (>680m).

Estimated Subsidence

7.5.35 An individual longwall panel in one of the seams in Zone 4 could result in subsidence between 0.5 and 1.0m with similar or greater amounts associated with a multi-seam/multi-panel layout.

Subsidence Implications

7.5.36 Mining of proportions proposed within Zones 1 to 3 beneath the Dulais valley (northern and southern parts of Zone 4 and western part of Zone 6) has the potential to cause structural damage and an adverse affect on river drainage.

7.5.37 Within the remaining areas (Zone 5 and the majority of Zone 6) mining of proportions similar to those proposed within zones 1 to 3 would not, in the absence of any sensitive development, be expected to result in any significant damage.

7.5.38 Having regard to the sensitivity of development within the southern part of Zone 4 and western part of Zone 6 a study would be required to assess the implications of the mining once the geology has been confirmed and outline mining proposals have been defined. The objective of the study would be to identify mitigation measures necessary to control the impact of mining subsidence.

7.6 Mitigation

7.6.1 The impact of mining subsidence can be mitigated by the following means or a combination thereof:

- Mine design;
- Preventive works;
- Remedial works.

Mine Design

7.6.2 Where highly sensitive structures are involved, such as a power station, then total protection can be achieved by provision of a support pillar. Such pillars increase in size with depth (see Appendix 7.1) and have a major impact on coal resource recovery and mine viability.

7.6.3 Where movements are required to be reduced to protect surface structures, then partial extraction can be adopted whereby a balance of mine panels and intervening pillars provide for a reduced subsidence profile. This method significantly reduces panel widths and can result in the sterilisation of significant coal resources (say up to 50%) and would only be justified when working beneath extensive built up areas such as practised when working beneath the large expanse of industrial areas at Coventry. Most mine layouts include an element of partial extraction as a consequence of the geological structure of the mine.

7.6.4 When movements are required to be kept to a minimum or where the coal resource is at shallow depth then ground movements can be controlled by adoption of multi-entry working (pillar and stall) where pillars are designed to minimise/avoid ground movements. Again the natural geology within a mine (adverse in-seam disturbances) can influence the need for the adoption of this method of mining.

Preventive Works

7.6.5 The impact on existing structures of a sensitive nature can be minimised/avoided by inclusion of preventive works immediately prior to the onset of mining. This work has a limited degree of success and is normally only practical for the more sensitive structures. Typical examples of such work include prior raising of canal bank levels to ensure maintenance of adequate free board and avoidance of overspilling. A further example is say for the inclusion of bellows units in pipelines to dissipate lateral ground forces induced by mining induced movement. Effective preventative works to mitigate the impact on wind turbines are not known to be available.

Remedial Works

7.6.6 A comprehensive statutory remedy is provided for subsidence damage associated with coal mining operations in the form of the Coal Mining Subsidence Act 1991. The provisions of the Act extend to include all property owners and occupants (private residents, commercial enterprises, public organisations, statutory undertakers etc).

7.6.7 The 1991 Act (as amended by the Coal Industry Act 1994) provides for the following at the mine operator's expense:

- Remedial works to the reasonable satisfaction of the claimant;

- Discretionary payments in lieu of remedial works;
- Obligatory payments in lieu of remedial works;
- Payments for emergency works;
- Special cases including Ancient Monuments and Listed Buildings;
- Home loss payments;
- Compensation for inconvenience;
- Crop loss payments;
- Alleviation of hardship (blight);
- Recovery of consequential losses for small firms;
- Compensation for damage to chattels;
- Preventive works;
- Recovery of professional fees;
- Dispute procedures;
- Advance notices to be given to property owners.

7.7 Coal Industry Act 1994

7.7.1 Prior to 1994 responsibility for subsidence damage caused by coal mining operations was a matter for the state run mine operator, British Coal Corporation (successors to the National Coal Board). Following privatisation of the coal industry in 1994, the responsibility under the 1991 Act is jointly a matter for the Coal Authority and a mine operator as the licensee.

7.7.2 Under the provisions of the 1994 Act, the Coal Authority has a statutory duty to ensure that the licensee makes financial provision for meeting their subsidence liabilities. The Coal Authority requires mine operators to provide security for all subsidence claims (and potential claims) resulting from past mining activities and potential damage arising from mining within the forthcoming twelve months.

Annual Notices

7.7.3 Historically, property owners made representations regarding the lack of knowledge of the details of mining taking place in the proximity of their property. Accordingly provision was included in the Coal Mining Subsidence Act 1991 (Sections 46 and 47) for the mine operator to provide property owners and local authorities with details (notices) of mining proposals that could affect their property within the forthcoming 12 months. Additionally, the mine operator is similarly required to provide the respective local authority with details of mine workings in the preceding 12 months.

7.7.4 This facility provides advance notice of proposed mining activities and alerts owners to the potential for damage to occur and the opportunity to manage the situation.

Schedule of Condition

7.7.5 Where special structures (Ancient Monuments and Listed Buildings) are affected by coal mining operations, Section 19 of the Coal Mining Subsidence Act 1991 places an obligation on the mine operator to restore the property to its condition prior to the onset of subsidence damage. In order to fulfil this obligation and avoid any dispute, it would be prudent to prepare a pre-mining condition survey of "special buildings".

Private Agreements

7.7.6 It has been common practice for mine operators and land owners to enter into a private agreement with regard to mining activities in proximity to sensitive surface structures. Examples include British Coal and British Rail, National Coal Board and British Waterways and a number with private companies.

7.8 Summary

7.8.1 Energybuild's proposals for underground mining of the Nine Feet and Eighteen Feet seams of coal will cause varying magnitudes of ground movement within the planning application area and in part of the immediately adjacent area. The northern boundary of the planning application area has been purposely designed to avoid ground movement extending into the administrative area covered by Powys County Council.

7.8.2 The surface area overlying and immediately adjacent to the planning application area is predominantly not sensitive to mining induced movement.

7.8.3 In view of the variance in the mining parameters and surface topography the planning application area has been sub-divided into seven zones for ease of reference. Zone Z0 does not include for coal extraction and as such does not provide for subsidence impact. In view of the lack of detail regarding the in-seam geological structure in Zones Z4 to Z6, these zones have only been assessed in outline. More detailed assessments have been made for Zones Z1 to Z3 where the geological structure is more detailed and for which mining is proposed in the short term future.

7.8.4 The surface area within Zones Z1 to Z3 is almost entirely devoid of any existing surface features sensitive to mining induced ground movements. At the extreme northern extremity on Zone Z1 is the village of Tynewydd, however, the mining in this area has been purposely designed to include for multi-entry, as opposed to longwall mining, where the resultant ground movement, if any, is of very low magnitudes.

7.8.5 There are four Scheduled Ancient Monuments within Zones Z2 and Z3 (GM274, GM275, GM592 and GM593). These "monuments" are ground structures/features as opposed to buildings and are not vulnerable to mining induced movements.

7.8.6 The proposed Hirfynydd windfarm development by Wind Ventures overlaps significant proportions of Zones Z2 and Z3. The turbines are highly sensitive to differential subsidence (tilt) and foundation integrity is vulnerable to geologically influenced movements. A number of longwall panels are proposed in both the Nine Feet and Eighteen Feet seams and mining induced movements would significantly impact on the operation of the windfarm over a prolonged period of time. Amendments to the mine layout to avoid adverse impact on the wind farm would have a major impact on the plans for the mine business.

7.8.7 Zone Z5 and the majority of Zone Z6 are similarly devoid of any sensitive surface features. The western part of Zone Z6 and the southern part of Zone Z4 include more sensitive surface features, primarily the village of Crynant and infrastructure within the River Dulais valley. The coal seams in this locality are, however, at greater depths than in Zones Z1 and Z2 which significantly reduces the impact of mining induced ground movements. Mine layouts in the vicinity of the existing sensitive structures will be designed to avoid significant impact. The reduced coal production in Zones 4 and 6 emphasises the need to maximise production in Zones 1 to 3.

7.8.8 Effective mitigation measures are available where necessary to minimise and remediate damage arising as a consequence of the mining, as summarised in Appendix 7.2. The statutory remedy provided by the Coal Mining Subsidence Act 1991 provides a comprehensive remedy for the impact of mining subsidence and ensures that any residual impact is avoided or kept to a minimum.

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8 GEOLOGY, HYDROGEOLOGY & GEOTECHNICAL CONDITIONS (UNDERGROUND AREA AND MWR)

8.1 Introduction

8.1.1 This chapter provides details on the surface conditions, geology, hydrogeology and previous mineworkings history of the area affected by the proposed underground workings and MWR

8.1.2 The chapter is divided into two parts. Part 1 is the geotechincal assessment of the MWR, while Part 2 is the assessment of the underground area.

8.2 Part 1 – Mine Waste Repository

8.2.1 As an integral part of the planned expansion of operations at the Aberpergwm Drift Mine, a requirement to accommodate the projected 10 cubic million tonnes of mine waste has necessitated the identification of a suitable location in which to deposit the material.

8.2.2 This section describes the characteristics of the identified area providing details on the surface conditions, geology, hydrogeology and previous mineworkings history. In addition, summary details of a geotechnical assessment of the proposed Mine Waste Repository (MWR) structure are provided with more comprehensive information being available in the Mines and Quarries (1969) Act Regulation 9 Report which has been compiled for the site.

8.2.3 It is proposed to transport mine spoil deposits from the Aberpergwm Drift Mine using articulated dumptrucks which will utilise the existing forestry road infrastructure to access the site area.

8.2.4 Operations will commence with the infilling of the final void of the Forest Quarry Area 2 Extension Opencast Coal Site upon which excavation has recently ceased. The area will be infilled to surrounding ground level and then tipping operations will re-commence at the south eastern end of the designated tip area, develop in a southerly direction and then to the north, as is shown in Drawing No. JA-034-012-003.1 - 003.5 Phasing Design.

8.2.5 The site has been identified as the most suitable one within reasonable proximity to the mine entrance on the basis of its judged acceptability on topography, landscape and geotechnical suitability grounds.

8.2.6 The proposed design of the MWR, which is shown in Drawing No. JA-034-012-001 - MWR Design - comprises gently grades slopes which, in addition to the prevailing foundation conditions, will not produce any significant short term or long term land stability issues.

Assessment methodology

8.2.7 The identification of the site area as being suitable for the proposed use has focussed upon a number of key elements for consideration as follows:

- Topography.
- Hydrology.
- Geology.
- Hydrogeology.
- Impact of previous mineworking, both surface and underground.
- Geotechnical characteristics of the near surface deposits.

8.2.8 Integrating the known physical ground conditions, which have been explored and confirmed by borehole and trial pit investigation, with an understanding of the likely nature of the arisings from the mine, the stability of the proposed structure has been geotechnically assessed.

8.2.9 The limit equilibrium technique has been used (RocScience Slide software) to undertake the geotechnical assessments.

Baseline conditions

Surface Conditions

8.2.10 The site is located on high ground forming the Hirfynydd ridge lying immediately to the south of the Sarn Helen Roman Road, is 2 kilometres west of Glynneath and 3 kilometres south east of Seven Sisters.

8.2.11 The elevation varies between approximately 470 metres along the northern boundary falling to approximately 420 metres along the southern boundary.

8.2.12 The topography has been affected by previous opencast mining activity beneath much of the designated site area with only the small sections along the eastern and southern limits being original ground. The areas of previous opencast activity have been largely restored to a final level which is above the original pre-mining ground level due to the effects of significant bulkage.

8.2.13 Surface gradients on both the original and restored areas are generally slight, though steepen rapidly beyond the site boundary in all directions other than to the north and north west where the topography levels off as the Hirfynydd ridge is approached.

8.2.14 The site itself occupies a southerly trending peninsular of land which, beyond the site boundary, falls steeply along its western side into the upper catchment area of the Rheola Brook and on its eastern into the catchment of the Nant Clwyd, both of which drain into the River Neath.

8.2.15 Vegetation across the area is sparse other than in the north eastern part (which has newly planted forestry stock on it) and is largely barren. There are no identifiable watercourses which traverse the site or arise within it, though prior to the commencement of mining activity a limited number of emergences were present but have subsequently been removed by opencast activity. These emergences were related to minor perched aquifers and fed via direct infiltration of rainwater into the underlying sandstone units.

Site Hydrology

8.2.16 As noted, prior to the commencement of opencasting operations on the site area the surface hydrology was simple, comprising two identified issues, the locations of which are shown in Drawing No. JA-034-012-004 (Locations 1 and 2).

8.2.17 A further groundwater emergence (which is also shown in the above drawing) was identified (Location 3) during the Water Features Survey undertaken as a part of the site investigations associated with the Forest Quarry Area 2 Extension OCCS planning application.

8.2.18 The identified water features have subsequently been removed as a part of the opencast operation, with the exception of one (Location 3) situated in the north eastern part of the site area. The features are minor, perched and undoubtedly related to the presence of thin mudstone / siltstone horizons contained within the sandstone dominated sequence of measures which overlie the Rhondda No. 1 coal seam (extracted in the OCCS).

8.2.19 External to the site (the highest point of which before operations commenced contained the watershed between the catchment of the Rheola Brook and Nant Clwyd) are minor tributary watercourses which feed into the above two features then into the River Neath which is the principal south westerly flowing drainage structure in the area.

Surface Deposits

8.2.20 The surface deposits beneath the proposed MWR area can be broadly divided into three types as follows:

- Peat
- Weathered Bedrock and Clay
- Opencast Backfill

Peat

8.2.21 Peat has been removed from the entire area which has been affected by opencast extraction operations and re-located in a reconstructed peat bog area to the east of the site and in certain sections of the site (i.e. northern part of the western boundary and areas of the original Forest Quarry site in the north east) re-laid and planted with coniferous trees.

8.2.22 Within areas which have not been affected by previous extraction operations, as shown in Drawing No. JA-034-012-002 - Areas of Previous Opencast Working, peat occurs, which will be completely removed and either used to finish completed tip slopes in other sections of the site or removed to an off-site repository.

Weathered Bedrock and Clay

8.2.23 Several trial pits have been excavated in the undisturbed areas to assess the thickness of peat and the nature of the deposits beneath the peat horizon. The location of trial pits and trial pit logs (with laboratory analyses) are available on request. Trial pit locations are shown in Drawing No. JA-034-012-005 - Borehole and Trial Pit Location Plan.

8.2.24 The deposit can be observed to comprise a soft, brown, sometimes mottled, silty clay with fine, sandy horizons which passes downwards into a loose fractured siltstone / sandstone with firm, grey / orange mottled, silty clay, representing weathered bedrock. The depth of significant weathering varies between approximately 1 and 2.9 metres below ground level.

Opencast Backfill

8.2.25 The sequence of measures which overlies the Rhondda No. 1 seam (which has been extracted in the opencasting operation and defines the base level of excavation) is dominated by sandstones and therefore the backfill primarily comprises this material. The bulkage on the site, when the sandstone overburden has been returned to de-coaled sections, has been calculated to be approximately 20% and as a consequence the unit will naturally have very good drainage and frictional shear strength characteristics (ideal for a basal layer in a tip).

8.2.26 Beneath the Rhondda No. 1 seam the immediate pavement measures comprise a stiff, silty, mudstone seatearth, which passes downwards into a further sequence of measures dominated by sandstone units.

Site Geology

8.2.27 The site is underlain by strata which belong to the Lower Pennant Measures (Upper Coal Measures) comprising the Rhondda Beds. Originally the strata occurred close to surface beneath a variable thickness of peat (up to 2 to 3 metres in places) and weathered bedrock comprising a silty clay which passes downwards into sandy, clayey gravel.

8.2.28 Within the area which has been opencasted the strata from surface to the Rhondda No. 1 coal seam principally comprised a strong, medium grained, Pennant sandstone. Approximately 60 metres below the Rhondda No. 1 coal seam is the Rhondda No. 2

seam (Ynisarwed) which has been extensively worked within the general area by numerous small licensed mines.

8.2.29 Beneath the Rhondda No. 1 and No. 2 seams the sequence of measures is dominated by sandstone horizons passing downwards to the Red Vein seam which has also been extensively worked in the area. As the Coal Measures sequence is descended further towards the main productive seams (i.e. Eighteen Feet and Nine Feet) the measures become increasingly dominated by mudstones and siltstones.

8.2.30 A Generalised Vertical Section of the sequence is shown in Drawing No. JA-034-012-006- Geological Base Plan.

Geological Structure

8.2.31 Regionally the site lies on the northern flank of the South Wales syncline which is an east / west orientated basinal structure.

8.2.32 The strata within the area are generally gently inclined towards the south / south west, though at a local level significant disturbance can occur resulting in the steepening and re-orientation of the measures.

8.2.33 Large north north west / south south east upright normal westerly downthrowing faults traverse the area and specific horizons (usually in the productive Lower Coal Measures section of the sequence, which is much further down) are affected by significant low angle thrust faulting (A thrust fault is typically a relatively flat lying i.e. inclined at between 15 and 35 degrees from horizontal plane or zone of shearing along which the lateral translation of rock has occurred. Such features commonly occur within specific horizons, for example the Eighteen Feet seam is 'known' within the geographical area to be an horizon which has been significantly affected by thrust dislocations. Often the strata both above and below the zone of thrusting exhibit no evidence of any structural disturbance).

8.2.34 A major structural feature in the area is the Neath disturbance which is a large (several kilometres displacement) north east / south west orientated sinistral transcurrent fault structure which is located approximately 1.5 kilometres to the south of the site.

Local

8.2.35 The geology of the site area and its immediate surroundings is relatively simple comprising strata which are generally inclined towards the south / south west.

8.2.36 Within the site is a recorded north north west / south south east orientated normal fault which defines the eastern limit of coal extraction in the Forest Quarry Area 2 Extension Site (A normal fault tends to be an upright planar fracture in the ground where the strata on one side has been vertically displaced in relation to the other side, thereby producing a 'step' in the structural continuity of the ground. The plane along which the vertical displacement has occurred is generally inclined at an angle of between 45 and 75 degrees from vertical and the displacement on a normal fault is in the direction to which the fault plane is dipping).The structure was evident in the field and has been recorded in underground mineworkings (in the Rhondda No. 2 seam), in the original Forest Quarry OCCS and also in opencast coal operations located in the Dulais valley (to the north of the site). The structure displaces the strata to the west by approximately 10 to 20 metres and appears in the field (exposed in opencast operations) as a steeply inclined simple fracture zone of limited width.

8.2.37 To the immediate east of the site boundary the Pentreclwydau fault, which is a large north north west / south south east trending, westerly downthrowing structure, is exposed at surface along the valley of the Nant Clwyd.

8.2.38 Drawing Number JA-034-012-006 - Geological Base Plan - provides general geological information covering the area of interest.

8.2.39 During operations within the three opencast coal sites which have operated in the designated tip area only minor structural disturbances comprising small faults and minor thrusts have been exposed, other than the un-named fault noted above which defined the eastern limit of excavation.

Previous Mineworkings

8.2.40 The site area has been affected by both opencast coal operations and underground coal mine workings, details of which are as follows.

Opencast

8.2.41 As noted above, a significant proportion of the site area has been affected by opencast coal extraction associated with the Forest Quarry, Forest Quarry Area 2 and Forest Quarry Area 2 Extension sites, the locations of which are shown in Drawing No. JA-034-012-002 - Areas of Previous Opencast Working.

8.2.42 Forest Quarry, the first of the sites operated in the north eastern section of the area, was followed by Forest Quarry Area 2 which was a westerly extension (extending across the north north west / south south east fault structure noted above), then by the Forest Quarry Area 2 Extension site which continued following the western crop of the Rhondda No. 1 seam towards the south, east and then north.

Underground Mining Activity

Abandoned Mines

8.2.43 Parts of the site area have been previously under-mined in the Rhondda No. 2 (Ynisarwed), Red Vein, Eighteen Feet and Nine Feet, details of which are described below.

Rhondda No. 2

8.2.44 Workings in the Rhondda No. 2 seam (which occurs at approximately 60 metres below the Rhondda No. 1 seam) have, over a period of many years, been undertaken by licensed small mines, none of which are any longer operational.

8.2.45 Mines which have operated either directly beneath or in close proximity to the site are as follows:

- Craig Clwyd
- Glan Deri
- Bryn-y-Garn
- Sarn Helen
- Rhaeadr No. 2
- Bwlch Ton
- Rhaeadr

8.2.46 The workings were all undertaken by pillar and stall method which, due to the predominantly arenaceous nature of the overlying (60 metres) sequence of strata and limited extracted section, i.e. generally less than 1 metres, will have given rise to relatively little subsidence effects at the Rhondda No. 1 seam horizon which was borne out by a lack of any identifiable mining related disturbance of strata being observed during opencast operations.

8.2.47 Operations at this seam horizon are extremely unlikely ever to be re-activated beneath the site area.

8.2.48 The outlines of the mined areas are shown in Drawing No. JA-034-012-007 - Abandoned Underground mineworkings in the Rhondda No. 2 (Ynisarwed) Seam.

Red Vein

8.2.49 The Red Vein seam, which occurs in excess of 180 metres beneath the Rhondda No. 2, has been worked extensively throughout the geographical area by both opencast and deep mine operations. The seam has been worked from beneath the site by pillar and stall method, outline details of which are shown in Drawing No. JA-034-012-008 - Red Vein Workings.

8.2.50 Mining activity in this seam, beneath the site area, has been undertaken by pillar and stall method and is now no longer operational nor will be re-activated at any time in the future

Active Mineworkings

8.2.51 The Aberpergwm Mine is currently active and the mine plan is for coal at both the Nine Feet and Eighteen Feet seam horizons to be extracted from beneath and to the immediate west of the proposed MWR area. The method of extraction is likely to be pillar and stall, which will limit the degree of any subsidence effects at Rhondda No. 1 level.

Eighteen Feet

8.2.52 The Eighteen Feet seam lies at approximately 250 metres below the level of the Rhondda No. 1 seam and has historically for many years been worked by pillar and stall technique from the Aberpergwm Mine.

8.2.53 The extraction thickness in places exceeds 3 metres though significant pillars have been left in-situ and therefore collapse of the overlying measures has been very limited, with effects at surface likely to have been un-noticeable. In addition, the upper section of the sequence extending from the Rhondda No. 1 to Red Vein seam is dominated by arenaceous deposits which will have further limited the potential impact of any subsidence which could have the potential to occur due to the removal of support.

Nine Feet

8.2.54 The Nine Feet seam occurs approximately 40 metres below the Eighteen Feet seam and has been extracted in limited areas by long wall working (approximate extraction thickness 1.5 metres). It is likely that subsidence will have affected the Eighteen Feet horizon but unlikely to have had any significant impact at the Rhondda No. 1 level.

8.2.55 It is considered to be highly unlikely that any future working at either the Eighteen Feet or Nine Feet seam horizons will have any noticeable significant impact upon the structural integrity of the proposed MWR structure. The areas of previous and current extraction are shown in Drawing No. JA-034-012-009 - Plan of Current Underground Aberpergwm Mine Mineworkings.

Site Exploration

8.2.56 The general site area has been the subject of several phases of exploration comprising rotary (open hole and cored) borehole drilling and trial pit excavation.

Exploration Boreholes Associated with Opencast Development

8.2.57 A number of exploration boreholes (principally openholes) in association with the opencast mining activity on the site have been drilled. The boreholes were used to identify the level of the Rhondda No. 1 seam, its thickness, seam section and quality. The majority of the boreholes were openhole, many of which were geophysically geologged (Trisonde), enabled the broad geometry of the 'basinal' structure of the site to be defined.

Exploratory Boreholes Associated with MWR Development

8.2.58 Four open / cored holes were drilled, Boreholes 1/13, 2/13, 3/13 and 4/13, in 2012 to confirm the pavement of the opencast site, the nature of the immediately underlying strata and enable piezometers to be installed.

8.2.59 Borehole logs are available on request and (Drawing No. JA-034-012-005) shows borehole locations.

8.2.60 The piezometers essentially showed the areas of backfill to be free-draining and the subpavement measures to be dry.

Site Hydrogeology

8.2.61 The Coal Measures are classified by the Environment Agency as a Minor Aquifer, which has no strategic significance as a groundwater resource but which can have importance at a local level.

8.2.62 There are no licensed or un-licensed abstractions within the near vicinity. All trial pits (x 6 No.) were excavated down through peat and weathered bedrock and intersected sandstone at depths varying between 1 and 1.8 metres. In all pits the bedrock was identified to be dry, though the overlying clay / weathered bedrock has been described as being damp to wet.

8.2.63 Piezometers have been installed in each of the 2013 rotary boreholes to identify water levels within the opencast backfill deposits and the immediate sub-pavement measures beneath the lowest level of excavation associated with the opencast operations.

8.2.64 The boreholes were reported to be dry during drilling and have only shown negligible water which is located at the base of the holes. It is considered highly likely that the materials located beneath the proposed MWR (principally opencast backfill) will be fully free-draining other than in those areas which have been unaffected by opencast excavation. In these areas, due to the bedrock, as identified by trial pits and boreholes, comprising sandstone, the drainage conditions are likely to be good. Though, it should be noted that the surface weathered clayey deposits will exhibit poor drainage characteristics.

8.2.65 In conclusion it is anticipated that elevated water pressures within the foundations of the proposed MWR will not occur.

Proposed Development

8.2.66 The Forest Quarry Area 2 Extension Opencast Coal Site, which occupies a significant proportion of the proposed MWR area, has finished coal extraction (October 2013) and created a moderately large void space, 300,000m^3 to 400,000m^3 at the north eastern end, which will be progressively infilled with colliery spoil deposits from development work currently being undertaken at the Aberpergwm Drift Mine.

8.2.67 The infilling of this section of the site will be undertaken in accordance with the approved methodology as defined in the site's Tipping Rules (Regulation 31 - Quarries Regulations 1999) to a geotechnically approved design (Regulation 33).

8.2.68 The existing overburden mounds associated with the opencasting operation will largely remain in-situ, re-graded and assimilated into the approved MWR design profiles, though some of the material (which largely comprises sandstone) will be used for drain armouring and also to provide firm access roads into tipping areas where necessary.

8.2.69 Upon the completion of coaling operations, the final void associated with the Forest Quarry opencast operation is available and will be infilled with mine waste. The infilling of the final void has been identified as the Phase 1 Area of the MWR construction scheme, details of which will be provided in the following sections.

Main (Mine Waste Repository) Structure

General

8.2.70 It is proposed to construct a mine waste repository (MWR) with a containment capacity of approximately 10 million cubic metres on top of areas which have been previously disturbed by opencast mining operations associated with the Forest Quarry schemes of coal extraction, and also some peripheral un-disturbed areas. Details of the size and form of the proposed 'final' MWR structure and areas of previous opencast coal extraction are shown in Drawings No.JA-034-012-001 and 002 respectively.

8.2.71 The colliery spoil deposits from the Aberpergwm Mine will be transported to the MWR site via articulated dumptrucks (ADTs) and then re-distributed (subject to the moisture content of the material) around the MWR structure.

8.2.72 Development of the MWR will commence in the Phase 1 area (final void of the opencast site- Years 0 - 5) and then progress to the southern half of the eastern boundary. Deposition of colliery spoil will then progress in a southerly direction creating an outer (completed) flank to the MWR structure. Operations will then progress in a northerly direction into the Phase 3 area as shown in Drawings No. JA-034-012-003.3 and 003.4

8.2.73 The overall scheme of development will, in general terms, be from south to north – as shown in the phase drawings JA-034-012-003.3 to 003.5 and deliver the final scheme as shown in Drawing No. JA-034-012-001.

8.2.74 Along the southern and eastern margins of the designated area undisturbed in-situ materials are present in the form of a variable thickness of peat / soils deposits underlain by weathered sandy / clay bedrock. Within the Phase 4 area (southern) the soils development is poor and there is little peat present. Within the Phase 7 area along the eastern boundary significant developments of peat are present.

8.2.75 Prior to the commencement of tipping operations all of the recoverable peat contained within various areas will be removed and re-located in the designated peat bog areas which lie outwith the MWR area, or placed on restored slopes as will any 'unsuitable' low shear strength materials. Significant deposits of peaty soils are currently contained within storage mounds located along the mid-western section of the site as shown in Drawing No. JA-034-012-003.1.

8.2.76 The scheme has been designed to enable these soils to be lifted from either virgin undisturbed areas or from the temporary storage mound and directly re-laid upon finished MWR surfaces.

Proposed MWR structure

8.2.77 The proposed form of the MWR is shown in Drawing No. JA-034-012-001 and can be seen to comprise a gently graded and rounded structure which has side slope gradients which vary between 1 in 4 and 1 in 17.5.

8.2.78 The steeper sections are located along the western, eastern and southern boundaries where the structure meets original ground. Towards the northern central section the MWR gradient decreases markedly forming a rounded, elongate,

north / south orientated, domed structure the form of which broadly recreates the watershed feature noted in Section 3.1 above.

Compliance

8.2.79 The proposed MWR will be constructed and managed in compliance with the requirements of the Mines and Quarries (Tips) Act 1969 and Mines and Quarries (Regulations) 1971 relating to Active Classified Tips.

8.2.80 Details will be contained with operational documentation which will be compiled in compliance with the above statutory requirements.

Stability analyses

8.2.81 A number of stability analyses of the proposed MWR structure have been undertaken using RocScience Slide software.

8.2.82 The analyses adopt the limit equilibrium technique and have involved assessing both rotational and composite (curvilinear) type failure mechanisms.

8.2.83 The following survey drawing DTMs have been used to generate models

- Topographical Survey (dated February 2013) FQ2E OCCS Profile at End of Coaling (Feb 2013) [LSS]
- Topographical Survey (dated December 2012) DEC 2012 Coal Plan [LSS]
- Base of Coal Seam - Base of Coal + Projected [LSS]
- Analysed Cross Sections

8.2.84 The locations of analysed cross sections, 1-1', 2-2', 3-3' and 4-4', are shown in Drawing No. JA-034-012-001 and cross-sections in Drawing No. JA-034-012-010.

8.2.85 Information gained from trial pits dug in February 2013 has been used to establish the base of peat and till / weathered bedrock models.

- Parameter Values
- Material Types

8.2.86 The shear strength and density parameter values used are based upon a knowledge of similar materials, laboratory test data (as shown on Appendix 8.2) taken from the nearby Nant-y-Mynydd Area 2 tip and outline parameters given in HMSO Tips Handbook.

Table 8.1 - Parameter values for modelled materials

Material	Cohesion Cu (kN/m2)	Cohesion C' (kN/m2)	Angle of Friction ø' (degrees)	Density kN/m3	Source of Parameter
Colliery Waste		25	25	21.3	James Associates
Sandstone Backfill		0	35	21	James Associates
Bedrock		500	35	20	James Associates
Glacial Till	25	0	30	20	2013 Test Data
Peat		20	5	10	Assumed

8.2.87 It has been assumed that drained conditions prevail throughout the MWR.

8.2.88 A water table has not been modelled though an Ru value of 0.1 has been used

Results

8.2.89 A summary of results is as shown below.

Table 8.2 - Stability analyses results

Slope Reference (Drg. No. 12-200-D-003)	Slope Conditions	Minimum FOS	Summary Plot
Section 1-1' (Eastern Slope)	Entire Slope (drained)	3.24	Figure 1
	Entire Slope (undrained)	2.71	Figure 2
	Entire Slope (undrained) ru= 0.1	2.14	Figure 3
	Mid Slope (drained)	2.83	Figure 4
	Mid Slope (undrained)	2.62	Figure 5
	Mid Slope (undrained) ru = 0.1	2.42	Figure 6
	Composite Surface (drained)	2.65	Figure 7

	Composite Surface (undrained)	1.32	Figure 8
	Composite Surface (undrained) ru = 0.1	1.27	Figure 9
Section 2-2' (Southern Slope)	Entire Slope (drained)	3.54	Figure 10
	Entire Slope (undrained)	2.84	Figure 11
	Entire Slope (undrained) ru= 0.1	2.48	Figure 12
	Mid Slope (drained)	2.80	Figure 13
	Mid Slope (undrained)	2.43	Figure 14
	Mid Slope (undrained) ru = 0.1	2.29	Figure 15
	Composite Surface (drained)	1.66	Figure 16
	Composite Surface (undrained)	0.87	Figure 17
	Composite Surface (undrained) ru = 0.1	0.81	Figure 18
Section 3-3' (Western Slope)	Entire Slope (drained)	4.27	Figure 19
	Mid Slope (drained)	4.59	Figure 20
Section 4-4' (Northern Slope)	Entire Slope (drained)	4.56	Figure 21
	Mid Slope (drained)	4.03	Figure 22

Discussion of Results

8.2.90 Using un-drained (short term) total stress parameter values the computed FOS for a number of models is unacceptable for sliding principally along the surface clay horizon in the areas which have not been previously affected by opencast extraction.

8.2.91 To remove the potential problem it is recommended that either all of the weathered clay is removed or a number of shear keys are installed.

8.2.92 Along the eastern side of the MWR a 20 metres strip along the toe of the MWR should be removed and replaced with sandstone derived for the OCCS.

8.2.93 Along the southern boundary it will be necessary to similarly either remove the clay or install a 10 metres wide strip along the toe area with a further 10 metres strip located 40 metres in from the toe.

8.2.94 Further stability analyses results are shown in Table No. 8.3 below which demonstrate a minimum computed factor of safety of 1.30.

Table 8.3 - Further stability analyses results (with 'shear key')

Slope Reference (Drg. No. 12-200-D-003)	Slope Conditions	Minimum FOS	Summary Plot
	Entire Slope (drained)	3.26	Figure 23

Section 1-1' (Eastern Slope)	Entire Slope (undrained)	2.72	Figure 24
	Entire Slope (undrained) ru= 0.1	2.21	Figure 25
	Mid Slope (drained)	2.88	Figure 26
	Mid Slope (undrained)	2.61	Figure 27
	Mid Slope (undrained) ru = 0.1	2.45	Figure 28
	General Composite Surface (drained)	2.70	Figure 29
	General Composite Surface (undrained)	1.40	Figure 30
	General Composite Surface (undrained) ru = 0.1	1.33	Figure 31
	Composite Surface (drained) - Toe	2.70	Figure 32
	Composite Surface (undrained) - Toe	1.42	Figure 33
	Composite Surface (undrained) ru = 0.1 - Toe	1.37	Figure 34
Section 2-2' (Southern Slope)	Entire Slope (drained)	3.23	Figure 35
	Entire Slope (undrained)	2.84	Figure 36
	Entire Slope (undrained) ru= 0.1	2.63	Figure 37
	Mid Slope (drained)	2.88	Figure 38
	Mid Slope (undrained)	2.66	Figure 39
	Mid Slope (undrained) ru = 0.1	2.57	Figure 40
	General Composite Surface (drained)	1.75	Figure 41

	General Composite Surface (undrained)	1.40	Figure 42
	General Composite Surface (undrained) ru = 0.1	1.32	Figure 43
	Composite Surface (drained) - Toe	1.86	Figure 44
	Composite Surface (undrained) - Toe	1.66	Figure 45
	Composite Surface (undrained) ru = 0.1 - Toe	1.61	Figure 46

Acceptable Factor of Safety Values

8.2.95 Where a risk of danger to persons or property would occur if a tip failed the minimum acceptable computed factor of safety (FOS) should be 1.5.

8.2.96 Where it is unlikely that persons or property would be affected by failure the acceptable minimum FOS reduces to 1.30. Due to the remote location of the MWR and the relatively insignificant consequences of failure, should it occur, a minimum computed factor of safety of 1.3 is considered to be appropriate.

Opinion on the Stability of the Proposed MWR Design

8.2.97 The likelihood of failure of the proposed MWR is not significant.

8.2.98 There are a number of key features which will minimise the potential for failure which are as follows:

i) Basinal form of the solid ground interface.

ii) Generally slight dip of less than 5° into the site around boundary positions.

iii) Free-draining frictional 'soil' opencast backfill filter blanket beneath a very significant proportion of the site area.

iv) Removal of soils and any other 'unsuitable1 materials from 'virgin' undisturbed ground prior to tipping.

v) Drained solid measures beneath the tipping pavement.

vi) Low gradient final MWR face designs.

vii) Controlled tipping to a defined methodology involving layering and compaction.

Surface drainage around and on the MWR

8.2.99 Water within a tip structure can lead to instability due to increased pore pressure and resultant reduction in the effective shear strength of materials. It is important that the MWR is designed such that surface water is not allowed to pond around the toe of the structure and is effectively diverted away from the area.

8.2.100 On the uphill side of the MWR a suitable drain will be constructed, as shown in Drawing No.JA-034-012-001, to divert any surface water flows away from the structure.

8.2.101 On final MWR surfaces suitable berm drains will be constructed to avoid the development of serious surface scouring, as shown in the above drawing.

8.2.102 The finished (pre-soiling) MWR surface will be graded such that surface water will be encouraged to drain off and not penetrate into the structure. The final layer of the MWR structure should (prior to the laying of soils) be suitably compacted to prevent significant percolation of rainfall.

Drainage beneath the MWR

8.2.103 Any springs which may be encountered in areas of proposed tipping and which have not been affected by previous opencast activity will be dealt with by installing pipe drains surrounded by graded filter material. The pipes will be designed and installed such that they can withstand the loading which will be superimposed upon them by the tipped deposits and take account of any envisaged maximum flows which could occur once an assessment of likely flow rate has been made.

1 i.e. low shear strength / high moisture

Factors to consider in the construction of the MWR

General

8.2.104 The following are key factors which have been considered in the design of the proposed MWR.

i) The stability of the foundations beneath the MWR.

ii) Groundwater conditions beneath the MWR.

iii) Surface water.

iv) The potential effects of mining subsidence associated with underground mines beneath the site.

v) Nature of the colliery spoil deposits, grading, moisture content and density.

vi) The impact of construction method on the shear strength and permeability of the spoil.

vii) Weather conditions and time dependent impacts on spoil characteristics.

viii) The potential for preferential zoning of materials based upon their physical properties for various uses around the MWR structure.

ix) Carbonaceous material content of the tipped material – this can impact upon the layering technique adopted in tip construction, though in the case of this structure is not considered to be a significant consideration.

The Stability of Foundations

8.2.105 MWR pavement stability has been reviewed in earlier sections where previous underground mineworkings, opencast workings and site geological conditions have been assessed. From this assessment it can be concluded that foundation stability will be acceptable and is not likely to produce problems under the maximum anticipated loading conditions. MWR instability associated with foundation failure will not occur.

Groundwater Conditions beneath the MWR

8.2.106 A number of potential groundwater regimes which could occur beneath the MWR have been assessed including:

- Groundwater beneath the pavement of the previous opencast site.
- Groundwater contained within areas of previous opencast mineworkings.
- Groundwater in peripheral un-disturbed areas.

8.2.107 From an assessment of data derived from the x 4 No. piezometers* which have been installed, it has been concluded that there will be no sub-pavement up-lift pressures present which could de-stabilise the MWR. It is also concluded that the areas of previous opencast mining activity will be free-draining and therefore no significant power water pressures will act to de-stabilise the MWR.

8.2.108 Trial pitting operations (See Appendix 8.2) in un-disturbed areas along the eastern and southern parts of the site have indicated the solid measures to be dry in the zone immediately beneath surface soils / weathered bedrock.

8.2.109 As indicated, the Rhondda No. 1 seam had a basinal structural form with the deepest section (approximately 20 metres below original ground level) being adjacent to the north west / south east trending fault which is shown in Drawing No. JA-034-012-006.

8.2.110 It is likely that groundwater will infiltrate the free-draining opencast backfill rising to an overspill level defined by the lowest level at which the seam cropped out at surface around the periphery of the opencasted area - essentially free-draining.

Surface Water

8.2.111 Any surface water which may flow towards / across the tipping area will be intercepted and diverted around the periphery of the structure. Surface water within the operational area is likely to pass into the quarry floor in areas of opencast backfill; and within tipped areas will be diverted (where possible) onto the backfill from where it is anticipated it will free-drain.

8.2.112 It is likely that the peripheral drainage system which will be installed around the periphery of the MWR structure will pick up 'over spill' water. If there is a build up of

water within the base of the MWR it is likely that the maximum level will be determined by the lowest point of opencast extraction along boundary positions.

The Potential Effects of Mining Subsidence Associated with Underground Mines beneath the Site

8.2.113 Abandoned mineworkings have been identified at a number of horizons beneath the area of the MWR namely at the No. 2 Rhondda, Red Vein, Eighteen Feet and Nine Feet seam levels. The distance between proposed MWR area and the mineworkings and nature of the intervening strata is such that any significant subsidence induced effects either primary associated with the on-going workings in the Eighteen and Nine Feet seams or secondary settlement due to the loading induced by the MWR will be insignificant.

8.2.114 MWR security will not be impacted upon by the effects of previous or proposed future underground workings.

Nature of the Colliery Spoil Deposits, Grading, Moisture Content and Density

(a) Volume

8.2.115 It is estimated that approximately 600,000m3 per annum of discard will be produced when the mine is operating at full capacity.

(b) Composition

8.2.116 The material will primarily comprise mudstone with subordinate quantities of siltstone and sandstone which can, on the basis of its size grading, be classified as follows:

Coarse discard	to 1mm
Fine discard	sub-1 mm
Lagoonal cleanings	

8.2.117 Reference should be made to Table No. 8.4 "Field Classification of Colliery Discard Materials in relation to Tip Construction" which provides a classification of materials and guidance with respect to their physical nature, handling characteristics and potential geotechnical issues.

Table 8.4 - Field classification of colliery discard materials in relation to tip construction			
Classification	Material	Comments	Geotechnical Features
Class 1	Mixed coarse colliery discard with washery fines. Proportion 14:1 respectively. Moisture 10-13%	Can always be used to build tips. Drains reasonably well. Heavy trucks can operate on the material (provided appropriate layer thickness is adopted) other than during/ following heavy rainfall.	Potential for shallow face failures on leading tipping edge. Of significance where tipping layer height exceeds 1 metre.
Class 2	Washery fines sub-1mm. Lagoonal cleanings sub-1mm. High moisture content in excess of 15%	Cannot be trafficked over by heavy plant. Where tipped en-masse can precipitate tip failure. High moisture content can produce handling problems. Should be mixed at source with lower moisture content coarse discard. Should not be tipped en-masse in any parts of the tip. A separate drying/holding area should be used where initial mixing has not been undertaken.	Can result in significant rotational tip failure particularly where the percentage fines is high. Where moisture content is excessive flow slides can occur which are potentially hazardous.

General Method of Placing Spoil

8.2.118 The adopted method of placement of spoil will be dependent to a significant extent upon its moisture content. The ideal moisture content would be between 10 and 14%.

8.2.119 The MWR will be constructed in layers, the thickness of which will be influenced by the condition of the material being tipped.

8.2.120 The NCB Technical Handbook 1970 - Spoil Heaps and Lagoons - defines three methods for guidance purposes which are as follows:

Method A Layers of up to 300mm in thickness

Method B Layers of up to 300mm in thickness, compacted with x 4 No. passes of a 5 tonne roller

Method C Layers of up to 5000m thick

8.2.121 The actual method which will be adopted on site will be significantly influenced by the nature of the material but is likely to entail tipping and dozing 500 to 1000mm thick layers. Alternating layers of coarse discard and tailings will be tipped. Where excessive quantities of tailings are produced it may be necessary to put the material into temporary storage and gradually incorporate into the MWR structure.

8.2.122 Compaction will be provided by trafficking over layers by delivery vehicles and the dozing operation and also by the use of a 50 to70 tonne vibratory roller which will be run across the top of the coarse discard layer.

8.2.123 Where the moisture content is high and vehicle trafficking is not possible it will be necessary to tip in thicker layers in the region of possibly 2 to 5 metres.

8.2.124 The proposed operational design makes provision for a spoil reception area at the point at which the conveyor system delivers spoil.

8.2.125 The moisture content of the material may vary significantly and at times be too high to enable the defined tipping method to be followed. In such circumstances (potentially over extended periods of time during the winter) it may be necessary to temporarily stockpile spoil in the 'Temporary Holding Area', the location of which is shown in Drawing No. JA-034-012-003.1.

8.2.126 It is intended to retain the sandstone overburden mound which is currently located at the northern end of the designated MWR area. The material may be used on an “as required” basis to provide running surfaces across tipped material when necessary. Furthermore, the material may, if necessary, be used to mix with coarse discard which will be compacted to form the outer tip face.

Process of MWR Formation

Delivery

8.2.127 Discard will be delivered to the MWR area by 40 tonne articulated dumptrucks, which will deposit the material in the designated tipping area, in accordance with the general phased development as shown in Drawing No. JA-034-012-003.1 and sections in Drawing No. JA-034-012-003.2. Where significantly saturated materials are delivered it may be necessary to place it in a temporary 'holding area' (location shown in the above drawing) to enable it to dry out and / or be mixed with drier more suitable discard. This 'holding area' will have an approximate capacity of 80,000 to 100,000m^3. In addition to holding un-suitable materials, part of the area will be used for plant parking, maintenance and mess facility for staff.

8.2.128 Discard will be loaded onto articulated dumptrucks and transported to the tipping area where it will be tipped and dozed in accordance with the defined specification.

8.2.129 An outer 3 metres wide 'skin' to the MWR will be constructed using dry, coarse discard only (Class 1- see Table No 8.4), behind which layers of tailings and coarse discard will be built up.

8.2.130 The outer 3 metres will be constructed as shown in the above drawing in a series of 0.5 metre thick layers which will be compacted using a 50 to 70 tonne vibratory roller.

Operational Area Drainage

8.2.131 The scheme will be designed such that surface water is directed away from operational areas. Ponding behind outer areas of the MWR will be avoided by ensuring that the orientation of developing 'legs' of the MWR is such that water naturally flows towards the peripheral drainage system and water treatment facilities.

MWR Haul Roads

a) Suitable haul roads will be provided from discharge / or water storage points to enable the safe passage of dumptrucks.

b) Haul roads will be provided with adequate drainage side channels, ditches, culverts and slurry pits as necessary.

c) The main haulroad will have a width of at least 3 x width of the largest truck it is proposed to use where a two-way traffic system is in operation. Or, 5 metres wide with passing points if single pass movements are proposed.

d) A maximum haul road gradient of 1 vertical to 10 horizontal will be constructed. Where not possible, adequate 'run-away' bays will be constructed at appropriate intervals.

e) Other haul roads where single pass access is proposed will be a minimum width of 5 metres.

f) Haul roads and turning / discharging areas will be maintained to minimise standing water and slurry at all times.

g) Haul roads and turning / discharging areas will be maintained with suitable cambers and cross-falls by the regular use of graders / dozers to remove soft spots and ruts.

h) All haul road edges adjacent to drops or steeply inclined slopes will be protected by edge protection in compliance with the requirements of the Quarries Regulations 1999, i.e. a height of 1.5 metres or the radius of the largest wheel / tyre of vehicles using the road (whichever is the greater). It may be necessary to enhance the protection in higher risk areas such as sharp bends located at the bottom of ramps.

General scheme of MWR development

8.2.132 Following consultations with NPTCBC planning officers the originally proposed phasing for the scheme of development for the MWR structure has been reviewed.

8.2.133 The principal changes to the phasing have focussed upon producing an evolving structure which delivers an acceptable landscape structure at various stages throughout the life of the proposed development.

8.2.134 The proposed revised phasing is shown in the above drawings and briefly summarised below.

Phase 1

8.2.135 The Phase 1 operation will commence in the area of the final void of the Forest Quarry Area 2 Extension OCCS which will be infilled up to the level of surrounding ground. The area lies in the central part of the MWR and will not be raised to final formation level until approximately Phase 10 of the operation and, therefore, no soils will be laid upon this area until a later date.

Phase 2

8.2.136 Phase 2 (which comprises an area of un-restored previously opencasted ground), will commence at the northern end of the indicated area with the formation of an outer face along the eastern limit of tipping with progressive layer tipping behind. The MWR will be progressed to height by repeating the process as shown schematically in Drawing No. JA-034-012-003.2. Phasing Design Cross-Sections.

8.2.137 As final MWR surfaces become available along the eastern flank, the proposed surface drainage works will be installed and then soils will be stripped from the southern parts of the indicated phase area and directly re-laid on the finished surface.

8.2.138 The MWR formation will progress in a southerly direction, then towards the north and into the indicated Phase 3 area.

Phase 3

8.2.139 The Phase 3 comprises the overburden mound associated with the opencast site which will be incorporated into the NNW / SSE trending ridge which is developed in phases 1 and 2.

Phase 4

8.2.140 The Phase 4 area is represented by the southernmost sections of the tip and comprises an undisturbed area within which the soils are thin and poorly developed. Soils which are contained within the Phase 4 area will be lifted and then re-laid on finished Phase 2 and 3 areas.

8.2.141 Development of the Phase 4 area will enable the southern half of the MWR to be completed - see Drawing No. JA-034-012-003.4 - Phase Design Year 10.

Phase 5

8.2.142 Phase 5 is currently covered by a significant volume of stored peat based soils which have been derived from the Forest Quarry Area 2 Extension OCCS.

8.2.143 As occurred in the Phase 2 area, the MWR will initially be developed along the western boundary flank then progressively eastwards to eventually marry into the Phase 1 ,2 and 3 areas.

8.2.144 The deposits of peat and subsoil will be progressively removed and directly re-laid on the prepared final restoration slopes within the Phase 2 and 4 areas.

Phase 6

8.2.145 Phase 6 is represented by the restored Forest Quarry OCCS area which has been restored, i.e. soiled and planted with coniferous trees.

8.2.146 The outer, northerly facing flank of the area will be profiled in accordance with the proposed final design proposal, as will the western (marrying in with the Phase 3 area) parts. The tipping will then be progressively advanced towards the south along the eastern flank developing into the Phase 7 area.

8.2.147 Within the Phase 6 area it is proposed to establish a peat bog to receive the peat deposits which will be excavated from the Phase 7 area.

8.2.148 The proposed bog , the location of which is shown in Drawing Number JA-034-012-001 will be approximately 12,000m^2 in aerial extent with a containment capacity in the order of 20,000m^3 and mean depth of approximately 1.8 m.

8.2.149 The bog will be lined using a bentonite liner to ensure the water holding integrity of the structure.

Phase 7

8.2.150 Development into Phase 7 will initially entail the removal of peat from the outer eastern flank of the area and its re-deposition in the proposed peat bog located within the Phase 6 area.

8.2.151 The area will then be infilled with colliery waste and as completed the flank will be progressively soiled to final levels. Development will continue in a southerly direction from the Phase 6 area and in a westerly direction from the outer (eastern) flank of Phase 7.

8.2.152 All peat deposits contained within the Phase 7 area will be transferred to the proposed peat bog located in the Phase 6 area.

Proposed Peat Bog in the Phase 6 area.

8.2.153 As noted above it is proposed to construct a peat bog within the Phase 6 area of the MWR structure.

8.2.154 The potential geotechnical implications of constructing such a structure are not considered to be significant provided that the colliery waste is deposited in accordance with the specified design , the structure is Bentonite lined and appropriate provisions are put in place to accommodate any water overflows arising from the bog area.

8.2.155 The proposed location for the feature is where the thickness of colliery spoil fill is relatively thin and the area is underlain by coarse granular sandstone opencast infill.

8.2.156 The construction of water retaining structures on colliery tips is not a new concept, with settling lagoon development having been a very common practice on many colliery sites in the past.

8.2.157 The likelihood of failure of the structure is considered to be low.

MWR Drainage

8.2.158 As the outer flanks of the MWR are constructed there will be the development of a system of permanent peripheral drains which are designed to intercept surface drainage arising from the finished surfaces of the structure. The ditches will be designed to link in with the existing and proposed water treatment facilities as indicated in Drawing No. JA-034-012-001.

8.2.159 On the MWR structure the proposed restoration drainage system has been designed to re-establish the original watershed between the Rheola Brook and Nant Clwyd which existed prior to the opencast operations affecting the system.

8.2.160 The drainage berms will be arranged at approximately 10 metres vertical intervals down the MWR, and have a width of approximately 4.5 metres which is graded back towards a drainage ditch at a gradient of approximately 1 in 10. The drainage

ditches will have gradients of between approximately 1.5% and 2.5% and will be linked into the peripheral drainage system.

8.3 Part 2 – Underground Working

Introduction

8.3.1 This section provides geological and hydrogeological information relating to the proposal to extend and develop the underground coal workings associated with the Aberpergwm Colliery.

8.3.2 The proposal involves the development towards the west from the existing Aberpergwm mineworkings into a resource block which is estimated to contain in excess of 70 million tonnes of anthracite coal located in the Eighteen Feet and Nine Feet coal seams.

8.3.3 The designs associated with the proposed indicative mine layout are covered in more detail in the subsidence section of this Environmental Statement (ES). The report demonstrates that the proposed layouts and mining method are essentially controlled by the prevailing geological conditions and a consideration of any features of sensitivity in relation to subsidence impact.

8.3.4 The geology of the area has been defined, using extensive archival and recent exploratory data, to comprise strata which dip gently towards the south which have been disturbed by north north west / south south east orientated normal faults that disrupt structural continuity and divide the identified resource area into a number of blocks. Further structural disturbance occurs in association with low angle thrust faulting which has a broadly north west / south east orientation.

8.3.5 Further control upon the location and shape of the application area for coal extraction are the zones of previous mineworkings associated with now abandoned collieries along the northern and southern boundaries.

8.3.6 At the western end of the application area is the Treforgan Colliery, the re-opening of which may be considered in the period to 2020 and beyond. Details of proposals to re-open and link into the existing abandoned mine infrastructure will be contained in future submissions.

8.3.7 The current mining operation can be considered to be a "dry mine" as the level of water inflow into the extensive network of underground roadways and area of previous workings is at "nuisance" level.

8.3.8 Whilst the longer term plan is to develop a much larger area containing six zones, Z1 to Z6, as shown in Drawing No. JA-034-001-023 - Surface Topography, Mining Zones and Catchment Definition Plan, the focus of this report has been upon zones Z1 to Z3 (inclusive) which form the eastern and central parts of the application area.

8.3.9 Several other zones have been defined, namely zones Z4 to Z6 (inclusive), which form a contiguous western extension to Z1 to Z3.

8.3.10 The geological succession of measures within the Z4 to Z6 zones is essentially the same as that contained within Zones Z1 to Z3, although a number of the higher level seams (which do not from a part of this mining scheme) are not present due to them cropping out at surface along the Dulais valleyside.

8.3.11 The structure in Zones Z4 to Z6 comprises strata which are inclined towards the south / south west , the structural continuity of which is disturbed by major NNW / SSE normal faulting and NW /SE orientated thrust faulting, i.e. as occurs in zones Z1 to Z3.

8.3.12 The Z1 to Z3 zones generally occupy higher ground associated with the Hirfynydd Ridge and upper levels of the Neath and Dulais river valleys, whereas zones Z4 to Z6 occupy the floor of the river Dulais (which contains settlements, a river and railway line) and the western and eastern valley sides.

8.3.13 Access to the application area is from the existing Aberpergwm Drift Mine which is located at the eastern end of the area, and from which Zones Z4 to Z6 are quite distant. All of the existing and immediate future developments will be into the Z1 to Z3 areas from the Aberpergwm access.

8.3.14 Whilst the geological conditions within zones Z4 to Z6 are anticipated to be broadly similar to those in the other zones, there has been a much greater level of exploratory work undertaken in the area covered by zones Z1 to Z3 than in the other zones. The information gained has been used to produce detailed mine layouts and enable the potential subsidence effects to be projected with a greater degree of accuracy than would be currently possible in the western Z4 to Z6 areas.

8.3.15 Operations in the Z1 to Z3 areas will produce valuable information on the detailed structural geology and ground response to the mining process, which will enable the detailed mine layout designs for the Z4 to Z6 zones and likely surface responses to be more accurately defined.

8.3.16 In addition, and as a part of what would be the natural development of this (and any other mine), would be an on-going programme of both surface and underground exploration the aims of which would be to continually prove the geological conditions and up-grade the reserve base.

Assessment methodology

8.3.17 The indicative mine layout which provides details of the proposed areas from which coal will be extracted along with the main elements of the mine infrastructure form the basis for this geological and hydrogeological assessment.

8.3.18 To enable the 3-dimensional mine model to be developed the following information has been collated and reviewed

- Published Geological Survey Sheets and Memoirs.
- Coal Authority held Abandoned Mines Records.
- British Coal surface borehole exploration information.
- Walter Energy surface borehole information.
- Walter Energy surface reflection seismic survey data.
- Mine records from the Aberpergwm Drift and all adjacent and superjacent Mines which provide geological and hydrogeological information.
- Ordnance Survey Sheet data.

8.3.19 The above geological and mine information has enabled the likely depth at which extraction is proposed below ground level to be identified and also provides details on the nature of the strata between the proposed mining horizons and surface level.

8.3.20 Using the geological information with Ordnance Survey data a hydrogeological model for the application area has been defined.

8.3.21 The likely nature and magnitude of impacts of the proposed mining scheme (details of which are contained within the subsequent section of this ES) on the prevailing ground and hydrogeological conditions are assessed in relation to potential immediate and long term effects.

8.3.22 This report then goes on to assess the potential post closure works required to maintain the water balance between the Neath and Dulais catchments which the scheme straddles.

8.3.23 An estimate of the likely long term nature and form of groundwater rebound following the mine closure is made.

Baseline conditions

General

8.3.24 The application area is approximately 2,318 hectares and mainly comprises undulating and mountainous woodland terrain. There are settlements in the western half of Zone 4 and western part of Zone 6 (see Drawing No. JA-034-001-023), both of which lie outside of the area assessed in this report.

8.3.25 The topographic elevation within the application area varies between a high of approximately 460 metres along the Hirfynydd Ridge (in Zone Z1) falling to 150 metres AOD (in Zone Z3).

8.3.26 The application area is split by the Hirfynydd Ridge which marks the watershed between the Neath valley to the east and Dulais to the west.

8.3.27 Minor watercourses which originate from the perched aquifers located in the upper sections of the stratigraphic sequence (i.e. Rhondda and Llynfi beds) emerge from the higher levels of the valley sides and provide base flows to the two main rivers.

8.3.28 A few minor pond features are located within the application area, which are manmade and associated with previous opencast operations.

8.3.29 The currently operating Aberpergwm Mine discharges mine water from the existing drifts at an annual rate of approximately 150 million gallons per year (21.6 L/sec). The quality of the mine water is rigorously monitored and shown to have the following characteristics

Suspended solids	Less than 5 mg/L
pH	8.3
Iron	Less than 0.01 mg/L

Geology

Background - Geological Setting

8.3.30 The South Wales coalfield comprises a kidney-shaped synclinal basin extending from Pontypool in the east to the Gwendraeth Valley in the west. The southern boundary of the basin is marked by seams which dip towards the north and extends from around Pyle on the southern boundary to the northern boundary of the basin around Cwmllynfell where the strata dip is towards the south. An extract from the published Geological Sheets for the area is shown in Drawing No. JA-034-001-024 - Published Geological Sheet and Vertical Section of Strata.

8.3.31 The Coal Measures are of Carboniferous Age and have been sub-divided into three divisions; the Lower, Middle and Upper Coal Measures.

8.3.32 The principal coal seams which have historically been of very significant importance in the South Wales coal mining industry are generally contained within the Lower and Middle sections.

8.3.33 Within the Aberpergwm prospect the principal seams of interest are located in the Middle Coal Measures sequence and are the Eighteen and Nine Feet seams.

8.3.34 A generalised vertical section which illustrates the sequence of measures contained within the application area is shown in Drawing No. JA-034-001-024.

Sequences of Measures

8.3.35 The sequences of measures around the main productive coal seams is dominated by argillaceous rock types, principally comprising mudstones and siltstone with occasional sandstone units, along with common major and several minor coal seam horizons.

8.3.36 This lower part of the sequence, which is approximately 350 metres in thickness, is followed upwards by the Llynfi beds which are approximately 100 metres thick and

significantly dominated by sandstone units with common, sometimes impersistent, thin, coal seams.

8.3.37 Overlying the Llynfi beds is the Rhondda sandstone sequence which again is totally dominated by sandstone with occasional slightly thicker (but still relatively thin) coal seams which have been extensively worked by small mines over a period of several decades. The unit has a thickness of approximately 180 metres.

Structural Geology

8.3.38 The coalfield is significantly affected by structural disturbances which have, through many decades of recording in underground mineworkings, been shown to have readily definable characteristics. A major structural feature within the geographical (but outside of the application area) area is the Neath disturbance which runs up the Neath valley in a north east / south west direction and is a large transcurrent fault thought to have a displacement in the order of several kilometres.

8.3.39 Major normal faulting with a north north west / south south east trend is dominant within the general area and has been proven from previous underground mineworkings at higher levels (Red Vein seam) and exploratory boreholes to affect the application area dividing it into a number of blocks. Many smaller scale normal faults have been recorded in underground mineworkings abandonment plans. The principal faults are shown in the Geological Structure Plan for the Nine Feet Seam - Drawing No. JA-034-001-025 - Nine Feet Seam Contour Plan.

8.3.40 In addition to the normal faulting, the measures are significantly affected, particularly in the lower parts of the sequence (which is dominated by structurally weaker argillaceous strata and the principal coal seams), by low angle thrust faulting along a north west / south east trend with movements from the south west.

8.3.41 Strata dip within the sequence is generally in the order of 1 in 8 to 1 in 9 towards the south west but can locally vary greatly due to the effects of faulting and thrusting. Widely varying coal seam thicknesses have been commonly encountered in the current working area and are associated with thrusting. It can be expected that such occurrences will be intersected during working within the application area blocks.

Exploration

8.3.42 Due to the mountainous terrain which forms a large proportion of the application area the use of various surface seismic exploration tools has been limited, though Walter Energy has recently (2011) undertaken approximately 20kms of surface reflection seismic surveying across the area. In addition to the seismic lines x 3 No. deep boreholes drilled from surface to the Nine Feet seam and below formed a part of the programme of exploration. The available data, therefore, comprises a limited number of deep boreholes, x 6 No. which were drilled by British Coal, and records from previous, now abandoned, higher level and adjacent underground mineworkings plus the recent seismic and borehole information produced by Walter Energy.

8.3.43 Within or in close proximity to the application area there are six fully cored deep boreholes extending to depths in excess of 770 metres which were drilled by British Coal. The boreholes were drilled as a part of a feasibility study into linking the Aberpergwm and Treforgan Collieries to exploit the large virgin coal resource block contained in land between the two. Walter Energy, as noted above, drilled a further x 3 No. deep boreholes from surface in 2011

8.3.44 Further information on the structural geology and details on coal seam sections has been gained from previous underground mineworkings in the Pentreclwyddau, Ynysarwed, Cefn Coed, Treforgan and Seven Sisters collieries which operated in the Nine Feet seam (and Eighteen Feet seam to a lesser extent) and which principally lie to the south and north of the identified resource block - see Drawing No. JA-034-001-025 - Nine Feet Seam Contour Plan.

8.3.45 Valuable structural information has also been gained from the extensive higher level mineworkings which have been undertaken at the Red Vein* seam horizon (now abandoned), which extend across the entire application area from east to west

8.3.46 (* Not to be confused with the Red seam also known as the Cornish.)

Coal Seams

8.3.47 The principal coal seams which are considered as a part of this application are the Nine Feet and the Eighteen (or Six) Feet which define the identified resource associated with the mine.

Nine Feet Seam

8.3.48 The seam has been extensively worked at the collieries noted above and whilst it does show variations in thickness as followed from east to west it still maintains a significant workable section which is generally in excess of 3 metres in thickness. The anticipated working section will be 3 metres, though borehole information indicates the composite thicknesses (i.e. coal, dirt, inferior coal) to exceed this in many places (likely to be due to structural disturbance rather than sedimentological). The resource block is shown in Drawing No. JA-034-001-026 - Proposed Mining Zones and Indicative Layout.

Eighteen Feet (Six Feet) Seam

8.3.49 Whilst this seam has been extensively worked at the Aberpergwm Mine, and has a measured seam sections of in excess of 3 metres, and occasionally in excess of 4.5 metres, it does rapidly degenerate into a number of thinner leaves as followed westwards and northwards.

8.3.50 None of the aforementioned mines which have worked the Nine Feet have recorded workings in the Eighteen Feet. Borehole information indicates that the seam partings which are present within the mined sections at Aberpergwm increase substantially in thickness whilst at the same time the seam sections decease as the seam is followed to the north and west.

8.3.51 Within the defined resource block, see Drawing No. JA-034-001-026, the anticipated extraction thickness will be in the order of 2.5 metres.

Previous Underground Mineworkings

8.3.52 Previous underground mineworkings have been undertaken within the Nine Feet seam from the Pentreclwyddau, Ynysarwed, Cefn Coed, Treforgan and Seven Sisters collieries, all of which are no longer operational. The locations of the workings are shown in Drawing No. JA-034-001-026.

8.3.53 Extensive higher level workings in the Red Vein seam, which lies approximately 250 to 300 metres above the Nine Feet, extend across the entire application area, details of which are shown in Drawing No: JA-034-001-027 - Red Vein Workings Plan. Other private mine operations have been undertaken in the Pinchin and Rhondda seams which are located above the Red Vein seam.

Area of Landslip

8.3.54 Away from the main areas of superficial / drift deposits in the Neath and Dulais river valleys, the application area does have a variable thickness of boulder clay and head deposits across it, particularly in the Dulais valley. The thickest recorded deposits occur in isolated pockets, one of which has been identified in the Rheola Brook area (18 metres thick), which lies outside of the application area. Elsewhere the drift is generally thin or, as is the case in the higher moorland areas, absent and replaced by thin soils and isolated pockets of peat.

8.3.55 Moderately large areas affected by landslips have been identified in several locations particularly along the Rheola Brook and on the north west side of the Neath valley opposite Resolven, which do not lie within the application area.

8.3.56 Within the application area only three minor landslips are noted around the Rhondda No. 2 / Upper Welsh seam outcrop positions which lie adjacent to the western boundary.

Hydrology

8.3.57 The application area lies beneath high mountainous land contained between the Neath and Dulais valleys.

8.3.58 The two rivers, Neath and Dulais, are the principal controlling drainage elements in the area and are separated by a watershed which follows the south west / north east trending Hirfynydd Ridge along which the Sarn Helen Roman Road passes. Waters on the western side of this ridge line flow towards the north west and the Dulais river, whereas waters on the eastern side flow south eastwards to the River Neath.

Dulais Catchment Area

8.3.59 (Reference should be made to Drawing No. JA-034-001-023 for watercourse locations.)

8.3.60 The principal secondary drainage elements within the Dulais catchment area are the Nant Hir at the northern end of the area and the Nant Creunant at the southern end, with the Nant Cafn in the central part.

Nant Hir (1)

8.3.61 The Nant Hir originates at the watershed, collects surface run-off and is joined by a number of small spring fed tributaries as it flows westwards. The small tributaries originate from perched aquifers contained within sandstone horizons that occur within the higher levels of the geological sequence and which crop out at surface generally close to the Hirfynydd ridgeline. The overall gradient of the watercourse is in the region of 1 in 10 with very much steeper gradients in its upper section.

Nant Cafn / Nant Creunant (3) / (2)

8.3.62 As with the Nant Hir, the Nant Cafn appears to originate from within the Rhondda sandstones and similarly collects surface run-off and is contributed to by tributaries which originate from sandstones within the Llynfi Beds. The overall gradient of the watercourse is approximately the same as for the Nant Hir. The Creunant watercourse originates close to the watershed arising from the Rhondda sandstones and has a gradient similar to the Nant Hir. The watercourse is joined by several tributaries which, as for the above, emanate from perched aquifers contained within sandstone units which crop out at surface.

Neath Catchment Area

8.3.63 (Reference should be made to Drawing No. JA-034-001-023 for watercourse locations.)

8.3.64 On the Neath catchment side of the watershed the principal secondary drainage elements are the Nant Clwyd at the eastern end (beneath the currently consented mining area), Rheola Brook in the central part and Crugau Brook at the south western end.

Rheola Brook (4)

8.3.65 The Rheola Brook originates at watershed between the two principal valleys from ground within which the Rhondda sandstone units occur. No issues or springs as such are noted and it is likely that the watercourse is a feature primarily formed as a result of surface run off which is also contributed to by groundwater seepages that emanate from the various sandstone horizons which crop out at surface. The gradient of the watercourse is steep with an overall average of approximately 1 in 9.

Crugau Brook (5)

8.3.66 This watercourse similarly originates from the Rhondda sandstones and is contributed to by a number of tributaries from other sandstone horizons such as the Llynfi beds. The watercourse has an overall gradient of approximately 1 in 5.

Nant Clwyd (6)

8.3.67 This watercourse originates in the Rhondda Sandstones (uppermost horizons) and is fed by numerous minor tributaries which arise from the same sandstone horizons. The gradient of the watercourse is significant, being in the order of 1 in 5.

General

8.3.68 Within both catchment areas there are a number of small springs which occur either from within sandstone horizons and, to a lesser degree, are occasionally associated with coal seams. The springs universally emanate from the principal sandstone units within the area in Llynfi and Rhondda beds. There are no significant water features, i.e. lakes or ponds, of note within the area of interest. The only identified ponds are those associated with previous mining activities, the locations of which are shown in the above drawing.

Hydrogeology

8.3.69 The sequences of measures which occur within the application area extend from the base of the Nine Feet seam to sandstones above the Rhondda No. 1 Rider coal seam at surface. A generalised vertical section is shown in Drawing No: JA-034-001-024.

8.3.70 The Environmental Agency classifies the Coal Measures bedrock strata as

> *" a minor aquifer. These can be fractured or potentially fractured rock, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although not producing large quantities of water for abstraction they are important for local supplies and in supplying base flows to rivers".*

8.3.71 The sequence can be broadly divided on the basis of hydrogeological characteristics as follows:

- Upper sections - comprising the Rhondda and Llynfi beds. Dominated by sandstone units with poor primary permeability and fairly low storativity containing minor perched aquifers with limited hydraulic potential.

- Lower section - extending from the base of the Llynfi beds to the lowest target seam, i.e. the Nine Feet. Dominated by Argillaceous strata with the potential for limited, only very minor, perched aquifers of no consequence. The unit can be considered as having virtually no permeability especially vertically. The principal means of any groundwater flow / stratal drainage will be via abandoned mineworkings which can result in very significant stored volumes and lateral flow rates.

8.3.72 As noted above, within the section of strata between the Nine Feet and surface there are a number of major sandstone units of which the Rhondda sandstone is of great importance. The Rhondda sandstone which forms the higher ground extending up to the watershed reaches a thickness of up to approximately 180 to in excess of 200 metres and comprises major sandstone units with occasional thin coal seam horizons and minor mudstone / siltstones. The unit contains a number of perched aquifers which are associated with the occurrence of the impersistent mudstone / siltstone beds within the sequence.

8.3.73 Beneath the Rhondda sandstones are the Llynfi beds which comprise a sequence similarly dominated by sandstones along with a number of thin impersistent coal seams. The unit is in excess of 100 metres in thickness.

8.3.74 Beneath the Llynfi beds, mudstone and siltstone horizons dominate the sequence, the lower parts of which contain the main productive coals seams. The limit is in excess of 100 metres in thickness. This section of the sequence can be considered as having very low hydraulic potential and to essentially represent a barrier to downwards water flow.

8.3.75 The main points of groundwater emergence are (as can be observed in the field) from the principal sandstone horizons, i.e. Rhondda and Llynfi beds, which, due to the presence of minor mudstone / siltstone horizons, contain a number of perched aquifers.

8.3.76 The rock types contained within the sequence generally have a very low intrinsic primary, but potentially slightly higher secondary, permeability with any

groundwater flow being mainly controlled by, principally, natural (jointing) or manmade mining induced fissures.

8.3.77 Typically the hydraulic transmissivity of undisturbed in-situ solid Coal Measures generally falls within the range of 10-6 to 10-7 m/sec for horizontal flow and somewhat lower for vertical flow.

8.3.78 The natural groundwater flow can be significantly affected by the presence of underground mineworkings roadways and extraction areas and also by mining induced fracturing due to subsidence which can lead to enhanced transmissivity in the subsidence zones and, in some instances, the localised disruption of perched aquifers.

Background Historical Information Relating to the Existing Aberpergwm Mine

8.3.79 The Aberpergwm Drift Mine was operated by British Coal, closed in 1985 and then re-opened by Glotec Mining in 1993.

8.3.80 Upon the removal of the "stoppings" (physical seal located at the mouth of the adit) the mine rest-water level was identified along the roadway at an elevation of 41 metres AOD. The significance of this level is that during the period of closure of the Aberpergwm Drift Mine there was a re-bound in groundwater level to 41 metres AOD and minewater flowed out of the 'Quakers Level' (which is shown in Drawing No. JA-034-001-026) and into the Neath Canal. An assessment of Coal Authority abandoned mines records shows there to be a direct connection between the Quakers level and Aberpergwm Drift Mine workings. The 41 metres AOD level also marks an 'overspill' point in the mine whereby water flows to the west over the intersection point between the Nine Feet and Pentreclwyddau fault which displaces the seam by approximately 100 metres towards the west. Therefore, essentially two groundwater regimes would be established upon the abandonment of mineworkings at the Aberpergwm Mine.

8.3.81 Since the re-opening of the Aberpergwm Drift the minewater which originally discharged from the Quakers level and, via a culverted section, into the Neath Canal has ceased to flow. This clearly indicates a direct linkage between the Quakers level and Aberpergwm workings and would strongly suggest that upon abandonment discharge would in all likelihood resume from this location.

Mine Drainage

8.3.82 Aberpergwm colliery has historically been a "dry mine". The principal source of underground water which has to be dealt with emanates from the older workings which lie to the east of the Pentreclwydau Fault line. These working are extensive and comprise multi-level extraction of mainly the Eighteen Feet seam (but with some in the Nine Feet and Four Feet seams) in the mining area. The individual seam workings are interconnected by numerous staple shafts*, cross measures drivages and surface adits which serve to facilitate the ingress of surface water.

(* Vertical connections between mining horizons.)

8.3.83 Neither the current working area nor the proposed extended "take" areas (Zone Z2 and Z3) have such surface connections. These areas are generally overlain by a thick sequence of Argillaceous strata and consequently the potential for significant water ingress is low - see Drawing No. JA-034-001-028 - Dulais to Neath Valley Schematic Cross Section.

8.3.84 It is anticipated that the dry conditions will prevail throughout the proposed extension area and that the planned mining activity within it will not precipitate any substantial increase in the underground water "makes".

8.3.85 The mine is currently equipped with a comprehensive pumping system which is capable of coping with any anticipated level of water make. Broadly the underground pumping system comprises various electric and compressed air pumps which are positioned at strategic low points throughout the mine workings. The individual pumps pump water via pipe ranges to central locations which subsequently pump the mine water to the main pumping station sited at the bottom of the intake drift. The water is then pumped to the surface where it is discharged into the water treatment lagoon system.

Sources of Minewater

8.3.86 As noted in previous sections, abandoned mineworkings are present in a number of higher level seam horizons, namely the Red Vein, Pinchin and Rhondda No. 1 seams. Following abandonment the workings will have, in some cases, become flooded.

8.3.87 Due to the general regional dip of the strata towards the south / south west those mines with entrances developed from the Neath side of the Hirfynydd Ridge will

free-drain towards the River Neath. Those workings located along the Dulais Valley side are likely to be flooded and in some instances have given rise to emergences from the mine mouth (some of which are ephemeral and respond to rainfall events) - as indicated schematically in Drawing No. JA-034-001-028.

8.3.88 The most extensive higher level workings are in the Red Vein seam which extend across the entire application area and lie beneath the main water-bearing horizons located within the Llynfi and Rhondda beds. Records of these workings have provided excellent information on the geological structure across the area.

Licensed Surface and Groundwater Abstractions

8.3.89 A search of licensed surface and groundwater abstractions within the area has been undertaken, details of which are contained in Appendix 1. The conclusion of the search is that there are no licensed or unlicensed surface or groundwater abstractions within the application area.

Potential impacts

8.3.90 It is proposed that extraction of coal will be undertaken by a number of techniques including longwall, shortwall and pillar and stall.

8.3.91 The magnitude of impact of the adopted mining technique on the overlying strata and surface features will be dependent upon a number of key features which are broadly as follows:

- The extraction thickness.
- The geometry of the worked area, i.e. width and length of openings.
- Depth of working.
- Nature of the overlying strata.

8.3.92 The target seams are the Nine Feet and Eighteen Feet, with the Nine Feet being the principal seam which it is proposed to work in all of the zone areas. The Eighteen Feet will be worked in Zones Z1 and Z2 only.

8.3.93 In areas where the Nine Feet and Eighteen Feet seams are worked (Zones Z1 and Z2) the maximum subsidence can be anticipated to occur in those places where longwall

panels are established. In the north western parts of Zone 1 possibly up to 3 metres could be expected to occur over a very limited area.

8.3.94 Where pillar and stall multi-entry working is undertaken the subsidence could be up to a maximum of 0.75 metre at surface, though it is likely to be significantly less than this.

8.3.95 Of the key features listed above which would impact upon the magnitude of any subsidence their principal impacts can be summarised as follows:

a) Extraction thickness - Clearly the greater the extraction thickness the greater the potential subsidence which may occur.

b) Geometry of the worked out area - The wider and longer that any longwall or shortwall panels are, the greater the surface area which may be affected by subsidence. In areas of pillar and stall working the potential for significant subsidence at surface is much reduced.

c) Depth of Working - As the depth of working increases the effects of any subsidence at surface decreases.

d) Nature of the Overlying Strata - This can have a very significant impact upon the nature and extent of any subsidence. The presence of any major competent horizons, as is the case over a very significant proportion of the application area where the Llynfi and Rhondda beds are present (combined maximum thickness of approximately 300 metres), will vastly reduce the potential for the development of any large scale subsidence impacts.

8.3.96 As is noted, the source of essentially all of the small watercourses which originate in the higher sections of the site area are the Rhondda beds. The unit has a significant thickness in the area of up to 200 metres and is underlain by the Llynfi beds which are in excess of 100 metres.

8.3.97 Both the Rhondda and Llynfi beds comprise sequences of thickly bedded competent sandstone horizons, several of which contain perched groundwater. The units are, as can be identified from borehole information and field observations of outcrops and exposures within opencast coal sites, tightly grained with negligible apparent porosity and low inherent permeability. In the opencast exposures the near surface jointing tends to be open but with depth becomes significantly "tighter". The units'

abilities to contain and transmit groundwater are determined by their secondary joint controlled permeability, which, other than in the immediate surface zone, can be considered to be intrinsically low.

8.3.98 The Rhondda and Llynfi beds, in addition to sandstone units, also contain minor mudstone and siltstone horizons which act as aquicludes / aquitards giving rise to the presence of perched aquifers at various levels within the sequence.

8.3.99 Typically, subsidence within ground above long and shortwall mineworkings comprises elements of extension, compression and vertical translation. Of these, the extensional and vertical translation movements can lead to localised alterations in the hydrogeological characteristics of aquifers.

8.3.100 In cases of extensional effects, this can lead to a dilation in the natural jointing system. A common feature associated with longwall extraction are rib-side breaks which form parallel to the elongate side of the panels and can be pervasive features which extend over significant vertical distances. The dilation of the natural jointing system can lead to enhanced permeability and storativity and, along with rib-side breaks, can, at a local level, potentially cause aquifer disruption.

8.3.101 Vertical translation (which tends to occur vertically above the central section of extraction panels) can lead to bedding plane separation resulting in temporary enhanced lateral flows into voids formed between bedding planes.

8.3.102 The level of likely impacts of the indicated potential magnitude of subsidence on the integrity of the perched aquifers is considered to be low. The secondary joint controlled permeability of the strata is such that the drawdown zone associated with any disruption to the integrity of the containing aquitards will be very limited in lateral extent.

8.3.103 Hydrogeologically the mining zones, Z1, Z2 and Z3, are isolated as a distinct area which is contained within an east / west orientated block of ground with the only possible connection to surface being via the various openings in the Aberpergwm Drift Mine area.

8.3.104 As noted in section “Previous Underground Mineworkings”, and can be seen in Drawing No. JA-034-001-026 - Proposed Mining Zones and indicative Layouts, the identified resource block lies within a previously un-worked "virgin" block of

anthracite. The area is hydrogeologically isolated from abandoned mineworkings along its northern and southern limits by in-situ blocks of solid, un-worked ground which act as a barrier to underground groundwater / minewater flow.

8.3.105 The lower working horizon in the Eighteen and Nine Feet are also hydrogeologically isolated from the upper level water-bearing Llynfi and Rhondda beds by the significant thickness of essentially impermeable (vertically) sequence of Argillaceous measures - see Drawing No. JA-034-001-028 - Dulais to Neath Valley Schematic Cross Sections.

8.3.106 The only means of water flow from the proposed mineworkings will, during the operational phase, be by pumping-out with discharge via the Aberpergwm Drift.

8.3.107 Upon the completion of mining operations within Zones Z1, Z2 and Z3 the mine will very slowly fill up with water and eventually a resumption of flow from the Aberpergwm Mine portal area will occur.

8.3.108 Water quality as is currently pumped from the mine has not historically produced any problems and discharges have always remained within the current consent limit - see Table No. 8.5 below. The minewater is monitored for suspended solids, pH, iron and the presence of oils and grease. The sequence of strata which is potentially going to be mined into is the same as that which has historically and is currently being worked at the Aberpergwm Mine. It is, therefore, anticipated that the likelihood of any significant water quality issues arising is considered to be remote.

Table 8.5- Aberpergwm colliery measured water quality (average values)

Determinand	Level	Consent Limit
Suspended Solids	<5 mg/L	80 mg/L
pH	8.3	6 to 9
Iron	< 0.01 mg/L	Nil

8.3.109 The likely impact on flow from the Aberpergwm Drift area will be a potentially increased flow volume due to an expansion in the effective underground "catchment" area, over and above that which existed prior to re-opening of the Aberpergwm Mine in 1993.

8.3.110 Upon the re-opening of the Aberpergwm Drift in 1993 the workings were observed to be flooded to a level of 41 metres AOD.

8.3.111 Drainage from the mine is known to have, up to this date, been from the "Quakers Level" at 41 metres AOD. The Quakers level is located close to the Aberpergwm Drift site and shown in Drawing No. JA-034-001-024 and JA-034-001-026.

8.3.112 This finding was confirmed when de-watering of the mine to a level below 41 metres AOD in 1993 resulted in the drying-up of the previous consented water discharge from the Quakers level.

Impacts on Surface Water Features

8.3.113 As noted above the principal water features within and in close proximity to the application area are the River Neath and the River Dulais, with the watershed between the two running along the Hirfynydd Ridge which cuts across mining zones Z1, Z2 and Z6 - see Drawing No. JA-034-001-023.

8.3.114 The numerous named and un-named watercourses (some of which are ephemeral) which feed into the main rivers originate on the higher levels of the valley sides.

8.3.115 As noted, the gradients of the watercourses throughout the application area are such that any likely range of potential impact associated with mining subsidence will not have an adverse significant negative impact upon the hydraulic characteristics of the features.

8.3.116 The worst case situation could be the development of fissures (potentially related to the re-activation of movements along existing faults due to subsidence) at surface forming across watercourses. This could result in the surface watercourse flowing into the fissures. Whilst this may have a significant immediate impact upon the watercourse, simple earthworks procedures can be implemented to address the problem. Typically such works would involve the temporary diversion of the watercourse, sealing of the fissures followed by a re-diversion of the flow onto its original course.

Impact upon Licensed and Unlicensed Abstractions

8.3.117 A search of Environment Agency data relating to the location of surface and groundwater abstractions within an area extending to at least 500 metres beyond the application boundary has been undertaken.

8.3.118 The details of the search, which are contained in Appendix 8.1, failed to identify any interests which are likely to be negatively impacted upon by the proposed operations.

Impact significance

Impact on Surface Waters

8.3.119 This application focuses upon Zones Z1, Z2 and Z3 and therefore the principal surface water features of interest are the small watercourses which arise along the higher valley sides and are an important element of the base-flow to the Rivers Dulais and Neath.

8.3.120 From an assessment of Drawings No. JA-034-001-023, JA-034-001-025 and JA-034-001-026 it can be seen that in the areas of proposed longwall, shortwall and multi-entry workings the extraction horizon is at its maximum depth, i.e. in the order of 600 metres below ground level. Consequently the level of subsidence (due to the depth) is likely to be much reduced and localised where it occurs.

8.3.121 Due to the significant gradients of the watercourses in their upper reaches the potential impact associated with the maximum foreseeable level of subsidence is unlikely to have any identifiable negative impact.

Impact upon Groundwater

8.3.122 The principal horizons which contain groundwater are:

- Minor perched aquifers contained within the Llynfi and Rhondda beds, and
- Abandoned underground mineworkings in the Red Vein, Pinchin and Rhondda No. 2 seams.

8.3.123 It is predicted that some mineworkings related subsidence will be experienced at surface and therefore clearly there will be impacts on the intervening strata between the mining horizon(s) and ground level.

8.3.124 Potentially the most significant impact upon groundwater would be the physical disruption of the strata and possible localised damage to the aquitards, i.e. the minor mudstone and siltstone horizons, which have given rise to the presence of perched aquifers within the sequence.

8.3.125 In the immediate vicinity of zones of enhanced fracturing groundwater may drain from one perched horizon down through the aquitard and into a lower sandstone unit. This is expected to be very localised with the creation, due to the lack of primary and poor secondary permeability of the sandstone units, of very steep drawdown cones defining any zones of impact which rapidly attenuate away from the point of impact.

8.3.126 As noted in previous sections of this report, the identified coal resource area has been divided into a number of mining zones which are defined by geological fault structures.

8.3.127 Records from underground mineworkings activity (abandoned and current) and surface boreholes, both of which have intersected several of the large faults which are known to be present within the application area, have failed to note any significant fault related groundwater inflows.

8.3.128 It is common for collapse associated with the removal of support in underground mineworkings to focus onto fault lines possibly resulting in a small scale re-activation of movements. Where this occurs it is possible that an increase in flows along the fault plane can occur. It is considered unlikely that such secondary movements would be large, nor would they result in a significant increase in any (what is currently regarded as negligible) water flow down the fault planes.

8.3.129 In general terms it is considered unlikely that any significant impact upon the existing groundwater regime will arise as a consequence of the proposed future mining activity associated with this application.

8.3.130 This application provides details for a number of identified zones, which are annotated Z0 to Z6 (the locations of which are shown in drawing number JA-034-

001-026), which have been defined on the basis of the interpreted geological structure.

8.3.131 Shorter term mining will be undertaken in Zones Z1 to Z3 which are located in the eastern half of the application area. These zones are assessed in greater detail than zones Z4 to Z6 for which there is a lower level of confidence with respect to the prevailing geological conditions.

Mitigation measures

Surface Waters and Licensed / Unlicensed Abstractions / Water Features

8.3.132 The foregoing discussion provides background information with respect to the nature of the surface water flow regimes in the application area and a projection of the "worst case" situation with respect to the magnitude of estimated subsidence at surface levels.

8.3.133 Measured against the backdrop of significant gradients along all watercourses, it has been concluded that the maximum anticipated subsidence and tilt are unlikely to have any noticeable negative impacts upon the features.

8.3.134 There are a limited number of surface water features present within the application area essentially comprising small manmade ponds which are, without exception, all related to previous opencast coal mining activities. The features are either located in areas of made-up ground (old opencast backfill) or, as in the case of the Dulais Valley side of the Hirfynydd Ridge, established on boulder clay deposits. There is the potential for some of the features to be affected by subsidence, particularly in areas of shallower working.

8.3.135 Given that the effects of subsidence are generally completed within approximately 18 months of the removal of support, it is proposed that the features which are identified on Drawing No. JA-034-001-023 - Surface Topography, Mining Zones and Catchment Definition Plan - will be monitored over the period during which any foreseeable impacts could occur. Remedial measures will be implemented as and when necessary.

8.3.136 As a consequence of the lack of any significant foreseeable potential impacts no mitigatory measures are proposed as a part of this submission.

Groundwater

8.3.137 The principal elements of the groundwater system within the application area are the natural perched aquifers which are contained within the near surface sandstone units and minewater contained within upper level abandoned mineworkings.

8.3.138 The potential impact of subsidence movements (if any) on both elements is considered likely to be of such limited extent that no mitigatory measures are considered to be necessary and therefore none are proposed.

Residual impacts

Surface Waters

8.3.139 It is anticipated that the only residual impact which may occur with respect to surface waters is a slight reduction in the gradients of some of the watercourses. The implications of this impact are considered to be of no consequence due to the significant gradients which exist at present.

8.3.140 The number of surface water features within the application area are limited to spring emergences, commonly associated with "boggy" ground. A few manmade ponds which were constructed as a part of previous opencast operations infrastructure exist.

8.3.141 Within those areas of potentially maximum estimated subsidence at surface (i.e. where the shallowest level working is proposed in Zone Z1 north) there are no emergences. Elsewhere, the effects of significant depth below ground to proposed working horizons will mitigate against any surface impacts of note.

Groundwater

8.3.142 As noted in previous sections, there are two key elements to the groundwater regime in the area, namely:

- That associated with currently operational and previous (now abandoned) mineworkings, and
- The "natural" groundwater system which comprises minor perched aquifers contained within the sandstone horizons which crop out at surface along the higher levels of the Dulais and Neath valley sides.

8.3.143 The anticipated impact upon the perched aquifers is expected to be insignificant due to a combination of:

- The vertical separation between the proposed mining horizons and aquifers,
- The relatively poor hydraulic capacity characteristics of the sandstone units which form the aquifers.
- The massively bedded, competent nature of the major sandstone horizons which occur between the mining horizons and perched aquifers.

8.3.144 The mineworkings within the application site area comprise active workings (associated with the Aberpergwm Drift) and abandoned workings (associated with the Red, Pinchin and Rhondda seams). The two sets have very different characteristics.

8.3.145 Section above provides comment with respect to the water regimes in the upper level abandoned workings which are expected to be essentially free-draining on the Neath Valley side of the watershed and flooded on the Dulais side.

8.3.146 The upper level workings are contained within the Llynfi / Rhondda part of the stratigraphic sequence and are completely hydraulically separated from the lower coal bearing horizons which contain the Eighteen and Nine Feet seams - see Drawing No. JA-034-001-028.

8.3.147 The lower level workings in the Eighteen Feet and Nine Feet seams will be completely isolated and contained between solid in-situ barriers to the north, west and south with no connections with any of the surrounding abandoned mineworkings at the same stratigraphic levels.

8.3.148 The current and proposed levels of the workings in both the Eighteen Feet and the Nine Feet all lie below surrounding ground levels and do not crop out at surface, as can be seen from Drawing No. JA-034-001-025 - Nine Feet Seam Contour Plan which shows the contours of the Nine Feet horizon. The Eighteen Feet lies approximately 30 to 50 metres above this level.

8.3.149 The only connection that the current and the proposed workings will have with the surface is via the existing Aberpergwm Mine mouth, i.e. specifically the Quakers level.

Closure of the Aberpergwm Drift Mine

8.3.150 Upon the completion of mining operations at the Aberpergwm Drift Mine there will be a very slow rebound of groundwater levels which is likely to result in the resumption of flow from the point at which discharge previously occurred following the previous closure of the mine by British Coal in 1985, i.e. the Quakers Level (the location of which is shown in Drawing No. JA-034-001-026).

8.3.151 Discharge from this level was previosuly culverted directly into the Neath Canal.

8.3.152 As the current workings progressed in a westerly direction they passed over the Pentreclwyddau fault which displaces the strata towards the west by approximately 100 metres.

8.3.153 The point at which the drivages intersect the fault is approximately 41 metres AOD, beyond and to the west of which the roadways fall to lower levels to access the Eighteen and Nine Feet seam horizons.

8.3.154 Upon abandonment of the mine it is expected that the workings to the west would flood up to the fault intersection point and then "top-over" and eventually resume flowing from the Quaker level.

8.3.155 To isolate the minewater in the western block it is intended to install a "stopping" in the roadways. This will eventually return the minewater regime at the Aberpergwm Mine entrance area to that which existed prior to the re-opening in 1993, i.e. flow from the Quakers level.

Water Quality and Volumes

8.3.156 During the operational phase the potential volume of water which is likely to be generated from the mine and needed to be pumped out will probably increase. The magnitude of this increase is not possible to accurately predict but, on the basis of the mine, in relative terms, being dry, it is likely that any increase will be in proportion to the expansion in area worked.

8.3.157 Minewater pumped volumes will be continually monitored during the operational phase of the mine and form the basis of any future designs to deal with discharge requirements upon closure of the mine. Predictions of likely water inflows, pumping

requirements and the designs of facilities to deal with the discharge are, at this time, not merited.

8.3.158 Similarly, water quality is currently continually monitored and will continue to be so during the life of the mine. It will be possible using this data to put forward appropriate post-closure treatment facilities (if merited) at a time nearer to the anticipated closure date. It should be noted that water quality at the Aberpergwm Mine is not and has not historically been a problem.

8.4 Summary

Surface Waters, Water Features and Protected Rights

8.4.1 From an assessment of the available data and projections of the likely range of effects of subsidence at surface and on the intervening strata down to the proposed mining horizons, it is considered highly unlikely that any significant negative impacts will arise.

8.4.2 Some tilt and / or vertical displacement in watercourses may occur but their gradients are so steep that any impacts would be of no consequence.

8.4.3 No surface water features of any significance have been identified. Minor manmade ponds (associated with previous opencasting operations) located in the northern area of Zones Z1 and Z2 will be monitored during the critical mining period in the area, i.e. during removal of support and for approximately 18 months to 24 months after.

8.4.4 No protected rights are located within influencing distance of the proposed workings.

Groundwater - Operational Phase

8.4.5 As has been described in various sections of this report, the effect of depth has a very significant mitigatory impact upon subsidence. The locations of the main aquifers (which are minor perched features) are in the upper levels of the stratigraphic column, in the Llynfi, and more dominantly, the Rhondda Beds. These units occur where mining depths are at their greatest and the effects of subsidence will be at their least.

8.4.6 The impact of depth and the nature of the perched aquifers, i.e. contained within very thick units of sandstone and with low secondary permeability characteristics, it is considered unlikely that any significant impacts will be experienced.

Groundwater - Post Operational Phase

8.4.7 All of the proposed mineworkings will occur in horizons which are several hundreds of metres from the zones in which the perched aquifers occur (generally in excess of 450 metres and up to 600 metres) and can be considered to be hydraulically isolated.

8.4.8 All workings will be located below surrounding ground levels and over a significant proportion of the application area, below Ordnance Datum.

8.4.9 It is proposed to hydraulically isolate the area to the west of the Pentreclwyddau fault by "stopping off" the main arterial roadways once mining operations have ceased at the colliery.

8.4.10 Upon closure, the mined area to the east of the Pentreclwyddau fault will be allowed to flood and it is anticipated that there will be a minewater rebound resulting in water flows resuming from the Quakers level at 41 metres AOD. This essentially returns the situation to what existed prior to the undertaking of the extended workings as proposed in this submission documentation.

8.4.11 On the basis of current (and historical) pumped minewater quality data, it is considered highly unlikely that any significant problems will arise post mine closure. Nevertheless, 12 months prior to the planned closure of the mine, an appropriate plan detailing measures designed to accommodate any ground or surface water impacts will be presented to the Coal Authority and NRW for approval. The proposals will be based upon data collected during the operational period of the mine.

9 HYDROLOGY AND DRAINAGE

9.1 Introduction

9.1.1 This chapter has been prepared by UTC Associates and considers the potential impacts on the existing hydrological and surface water drainage regime due to the continued use of the surface mine facilities for the next 25 years. The proposals comprise the consolidation of existing planning consents, an extension of the underground coal workings, the use of recent opencast land for a mine waste repository and the continued use of the existing mine haul road to connect the mining operations.

9.1.2 The site has operated at this location for a number of years both as an underground mine and as an open cast coal site. In order to increase coal production in line with the mine business model the coal processing and distribution area was recently extended into the adjacent Cae Capel field to include a new coal preparation plant, coal product bins and loading area, to improve vehicular circulation and to increase car parking provision with a temporary car park on the south side of the B4232.

9.1.3 The Cae Capel development was completed in 2011 with the exception of the proposed dry coal store building. The receiving surface water drainage system for the dry coal store building has already been installed and includes a large underground rainwater harvesting tank and pumping main to enable the roof rainwater from the building to be recycled for use in the coal washery process.

9.1.4 Long-term, further improvements are planned to construct new office facilities on the south side of the B4232 and to remove the old portable offices to make space available to improve the current water treatment facilities that are located within the old yard. However, these long-term proposals are to be developed on a phased basis and the intended office development is not included in this current application.

9.1.5 It is also proposed to upgrade the old coal yard on a phased basis and Phase 1 of the concrete surface replacement works was included in the recent Cae Capel planning permission. The Phase 2 works are not included in this application as they will require the offices to be first relocated away from the site. Until the Phase 2 works are completed the Phase 1 resurfacing area will continue to drain into the existing

lagoon system as it currently does and in accordance with the existing consent to discharge.

9.1.6 The future Phase 2 redevelopment of the old coal yard can only be undertaken when the proposed new office development has been completed and the existing offices may be removed. At this stage it is intended that a new surface water treatment area will be constructed to replace the old system and the remainder of the old yard will be renewed by reconstructing the yard in concrete slabs.

9.1.7 In relation to the proposed extension of the underground coal workings, this chapter also considers the potential impacts on the existing hydrological and surface water drainage regime at the ground surface due to the continued pumping of water ingress to the existing and extended underground mining operation. The scoping response from National Resources Wales on this aspect of the proposals requested an existing water features survey be undertaken and this is separately covered in the preceding Hydro-geological Chapter 8.

9.1.8 The proposed underground extension is programmed to be implemented on a phased basis to include works in the zoned areas Z1, Z2 and Z3 in the initial years up to 2022, zones Z4 and Z6 to follow between years 2023 and 2031, with zone Z5 implemented between years 2031 and 2040. The extent of the proposals and the sub-division into underground zones are shown on Figure 9.9.

9.1.9 Due to the lengthy timeframe for the proposed development of the underground works and in line with the other environmental studies, the initial mine extension comprising zones Z1, Z2 and Z3 that is planned for the first 8 years is considered in detail and the later phases are dealt with in principle. The impacts relating to Zones Z4, Z5 and Z6 will be fully assessed at the appropriate time when more precise parameters are known.

9.1.10 Following the disturbance of the ground surface over the new drift mine just above Pwllfaron in 2011, it is proposed to utilise a part of the previously disturbed ground for the temporary storage of materials. This chapter also considers the potential impacts on the existing hydrological and surface water drainage regime due to the use of this small parcel of land adjacent to the existing haul road for the storage of materials.

9.1.11 The designation of this area for the storage of materials would provide a convenient location adjacent to the existing haul road to temporarily offload and collect smaller items that are needed for the on-going mining operations. The area is currently open without much vegetation and would be levelled to enable easy vehicle access direct from the existing haul road and then formed with a gravel surface to maintain a mainly permeable and natural surface finish.

9.1.12 Further up the hillside it is proposed that a long-term mine waste repository (MWR) will occupy the surface area of the previously worked open cast coal sites of the original Forest Quarry OCCS, Forest Quarry Area 2 and the Forest Quarry Area 2 Extension together with some additional land immediately to the east and to the south of the Forest Quarry 2 Extension.

9.1.13 This chapter considers the potential impacts on the existing hydrological and surface water drainage regime due to the estimated 25 year life of the mine waste repository. The MWR will be required to accommodate the future mine waste comprising discard from coal preparation and waste rock from the underground mining development.

9.1.14 In the longer term, it is proposed that an alternative transport system will convey the discard material directly from the coal preparation plant at the Cae Capel surface facilities up to the MWR delivery area where it will be transferred to its permanent location and placed in a controlled manner. The alternative transport proposals are not included as part of this planning application so the following assessment has been undertaken assuming that the discard to the MWR will be transported in dump trucks, and it is anticipated that the haul road will continue to be used for this purpose until 2019. As production levels increase beyond that projected for 2019, an alternative means of transport will be required to avoid exceeding the permitted noise thresholds.

9.1.15 Initially, the existing haul road from Cae Capel to the MWR will only need to carry a low volume of articulated dump trucks to transport the discard material. The number of return dump truck movements to the MWR is expected to increase initially from an estimated 2.27 two-way movements per hour in 2014 to 3.87 two-way movements per hour in 2019. Provided that the coal production increases in line with current projections it is envisaged that an alternative transport system will be introduced in 2020, subject to the appropriate future consents.

9.1.16 The existing haul road from Cae Capel to the MWP and the associated lagoon systems have been subject to discussions with both the Planning Authority and the Environment Agency in the past and a request for a current assessment was made during the scoping exercise. A number of minor improvements have been undertaken over recent years so the existing haul road and the associated lagoons have been recently surveyed to provide current baseline data. A separate assessment report on the haul road and the associated surface water drainage has been undertaken and is included as Appendix 9.2.

9.1.17 Extensive land restoration works have been undertaken to the old Nant y Mynydd opencast sites and the Nant y Mynydd 2 consent to discharge from the Environment Agency, reference BP0348301 is still maintained by Energybuild Ltd. The restoration site areas that are drained to the receiving lagoon system are increasingly covered with maturing vegetation and the demand on the system is continually reducing to the point where they will soon no longer be required.

9.1.18 Long-term it is intended to discontinue the consent to discharge and leave the lagoons in place to develop as natural ecological habitats. The proposed land restoration works are covered in the land use and soils Chapter 10. The advanced (but still on-going) Nant y Mynydd opencast restoration works also include the relocation of peat bog areas and the completion of these works is also covered exclusively in Chapter 10 on land use and soils.

9.2 Assessment Methodology

9.2.1 This Chapter 9 and the supporting assessment is based on a desk study of the hydrology of the site and its surrounds, a review of the past operations at the site, the collection of baseline data and a site walk-over visual survey of the site. This assessment has been undertaken to comply with the various legislation, policies, directives and guidance that relate to the water environment with particular regard to the objectives of the Water Framework Directive and in accordance with the following principal guidance documents:

- EC Water Framework Directive (2000/60/EC)
- Environment Act 1995
- Environmental Permitting (England and Wales) Regulations 2010

- Floods and Water Management Act 2010
- Land Drainage act 1991
- Neath Port Talbot Unitary Development Plan 2008
- Planning Policy Wales 2001
- Pollution Prevention Guidelines (PPGs)
- Technical Advice Note 15: Development and Flood Risk, 2004
- The Sustainable Urban Drainage Manual, CIRIA Report C697, 2007
- Water Environment (WFD)(England and Wales) Regulations 2003
- Water Resources Act 1991
- Western Wales River Basin District, December 2009

9.2.2 This assessment covers the potential impacts that may occur as a result of the proposals and the methodology applied is a qualitative risk assessment approach in which both the sensitivity of the receptor and the likely magnitude of the impact are considered and combined together. The effects of the proposals are identified against the baseline conditions and the significance of these effects is assessed following the DCLG guidance and is also based on professional judgement, experience and site specific characteristics. The general principles of this methodology are as set out in Table 9.1 below.

Table 9.1 – Impact significance

	Low Impact	**Medium Impact**	**High Impact**
Low Sensitivity Receptor	Negligible	Minor	Moderate
Medium Sensitivity Receptor	Minor	Moderate	Major
High Sensitivity Receptor	Moderate	Major	Extreme

9.2.3 The significance of each impact is later reported using the above terms and either adverse or positive. The significance criteria are defined as follows.

Extreme - These effects represent key factors in the decision making process. They are generally but not exclusively associated with sites and features that are unique and which, if lost, cannot be replaced.

Major – 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.

Moderate – 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 recource.

Minor – 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 design of the project.

Negligible – Effects that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

9.3 General Baseline Information

9.3.1 The mine surface site, the Pwllfaron area (including the underground mine water discharge), the mine waste repository and the connecting haul road are all located within the River Neath catchment area which is recorded as 190.9 sq km at the gauging station 58002 just downstream at Resolven. The River Neath contributes to the Tawe to Ogmore River Catchment in the southern part of the Western Wales River Basin District. This district extends across West Wales from the Vale of Glamorgan in the south to Denbighshire in the north with a total catchment area of 16,653km^2.

9.3.2 The main river catchment boundary is defined to the north by a watershed formed by the Hirfynydd Ridge that runs in a north-east south-west direction. There are a number of watercourses that carry the run-off from the northern hillside and these all drain in a southerly direction with steep gradients towards the River Neath. The

Nant Pergwm passes to the east of Cae Capel and the Nant Ysgwrfa passes to the west of the original coal yard, between the yard and Pwllfaron.

9.3.3 The Nant Ysgwrfa issues from the hillside approximately 3km to the north with an estimated catchment of around 217Ha. It flows rapidly at steep gradients towards the south and passes through a series of culverts adjacent to the existing coal processing area before joining with the River Neath. The Nant Pergwm flows through an existing culvert approximately 100m to the east of the car parking site before joining the River Neath. The River Neath follows the southern boundary of the car parking site and the B4242 forms the boundary to the north. Immediately adjacent to the north side of the B4242 is the Neath Canal.

9.3.4 The only watercourse that crosses the car parking site on the south side of the B4242 is the unnamed culverted watercourse that was routed through the site when the brown field land was remediated by the Welsh Development Agency for business use some years ago. To the south the culvert terminates within the bank of the River Neath with a concrete headwall arrangement. The bank of the River Neath has been reinforced with stone-filled gabions and block stone around the northern outer edge to protect the site from the effects of erosion. The locations of the watercourses and culverts may be seen on the mine surface existing hydrology plan, Figure 9.4.

9.3.5 Smaller unnamed watercourses collect the surface run-off from the areas between these main watercourses, and in particular from the area immediately to the north of the mine surface site. These watercourses are all fed by the natural surface water run-off and are typically supplemented by occasional groundwater seepages issuing from the hillside.

9.3.6 The existing ground topography falls steeply southwards towards the mine surface site, but then gently from the site towards the River Neath which is approximately 150m further to the south of the site. The sum total area of the watercourse catchments that have been affected by the existing mine surface site comprise approximately 16Ha, and the haul road comprises a further 5Ha, forming only a very small finite part of the River Neath catchment. The proposed MWR will cover around 74Ha and this equates to around 0.4% of the total River Neath catchment.

9.3.7 The average annual rainfall in the immediate area is approximately 1900mm and is predominantly produced by frontal rainfall systems from the Atlantic Ocean. The Met Office classifies the months from October to January as significantly wetter than

from February to September and this reflects the high frequency of winter Atlantic depressions and the low frequency of summer thunderstorms that affect the area.

9.3.8 The Environment Agency Wales/National Resources Wales flood maps identify the River Neath and the lower reaches of some of its tributaries as being at risk of flooding during extreme rainfall events. The lower part of Cae Capel field, including the site access, and the Nant Pergwm which runs to the east of the site have been identified as being subject to some potential flood risk.

9.3.9 The existing staff car parking area lies generally above the localised flood levels and outside of the 0.1% flood risk area. The flood maps suggest that only the immediate car park access from the A4242 may be subject to 0.1% flood risk. A separate Flood Consequence Assessment has been prepared, see Appendix 9.1, and reference to relevant parts of the assessment of flood risk are also included in this assessment.

9.3.10 The current overall status of the River Neath is categorised in the Western Wales River Basin District documents as being good. The ecological quality of the river is generally classed as good with similar status for both the biological water quality and the chemical status. The river is predicted to achieve an overall good ecological and chemical status by 2015.

Original Aberpergwm Mine Site Baseline

9.3.11 Surface water run-off from the original working area is collected into an attenuation pond within the site, released into two settlement lagoons and then discharged to an unnamed watercourse that runs along the southern boundary of the site. The flows enter a culvert that crosses under the Neath Canal and the B4232, pass under the existing temporary car parking area and then discharge into the River Neath approximately 120m to the south of the canal.

9.3.12 The surface area of the original coal yard is just under 1ha and the receiving surface water treatment system is covered by an existing discharge consent from the Environment Agency, reference BP0299101. The discharge consent requires a controlled water quality and a maximum discharge rate of 19 lit/sec to protect the receiving watercourses against any potential deterioration in the water quality and/or increase in the surface water run-off.

9.3.13 Prior to the Cae Capel development there were some historic failures of discharge standards at this location so random water samples were collected from the existing site surface water discharge and tested in July 2012. The test results suggest that the current discharge water quality is generally good with neutral to moderately alkaline pH value that was measured as 7.5 to 8.1 and with low concentrations of suspended solids. The sample test results are included as Appendix 9.3.

9.3.14 The existing mine bath house and the foul drainage from the site are discharged to the same unnamed watercourse after passing through a Klargester biodisc treatment plant and the discharge is covered by a consent to discharge from the Environment Agency, reference NPSWQD004611. The permit requires a controlled water quality and a maximum discharge rate of 22 cum per day and it is understood that the discharge is consistently in compliance with the consent conditions.

9.3.15 Upstream of the existing discharge consents, the receiving watercourse is contained within a 55m long 525mm diameter concrete culvert that runs diagonally underneath the colliery access road. The 525mm culvert receives flows from small catchments above the site via new 525mm and 450mm concrete culverts that were constructed as part of the Cae Capel development in 2010 and in accordance with the flood defence consents reference E10/2039 and E10/2045.

9.3.16 During periods of heavy rainfall, surface water run-off from the lower section of the haul road up to the open cast mine is temporarily stored in a small holding lagoon at the bottom of the haul road before being released into the new Cae Capel drainage system. This arrangement prevents excessive overland surface flows from travelling across the coal processing area and into the original surface water treatment system.

9.3.17 The highway access into the site, the south east corner of the coal yard, and the existing visitor car parking areas all fall within the predicted 0.1% risk flood area. The recently consented Phase 1 resurfacing area lies outside of this flood risk area, but part of the future intended Phase 2 resurfacing area is also within this flood risk area.

9.3.18 If the predicted 1 in 100-year rainfall event occurred, the existing site access and visitor parking would be under floodwater and existing precautionary measures would need to be implemented and that may include temporary site evacuation procedures if necessary. The extent of the 1% flood risk area is indicated by the 45.35m AOD contour and the 0.1% flood risk area is indicated by the 46.25m AOD

contour and these are included on the site drainage layout drawings, Figures 9.1 and 9.2.

9.3.19 Under extreme flood conditions the colliery would not be affected in isolation. Parts of the nearby residential housing, various access roads, and substantial lengths of the principal A465 highway through the Neath Valley would all be affected by rising floodwater. The likely effects due to a high return flood event are covered in more detail in the separate Flood Consequence Assessment, see Appendix 9.1.

Cae Capel Field Baseline

9.3.20 Cae Capel field lies immediately to the east of the original coal yard and has recently been developed to support the controlled expansion of the mining operation. The area of the field is just under 7ha and it slopes gently in a southerly direction. The southern area that formed the lower part of the field also lies within the predicted 1% and 0.1% flood risk area as it shares the same site access with the original yard. With regard to potential flood risk, the same precautionary measures referred to in paragraph 9.39 above will apply to the enlarged site as a whole.

9.3.21 Surface water run-off from the Cae Capel site is collected into an attenuation pond via primary settlement lagoons, released at a controlled rate into two settlement lagoons and then discharged to the unnamed watercourse after first passing through an oil separator. The flows enter the culvert under the Neath Canal and the B4232, pass under the temporary car parking area and then discharge into the River Neath approximately 120m to the south of the canal.

9.3.22 This surface water treatment system is covered by a recent environmental permit from the Environment Agency, reference EPR/DP3025GS. The permit requires a controlled water quality and a maximum discharge rate of 137 lit/sec that is based on the 1 in 2-year (QMED) estimate of 19.9lit/sec/Ha and is controlled to protect the receiving watercourses against any potential deterioration in the water quality and/or increase in the surface water run-off.

9.3.23 Random water samples were collected from the existing site surface water discharge and tested in July and September 2012. The test results show that the existing discharge water quality is generally good with neutral to moderately alkaline pH value that was measured as 7.2 and 7.7 with low concentrations of suspended solids. The sample test results are included as Appendix 9.4.

9.3.24 The foul drainage from the site is discharged to the same receiving watercourse after passing through a Klargester biodisc treatment plant. As the discharge is only of small volume it is exempt from the permitting regulations and the discharge was registered with the Environment Agency as a 'small sewage effluent discharge' when the unit was installed in 2011.

9.3.25 The Neath Canal runs along the southern boundary of the field and is fed by the small watercourses and man-made drainage channels that are connected to it. There is an overflow arrangement from the canal to the River Neath via the Nant Ysgwyrfa approximately 300m to the west of the site access.

9.3.26 The Nant Pergwm flows from north to south along the eastern boundary of the site, crosses the line of the Neath Canal and flows into the River Neath via a large diameter culvert under the B4242. The level of the Nant Pergwm was historically raised alongside Cae Capel field in association with the original construction of the Neath Canal and the watercourse may be at risk of over-topping its banks during high return period storm events.

9.3.27 Under such extreme conditions, any potential overflow from the west bank of the Nant Pergwm adjacent to the site would flow overland across Cae Capel field following the natural contours and into the water treatment area before passing into the receiving unnamed watercourse and thereafter into the River Neath. The surface water attenuation and treatment area was constructed with a compensatory flood volume such that it would be the first part of the site to hold flood water in the event of a high return rainfall event.

9.3.28 The Nant Pergwm and the Neath Canal border the eastern and southern boundaries of Cae Capel field respectively, and both water bodies were unaffected by the recent Cae Capel development. A vegetated buffer zone was provided as part of the site proposals to offer separation between the watercourses and the new development.

9.3.29 A minor unnamed watercourse drains a very small catchment area of around 2.7ha to the north of Cae Capel field and flows along the northern boundary of the field before entering the new 450mm concrete culvert that was constructed in accordance with the flood defence consent reference E10/2045.

9.3.30 Another unnamed watercourse flows from the northern slope above Cae Capel field and has been connected via a concrete headwall into the 525mm culvert that was

extended up through the site in accordance with the flood defence consent reference E10/2039. This watercourse also drains a small catchment area estimated to be around 6.1Ha immediately to the north of Cae Capel field.

9.3.31 The surface water features described above are all shown on the existing hydrology plan that is included as Figure 9.4 and the various catchment areas that have been defined are shown on Figure 9.5.

Staff Car Parking Area Baseline

9.3.32 The staff car park on the south side of the B4242 forms part of the undeveloped Glynneath Business Park that was prepared as a serviced site by the Welsh Development Agency (WDA) some years ago. It is generally flat, lies above the flood risk area and slopes gently in a southerly direction towards the River Neath. There are no surface water features on the site but it is crossed by the culverted watercourse described in paragraph 9.25 above.

9.3.33 The parking area remains un-surfaced with a gravel finish to allow rainwater to percolate into the ground and at the time of construction the car parking area was surrounded by a soil bund to prevent any direct surface water run-off from the car parking area running into the River Neath.

9.3.34 Part of the B4242 around the main colliery site access falls within the estimated 1% flood risk area, although the highway junction to the car park appears to fall outside of this flood risk area. Under the estimated 0.1% flood risk conditions the flood risk area increases to include more of the B4242 and the site access junction.

9.3.35 If the predicted 1 in 1000-year rainfall event occurred, the existing site access would be under floodwater and the mine's current precautionary measures would need to be implemented and that could include evacuation procedures for the car parking area if necessary. The extents of the flood risk areas are indicated on Figures 9.6 and 9.7 and the estimated flood risk contours are included on the surface water drainage layout Figure 9.2.

Pwllfaron Area (and Underground Licence Extension) Baseline

9.3.36 The Pwllfaron workshops and lagoons are located just above and to the west of the original coal yard. The new workshops were constructed on the old concrete hard surface to include a rainwater harvesting system and a Klargester Biodisc unit to

treat the foul discharge from the building. As the discharge is only of small volume it is exempt from the permitting regulations and the discharge was registered with the Environment Agency as a 'small sewage effluent discharge' when the unit was installed in 2011. The Pwllfaron surface water drainage is shown on Figure 9.3.

9.3.37 The Pwllfaron lagoons receive surface water run-off from the lower haul road and pumped mine water from underground. The resulting combined discharge is subject to conditions under the consent to discharge from the Environment Agency, reference BP0166101. The approved consent to discharge is for both rainfall related site drainage from the site haul road and for the mine water that is pumped up to the surface from underground. The permitted rate of discharge to the Nant Ysgwrfa is limited to 60 lit/sec with no more than 80 mg/lit of suspended solids.

9.3.38 The existing mine has an underground water collection system comprising of a number of small collection/holding tanks located close to each of the respective water ingress sources that have been encountered by the mining operation. As water collects at each source location, it is pumped at a low delivery rate of around 0.2 lit/sec to a centralised collection/storage point in the return drift.

9.3.39 From this first collection point the water is lifted approximately 40m at a rate of around 1.1 lit/sec to an underground storage tank that holds 10,000 litres. A turbine pump lifts it again at a rate of around 1.4 lit/sec to Pwllfaron Pit where it is held in the old underground workings. The water is retained in the Pwllfaron Pit for some time, so the general water quality benefits from an interim period of settlement before it is eventually lifted to the surface.

9.3.40 The mine water is finally pumped up to the surface from a single central pumping system and is delivered at an average rate of 285 gallons per minute, or 21.6 lit/sec. The pump operates intermittently, typically for around 5-minute periods, delivering 1200-1500 gallons of water during a normal delivery period. This is received at the western edge of the Pwllfaron lagoon system and it travels through the lagoons from west to east before being discharged to the Nant Ysgwrfa.

9.3.41 The mine water has been regularly sampled at the surface and the samples have been tested in the laboratory by Scientifics Ltd over a six month period from March 2013 to September 2013. The series of test results are included as Appendix 9.5 and they demonstrate that the quality of the mine water is well within the existing

consent conditions without the need for any further treatment. These recent results are supported by a similar series of test results that were undertaken in 2009.

9.3.42 The existing water treatment system that receives the pumped mine water is located behind the Pwllfaron workshops. The mine water currently mixes with surface water run-off from the site haul road and the combined water from both sources is discharged to the Nant Ysgwrfa after being retained in the system for a period of settlement. The existing Pwllfaron lagoons are shown on Figure 9.10.

9.3.43 The mine currently operates two surface water extraction points to supply and maintain its underground fire suppression system. The main water feed is via the Environment Agency abstraction licence 21/58/72/0030 located to the north-west of Pwllfaron for up to 120cum per day. A secondary feed for up to 20cum per day is located in the Nant Ysgwrfa directly to the north of Pwllfaron and this second feed is permitted by the Environment Agency flood defence consent E10/2090.

Proposed Materials Storage Area Baseline

9.3.44 The proposed materials storage area is only a very small area that is less than 0.1 Ha and is located adjacent to the mine haul road just above the Pwllfaron workshops. It is currently formed as rough open ground with little vegetation and lies above the new drift mine that was tunnelled into the hillside during 2011 to 2012.

9.3.45 Underground problems associated with the ingress of water into the drift mine workings required some ground surface work to be undertaken above it at the time of the underground construction drive, resulting in the clearance of areas of the ground surface to enable the urgent ground stabilisation works to proceed.

9.3.46 As part of the emergency works that were undertaken, an unnamed watercourse was diverted away from the line of the drift mine and the diverted watercourse is now located approximately 30m to 40m to the south of the proposed storage area. The watercourse had only a small upstream catchment area of approximately 5Ha and its diversion removed a large part of this catchment area and the associated flows from above the drift mine.

9.3.47 The bed of the original watercourse was left in place and it meanders around the southern edge of the proposed storage area. The reduced catchment area draining to the original channel bed comprises a small area of around 2.3Ha. The surface

water run-off from this catchment area generates only low flows that pass through the line of the old watercourse.

9.3.48 A similar size catchment area of around 2.1Ha adjacent and to the north-east produces a similar low rate of run-off in another small channel bed that joins with it just below and to the south of the proposed storage area. The two streams meet in an old concrete channel that was constructed in association with previous mine workings in the area. The catchment areas for these two minor watercourses are shown on Figure 9.12.

9.3.49 Due to some historical localised ground movement, the surface water flow entering the channel is not clearly defined so it is proposed to replace the old connecting pipeline under the existing crossover with a new culvert as part of the proposed materials storage area works.

9.3.50 Approximately 15m downstream of the confluence of the two minor watercourses the concrete channel connects to a concrete box culvert underneath an old access track and then continues downstream again as a concrete channel.

9.3.51 The diverted watercourse joins with the other two minor watercourses on the south side of the access track and the connection is also formed within the length of the existing concrete lined channel. As the downstream gradient eases away from the proposed materials storage area the concrete channel gives way to a natural stream bed and the watercourse disappears into the wooded area below.

9.3.52 The watercourse continues for around 300m through the wooded area, down the hillside diverging away from the mine haul road, behind the Pwllfaron workshops and past the Pwllfaron water treatment lagoons to discharge into the Neath Canal adjacent to the B4242.

9.3.53 The Neath Canal runs along the southern site boundary of the mine site and is fed by other occasional un-named natural watercourses and man-made drainage channels. Approximately 300m to the west of the Aberpergwm Mine access road, an overflow discharges any excess water from the canal under the B4242 and then finally into the River Neath via the Nant Ysgwrfa.

Mine Waste Repository Baseline

9.3.54 The proposed Mine Waste Repository (MWR) covers a total site area of approximately 74 hectares of which a large part is the Forest Quarry 2 Extension and the open cast coal extraction from this site has recently been completed. Much of the Forest Quarry 2 Extension site is bare ground with some restored areas and there are remaining overburden mounds and retained topsoil stored on the western side of the site.

9.3.55 To the north, the original Forest Quarry OCCS is substantially under restoration and the proposed MWR site includes some forestry land to the east and to the south that has not been disturbed by the previous open cast operations.

9.3.56 The main river catchment boundary is defined immediately to the north of the site by a watershed formed by the Hirfynydd Ridge that runs in a north-east south-west direction. Surface water issues from the hillside just below the ridgeline flow away from the site on both sides and one minor watercourse is formed on the west side of the site to join with the Rheola Brook and another minor watercourse on the east side of the site connects to the Nant Clwyd. The surface water run-off from the restored Forest Quarry OCCS is currently directed along a small roadside channel and into the tributary of the Nant Clwyd.

9.3.57 The ground falls away at fairly steep gradients towards the south and a number of minor watercourses form to carry the surface water run-off in a southerly direction with steep gradients towards the River Neath. A local gentle watershed divides the site from north to south with the western side of the site forming part of the Rheola Brook catchment and eastern side of the site is part of the Nant Clwyd catchment. The site catchment areas are defined on Figure 9.14.

9.3.58 The Environment Agency Wales/National Resources Wales flood maps identify the River Neath and the lower reaches of some of its tributaries as being at risk of flooding during extreme rainfall events. The Nant Clwyd is not identified as being at risk of flood but the lower reach and confluence of the Rheola Brook with the River Neath is close to a low point on the B4242 and both the Rheola Brook and B4242 are identified as being subject to some potential flood risk in this downstream area.

9.3.59 As part of the Forest Quarry 2 Extension, two water treatment areas were constructed with WTA 2A Outlet 1 discharging to the west and WTA 2B Outlet 2

discharging to the east. These facilities are still in place and both surface water discharges are covered by the current environmental permit, reference EPR/DP3024XW. Outlet 1 has a permitted maximum rate of discharge of 470 l/s and Outlet 2 has a permitted maximum rate of discharge of 406 l/s. The permit specifies a maximum 50 mg/l suspended solids at each of the two outlets to control the discharge water quality.

9.3.60 The environmental permit was authorised in July 2010 and the discharge rates were based on the agreed respective QMED (1 in 2-year) run-off rates of 21.1 lit/sec/Ha for the Rheola Brook catchment area and 18.7 lit/sec/Ha for the Nant Clwyd catchment area. These QMED values were confirmed by the Environment Agency at the time that the permit was issued. The original Greenfield run-off from the site has therefore been estimated using these previously agreed QMED values and the assessed site catchment areas.

9.3.61 Using the above methodology, the total Greenfield run-off from the site has been estimated to be QMED = 694 l/s (Rheola catchment) + 759 l/s (Nant Clwyd catchment) = 1.453 cumec for the combined catchments and this preliminary estimate has been used in the following preliminary surface water run-off assessments and for the proposed on-site attenuation volume balance. For higher return period assessments the estimated values have been factored in accordance with the appropriate FSSR growth curve for Hydrological Region 9.

9.3.62 Just to the east of the MWR site, a rock outcrop has led to the formation of a small waterfall on the upper reach of the Nant Clwyd. This is identified in the Ecology Chapter 12 where it is referenced TN32. The catchment area above this waterfall is shown on Figure 9.19 and has been assessed to be 10.686 Ha. The QMED flow at this feature has been estimated to be approximately 0.2 cumec.

9.3.63 Random water sampling and testing has continued since the construction of the two water treatment areas and the most recent results that are available were undertaken in May and July 2012. The test results show that the existing discharge water quality is generally good with neutral to slightly acidic pH value that was measured between 5.4 and 7.8 and with low concentrations of suspended solids. Samples taken from the lagoons when they were not discharging showed slightly elevated suspended solid levels between 20.6 and 50.5 mg/l. The test results are included as Appendix 9.7.

9.3.64 An assessment of the possible impacts from the MWR site proposals on existing groundwater flows and any proposed sub-surface drainage measures that may be considered as part of the mine waste repository construction works are covered in the preceding Hydrogeology Chapter 8.

Mine Haul Road Baseline

9.3.65 The existing mine haul road comprises a compacted gravel haul road that winds down the hillside from the proposed MWR for approximately 4.5 kilometres to the coal processing area at Cae Capel. The haul road is naturally steep and is finished with a trimmed compacted natural stone and gravel surface.

9.3.66 The haul road has carried operational opencast coal site traffic and other licensed mine traffic for approximately 20 years. The frequency of heavy traffic movements has recently dropped with the completion of the opencast mining sites but as the mining operations increase again in line with the proposed programme of expansion the number of traffic movements will also increase.

9.3.67 Surface water generally runs off to the side of the haul road where it is collected into open drainage channels that run parallel to the haul road. Under the heavy vehicle loads, some fine clay material tends to squeeze up through the road surface and mix with the surface water run-off. The resulting surface water run-off, containing soils in suspension, is directed via roadside channels into existing settlement lagoons to remove the solid particles before being discharged back to the receiving watercourses.

9.3.68 There are two sets of settlement lagoons that currently treat the surface water run-off from the haul road prior to discharging back to the respective receiving watercourses and thereafter to the River Neath. The discharge from each system is controlled by an existing consent to discharge from the Environment Agency that requires a controlled water quality to protect the downstream water environment.

9.3.69 The lower lagoon system at Pwllfaron is covered by the Environment Agency consent to discharge BP0166101 and has been assessed by setting up a simulation model in WinDes software to discharge the haul road run-off at a rate of 19 lit/sec under 2-year rainfall conditions and around 87 lit/sec under 100-year rainfall conditions plus an allowance for climate change.

9.3.70 The discharge from the upper lagoon system is covered by the Environment Agency consent to discharge BP0355301 and has been similarly assessed to discharge at a rate of 74 lit/sec under 2-year rainfall conditions and at an estimated 289 lit/sec under 100-year rainfall conditions plus an allowance for climate change. The WinDes output data for the existing conditions are included as Appendix 9.8 and Appendix 9.10.

9.4 Potential Impacts on Flood Risk

9.4.1 The impermeable concrete surfaces at the mine surface site would increase the instantaneous surface water run-off rates and volumes if the rainfall was collected and discharged to the watercourse without attenuation. However, in accordance with current good practice to use SUDS drainage systems to reduce the potential impact on the receiving watercourses, on-site attenuation of the surface water run-off has been designed into the scheme as an integral part of the development drainage proposals.

9.4.2 The mine surface site itself is partially at risk of flooding where the lower part of the site lies within the 1% flood risk area and there is potential for the site access from the B4242 and the lower part of the site to be affected by floodwaters during high return storm conditions.

9.4.3 There could also have been some potential for the mine surface development to marginally increase the flood risk downstream of the site due to the displacement of on-site flood water. Such increased flood risk would not be considered acceptable so the completed Cae Capel scheme design and construction included flood compensation measures to maintain the on-site flood potential and avoid any increase in flood risk to the development itself and also to any downstream property.

9.4.4 The existing staff car park lies above and outside of the estimated flood risk area, although land immediately to the north has been identified as being at risk of flood. The only flood risk impact in relation to the car park itself is the possibility of the site access being cut off during an extremely high return rainfall event, and this would prevent access to and egress from the car park.

9.4.5 At Pwllfaron the existing consent to discharge permits 60 lit/sec of combined mine water and haul road surface water run-off to be discharged to the Nant Ysgwrfa.

When considering flood risk this order of discharge is insignificant when compared to the typical flows in the receiving Nant Ysgwrfa watercourse and the far greater flows in the River Neath.

9.4.6 However, to ensure that there will be no additional flood risk due to the increased underground activity it is proposed that the same overall discharge rate of 60 lit/sec will continue to the Nant Ysgwrfa, but with the two water sources split into two separate systems. The haul road surface water run-off will be controlled to maximum 38 lit/sec by the existing lagoon system with the same discharge point and the mine water will be controlled to 22 lit/sec at the proposed new lagoon discharge point.

9.4.7 The construction of a new impermeable surface for the proposed small materials storage area would potentially increase the local instantaneous surface water run-off rates, so it is intended to utilise a permeable stone area for the proposed materials storage area rather than an impermeable surface finish.

9.4.8 Higher up the site, and in the event of a high return rainfall event, some rapid overland flow could potentially cause flooding within the MWR site. The site will be surrounded with an interceptor channel to contain any such event within the site and the nature of the development as a mine operation means that such conditions would be dealt with as a matter of course and any risk to the on-site operations would be comfortably managed.

9.4.9 Areas of exposed rock and soil-stripped ground could increase the instantaneous surface water run-off rates and volumes if the rainfall was collected and discharged to the receiving watercourses without attenuation. However, the site is already protected with surface water treatment areas that attenuate high return rainfall events and the surface water run-off will all be directed to these areas, so the risk of downstream flooding will effectively be reduced during the life of the project and this is addressed later in the chapter.

9.4.10 In the event of a high return rainfall event, some rapid overland flow could potentially also cause some surface flooding along the existing haul road with some possible overloading of the existing surface water treatment lagoon systems. This assessment addresses such a possibility later in the chapter.

9.4.11 The development of the MWR site will remove the site surface area from the original downstream catchments by intercepting the surface water run-off, attenuating flows to QMED (1 in 2 Year) greenfield run-off rates and providing settlement before the site run-off is released to the receiving watercourses. This will marginally reduce the flows in the receiving watercourses and offer some reduction in downstream flood risk.

9.5 Potential Impacts on Water Quality

9.5.1 Throughout the period of operation of the mine surface facilities, there will be a risk of fine coal particles and other sediment being carried by rainwater via rapid run-off from the impermeable surfaces into the site drainage systems and thereafter into the receiving watercourses. The inclusion of surface water management systems for the continued operations to include both attenuation and water quality treatment prior to discharge will provide mitigation against these potential effects.

9.5.2 There is also a risk that oil and plant fluid leakages could be carried by rainwater via rapid run-off from the impermeable surfaces into the site drainage systems and thereafter into the receiving watercourses. The new surface water management and drainage systems have been designed to pass the settled water through an oil separator prior to discharge to the receiving watercourse and this will provide mitigation against these potential effects.

9.5.3 There are no public foul sewers close to the site, so the disposal of foul drainage from the site without adequate treatment could result in pollution of the local watercourses. Three Klargester sewerage treatment units currently operate at the site to mitigate these possible effects by treating the foul drainage to a high standard prior to the discharge of treated water to the unnamed watercourses and thereafter to the River Neath.

9.5.4 The potential impacts on the surface water quality from the continued de-watering the underground workings have been identified as:

- The composition of the underground pumped mine water
- Soil sediment reaching receiving waters during lagoon construction work
- Oil, fuel and hydraulic fluid leakages carried into the drainage systems

9.5.5 The on-going dewatering of the underground workings will require mine water to continue to be pumped to the surface and disposed to the Nant Ysgwrfa. The mine water will be passed through a new lagoon system to prevent the mine water from mixing with the haul road surface water run-off before being discharged from the site.

9.5.6 This will provide an improvement to the existing combined discharge arrangements by ensuring that the mine water will not be exposed to any pollutants from the haul road and by reducing the loading on the existing lagoon system to increase settlement times in the existing settlement lagoon for the benefit of the site haul road run-off.

9.5.7 The risk of sediment pollution and plant fluid leakages will need to be considered initially for the construction of the new lagoons and subsequently for their continued use. The surface water management and drainage system will be designed to deal with these potential impacts on the surface water regime and the detailed design of the new lagoon system will be subject to the conditions of an environmental permit from Natural Resources Wales.

9.5.8 The construction of a soil bund along the southern edge of the proposed materials storage area could increase the risk of some soil sediment entering the watercourse for a short period of time. The bund will protect the watercourse in the longer term and localised measures will be possible to avoid any issues in the short term when the bund is formed.

9.5.9 There are potential impacts associated with oil, fuel and hydraulic fluid leakages from construction and operational plant using the materials storage area. These potential impacts will need to be managed on the site through good site practice, just as they currently are on a more widespread basis throughout the whole operational site.

9.5.10 The potential impacts from the MWR on water quality have been identified as:

- Sediment from on-site earth moving and placement operations
- Sediment from off-site dump truck movements on the haul road
- Oil, fuel and hydraulic fluid leakages carried into the drainage systems

- The discharge of foul drainage

9.5.11 The construction of the proposed haul road improvements, the forest road diversions, new peripheral intercept channel, additional attenuation volume and the delivery pad/winter storage area could have some effect on sediment travelling into the receiving watercourses, including the Nant Clwyd waterfall, and the possibility of this happening will need to be controlled within the site. Some of these works will need to be undertaken quite early in the scheme to provide the required facilities.

9.5.12 The continued risk of sediment pollution, plant fluid leakages and the discharge of foul drainage will all need to be considered throughout the life of the proposed MWR from initial soil moving operations, during the operational filling phase and through to the final restoration of the site. The surface water management and drainage systems will be designed to deal with the potential impacts on the surface water regime and if appropriate the detailed design may require a variation of the current environmental permit for the water treatment areas from Natural Resources Wales.

9.6 Impact Significance – Early Construction Phase

9.6.1 During the initial construction phase for the proposed mine water lagoons there will be some potential for sediment to be mobilised from the localised movement of materials to construct the proposed new lagoons and these operations may have greater potential impact for those earth moving activities that are closer to the receiving watercourse.

9.6.2 To mitigate these potential effects, it is proposed to first construct the mine water settlement lagoon and commission it such that any surface water run-off that is carrying sediment in suspension can gravitate direct into the settlement lagoon for treatment as early as possible. Temporary construction measures using silt mats and/or silt fences will also be incorporated into the works to provide protection for the receiving watercourse, the Nant Ysgwrfa.

9.6.3 The potential impacts associated with sedimentation during this phase of the works are considered to be minor to moderate adverse. However, these impacts would be short term with only temporary effects in relation to water quality.

9.6.4 If a high intensity rainfall event occurred during this stage of the project, some larger amount of sediment and earthworks material could be mobilised with corresponding impact on both water quality and the downstream flows, although this would only be for a short period of time. These potential impacts are considered to be minor to moderate adverse and would only be short term with temporary effects that will be mitigated when the settlement lagoon works are completed.

9.6.5 The early stages of the MWR filling operation are to backfill the current open cast excavations, so there will be no advance drainage preparation required in order to commence the filling operations. However, the initial phase will also involve the improvement of the existing water treatment areas for later phases and some temporary drainage channels to convey the surface water run-off to the surface water treatment areas as the ground is filled.

9.6.6 The water treatment areas are already in place from the open cast site, although some works are proposed to increase the attenuation volumes and improve the settlement capabilities. At least one of the two settlement lagoons at each location may be kept functional during these improvement works so the potential impacts associated with sedimentation during this phase of the works are considered to be only minor adverse, and these impacts would be short term with only temporary effects in relation to water quality.

9.6.7 The potential impacts associated with oil, fuel and hydraulic fluid leakages will be managed during this phase of the works through good site practice. These potential impacts could be direct or secondary and are considered to be minor to moderate, with short-term adverse effects. On-site arrangements for bunded storage tanks, refuelling and servicing vehicles will be completed as early as possible to mitigate against the potential effects from such leakages.

9.6.8 The foul drainage will be contained by a sealed cess-pit at the MWR and will be taken away from the MWR site by road tanker to an approved waste disposal facility. It is therefore considered that there will be no need to further consider any potential environmental impacts on the local water environment that could occur as a result of the foul drainage of the site at this stage of the operations.

9.6.9 The number of dump truck movements to and from the MWR on the haul road will start with low frequency and then steadily increase. Repetitive heavy loading tends to squeeze fine clay materials up through the gravel road surface to mix with the

surface water run-off. Initially this should not cause undue demand on the existing receiving water treatment areas, and it is proposed to undertake specific improvement works at this stage to alleviate the possible water quality and discharge issues in the future.

9.6.10 An assessment report on the haul road and the associated surface water drainage system is included as Appendix 9.2 and the improvement works that have been identified for the haul road and its drainage system are to be completed prior to the intensification of dump truck movements. At this stage the potential impacts from the use of the haul road on the receiving watercourses are considered to be minor to moderate adverse and will be further mitigated when the works that have been identified have been completed.

9.7 Impact Significance - Operational Phase

9.7.1 The Cae Capel water treatment area was only recently designed to accommodate the surface water drainage from the new development areas and the lower section of the haul road behind the old yard. It was designed to attenuate the outflow to maximum 137 lit/sec which is the assessed QMED estimate for the previously Greenfield site.

9.7.2 The surface water run-off then passes through parallel settlement lagoons where the suspended solids that have collected in the surface water run-off are removed and it then passes through an oil separator that was designed for the maximum attenuated flow rate before being discharged into the receiving watercourse.

9.7.3 The resulting impact on water quality in the receiving watercourse is therefore considered to be minor adverse and diminishing as the downstream catchment area increases. As a consequence of the attenuation of flows to the QMED estimate the impact on downstream flood risk is considered to be minor positive.

9.7.4 The water treatment system serving the old yard was fitted into a difficult topography and is difficult to maintain properly. Historically it was overloaded periodically by additional flows from the lower haul road and this situation was improved when the Cae Capel water treatment area was constructed.

9.7.5 The existing lagoon system in the old yard provides both attenuation and settlement for the surface water run-off from the hard areas prior to discharge from the site,

and the impact on water quality in the receiving watercourse is considered to be minor adverse. The attenuation provided by the system offers a minor positive impact in relation to downstream flood risk.

9.7.6 The existing surface water drainage system and settlement lagoons are proposed to continue to operate in the current format for the time being, but the system has been identified for improvement in the future due to its location and inherent maintenance difficulties and in the longer term the intention is to provide a replacement system.

9.7.7 The foul drainage is currently disposed from the site via three Klargester Biodisc treatment units and these units have been designed to produce an outflow to a high standard. No change is proposed to these arrangements. The rate of discharge is very low and in combination with the high standard of treatment it is considered that the impact on the receiving watercourse is minor to negligible.

9.7.8 When the proposed new mine water treatment area has been built at Pwllfaron, the pumped mine water will be received in the holding lagoon and passed through the settlement lagoon as a precautionary measure before discharge to the Nant Ysgwrfa. The mine water has been tested over a period of time and has been shown to be clear enough to discharge direct without any settlement. It is therefore anticipated that there will be no significant impact on the Nant Ysgwrfa due to the mine water discharge. The general arrangement of the proposed mine water lagoon system is shown on Figure 9.11.

9.7.9 The proposed extension of the underground boundary will inevitably lead to an expansion of the network of underground collection and pumping systems as new source points are discovered. However, it is anticipated that any additional water collected underground will initially be stored underground at source in the same manner as it currently is, attenuated and pumped to the same final underground collection point and lifted up to the surface using the existing pumping system.

9.7.10 The rate of pumped delivery of the mine water up to the surface will therefore remain the same. To attempt an estimate of future water ingress to the expanded workings at the present time would not be reliable as ingress rates will be dependent on geological formations, faults and localised features that are not yet known in enough detail. It is proposed that any future increase in the collection of water

underground will be dealt with either by longer individual pumping periods or some increased frequency of pumping.

9.7.11 Under either circumstance, the rate at which the mine water travels through the surface water treatment system is proposed to remain the same in the future as it currently is because it will be controlled by the same actual pumping rate of 285 gallons/minute, which is equivalent to 21.6 lit/sec.

9.7.12 The proposed mine water treatment area will be subject to detailed design and the final discharge will require an environmental permit from National Resources Wales. An application will be submitted at the appropriate time to ensure that the mine water treatment area may be installed and commissioned in good time and as required for the future mining operations.

9.7.13 The existing Pwllfaron lagoons will continue to operate but will be dedicated to the haul road surface water run-off only and controlled to a lower discharge rate, such that the combined discharge from the separate facilities at Pwllfaron will be no more than the current permitted rate of discharge. The details of the proposed improvements to this lagoon system are included in the haul road assessment report, Appendix 9.2 and illustrated on Figure 9.30. Supporting WinDes model output data is included as Appendix 9.9.

9.7.14 The potential impacts due to the construction of the soil bund edging the materials storage area could comprise some small generation of increased sediment loads in the surface water run-off. However, as a consequence of the small scale of the works and the ease of control measures for such minor works, the impacts are assessed to be minor to negligible. The small area of less than 0.1Ha constructed with a permeable stone surface will have no significant impact on the rate of run-off from the catchment area and the impacts in this respect are also assessed to be minor to negligible.

9.7.15 The potential impacts that have been identified during the MWR site filling operations are principally the generation of increased sediment loads in the surface water run-off and an increased rate of surface water run-off from the excavated surfaces. Without mitigation, both of these potential impacts could be of some significance in the short and medium term with temporary moderate adverse effects.

9.7.16 To mitigate these potential impacts it is proposed to install a peripheral intercept channel to collect the surface run-off and prevent any sediment that washes out of the on-site materials from entering the downstream watercourses. This will include effective protection for the Nant Clwyd waterfall. The surface water run-off will be channelled to one of three attenuation ponds where it will be held before passing through one of the existing surface water treatment areas to remove the suspended solids that may have been collected in transition.

9.7.17 The peripheral intercept channel around the MWR site will temporarily reduce the catchment areas drained to the receiving watercourses and this will have some impact on the flows through the Nant Clwyd waterfall. The catchment area will reduce from an estimated 10.686 Ha to 9.129 Ha, with a corresponding flow reduction of around 15% for any given rainfall event, so 85% of the pre-development flows will continue through the waterfall and this will have only minor impact at this location.

9.7.18 A preliminary assessment has been undertaken for the MWR site comprising an on-site catchment area analysis, an estimation of Greenfield run-off and the calculation of attenuation and settlement volumes that will be required to restrict the final discharge from the site. It is proposed to attenuate flows to no greater than the estimated mean annual peak rate QMED for the natural catchment areas for all rainfall events up to 100-yr + 30% climate change. This will have the benefit of providing a minor positive impact with regard to downstream flood risk.

9.7.19 The preliminary volume assessment using WinDes software predicts that a maximum attenuation volume of up to around 14,000cum will be required for 100-yr rainfall events including climate change, and the provision of the total volume will be split with attenuation volumes of 7,330cum at the southern low point, around 3,570cum at WTA 2A and 3,330cum at WTA 2B. The general arrangement of the operational surface water management system for the site is shown on Figure 9.15.

9.7.20 The maximum discharge from existing Outlet 1 at WTA 2A will be set at 470 l/sec and from existing Outlet 2 at WTA 2B it will be set at 406 l/sec; both are the same discharge rates that are specified by the current environmental permit. The existing attenuation pond at WTA 2A will be reconfigured and extended to provide additional storage volume, the existing attenuation pond at WTA 2B will be enlarged and a third attenuation pond at the southern low point will be added to enable the peak

flows to be regulated. The layout details are shown on Figures 9.16, 9.17 and 9.18 and supporting WinDes model output data is included as Appendix 9.12, 9.13 and 9.14.

9.7.21 The attenuated flows will pass through the parallel settlement lagoons at WTA 2A and WTA 2B to remove sediment and other suspended solids collected by the surface water in transition prior to discharge back into the receiving watercourses. After passing through the proposed drainage systems the adverse impacts on downstream water quality are considered to be minor to negligible.

9.7.22 The three attenuation areas will be subject to detailed design and although the respective discharges will not be varied from the permitted rates, the added facilities may require a variation of the existing environmental permit from National Resources Wales. If this is required, an application will be submitted at the appropriate time to ensure that the surface water treatment area may be upgraded with additional attenuation volume in good time and as required for the site operations.

9.7.23 The foul drainage will continue to be contained by cess pit and the waste taken away by road tanker to an approved waste disposal facility. It is anticipated that here will be no impact on the local water environment from this source.

9.7.24 At this stage of the operations the potential impacts associated with oil, fuel and hydraulic fluid leakages will continue to be managed through good site practice that will have been established and further refined with time. The on-site arrangements for bunded storage tanks and refuelling and servicing vehicles will have been installed and will continue to mitigate against the potential effects from such leakages.

9.7.25 The MWR on-site surface water management and treatment systems will ensure that the site operation itself will not be at risk of flooding under high return storm conditions and that any existing downstream flood risk will be reduced by on-site attenuation while the systems are in operation. This will be of particular benefit to the Rheola Brook catchment which has been identified as being at some potential downstream flood risk during high return rainfall events.

9.7.26 The surface water run-off from lower return rainfall events will pass directly through the systems without attenuation to maintain the lower base flows in the receiving

watercourses, and all flows will be held in the settlement lagoons to filter out any suspended solid particles and maintain the discharge water quality prior to release to the receiving watercourses.

9.7.27 The proposed improvements to the two existing haul road lagoon systems will have been completed at this stage and the quality of the surface water discharge will continue to be monitored at each lagoon discharge point. It is considered that the potential impacts on the receiving watercourses will continue to be minor to moderate adverse under the more frequent assessed articulated dump truck loading.

9.7.28 As coal production increases the need for alternative transport will increase and the expansion programme predicts that an alternative transport system should be constructed by 2020, subject to the appropriate permissions. When the coal production reaches the predicted level and the alternative transport system is introduced the vehicle movements on the haul road will reduce significantly and the impacts on the receiving watercourses under these conditions will correspondingly reduce to only minor to negligible.

9.8 Impact Significance - Restoration Phase

9.8.1 The mine surface site water management and water treatment systems installed for the mining operations will remain in operation throughout the restoration stage. They will continue to be maintained as long as they are needed to offer protection to the downstream watercourses from the effects of sediment and possible higher rates of surface water run-off. The impact significance on the downstream watercourses during the restoration stage is considered to be similar to the operational stage, with minor adverse impact on water quality and minor positive impact on flood risk to downstream properties.

9.8.2 The underground pumping arrangements and the new mine water lagoon system will remain in place for the foreseeable future and this situation will be reviewed in years to come when the mine is in its later stages of operation. The final decision on mine closure pumping arrangements will be agreed with the planning authority and other interested parties at the appropriate time. The impact from the mine water discharge is considered to be minor to negligible at this stage.

9.8.3 The first MWR restoration works will be commenced as early as possible and will be undertaken on a progressive basis as the filling is completed in each area of the MWR. During the progressive restoration of the MWR there will still be the potential for sediment to be mobilised and carried into the surface water system during the general earthworks operations, the final ground profiling and spreading of topsoil. The ground restoration works will be phased and will generally follow immediately after the sequential mine discard filling operations.

9.8.4 The MWR and haul road operational surface water management and surface water treatment systems will remain in place for the duration of the restoration works and will be maintained as long as they are needed to continue to offer protection to the receiving downstream watercourses. The possible impacts associated with sediment on the downstream watercourses during this phase are considered to be at worst minor adverse, and would be short-term resulting in temporary effects to surface water quality.

9.8.5 The final MWR ground levels, landform and on-site drainage restoration proposals are all covered in more detail in Chapter 10. The final landform has been designed to replicate the original split of the on-site catchment areas to the east and west so that there will be no long-term changes to the catchment areas and no residual impacts arising from the distribution of the areas that drain to the receiving watercourses.

9.8.6 The potential impacts associated with oil, fuel and hydraulic fluid leakages on the surface water environment will continue to be managed through established good site practice and the potential impacts will be similar to the earlier phases. The on-site arrangements will continue to mitigate against the potential effects from such leakages and these will be maintained during the progressive removal of the other site facilities as they become redundant.

9.8.7 The potential risks from flooding within the site will be minimal and similar to that for the earlier phases. Once the restored ground surfaces have mature vegetation the surface water run-off will return closely to the original baseline conditions to allow the attenuation ponds to be partially reshaped and/or filled with on-site material. The restoration works to the surface water management systems will be undertaken as the final operations before each part of the site enters into aftercare arrangements.

9.8.8 The use of the haul road will have reduced to only occasional heavy vehicle movements at this stage so the sediment loading through the two settlement lagoon systems will have substantially reduced and the potential impacts from sediment in the discharges will reduce to minor to negligible. It is intended to leave the haul road lagoon systems in place to develop as ecological habitats in the future years.

9.9 Summary of Mitigation Measures

9.9.1 The total surface water run-off from the mine surface development at Cae Capel is reduced by the use of underground rainwater harvesting tanks to collect and recycle the rain water run-off from the roof of the washery building and (when it is built) from the dry coal store building roof. This harvested rain water will be reused in the coal washery process to reduce the water demand from other sources.

9.9.2 The surface water drainage system in Cae Capel field was recently designed to collect and convey the development run-off via surface channels, attenuate the flows on-site, pass the controlled flows through settlement lagoons to remove the suspended solid particles and then through an oil separator to ensure a satisfactory standard of discharge from the site. No further mitigation measures are proposed for this system.

9.9.3 Phase 1 of the proposed resurfacing of the old yard is to include a new drainage channel system and will be undertaken without disturbing the existing lagoon system. Long-term it is intended to replace this existing lagoon system with a similar but upgraded arrangement that has better access for maintenance purposes. It is proposed to maintain the current system until such time that the administration offices can be relocated to facilitate construction of a replacement system.

9.9.4 Part of the site falls within the 0.1% and 1% flood risk area, and in particular the surface water treatment areas that are located within the lower part of the site. The design of the Cae Capel development incorporated various measures to accommodate the flood risk aspects of the site and no additional mitigation measures are proposed in this respect. The relevant flood risk issues are covered in the Flood Consequence Assessment included as Appendix 9.1.

9.9.5 The Cae Capel scheme design and construction reflected the results of the earlier Cae Capel Flood Consequence Assessment, with the coal processing plant and most of the working areas located above the flood risk contours and the surface water

treatment area and some less vulnerable materials storage areas lying within the flood risk area. The building layout and the extent of the on-site flood risk as defined by the estimated flood risk contours are included on the site layout Figure 9.1.

9.9.6 Due to the consistently positive results of the mine water testing, a direct discharge of the pumped mine water to the Nant Ysgwrfa has been considered. However, as there are future unknowns associated with the expansion of the underground boundary it has been decided to separate the mine water from the haul road run-off and to discharge the mine water through a new treatment system. Separating these flows will mitigate against the possibility of the future collection and discharge of any polluting constituents from the mine water system.

9.9.7 As the underground mine workings expand it is likely that additional sources of water will be encountered and such additional sources will be similarly held at source initially and then raised to the surface via staged pumping using the existing pumping system. If the volume of water ingress increases, the frequency and/or period of operation of the pumps will increase accordingly with the same delivery rate that is currently pumped to the Pwllfaron lagoons.

9.9.8 The separation of the pumped mine water and haul road run-off with two separate discharge points will require approval from Natural Resources Wales under the environmental permitting regulations and either an amendment to the existing consent or a new application will be submitted following consultation with National Resources Wales on the permit requirements.

9.9.9 A preliminary design has been undertaken for the proposed mine water lagoons, based on 22 lit/sec pass-through and discharge rate with two hours period of retention provided in the system prior to discharge to the Nant Ysgwrfa. The final design of the mine water discharge facility will be subject to approval by National Resources Wales. Energybuild Limited will implement a regime to monitor and test the discharge flows to ensure compliance with the future conditions of discharge.

9.9.10 It is anticipated that the mine water discharge will continue to be consistent as the underground extension expands, but both the pumping system and discharge arrangements will be kept under review in case there are any significant new sources of water that are encountered by the progressive mining operation. The water quality of the pumped mine water will then continue to be monitored at the surface for any changes and if conditions dictate then the treatment will be modified as

appropriate to deal with the changed conditions. Any changes will be subject to consultation with the planning authority and National Resources Wales and if significant enough incorporated into an amended permit.

9.9.11 The new lagoons have been located away from other activities to cover the possibility of a future expansion of the attenuation volume if there is ever a need for expansion. This will ensure that space will be available for future upgrading of the facility if it becomes necessary as the underground extension continues to expand in later years.

9.9.12 A soil bund will be constructed around the southern edge of the proposed materials storage area to offer long term protection to the existing unnamed watercourse from any direct surface water run-off. During construction the edge of the watercourse will be suitably protected, for example using silt fencing.

9.9.13 There will be very little surface run-off from the proposed materials storage area stone surface, however, a small holding pond will be provided to retain the run-off in case it contains any solids in suspension. A small surface channel adjacent to the bund will direct any surface run-off into the holding pond before discharging to the watercourse. The surface water drainage layout is shown on Figure 9.13.

9.9.14 The old pipes under the proposed access to the storage area will be replaced with a new 450mm culvert and the details will be subject to Ordinary Watercourse Consent from Neath Port Talbot County Borough Council. An application will be submitted in good time to seek approval prior to the works commencing on-site.

9.9.15 A scheme of mitigation measures to protect the downstream water environment have been incorporated into the MWR proposals to prevent and/or reduce potential impacts during the site set-up phase, the operational phase and restoration phase. The overall surface water management scheme is shown on Figure 9.15 and will continue in operation throughout the life of the MWR including the restoration works.

9.9.16 The two existing surface water treatment areas will be upgraded to protect the receiving watercourse from the potential effects of sedimentation and downstream flood risk by providing attenuation and settlement facilities prior to the discharge of the site surface water run-off to the receiving watercourses, tributaries to Rheola Brook and Nant Clwyd. The surface water systems including existing WTA 2A and

WTA 2B will be subject to continued conditions of consent via an environmental permit from Natural Resources Wales.

9.9.17 The entire MWR site will be enclosed with a peripheral intercept channel to prevent any sediment leaving the site and to direct the surface water run-off to the two water treatment areas. A series of on-site temporary channels will direct the on-site run-off to the receiving systems as the filling operation progresses across the MWR site. An additional attenuation pond will be located at the low point at the southern edge of the site and the attenuation volume at each of the two existing water treatment areas will be expanded. This will enable the discharge to continue at WTA 2A and WTA 2B at the same discharge rates that are specified in the current environmental permit.

9.9.18 The existing haul road and the associated surface water drainage systems have been assessed and a series of improvements identified to improve the functionality of the road and to increase the efficiency of the two existing water treatment systems. These proposed improvements are covered in the Haul Road Report Appendix 9.2 and are illustrated by the Figures 9.20 to 9.31.

9.9.19 The haul road objectives are to reduce the current difficulty of use for large articulated dump trucks by improving the road alignments where possible, to increase the stability of the road under repetitive heavy wheel loads and to improve the surface water drainage systems. The proposed improvements will reduce the current rate of surface water discharge and will provide better protection for the receiving watercourses from sediment carried in suspension by the haul road run-off.

9.9.20 Due to the steep site topography the existing lagoons already occupy most of the available space adjacent to the road. The proposed surface water mitigation is generally provided by adding new outlet controls to attenuate the flows higher in the systems, reduce the rate of flow through the systems and increase the settlement times before discharge. Fine clay content is likely to be carried in suspension by the road run-off so flocculant points have also been added to the existing lagoon systems to assist the settlement of solids to achieve the current discharge consent conditions.

9.9.21 In order to minimise the potential impacts on the water environment due to the mobilisation of sediment by the site operations the following measures will also be incorporated into the project where appropriate:

- Topsoil and subsoil works will be restricted during heavy rainfall events.
- Soil mounds will be seeded to reduce the risk of fine particles washing out.
- The movement of traffic will confined to defined tracks and hard standings.
- Dust will be damped down during dry periods.
- Wheel wash facilities will be directed to the water treatment areas.

9.9.22 Measures will also be taken to prevent the potential pollution of watercourses and will be generally in accordance with the Pollution Prevention Guidelines published by Environment Agency Wales/ National Resources Wales. In particular:

- Chemical, fuel and oils stores will be sited on impervious bases within a secured bund that will contain 110% of the expected storage capacity.
- Clean-up equipment will be stored in designated areas to enable the containment and clean-up of any spills of fuels or lubricants as required.
- Personnel will be briefed/trained on preventative and clean-up actions.
- Refuelling of vehicles and machinery will be carried out in accordance with PPG7.
- Vehicles used on-site will be regularly inspected and maintained.
- Standing machinery will have drip trays underneath potential leakage points
- The drainage systems and bunded storage areas will be maintained and checked regularly.

9.10 Residual Impacts and Monitoring

9.10.1 The existing and proposed surface water management systems will mitigate impacts throughout the life of the proposed operations and it is anticipated that there will be no significant residual impacts. Attenuation of flows to the QMED (1 in 2-year)

Greenfield run-off will positively reduce flood risk to downstream property for any higher return rainfall events and the settlement lagoons will protect against any deterioration in water quality in the receiving watercourse.

9.10.2 The controlled discharge from each of the surface water management and treatment systems to maximum assessed QMED (1 in 2-year) rates will also allow the run-off from lower return rainfall events up to QMED to pass through the systems without attenuation and this will serve to maintain the base surface water flows in the receiving watercourses.

9.10.3 The discharge from the Cae Capel water treatment area is covered by the environmental permit EPR/DP3025GS and is monitored both by National Resources Wales and by Energybuild Ltd. The existing water treatment area in the original coal yard is covered by the Consent to Discharge BP0299101. This is also subject to on-going monitoring that will provide a framework to confirm that there will be no significant residual impacts on the receiving watercourse.

9.10.4 Part of the mine surface working areas, the mine site access and the attenuation pond and settlement lagoons are located within the estimated flood risk area. Flood compensation has been provided to balance any potential loss of flood volume in the lower part of the Cae Capel development and will continue to provide flood compensation for the assessed high return rainfall events.

9.10.5 The future risk of surface flooding within the mine surface site will continue to be managed in the same way that it is currently managed for the on-going mine operations, with the existing water treatment areas and the other less vulnerable site operations first affected by flood water if a high return rainfall event ever occurs during the life of the mine.

9.10.6 There will be some residual risk of the car park access being subject to flooding at the peak of extremely high return rainfall events, but this risk is only remote. The mine site access to the north of the B4242 has similar but higher flood risk, so the potential car park access issue will continue to be managed in the same way that it is for the current mine operations.

9.10.7 The existing Environment Agency discharge consents for the Pwllfaron lagoons (System 1) and the haul road lagoons (System 2) and the new environmental permit

that will be required for the proposed mine water lagoon system discharge will all carry on-going monitoring requirements.

9.10.8 Energybuild Limited will undertake regular testing of water samples from each of the discharge points to maintain and if necessary improve the water quality and rate of discharge in accordance with the conditions of discharge. National Resources Wales in its regulatory role will also independently test random water samples to check the quality of the water that discharges from the site during the lifetime of the operation.

9.10.9 It is considered that there will be no significant residual impacts as a result of the proposal to utilise the small site area adjacent to the haul road for the storage of materials used in the mining operations.

9.10.10 The existing environmental permit that covers the MWR water treatment areas WTA 2A and WTA 2B will continue to carry on-going monitoring requirements and Energybuild Limited will also undertake regular testing of water samples from these two discharge points to maintain the water quality and control the rate of discharge. National Resources Wales in its regulatory role will also independently test random water samples to check the quality of the water discharging from the MWR.

9.10.11 As a consequence of the proposed mitigation measures described above, and in particular the number of water treatment areas that will continue to provide for the attenuation of flows and the control of water quality, it is considered that none of the potential short-term or longer-term impacts that have been identified and that could possibly arise due to sediment, pollution, flooding or mine water discharges will be of any significance.

9.11 Cumulative Impact

9.11.1 The operation of the mine surface facilities combined with the MWR filling operations and transportation along the mine haul road could possibly produce some cumulative impact on water quality in the downstream receiving watercourse, the River Neath. However, the impacts from each part of the development will be mitigated at source and at each of the points where the unnamed watercourse meets the River Neath the impact will be only minor to negligible. Any contribution towards an overall impact on the River Neath will be negligible in relation to the relatively large flows in the river.

9.11.2 Rainfall events higher than QMED (1 in 2 year return) will be attenuated at different locations within the site so for higher return events there will be some cumulative reduction of flood risk in the River Neath. However, even when each reduced flow rate is combined with similar contributions from the attenuation provided at other locations there will be only some minor cumulative positive impact on the overall flood risk to the River Neath. This will be of minor positive benefit to downstream properties for flood risk during higher return storm events.

9.11.3 The other developments that have been identified for cumulative impact are the Healthcare Centre to the south of the B4242 and the Wind Ventures wind farm proposals along Hyrfynydd Ridge. The proposed healthcare development will provide its own sustainable drainage system within its application boundary to mitigate any impacts on hydrology. The cumulative impact with this planning application would be related to the surface water discharge to the River Neath, but because both schemes are mitigated at source the cumulative impact will be negligible.

9.11.4 The wind farm is proposed to be located on the northwest side of Hyrfynydd Ridge so any possible impact from that scheme would be within the River Dulais catchment and the assessment in support of the wind farm application determined that there would be no significant impact on the site hydrology. The possible impacts arising from the Aberpergwm Mine surface activities have been assessed to be minor to negligible and are on the southeast side of Hyrfynydd Ridge and within the River Neath catchment, so the two schemes drain to different river catchments and there will be no cumulative impact on the site hydrology in relation to the mine surface activities and the proposed wind farm scheme.

9.11.5 The subsidence assessment has identified the possibility of some cumulative impact from the proposed underground workings and the proposed wind farm structures. However, as the proposed wind farm is located close to Hyrfynydd Ridge, any subsidence risk related to the tributary streams would affect only very small areas at the top of the catchments and the impact significance on the downstream watercourses would be negligible.

9.12 Hydrology and Drainage Summary

9.12.1 The Aberpergwm Mine Surface site can continue to be drained in a relatively sustainable manner as local conditions and the nature of the operations will allow. The clean roof rainwater will be harvested for reuse in the coal washing process and the surface water run-off from the working surfaces will be attenuated and treated within the site. The surface water run-off will then be discharged to the receiving watercourse under controlled water quality standards and outflow rates that will reduce the impact on the receiving watercourses for any higher return rainfall events.

9.12.2 The recently constructed Cae Capel surface water drainage system has provided for the expansion of the surface mine facilities and working areas and the surface water run-off is directed to the surface water treatment area adjacent to the site access. The new system was subject to an Environmental Permit from the Environment Agency, and the application was consented in 2010.

9.12.3 Clean water flows from above the site were previously routed around the site by constructing two new sections of culvert. The two culverts were agreed to protect the clean water from becoming contaminated with fine coal particles from the site operations and were constructed in accordance with flood defence consents from the Environment Agency in 2010.

9.12.4 The surface water discharge from the original coal processing site to the unnamed watercourse via attenuation and settlement ponds is covered by a current discharge consent from the Environment Agency, and this existing consent will continue to be maintained by Energybuild Ltd until the old system is replaced sometime in the future. This is intended to follow the relocation of the site offices as this will create the space for a new surface water treatment area to be built.

9.12.5 The Aberpergwm colliery site operates with its access road, water treatment area, weighbridge, wheel wash and lower working areas within the 1% flood risk area. The site has always had to consider the possibility of flood risk and to make provisions for emergency procedures in case a high return rainfall event ever occurred.

9.12.6 The coal processing areas have been located on the higher part of the field so that the main working areas are above the estimated 1% flood risk contour of 45.35m AOD. Only the site access, weighbridge, and the less vulnerable activities comprising

a small part of the working yard, the surface water lagoon system and part of the materials storage area are located within the estimated 1% flood risk area.

9.12.7 The staff car park forms part of the undeveloped Glynneath Business Park that was prepared as a serviced site by the Welsh Development Agency (WDA) some years ago. It is generally flat, lies above the flood risk area and slopes gently in a southerly direction towards the River Neath. There are no surface water features on the site but it is crossed by an existing culverted watercourse.

9.12.8 The car park lies generally above and outside of the flood risk area, however, the site access may be subject to flood risk under extreme high return rainfall conditions. The Aberpergwm colliery site operates with its access road and lower less vulnerable areas within the flood risk area and the car park will continue to operate in a similar manner as the existing colliery using the same emergency procedures.

9.12.9 Potential flood risk to other properties as a result of the development was previously assessed and measures have been incorporated into the design to avoid any increase in flood risk to other properties. This was achieved by balancing any cut and fill within the flood risk area to provide at least equivalent flood compensation where finished surface levels were changed.

9.12.10 There are no properties sensitive to flooding immediately downstream of the Aberpergwm site. The River Neath itself is at risk of flooding during extreme rainfall events, but as the site proposals include attenuation to discharge at the equivalent QMED (1 in 2-year) Greenfield run-off there will be no additional flood risk to the receiving watercourses as a consequence of the development.

9.12.11 A separate Flood Consequence Assessment has been undertaken for the surface mine development, see Appendix 9.1, and it has been concluded that the flood risk can be managed to an acceptable level for the type of development proposed.

9.12.12 It is proposed to progressively extend the existing underground workings and continue to dewater the mine by collecting the ingress of water at source and to raise it up to the surface by pumping in stages. At each holding point the water undergoes a period of settlement and when it is brought to the surface at Pwllfaron it has been tested to show that it is of sufficient quality to discharge direct to the receiving watercourse.

9.12.13 As the underground mining operation expands further it is anticipated that any new source of water ingress will be held underground at source and removed by lifting it to the surface in the same manner and at the same rate that it is currently pumped but with increased frequency and/or periods of operation.

9.12.14 The mine water is currently discharged into Pwllfaron lagoons where it mixes with surface water run-off from the site haul road. This surface water run-off generally contains a raised level of suspended solids that need to be settled out before being released to the receiving watercourse. It has therefore been decided to keep the two sources of water separate and to discharge each at different points.

9.12.15 It is proposed that the existing Pwllfaron lagoons will continue to receive the surface water run-off from the site haul road and have been assessed to improve their efficiency in the future. The pumped mine water will be transferred to new lagoons approximately 100m to the north of Pwllfaron.

9.12.16 The new mine water lagoons will comprise a receiving lagoon with flow control and a settlement lagoon for the water to pass through prior to discharge to the Nant Ysgwrfa. The mine water has been shown to be clear enough to discharge without settlement, but the new system will be provided in case of any future change in the water quality as the mine is expanded. The discharge from this new system will require an environmental permit from National Resources Wales.

9.12.17 The assessment has concluded that due to the provision of a new water management system there will be no significant effects on the receiving watercourse as a result of the proposed continued dewatering of the existing mine and the progressive extension of the underground workings.

9.12.18 It is proposed to create a small gravel surface area to store materials adjacent to the mine haul road. The site is only a very small area that is less than 0.1 Ha and is located just above the Pwllfaron workshops. It is currently formed as rough open ground with little vegetation and lies above the new drift mine that was tunnelled into the hillside in 2011 to 2012.

9.12.19 The works will comprise some levelling of the ground, laying a permeable gravel surface, forming a soil bund to protect the adjacent watercourse and a small holding pond to control any surface water run-off from the area. The site will occupy only a

small site area and it is considered that there will be no significant impact on the water environment as a consequence of the materials storage area proposals.

9.12.20 The proposed mine waste repository (MWR) site is located just below the Hirfynnydd Ridge that defines the northern edge of the River Neath catchment area. The site itself has a gentle north-south watershed and contributes to two sub-catchment areas within the larger River Neath catchment with the western side draining towards the Rheola Brook and the eastern side draining towards the Nant Clwyd.

9.12.21 The site is mostly composed of previously worked open cast coal sites comprising the original Forest Quarry OCCS, Forest Quarry Area 2 and the Forest Quarry Area 2 Extension together with some additional land immediately to the east and to the south of the Forest Quarry 2 Extension.

9.12.22 Two water treatment areas are still in place from the previous open cast operations with WTA 2A discharging to the west and WTA 2B discharging to the east. It is intended to retain and improve these existing facilities to protect the downstream watercourses from any impacts from the filling operations.

9.12.23 A peripheral intercept channel will be installed to prevent any direct surface run-off from the site and some supplementary works will be undertaken to the lagoons to improve their capacity and efficiency. The existing discharges are covered by a current environmental permit and this may be varied if required by National Resources Wales.

9.12.24 Flood risk has been considered in relation to the proposals as the main downstream receiving watercourse, the River Neath and the lower reach of the Rheola Brook and confluence with the River Neath are identified as being subject to some potential downstream flood risk during high return rainfall events. The provision of on-site attenuation will reduce the run-off from the site for higher return rainfall events and this will offer a minor positive benefit in relation to downstream flood risk.

9.12.25 The impacts on the water environment due to increased dump truck movements on the existing haul road have been separately assessed and the results of the haul road and drainage assessment, the proposed mitigation measures and the implementation of the proposed works are all included in the Appendix 9.2.

9.12.26 As the MWR site filling operations progress, areas of the site will be subject to a follow-on progressive restoration scheme under agreement with the Planning Authority. The proposed site restoration works will ensure that there will be no long-term detrimental impacts on the hydrology of the MWR site itself or on the downstream receiving watercourses.

10 Land use and soils, including restoration and aftercare

10.1 Introduction

10.1.1 Progressive Restoration Limited was commissioned by Walter Energy Limited in November 2013 to carry out a soil resource assessment in support of their application to Neath Port Talbot County Borough Council in respect of the renewal of planning consent for the Aberpergwm Mine Site, Glynneath. The work focused on the proposed Mine Waste Repository, which is located on Hirfynydd Ridge, and included:

- Review of the implications of past mineral working and restoration on the availability and characteristics of soils,
- Soil survey of undisturbed areas within the curtilage of the Mine Waste Repository, with particular focus on determining the extent, type, condition and thickness of deep peat,
- Development of proposals for further development of the Ecological conservation area to accommodate deep peat,
- Soil recovery, including assessment of the implications of the proposed phasing of operations on the requirement for soil storage,
- Preparation of detailed restoration scheme, including a soil strategy to maximise the value of the available soil resource for restoration,
- Preparation of outline aftercare scheme,
- Analysis of the significance of the impact of the development on existing land use and soil resources.

The following chapter contains a summary of the technical report produced, which is presented in full in Appendix 10.1. Drawing and tables referred to are included within the appendix.

10.2 Review of the implications of past mineral working and restoration on the availability and characteristics of soils

10.2.1 Table 1 'Current and previous land use' provides a breakdown of land use units within the planning application boundary for the Mine Waste Repository. Full details are presented on past mineral extraction and the planning permissions under which this was undertaken.

10.2.2 Drawing number CA10649-001 'Planning permission boundary for Mine Waste Repository – current and previous land use' shows the relative proportion of undisturbed and disturbed ground within the site. The former totals 25 ha, and equates to 30% of the total area, while the latter comprises 58 ha, some 70% of the area. The disturbed area can be further sub-divided into restored ground, on which a soil cover has been reinstated, and unrestored ground, which is devoid of soils.

10.2.3 The soil resources on areas that have been affected by previous mineral working can be sub-dived into five as follows:

- Stored soils – surcharged over an extensive, and elevated area, upon Overburden mound 2 which forms the central and western part of the former Forest Quarry 2 Extension OCCS and also unclassified rock regolith and subsoil stored in a conspicuous mound on graded backfill in the centre of the former site,

- Reinstated soils – located on restored ground within the former Forest Quarry OCCS together with a parcel of progressive restoration in the north-west corner of the former Forest Quarry 2 OCCS,

- Potential geological soil-forming materials – generated by the excavation of additional peat bogs in partly disturbed ground within the Nant y Mynydd Conservation Area,

- Potential man-made soil-forming materials – colliery discard from the Aberpergwm Drift Mine.

10.2.4 A detailed assessment of each source of soils is given in the following.

10.3 Stored soils

10.3.1 The deferment of progressive restoration during the operation of the Forest Quarry 2 Extension OCCS led to the accumulation of a substantial soil volume estimated to be 163,560 m^3. The location and extent of the storage area is indicated on Drawing number CA/01649/002A 'Extent of reinstated soil profiles on restored ground and location of soil storage mounds within areas previously subjected to opencast coal extraction within the Mine Waste Repository'.

10.3.2 The soils were originally stored as a series of linear mound separated by aisles for access but infilled in the latter stages of operation of the Forest Quarry 2 Extension OCCS. Infilling was carried in order to provide an extensive contiguous surface to assist in long term management.

10.3.3 The soils stored on Overburden Mound 2 are peat / subsoil composites recovered from the Angelzarke, Gelligaer, Rhondda and Crowdy Series, which form part of the Gelligaer Association. The opportunity was taken in the later stages of operation of the Forest Quarry 2 Extension OCCS to recover unclassified subsoil and soil-forming material. These were placed in temporary storage on graded backfill with survey indicating a total quantity of 9,814 m^3.

10.4 Reinstated soils

10.4.1 The location and extent of soils reinstated on previously disturbed ground is indicated on Drawing number CA/01649/002A 'Extent of reinstated soil profiles on restored ground and location of soil storage mounds within areas previously subjected to opencast coal extraction within the Mine Waste Repository)'. Two areas are identified with 11.6 ha located on the former Forest Quarry OCCS together with a further 3.70 ha on the Forest Quarry 2 OCCS.

10.4.2 The average thickness of soils on Forest Quarry OCCS is 750 mm giving a total soil resource of 87,000 m^3, while the average thickness of soils on Forest Quarry 2 OCCS is 905 mm giving a total soil resource of 33,485 m^3.

10.5 Soil-forming materials generated by the excavation of additional peat bogs in partly disturbed ground within the Nant y Mynydd Conservation Area

10.5.1 The opportunity exists in the course of constructing the Mine Waste Repository to further develop the Nant y Mynydd Conservation Area in order provide additional opportunities for the creation of new peat bogs. Drawing number 'CA10649-005A 'Further development of Nant y Mynydd Conservation Area' identifies possible locations for three new containment cells.

10.5.2 The total potential quantity of subsoil and soil-forming material that could be produced in the course of excavation of the three cells is estimated to be 20,999 m^3.

10.6 Colliery discard from the Aberpergwm Drift Mine

10.6.1 The colliery discard that is deposited within the Mine Waste Repository will provide the sub grade upon which the recovered natural soils will be reinstated. However, the discard itself has the potential to be used as a soil-forming material.

10.6.2 Samples of discard originating from the 18ft seam were taken from the Aberpergwm Mine in October 2009 and subject to analysis. The results showed samples to be generally chemically benign with little acid generating potential. The colliery spoils are mechanically derived and consist exclusively of small and medium stones when fresh, but weather to generate a clay matrix.

10.7 Soil survey of undisturbed areas within the curtilage of the Mine Waste Repository, with particular focus on determining the extent, type, condition and thickness of deep peat

10.7.1 A soil survey was carried out by Dr Nigel Bending (Progressive Restoration) in November 2013 in order to map the distribution of soils within the 11.5 ha area of previously undisturbed land to the east and 8.2 ha area to the south of the former Forest Quarry 2 Extension OCCS. Drawing number CA10649-001 'Planning permission boundary for Mine Waste Repository – current and previous land use' identifies the additional areas that required soil survey.

10.7.2 The areas subject to survey contained unthinned 15-20 year old sitka spruce trees. The use of tracked excavators for mechanical trial pit excavation was made impossible by the presence of stumps and absence of rides. The soil survey was

therefore undertaken predominantly by probing, but this was appropriate because the focus of the survey was to identify the extent and thickness of deep peat deposits

10.7.3 The distribution of soil types is shown on Drawing number CA10649-003A 'Distribution of soil groups on previously undisturbed ground within the curtilage of the mine waste repository'. The split between mineral soils (mineral soils and skeletal soils) and organic soils (deep peat and organic soils) on undisturbed ground is approximately 60/40 although the greater proportion of organic soils, including all deep peat occurs on the Additional land to the east of the FQ2E.

10.7.4 The soils identified during the survey belong to the Gelligaer Association and this is the predominant soil association within the Pennant Sandstone uplands on the South Wales Coalfield where the plateaus and ridges are wholly devoid of glacial deposits. The sandstones are exceptionally hard and resistant to weathering so that majority of mineral soil profiles are relatively thin. However, deep raw peats are common within the association. These are usually located within basins carved out by glaciers into the sandstone pavement. The distribution of soil types recorded on undisturbed ground during this survey are consistent with the results of previous surveys.

10.7.5 Further analysis of the distribution of peat within the site is presented on Drawing number CA10649-004A 'Isopachytes to show thickness of peat on undisturbed ground within curtilage of the Mine Waste Repository'. This shows peat thickness across the site and this clearly delineates the significant area of 'deep peat' (defined as peat greater than 1,800 mm in thickness) within the northern part of the Additional land to the east of FQ2E.

10.7.6 Exposures of deep peat were available for detailed examination in the course of the survey at the eastern limit of excavation on the Forest Quarry 2 Extension OCCS. The Winter Hill Series peats are fibrous, light brown (H4) and contain occasional preserved wood fragments of birch and hazel, while the Crowdy Series peats are amorphous and contain black (H8) humified organic matter.

10.8 Development of proposals for further development of the Ecological conservation area to accommodate deep peat

10.8.1 The peat resource identified within the Additional land to the east of FQ2E presents the opportunity to build upon the success of the mitigation scheme, which was implemented in order to permit development of the Forest Quarry 2 Extension OCCS. While the principal voids which remained after sandstone quarrying within 'Area 1' on Nant y Mynydd were utilised in the course of constructing Bogs 2, 3 and 4 within the Conservation area a number of additional opportunities have been identified for bog construction and these are shown on Drawing number CA10649-005A 'Further development of Nant y Mynydd Conservation Area'.

10.8.2 Wardell Armstrong carried out a desktop survey in August 2013 to identify opportunities to construct containment structures capable of providing drainage conditions conducive to the preservation of peat and the creation of bog habitat. The survey reaffirmed the suitability of the defunct opencast void known colloquially as 'Lake Windermere' for conversion into a peat bog. However, the survey identified that any further peat bogs would require excavation to create containment structures and that this would be constrained by the topography of the existing ground surface, the occurrence of sub-cropping sandstone and the presence of recovering heathland over much of the area. Notwithstanding these difficulties a number of opportunities have been identified. The potential exists to extend Bog 2 to the west into an area, which is currently used for soil storage. In addition it has been concluded that a further satellite bog can be constructed on the western flank of the area in a natural hollow. The proposed satellite bog encroaches in part onto retained heath but could be constructed with minimal damage by carrying out the works from the western side and translocating vegetation turfs.

10.8.3 The arrangement of existing and proposed peat bogs is indicated on Drawing number CA10649-005A 'Further development of Nant Y Mynydd Conservation Area' and this shows that that it would be possible to link Peat bog 4 which presents an outflow with a near continual base flow to the Extension to Peat bog 2 and in turn to Satellite Peat bog 1 and Peat bog 1 and in so doing to augment the volume of water which reaches each structure by surface runoff. It should be noted that the dedicated drainage proposed between the peat bogs is designed to avoid cross contamination with drainage from the haul road to the west.

10.8.4 The capacity for preservation of peat by the construction of additional peat bogs within the Conservation area on Nant y Mynydd is 21,960 m^3. However, this represents only approximately 40% of the total volume of 53,300 m^3 of deep peat expected to be encountered in the course of extending the Mine Waste Repository into the Additional Land to the east of FQ2E. In order to maximise the preservation of peat it is proposed that an additional facility, 'Peat bog 5' will be developed at the northern part of the Mine Waste Repository in the closest proximity possible to the Conservation Area, approximately 300 m to the south-west of Peat bog 4.

10.8.5 Peat bog 5 will be constructed by engineering of the colliery discard to create a scalloped 'basin' feature and this will be lined with an 'extra over' thickness of 500 mm of clay to minimise the risk of seepage from the bog into the fill below. Peat bog 5 will be designed to allow the permanent emplacement of a further 21,000 m^3 of pristine peat. The outstanding balance of 9,000 m^3 will be used for the re establishment of forestry. The cell for Peat bog 5 will be developed in the course of tipping within Phase 6 of the development and will immediately precede disturbance of the deep peat deposit within Phase 7 to the immediate south-east.

10.8.6 New peat bogs will be constructed as per the methodology developed for Peat bogs 2, 3 and 4 which draws upon the engineering of containment cells on landfill sites, with side slopes to cells graded at no steeper than 33% and a 250 mm minimum thickness clay lining (500 mm for Peat bog 5 to reflect its location on the tip itself). This will be constructed in two layers with stones and obstructions present in the clay removed by hand. The clay will be maintained at the optimum moisture content to achieve the required plasticity for effective compaction. A sheep's foot roller will be used to compact the clay.

10.8.7 Deep peat will be removed from within the Additional land to the east of FQ2E and specifically from the unafforested section which contains up to 2,800 mm pristine peat. This is considered to provide the best peat resource as it does not contain tree stumps and hosts a remnant bog community that includes *Sphagnum Sp* and *Eriophorum Sp*. An excavator, which will be operated as a 'face shovel' will lift blocks of peat from their base and attempt in so doing to maintain the vegetation cover in tact. Peat will be deposited directly into the pre constructed containment cells with double handling thereby entirely avoided. The peat will be maintained at, or close to, saturation throughout. The presumption will be to replace, as far as practicable,

blocks upright to maintain the viability of the vegetation and encourage recolonisation of any adjoining bare peat surfaces.

10.9 Soil recovery, including assessment of the implications on the proposed phasing on soil use and management

Implications of phasing on soil use and management

10.9.1 Soils will be recovered from all areas within the Mine Waste Repository in order to prevent their burial in the course of depositing, spreading and levelling colliery discard. Drawing number CA/01649/002A 'Extent of reinstated soil profiles on restored ground and location of soil storage mounds within areas previously subjected to opencast coal extraction within the Mine Waste Repository' and Drawing number CA/01649/003A 'Distribution of soil series on previously undisturbed ground within the curtilage of the Mine Waste Repository' show the relationship between the soil resources present and the phasing of construction.

10.9.2 Table 5 'Soil volume generated by individual phases' shows the extent of soil cover to be removed to allow deposition of colliery discard during each phase of development. The table contains an estimate of the soil volume available for recovery under each phase of the development (1-7).

10.9.3 Table 6. 'Soil volume utilised in progressive restoration' confirms the area to be restored under each phase and this is sub divided by vegetation type. The total volume of soils used in restoration under each phase is calculated within the table and reconciled to the quantity of soil generated in the next phase of development to produce a running total. A negative figure highlights the opportunity to extend soil recovery into the next phase and / or to remove soils from temporary storage. A positive figure identifies the need for temporary storage of soils. It is intended to defer the restoration of Phases 1 and 3 (existing restored area on FQ2E and Overburden mound 1) in order to ensure sufficient area is available to store soils that are surplus from individual phases as necessary throughout the course of the development.

10.9.4 The analysis shows that the storage of deep peat will not be required at any point during the development. Peat recovered during Phases 1 and 2 will be used to fill Peat bog 1 and the Satellite Peat bog 1 within the Conservation area on Nant Y

Mynydd within the first 5 years of the operation of the Mine Waste Repository. Peat recovered during Phase 7 will be used to fill the Extension to Peat bog 2 on Nant Y Mynydd and Peat bog 5 within the Mine Waste Repository itself and this will take place after approximately year 20.

Soil recovery

10.9.5 The method adopted for soil recovery from undisturbed areas will be the same as employed during the operation of the Forest Quarry 2 Extension OCCS. Soils will be removed using an excavator fitted with a toothed digging bucket, which shall operate from upon the exposed bedrock alongside the natural soil profiles, and loaded into articulated dump trucks for reinstatement onto areas undergoing restoration (if available) or placement into temporary storage. Vehicles used in transporting soil will only travel over areas of ground from which soils have been previously recovered. Tree stumps will, where present, be extracted from the soils and set aside in windrows to dry. After a period of not less than 3 months the stumps will be shaken to remove all adhering soils. This method will be modified as necessary for soil recovery on previously restored areas with equipment only traversing the exposed overburden surface.

10.9.6 Deep peat will be removed from beneath the Winter Hill Series the distribution of which is shown on Drawing number CA/01649/003A 'Distribution of soil groups on previously undisturbed ground within the curtilage of the Mine Waste Repository' and highlighted on Drawing number CA/01649/004A 'Isopachytes to show thicknesses of peat on previously undisturbed ground within the curtilage of the Mine Waste Repository' as the extensive olive green area within the Additional land the east of the FQ2E.

10.9.7 This Winter Hill Series is considered to provide the best peat resource as it contains a remnant bog community that includes *Sphagnum Sp* and *Eriophorum Sp*. The Winter Hill Series is comprised of a fibrous peat, which has more structural strength than the amorphous Crowdy Series peat and benefits also from not having been entirely afforested previously (the removal of tree stumps is extremely damaging to the peat) within the area identified for its recovery.

10.9.8 An excavator, which will be operated as a 'face shovel' will attempt to lift on a 'best endeavour' basis blocks of peat from their base. The bucket will be inserted at the interface of the peat with the clay, which is usually well defined, and the sides of the buckets used to cut out blocks by forcing the bucket forward. These will be loaded upright onto the base on an articulated dump truck, transported and deposited directly into the pre constructed bog containment cells so as to avoid double handling.

Soil storage

10.9.9 While the presumption will be to carry out progressive restoration so as to limit the requirement for temporary soil storage the analysis presented in Table 6 'Soil volume utilised in progressive Restoration' identifies that temporary storage will be required during Phases 2, 5 and 7.

10.9.10 Where temporary storage is unavoidable the peat / subsoil composite will be placed in conventional mounds constructed on clean competent surfaces that possess a shedding gradient. Experience has shown the composite to be sufficiently stable not to require containment.

10.9.11 Storage mounds will be formed by a combination of block tipping and 'haymaking' using an excavator. No equipment will be permitted to travel over, or stand upon, the soil in the course of constructing mounds.

10.10 Restoration scheme, including a soil strategy to maximise the value of the available soil resource for restoration

Landform and Drainage

10.10.1 The final landform proposed for the Mine Waste Repository is shown on Drawing number CA10649-006A 'Proposed final landform, slope gradients, surface water drainage system and access arrangements'. The Mine Waste Repository has the outline of a 'keyhole' being relatively narrow at its southern extremity, having a maximum width at its centre and tapering to the north. The southern section has a pronounced ridge like cross section but the landform opens out northwards and flattens to given a more gentle rolling profile. The construction of a flat plateau top has been purposely avoided and the tip is crowned by a flattened hillock.

10.10.2 Slope gradients have been set by the design at a maximum of 33% and a minimum of 5% but gradients of 11-20% have been achieved over the greater part of the area and in fact rarely exceed 25%. The landform gives rises to two near equal watersheds with the eastern half of the site (42 ha) within the Craig Llwyd catchment and the western half (31 ha) within the Rheola Brook catchment.

10.10.3 Drainage of the Mine Waste Repository will be achieved by a combination of berms and armoured channels. The approach will be the same as that adopted for the restoration of the former Sarn Helen and Nant y Mynydd OCCSs. The forest roads to the north and east of the Mine Waste Repository will be retained on completion of the scheme. The drainage design allows for the part construction of berms and armoured channels in the course of construction of the Mine Waste Repository and the progressive restoration of separate tiers of batter. Drawing number CA/01649/010 'Standard details for permanent infrastructure' confirms the construction and dimensions of berms, armoured channels, drainage ditches, forest roads and culverts'.

Landscape design

10.10.4 The landscape design proposed for the Mine Waste Repository is shown on Drawing number CA10649-007A 'Proposed landscaping scheme'. The landscape design complements the landform and in particular capitalises on the elevation and orientation of the ridgeline to create a promontory. The southern part of the repository and the lower flanks of the northern part of the repository will be planted with sitka spruce as commercial plantation. A transitional broken band of Scots pine, with a component of downy birch and rowan, will be planted above this as open amenity woodland. Grassland will be established on the extensive open ground on the rolling upper surface. The elevated landform offers vistas into, and across, the Neath Valley below and to take full advantage of these a viewing platform will be constructed using sandstone flagstones to create a paved area surrounded by a circular dry stone wall to replicate a sheep fold.

Soil strategy

10.10.5 Table 4. 'Soil use and management for the restoration of the Mine Waste Repository', which is divided into two parts, reconciles the soil resources potentially

available, which totals 525,301 m^3, for use in restoration to the vegetation types contained within the proposed landscape scheme. Part 1 confirms the available soil resources, while Part 2 shows the proposed construction of restored soil profiles for each vegetation type together with the soil volume that would be required to provide the thickness of layers indicated based on the area of each vegetation type.

10.10.6 The analysis indicates that the soil resource is sufficient to provide 950 mm deep soil profiles for both Commercial plantation (sitka spruce) and Amenity woodland (Scots pine with downy birch and rowan) and 400 mm deep for Conservation grassland (mosaic of wet and dry acidic grassland). The soil resource is sufficient to allow all soil profiles to be constructed using peat / subsoil composite exclusively as an upper layer with the small balance of surplus deep peat used only exceptionally for this purpose. The deep peat requirements for the construction of Peat bog 1, the Satellite to Peat bog 1 and the Extension to Peat bog 2 within the Conservation Area on Nant y Mynydd and the construction of Bog 5 within Mine Waste Repository are also identified in Part 2 of the table. The thickness of peat in each additional bog and the volume of peat to be deposited are indicated together with corresponding figures for clay to be used for lining the containment structures.

Soil profile construction

10.10.7 Colliery discard will be deposited, spread and levelled in accordance with the rules established for tipping in order to construct the landform illustrated on Drawing number CA/01649/006A 'Proposed final landform, slope gradients, surface water drainage system and access arrangements'. Thereafter the drainage system, or that part of the system associated with the phase of the development being restored will be constructed in order to ensure that soils once placed will be adequately protected from scour and erosion and not at risk of slumping.

10.10.8 Soil profiles will be constructed by loose tipping. The distribution of soil profiles and details of their construction are shown on Drawing number CA/01649/008A 'Proposed restored soil profiles'. The method of construction for soil profiles will depend on slope gradients and the access available for articulated dump trucks.

10.10.9 The construction of Soil profile 1, which is generally located on slopes of less than 10%, will follow the now conventional narrow strip system that allows soils to be

deposited, spread and levelled using a tracked excavator without traversing the soil surface. Soil-forming material (rock regolith) will be spread using a bulldozer to produce a 75 mm think 'blinding' layer over the graded landform immediately prior to soil profile construction. The contoured and profiled fill surface will be ripped downslope using winged tines pulled by a D6 bulldozer, in strips 6.0 m wide to a depth of 400 mm in order to relieve compaction within the soil-forming material and colliery discard. Large stone (>150 mm in any dimension) visible on the ripped surface and liable to intrude significantly into the final cover will be removed. Trucks will reverse downslope up to the edge of the strip (which will be orientated parallel to the dip of the slope) and tip peat / subsoil composite in conical mounds. The spacing between the mounds will allow for a final 325 mm soil thickness to be achieved. An excavator, fitted with a toothed digging bucket, standing on the fill surface immediately behind the edge will spread the material to the required thickness and in the process remove obstructions greater than 150 mm in any dimension from the surface. The final surface shall be left generally free of significant (>50 mm) depressions and high spots but not graded flat in order to slow the shedding of surface water and to encourage infiltration.

10.10.10 The construction of Soil profile 2, which is generally on slopes of greater than 10% and up to 33%, will be accomplished by a modified form of loose tipping. The fill surface will once again be ripped downslope, and obstructions removed but dump trucks will deposit the peat / subsoil upon berms, which are positioned at regular intervals to divide the batters. A tracked excavator working from upon the fill surface alongside the ripped strip will 'haymake' the soils onto the ripped colliery discard and into position to achieve a final soil profile 950 mm in thickness. The removal of obstructions and the surface finish shall be as per Soil profile 1.

10.10.11 Areas upon which soils are reinstated will be protected from loss, damage and contamination with colliery discard by the excavation of drainage ditches and /or bunds to provide a physical barrier to encroachment by equipment

Aftercare scheme, including long term management of Ecological conservation area on Nant y Mynydd

10.10.12 Restored areas will be subject to aftercare in order to establish the arrangement of vegetation shown on Drawing number CA10649-007A 'Proposed landscaping

scheme'. Details of the tree planting and seed mixes, the source of seed and planting stock, the methods of sowing and planting and the timings of operations are given below.

Establishment of Conservation grassland

10.10.13 Conservation grassland, which will comprise a mosaic of wet and dry acidic grassland with scattered hawthorn, will be established using the seed mix presented in Table 7 'Seed mix for conservation grassland – mosaic of wet and dry acidic grassland with scattered hawthorn'. The Conservation grassland will be established on a peat / subsoil composite with a relatively low ratio of peat to subsoil (<1:1) and the substrate will as a result be relatively free draining, moderately acidic and reasonably fertile. Species selection within the seed mix reflects these soil properties and is designed to provide a composition comparable to that of semi improved pasture, however, the low sowing rate of 60 kgs ha is intended to do no more than bind the surface to reduce the risk of erosion and scour and to allow an open low density sward to develop. The approach is designed to ensure that the opportunity is presented for natural colonisation to occur and species which prove most adaptable to emerge to form a diverse stable vegetation community over an extended period.

10.10.14 Grass seed will be obtained from a reputable supplier with seed certificates obtained to confirm the provenance of material. The Conservation grassland seed mix will be sown by hand and the soils will receive a light application of inorganic preseeding fertiliser in advance (60 kgs ha 16:16:16 NPK). However, no agricultural type cultivation will be carried out to prepare a seed bed. Experience has shown this serves to increase the proportion of water that forms surface water runoff, at the expense of that infiltrating into soil profiles. Increasing the amount and speed of surface runoff heightens the propensity of loose tipped soils to scour and erosion. Sowing will be extended to cut and fill slopes above and below berms and to verges along forest roads where this is likely to aid stabilisation.

10.10.15 Seeding will be carried out in the period April-September inclusive in any year.

Establishment of Commercial forestry plantation and Amenity woodland

10.10.16 The landscape scheme contains two separate planting mixes and these are Commercial forestry plantation comprised of sitka spruce and Amenity woodland

comprised of Scots pine with minor downy birch and rowan. Table 8 'Forestry and woodland planting mixes' contains details of the plant spacing and stocking density together with a breakdown of plant numbers by compartment.

10.10.17 Planting stock will be obtained from nurseries within South Wales and / or Herefordshire. Sitka spruce will be supplied as 2+1 20-30 cms bare rooted transplants, Scots pine as 1 year old 110 cc 15-20 cm cell grown plants. Downy birch and rowan will both be supplied as 1 year old 175 cc 30-40 cm cell grown plants

10.10.18 Planting will be carried out at the end of each planting season (February / March) to ensure all available soiled areas are included.

10.10.19 The trespass of sheep within Forest Enterprise blocks remains a perennial problem. The incidence of damage has declined in recent years due to the policy of impoundment operated by the Natural Resources Wales within the Rheola Forest Block. Broadleaved trees will be fitted with tree shelters to assist establishment and to provide protection from browsing. Conifers will not be protected initially but the requirement for fencing will be reassessed in the event of significant damage occurring to trees.

Maintenance of natural regeneration bogs, heathland and grassland

10.10.20 While the Nant y Mynydd Conservation area will, like the Mine Waste Repository, be subject to 5 years aftercare the full potential of the newly created peat bogs, the recovery of the heath remnant and the development of wet grassland on previously restored areas as shown on Drawing number CA10649-005A 'Further development of Nant y Mynydd conservation area' will not be realised within this time frame. It is for this reason that Walter Energy proposes to commit to maintain and actively manage the Conservation area for the duration of the life of the Mine Waste Repository. Proposals for maintenance, management and monitoring would be agreed between the Mineral Planning Authority and Natural Resources Wales but the general arrangements will be as below.

10.10.21 Maintenance of natural regeneration in bogs and on heathland and grassland will be carried out in response to recommendations resulting from survey work carried out by an ecologist (Barry Stewart, Richard Pryce Associates), or equally competent successor. The expectation is that this will involve the control of rush, willow and

bramble together with other plant species considered undesirable to the emergence of the desired NVC or other recorded vegetation communities.

10.10.22 Weed control will be undertaken by herbicide application with care taken to ensure that products used in proximity to the bogs are suitable for use in an aquatic environment. Weed control will be timed to prevent plants maturing thereby reducing the opportunity for seed production and dispersal.

10.10.23 Maintenance of bogs will include the removal of fines from silt traps and this will be undertaken routinely each autumn and spring and as required over the winter months. Inlets and outlets to bogs will be modified as necessary to maintain water conditions at the optimum for the development of favoured vegetation communities and ultimately to promote peat formation.

Analysis of the significance of the impact of the development on existing land use and soil resources.

10.11 Baseline

10.11.1 The proposed Mine Waste Repository is located on the Hirfynydd Ridge within the Rheola Forest Block, and is surrounded by predominantly commercial forestry plantation. The 82.5 ha area identified for development has been subject to extensive disturbance previously. Approximately 15 ha have been restored following mining but a further 45 ha remains pending determination of Planning Permission for the Aberpergwm Mine. The balance of 23 ha is comprised of natural ground, which mostly possesses a juvenile (<20 years old), unthinned, second generation Sitka spruce crop.

10.11.2 A combination of new soil survey, past soil survey reports and records held by Walter Energy relating to the operation of opencast coal sites which occurred between 2007 and 2013 have been used to establish the type and quantity of soil resources. Particular attention has been devoted towards the identification of deep peats within previously undisturbed areas.

10.11.3 The soil resources present on the site are a combination of soils in long-term storage, soils reinstated on previously restored ground and natural soil profiles on previously undisturbed areas.

10.11.4 Deep peat occupies 2.4 ha (11%) of the undisturbed area, though their contribution to the total soil volume is approximately 25% of the total, owing to their far greater thickness than the mineral soils. The maximum thickness of peat recorded was 2,800 mm compared to a maximum of 2,200 mm in previous soil surveys.

10.12 Potential impacts

10.12.1 The Mine Waste Repository is purposely located on an extensive area of brownfield land, which means the potential impacts are largely confined to previously undisturbed areas to the east and south of the former Forest Quarry 2 Extension OCCS, which will be overtipped in the course of the development. The potential impacts are the loss of approximately 15 ha of commercial forestry plantation on the undisturbed ground, together with the removal of 2.4 ha of degraded peat bog. The removal of 12 ha of newly planted conifers on previously restored ground should also be recorded.

10.13 Impact significance

10.13.1 The impact of the development on commercial forestry production is not significant because the crops are juvenile and are unthinned and in addition a proportion of the area has not been replanted following clear felling. The loss of the newly planted conifers on the restored area is likewise not significant. The loss of the peat bog is more significant because of the potential for the oxidation of peat as a result of disturbance and the production of carbon dioxide and also due to the potential loss of the remnant bog community identified.

10.14 Mitigation measures

10.14.1 The challenge presented by the disturbance of deep peat deposits in the course of construction of the Mine Waste Repository is the same as that faced by Walter Energy in 2011 when the company sought, and were granted, planning permission for the Forest Quarry 2 Extension OCCS. The construction of containment lined cells within former quarries to accept deep peat that would otherwise have been unduly damaged by the opencast development has proved highly successful. The engineering techniques adopted to construct lining on containment landfills have proved effective in creating sealed structures, despite the permeability of the

underlying fill and fracturing of the surrounding sandstone. Peat, which has been transferred, has quickly regained saturation and not been prone to drying out. The opportunity exists to extend this practice in the course of developing the Mine Waste Repository and in so doing to conserve a further 43,500 m^3 of peat, within a further four bogs, three of which are proposed to be located within the Nant y Mynydd Conservation area and the fourth on the restored Mine Waste Repository. The peat resource available is of higher quality than that previously available with the core area of the existing bog not having been subject to afforestation and hosting a remnant and potential donor plant community which includes *Sphagnum Sp*.

10.15 Residual impacts

10.15.1 The scheme is considered in its entirety to provide positive residual impacts, particularly with regards the conservation of peat. The area of peat bogs delivered will on completion total 5.5 ha with close to 100,000 m^3 of peat conserved. **The likelihood is that the peat resource would, if it had remained in situ, continued to degrade as a result of land drainage and the increasing demands of the second rotation conifer crop, with the remnant bog community subsumed beneath willow and bramble scrub.**

10.15.2 The soil resources available for restoration are sufficient to construct soil profiles that exceed for forestry and woodland the thickness of natural soil profiles, and which are far less variable spatially. The peat / subsoil composites have been demonstrated to provide an excellent growing medium which can support high growth rates across a wide range of conifers and which are likely to remain more windfirm than crops on skeletal and mineral soils. Slope gradients on the restored landform are more advantageous for woodland and forestry than those, which are proposed in the approved restoration scheme for the Forest Quarry 2 Extension OCCS or occur on natural ground in the southern part of the development area.

10.15.3 The landscaping scheme devotes an extensive area to conservation grassland, which possesses considerable potential as habitat for ground nesting birds. The scheme also results in the amenity value of the location being considerably enhanced, with the arrangement of paths and tracks on the restored area DDA compliant.

10.16 Cumulative impacts

Potential simultaneous effects from concurrent developments

10.16.1 The Mine Waste Repository is located on an area that has been extensively disturbed by surface mineral working. The reserves of opencast coal and Pennant sandstone are considered to be 'worked out' and there are no concurrent developments, which are active or planned upon the Hirfynydd Ridge or indeed the western side of the upper Neath valley. The potential for simultaneous effects from concurrent developments is therefore considered low.

A potential combination of effects from the same development

10.16.2 The operational development of the Mine Waste Repository has been carefully considered in order to avoid the unnecessary disturbance of natural soils. Land to the east and south of the former Forest Quarry 2 Extension OCCS will only be disturbed when the opportunities for the disposal of colliery discard on areas, which have been subject to previous disturbance, are exhausted. The deposition of colliery discard on the southern area will not be carried out concurrently with that on the eastern area, with tipping on the latter area deferred by up to 15 years.

Potential successive effects having regard to past, present and foreseeable future development

10.16.3 The Hirfynydd Ridge has been subject to successive mineral working operations since the 1990s with the quarrying of Pennant sandstone and opencast coal extraction leading to extensive disturbance of the natural soil cover. Mineral working was poorly controlled until 2007 with significant loss of soils and large areas left essentially unrestored. Walter Energy and their predecessors, Energybuild and Western Coal, have made significant gains towards the restoration of the disturbed area since 2007 starting with the restoration of the Forest Quarry OCCS. Completion of the restoration of the Sarn Helen OCCS and Nant y Mynydd OCCS is programmed for November 2014. The reclamation carried out has been unifying with a consistent approach adopted towards the design of restoration, which has been firmly based on best practice, and works delivered to a high standard. The approach adopted has been highly innovative, and forward thinking, with the use of technologies most often employed for the construction of landfills used to form cells to recreate peat

bogs and the development of an Ecological conservation area to provide an appropriate context to these.

10.16.4 The successive effects of recent mineral developments within the area have been consistently positive with new mineral developments heavily linked into previous developments to remove unsatisfactory legacies. This was no more apparent in the removal of the 500,000 m^3 surplus of overburden which occurred during the operation of the Forest Quarry 2 Extension OCCS for backfilling of the Area 2 void on Nant y Mynydd and the use of the multiple quarries within Area 1 Nant y Mynydd as structures for the creation of peat bogs in anticipation of the Mine Waste Repository.

10.16.5 This pattern is continued in the restoration proposals for the Mine Waste Repository, which considerably enhance those of the approved restoration scheme for Forest Quarry 2 Extension OCCS.

10.16.6 There are no foreseeable future mineral developments on Hirfynydd.

10.17 Overall conclusions – cumulative impact, combined positive and negative effects

10.17.1 The cumulative impact of the development of the Mine Waste Repository is considered to be strongly positive as a result of the significant mitigation scheme and phasing of operations proposed both of which promote soil conservation. The measures previously employed to recreate bogs to conserve peat, which will be continued in the event of the development of the Mine Waste Repository continuing for its full term of 25 years are unique. The proposals meet if not exceed the requirements, of Natural Resources Wales for the conservation of peat and provide an exemplar model for other developments.

11 GROUND CONDITIONS OF THE CAR PARK

11.1 Introduction

11.1.1 Wardell Armstrong LLP carried out a Phase 1 desk-based review of environmental data pertaining to the site and surrounding area and a Phase II intrusive investigation to determine the geo-environmental properties of the near surface soils across the site. The information gathered allows for the comprehensive characterisation of the ground conditions within the car park area.

11.1.2 The objectives of the investigation were to undertake a geo-environmental desk study of the site to determine the historical and current contaminative setting of the site and surrounding area. The intrusive site investigation was also undertaken to allow a geo-environmental assessment of the site to be made which meets the requirements of the Local Planning Authority (Neath Port Talbot County Borough Council) as part of the Planning Application for the site. This facilitated an assessment of the following in particular:

- Nature and condition of the near surface soils beneath the site;
- Geo-environmental conditions at the site;
- Land contamination risks associated with the site; and
- Brief consideration of foundation options for the site.

11.1.3 This section of the report details the ground conditions of the car park area in relation to the Phase I investigation (comprising a Desk Study undertaken in general accordance with model procedures Environment Agency (2003) and R&D66), and the Phase II intrusive geo-environmental site investigation. The Phase I Desk Study included a conceptual model of the site which identifies specific areas of the subject site where there could be the potential for ground contamination or geotechnical concerns. The findings of the Phase I Desk Study were then used to design the Phase 2 intrusive site investigation works. It should be noted that the investigation was undertaken for the proposed developments at the site in terms of commercial land use and may need to be re-assessed should the development proposals be significantly revised.

11.1.4 The assessment was undertaken based on desk study findings of publicly available information on the geological and geo-environmental aspects of the site, as well as intrusive investigations undertaken on the site. Information from a Landmark Envirocheck™ survey report was utilised in the preparation of the desk study research. The Envirocheck™ report is included in Appendix 11.1. Reference was also made to previous investigations and reports undertaken on the site as detailed below:

- Site Investigation Report, Welsh Development Agency, Proposed Development Aberpergwm May 2000, Integral Geotechnique (Wales) Limited;
- Development Feasibility Study, Glynneath Business Park Aberpergwm, 2000, Capita Property Consultancy,
- Sitecheck Assess Report, Land at Neath Canal, Glynneath, Neath, Neath Port Talbot, South Wales, 18 November 2010, John Collins and Partners LLP.

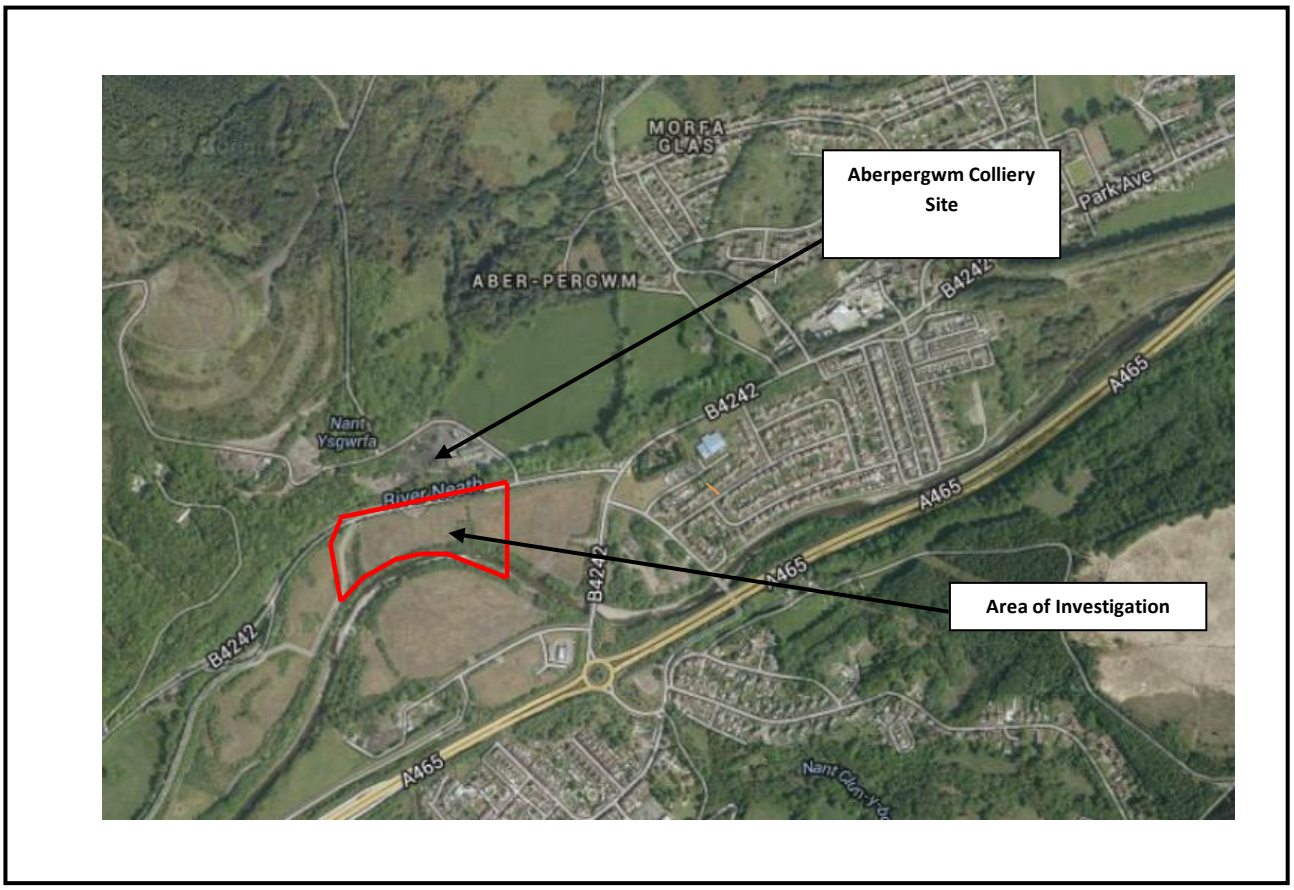
11.1.5 It should be noted that references to the word 'contamination' in this section of the report do not relate to the statutory definition of Contaminated Land in accordance with Department of the Environment, Transport and the Regions (amended 2000). In the context of this report a wider term is used, to cover all cases where the actual or suspected presence of substances in, on or under the land may cause risks to people, property, human activities or the environment, regardless of whether or not the land meets the statutory definition in Part IIA.

11.2 Site Location

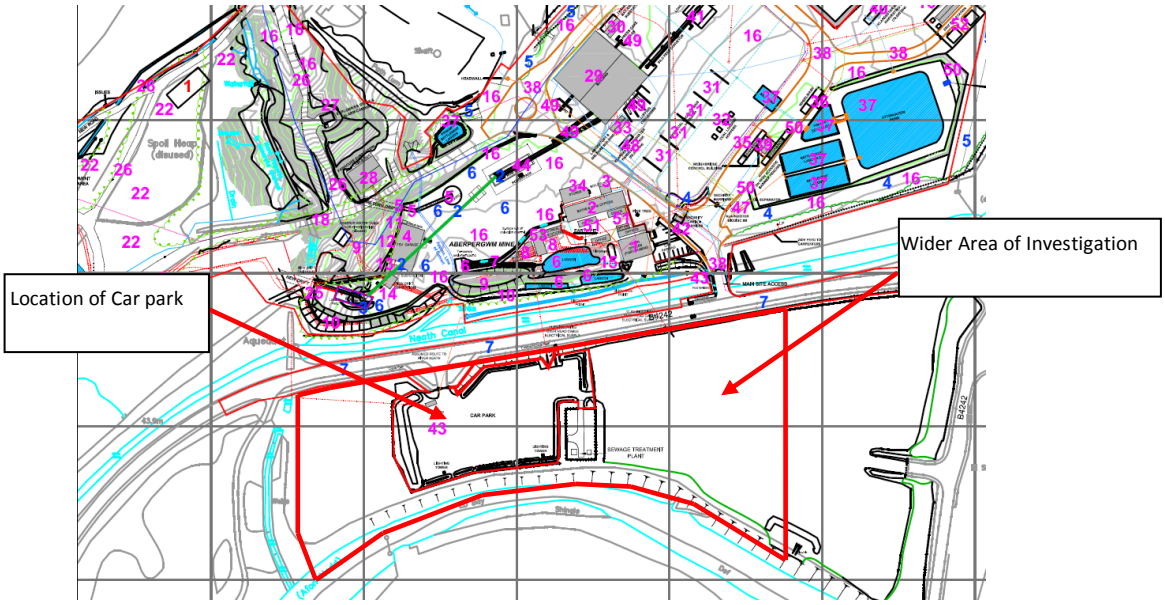
11.2.1 As described in Section 2, the site is located approximately 14km north east of Neath and 2km south west of Glynneath within Neath Port Talbot at National Grid Reference SS865 057.

11.2.2 The wider site is approximately rectangular in shape and occupies an area of approximately 3.2 hectares immediately to the south of the B4242 as detailed in Figure 11.1 overleaf. The car park is also approximately rectangular in shape, located to the north of the Neath Canal and occupies an area of approximately 0.8 hectares.

Figure 11.1 – Site Location Plan



Base Image reproduced from Google Maps



11.2.3 At the time of the site investigation works the eastern side of the wider site was generally covered by roughly vegetated colliery spoil comprising mainly coarse grass.

The western side of the wider site which forms the subject car park site had been gravel surfaced to provide the car park site for the Aberpergwm Colliery site located immediately on the northern side of the B4242, to the north of the Neath Canal. The car park site was identified as being generally topographically flat.

11.2.4 The eastern end of the wider site was separated from the car park area by a hedgerow which runs from north to south across the site and surrounds the Pumping Station constructed within the centre of the site, with an outfall running to the south east. The eastern end of the site was access by a double bar gate located immediately to the north of the pumping station.

11.3 Site History

11.3.1 Past editions of published Ordnance Survey County Series and National Grid plans dating between 1886 and 2012 were reviewed in order to determine the development history of the site and the immediate surroundings. The historical plans for the site are included as part of the Envirocheck Report included as Appendix 11.1.

11.3.2 In summary the wider site area remained undeveloped until 1899 when it was developed as a railway siding. The site continued to develop as a railway siding with additional tracks and buildings added to the northern and western parts of the site until 1962 when a large works building was also constructed in the western side of the site. The site was then cleared between 1990 and 1993 and utilised as a colliery spoil tip.

11.3.3 The surrounding area has been developed with various works and mine buildings between 1876 and 1990. Of particular note was the electric power station located within and to the east of the site. A large works was also constructed along the western site boundary. To the north of the site and the Neath Canal a large mine building was constructed in circa 1962 and was demolished in 1990.

Recorded Geology

11.3.4 The published geological mapping for the area (BGS, 1:10,560 scale geological mapping Sheet SM 80 NE) indicates the site to be underlain by the Carboniferous Middle and Lower Coal Measures consisting predominantly of mudstone and siltstone with occasional sandstone and coal seams.

11.3.5 The geological plan indicates these strata dip at between 15° and 40° to the north-west. However, there are known local variances to the general dip of the strata particularly to north-west of the site associated with the complex faulting and shearing of the Neath Disturbance. The Neath Disturbance is conjectured to be in association with the site area, while a number of smaller faults are shown to the south west of the site trending in various directions and terminating against the Neath Disturbance.

11.3.6 The geological plan indicates a number of coal seams to the north and south of the site, including the Aberpergwm Drift to the north and the Blaengwrach to the New Drift to the south.

11.3.7 The solid geology of the area is shown to be overlain by alluvial deposits which may be very thick locally due to a conjectured deep "buried channel" beneath the present Neath Valley. Additionally the geological plan shows large areas of Made Ground to the west and south of the site. Made Ground is also known to underlie the subject site.

Ground Stability and Mining / Mineral Extraction

11.3.8 The mining report from the Coal Mining Authority and associated mining plans were reviewed as part of the desk study, and revealed the following past workings to be present beneath or close to the site:

- Four Feet
- Six Feet
- Upper Nine Feet
- Lower Nine Feet
- Bute

11.3.9 The Coal Mining Report obtained for the site documents that the "the property is not within the zone of physical influence on the surface from past underground coal workings ". The Coal Authority Report also states that they "have no knowledge of any mine entries within, or within 20m of the boundary of the property". A copy of the Coal Authority Report is included as Appendix 11.2.

11.3.10 The report also states that site "is in an area where coal is believed to exist at or close to the surface that may have been worked at some time in the past". However, given the proximity of the River Neath, the likely thickness of Alluvial Deposits beneath the site and the known geological disturbances associated with the Neath Disturbance, it is thought unlikely that shallow mining will have impacted the site.

- The environmental data report suggests the following stability hazards may apply to the site:
- The potential for collapsible and/or compressible ground at the site is very low with no hazard rating;
- The potential for landslide ground stability hazard and running sand stability on the site are very low;
- The potential for ground dissolution stability hazard is no hazard;
- The potential for shrinking or swelling clay ground stability hazard is no hazard;

Hydrogeology

11.3.11 The Environment Agency (EA) Website was consulted in respect of the underlying aquifer designation. The EA indicated that the alluvial deposits underlying the site are classified as a minor Secondary A Aquifer with soils of high leaching potential. Minor Secondary A Aquifers rarely produce large quantities of water for abstraction, but can be important for both local supplies and in supplying base flows to rivers. Information published by the Landmark Information Group indicated that the soils beneath the site are classified as soils of low leaching potential.

11.3.12 These are soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have large ability to attenuate diffuse pollutants. Lateral flow from these soils contributes to groundwater recharge elsewhere in the catchment. The Carboniferous Middle and Lower Coal Measures underlying the site are also classified by the Environment Agency as minor Secondary A Aquifers.

11.3.13 There is one recorded active licensed water abstraction within 500m of the site area. The abstraction licence, (21/58/72/0030) is registered to Energybuild Limited and

relates to the single point surface abstraction of water from a Tributary Of River Neath at Penstar Tip for use as 'Make-up or top up water'. The only other abstraction licence detailed is abstraction licence 21/58/72/0024 registered to Celtic Energy Ltd. The licence is detailed as the surface abstraction of up to 163m^3 of surface water from the River Neath at Aberpergwm Washery Glynneath detailed as "wash unspecified".

11.3.14 No authorised start or end date is supplied but it is thought that the licence will now have lapsed as the Washery has been demolished and is no longer present on the site.

11.3.15 There are three active recorded discharge consents within 200m of the site. The consents are all held by Energybuild Limited for the discharge of site drainage, Sewage Discharges - Final/Treated Effluent and mine water to The Nant Ysgwrfa (Tributary Of the River Neath) from Aberpergwm Colliery.

11.3.16 The site does not lie within an area defined by the Environment Agency as a Source Protection Zone.

Flooding

11.3.17 The Environment Agency website indicates that the site does lie within an area which is susceptible to flooding from major watercourses or the sea. The car park area is classified by the Environment Agency as a Zone 3 flood risk area, which is an area at risk from flooding from rivers and the sea without flood defences.

11.3.18 In addition the surrounding area to the east and north east of the site is classified by the Environment Agency as a zone flood risk area, which an area at extreme risk from flooding from rivers and the sea without flood defences. On this basis it would be advised that a flood risk assessment is carried out for the site. Previous works undertaken on the site by Integral Geotechnique (Wales) Limited identified that a minimum floor level of 46.5m AOD is required for the subject site as a precaution against flooding.

Radon Gas

11.3.19 The Building Research Establishment (BRE) 'Guidance on Protective Measures for New Dwellings' (BR 211) was consulted. This review uses data obtained from the measurement of radon within existing houses, undertaken by the National

Radiological Protection Board (NRPB), and an assessment of the geological radon potential of an area prepared by the British Geological Survey.

11.3.20 The BRE guidance document classifies the site area as requiring basic radon protective measures as less than 1% of homes are above the action level.

Pollution Incidents to Controlled Waters

11.3.21 There are two recorded pollution incidents to controlled waters on the site area. The incidents are recorded as Category 3 minor incidents involving the accidental spillage/leakage of light oil on the 28th February 1995 due to poor operational practice and the accidental spillage/leakage of an unknown pollutant on the 16th November 1994. A further 42 pollution incidents are recorded within 250m of the site. Of these incidents only six are recorded as Category 2 significant incidents as detailed in Table 11.1 overleaf.

Table 11.1- Category 2 Pollution Incidents

Location from Site	Incident Severity	Property Type	Incident Location	Incident Date	Pollutant
23m SW	Category 2 Significant Incident	Water Company Sewage: Storm Overflow	30 Yards Down Stream Of, Chain Road Bridge	19/09/1995	Mining Water
49m W	Category 2 Significant Incident	Not Given	Glotec Mining	26/09/1994	Oils - Fats And Grease
130m E	Category 2 Significant Incident	Water Company Sewage: Sewerage	50 Metres Below Road Bridge, Cwmgwrach	6/02/1991	Farm Effluent/Slurry
142m W	Category 2 Significant Incident	Not Given	Opencast In, Upper, Aberpergwm	02/12/1994	Coal Solids
138m W	Category 2 - Significant Incident	Domestic/Residential	Glotec	24/01/1995	Chemicals - Other Organic

199m E	Category 2 Significant Incident	Water Company Sewage: Sewerage	50 Metres Below Road Bridge, Cwmgwrach	14/01/1992	Crude Sewage

11.3.22 None of the above recorded pollution incidents are considered to have a long term detrimental impact on the site.

Landfill Sites and Waste Management Facilities

11.3.23 There is one recorded historical landfill site located within 250m of the site. The site is named as Tip Morfa Glas located approximately 220m north-west of the site. No other details are provided for on site.

11.3.24 There is one Licensed Waste Management Facility within 500m of the site. The license relates to a Mobile Plant Licence held by Energybuild Limited on Aberpergwm Mine, Glynneath Road, Glynneath, Neath. No other details on the licence are provided.

Local Authority Integrated Pollution Prevention and Controls

11.3.25 There is an active IPPC held by Energybuild Limited at Aberpergwm Colliery, Aberpergwm, Glynneath, West Glamorgan, SA11 5TY for CPG3/5 Coal, coke and coal product processes.

11.3.26 The permit is manually positioned 177m North-west of the subject site.

Contemporary Trade Entries

11.3.27 There are no contemporary trade directory entries and/or petrol stations located within 250m of the site.

Previous Site Investigation Data

11.3.28 Integral Geotechnique (Wales)Limited undertook an initial geotechnical desk study of the wider site for the WDA in 1992 and then following the purchase of the Aberpergwm Washery Site in 1993 were appointed to undertake a site investigation of the wider area. The 1993 investigation comprised twenty-seven trial pits, seventeen shell and auger boreholes and five probe holes across the wider site area with associated laboratory geochemical analysis and geotechnical testing.

11.3.29 However, much of the Made Ground overlying the site has been recycled since the 1993 investigation due to coal extraction from the stockpiles. Consequently the strength and composition of the colliery spoil, together with the surface levels are all likely to have changed since 1993.

11.3.30 Subsequently, The Welsh Development Authority undertook a full assessment of the 20 hectares of land comprising the wider Glynneath Business Park in the summer of 2000 as part of Capita Property Consultancy's Development Feasibility Study for the proposed Glynneath Business Park. As part of this assessment the spoil materials at the site were again assessed and analysed by Integral Geotechnique (Wales) Limited and reported within a Site Investigation Report dated May 2000.

11.3.31 The results of the investigation identified the Made Ground materials to comprise predominantly Colliery Spoil consisting of either very loose to medium dense dark grey clayey silty sandy angular gravels of mainly mudstone and/or very soft to stiff sandy silty clay/sandy silt with cobbles and boulders of brick and concrete, and inclusions of timber railway sleepers. The Made Ground was typically found to vary in thickness from 2.5m to 4.0m in thickness.

11.3.32 The natural strata encountered beneath the Colliery Spoil Made Ground was recorded to typically comprise soft to stiff grey orange brown sandy silty clay with some gravels and cobbles overlying medium dense to dense brown clayey silty sandy sub-rounded and gravels and cobbles. This has been interpreted as the Alluvial Valley Deposits.

11.3.33 Rock was encountered across the site at depths of between 8m and 12m as was recorded as dark grey Mudstones, Siltstones and Sandstone with occasional thin coal seams.

11.3.34 Approximately half of the trial pits excavated recorded slight seepages or inflows of groundwater within the upper 2m. However, of the five boreholes drilled across the surrounding area of the car park site, only two encountered groundwater. In both cases the groundwater was encountered within the Made Ground, so was interpreted as perched groundwater.

11.3.35 The Integral Geotechnique report indicates that the probe-holes drilled across the wider surrounding site area encountered a substantial thickness of superficial/alluvial deposits. Although coal seams had also been encountered at

shallow depths to the west of the site, the only workable seam was 1.2m thick and was encountered at 34.2m depth. This is considered to have more than enough rock cover to prevent the surface being affected by any ground subsidence related to possible past unrecorded mine workings within the seam.

11.3.36 No traces of any voids or broken ground which might be associated with past shallow mining were recorded in any of the drilled probeholes undertaken in the surrounding area. It was therefore considered that, based on the drilled probehole findings, together with the predominantly thin nature of the coal seams encountered, the proximity of both the Neath River and the Neath Disturbance, and also the lack of any recorded shallow recorded mining beneath the site, there was little risk of this site setting being adversely affected by ground subsistence related to past shallow unrecorded mining activity beneath the site.

11.3.37 Following the Integral Geotechnique site investigation works one hundred and one samples were scheduled for geochemical laboratory analysis. The results of the analysis were compared against appropriate guidelines at the time, namely, the ICRCL Guidance Note 58/83 for a commercial end use. Where ICRCL Guidelines did not specify a threshold action level, reference was made to the Dutch Ministry of the Environment Guidelines. Although, this method of assessment has since been superseded it does give an indication of the contaminative setting of the near surface materials across the site.

11.3.38 The results of the laboratory analysis recorded elevated concentrations of arsenic, selenium, total sulphate and zinc with all other analysed determinants recording concentrations below the threshold concentrations. Based on these results it was recommended within the report that any soft standing areas of the site post development would require capping/covering by a minimum 400m thick layer of appropriately inert and acceptable topsoil and subsoil materials.

11.3.39 No asbestos was detected within any of the samples analysed.

11.3.40 Integral Geotechnique state that “from the experience of other sites, a loss of ignition value of approximately 25% correlates to a coal content in the material of about 10% to 15%. Experience of colliery tips where fires have occurred, suggests that loss of ignition values of more than 30%could pose a potential combustibility hazard. Based on the recorded loss of ignition results found during the sample analysis, the colliery spoil beneath some parts of the site should be considered as

potentially combustible, either as a result of coming into contact with a direct source of heat, or by spontaneous combustion if sufficient oxygen is available within the made ground. Appropriate measures would therefore need to be incorporated into the construction of any proposed development over such materials."

11.3.41 However, the report does state that "it is therefore considered that the risk of heat induced combustion within well compacted colliery spoil could be reduced to negligible levels, provided that appropriate precautionary measures are taken during the general earthworks. Such measures could include the excavation and re-compaction of the top 1 to 2m of the existing made ground."

11.3.42 Our understanding is that these works have been undertaken since the date of this report, thus mitigating the potential risk.

11.4 Report Recommendations

11.4.1 The following recommendations were made within the Integral Geotechnique report for the redevelopment of the site:

11.4.2 Ground improvement techniques will be required to provide a uniformly compacted stratum beneath the site such that an allowable bearing pressure of 100kN/m2 is achieved at the formation level suitable for wide reinforced strip foundations;

11.4.3 Alternatively on the subject site (wider surrounding area) where the made ground is typically 2.5m to 4.0m deep the strength of the ground could be improved by excavating all the made ground to depth of 2.0m beneath the existing surface.

11.4.4 A minimum floor level of 46.5m AOD is required for Site B as a precaution against flooding.

11.4.5 The results of the laboratory analysis recorded elevated concentrations of arsenic, selenium, total sulphate and zinc with all other analysed determinants recording concentrations below the threshold concentrations. Based on these results it was recommended within the report that any soft standing areas of the site post development would require capping/covering by a minimum 400m thick layer of appropriately inert and acceptable topsoil and subsoil materials.

Wardell Armstrong Site Investigation Data

11.4.6 A new phase of site investigation works were undertaken on the 27th February 2013 by Wardell Armstrong LLP, utilising a back excavator supplied by Energybuild Limited. The investigation was designed to confirm the geochemical properties of the near surface soils beneath the carp park site and surrounding area including the new administration office/welfare building and footbridge site. The overall investigation comprised the excavation of fourteen trial pits.

11.4.7 All the trial pits were engineer logged in accordance with Euro code 4, with selected samples of near surface materials being retained and scheduled for laboratory analysis at SAL Ltd a UKAS accredited laboratory.

11.4.8 The locations of the exploratory holes and the engineered trial pit logs are included as Appendix 11.3.

11.4.9 Made ground colliery spoil materials were encountered across the area to depths of between 2.4m (TP14) and greater than 4.00m (TP2). The colliery spoil Made Ground generally comprised medium dense dark grey clayey silty sandy angular GRAVEL of mainly mudstone, with a medium cobble and boulder content of brick, brickwork and concrete. Occasional pieces of timber and gravels of coal were identified throughout. Some pockets of dark grey sandy silty CLAY. Much rounded to sub-rounded quartzite gravel and cobbles.

11.4.10 Beneath the Colliery Spoil Made Ground natural Alluvial Deposits were encountered in several locations, as medium dense brown silty SAND with a medium gravel and cobble content of rounded to subrounded quartzite and loose to medium dense fine to coarse light brown sandy GRAVEL of mudstone with high gravel and cobble content of sandstone.

11.4.11 During the course of the site works no groundwater was encountered within any of the trial pits excavated.

11.5 Assessment of Results

11.5.1 A total of fifteen samples of the near surface soils were retained during the intrusive investigation works in 2006 and analysed for a range of determinants, the results of which were re-assessed to current guidelines as part of Wardell Armstrong's recent site investigation.

11.5.2 A generic quantitative risk assessment (GQRA) was undertaken using the geochemical results for the soil samples retained from the site to ascertain the potential risks to human health of the future site users.

11.5.3 The approach to human health risk assessment adopted in the report was consistent with the Environment Agency's Model Procedures (CLR11), CL:AIRE statistics guidance and other relevant guidance (including SR3, BS10175:2001 and NPPF). It is stated that further information on the methodology can be provided on request.

11.5.4 The laboratory soil data was compared to relevant critical concentrations as outlined in the guidance. These criteria could have either been Generic Assessment Criteria (GAC) or Site Specific Assessment Criteria (SSAC). For the purpose of the generic quantitative risk assessment, GAC was used.

11.5.5 In summary, the results of the soil analysis recorded all concentrations to be below the General Assessment Criteria and therefore do not pose a risk to future occupiers or users of the site for the proposed commercial end-use.

11.5.6 A Preliminary Conceptual Site Model was developed summarising the potential pollution linkages identified as part of the desk based review. This summarised the key potential pollution linkages and risks as:

- Elevated concentrations of metal determinants within the near surface soils
- The Electric Power Station located to the north east of the car park area
- The works building located the north west of the car park area
- The surrounding area's former usage as Aberpergwm Rail Sidings and associated works
- The surrounding area's former usage as a coal tip
- The heavy works buildings that historically located in close vicinity to the car park area

11.5.7 Based on the results of the Preliminary Conceptual Site Model, Table 11.2 lists the potential impacts of the car park in terms of risk of contamination, along with a set of appropriate mitigation.

11.5.8 The effects of the proposal are indentified against the baseline conditions and the significance of these effects is assessed following the criteria of the Department for communities and local government, "Environmental Impact Assessment: a guide to good practice and procedures" (2006). These are stated below:

"Extreme *These effects represent key factors in the decision-making process. They 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.*

Major *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.*

Moderate *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.*

Minor *These effect 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.*

Negligible *Effect which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error."*

11.5.9 Each identified potential effects is assessed. Up to date site investigation has not identified key potential pollution linkages associated with the site and the site was deemed suitable for the proposed commercial end-use.

Table 11.2 – Impact assessment						
Scenario	Source	Pathway	Receptor	Potential pollution linkage effect (Including significance)	Mitigation Measures	Residual Impact
Construction Workers	Potential contaminants onsite and migrating from offsite	Dermal contact, ingestion and/or inhalation of soil, dust, vapours	Human Health	*Minor* - No potentially significant sources of contamination have been identified on site. Impact from potential off-site sources has not been identified	Appropriate personal protective measures and good practice with regard to construction activities will be required.	Negligible
Future Users of site.	Potential contaminants onsite and migrating from offsite	Contact and accidental ingestion of surface soils. Inhalation and ingestion of dust.	Site occupants / visitors	*Minor* - No potentially significant sources of contamination have been identified on site. Impact from potential off-site sources has not been identified	Intrusive ground investigations to be carried out during construction to assess any post-construction risks	Negligible
Migration of contaminants from the site in to the underlying aquifer	Potential contaminants in the soil on site.	Leaching and/or percolation to underlying strata.	Minor Secondary A Aquifer	*Minor* - No potentially significant sources of contamination have been identified on site. Impact from potential off-site sources has not been identified. Minor Aquifer	Intrusive ground investigations and groundwater assessment to be carried out during and after construction to assess any post-construction risks	Negligible
Impacted groundwater abstraction and use	Potential geochemistry of underlying groundwater	Abstraction of groundwater	Groundwater use	*Minor* - No potentially significant sources of contamination have been identified on site. Impact from potential off-site sources has not been identified	Intrusive ground investigations and groundwater assessment to be carried out during and after construction to assess any post-construction risks	Negligible

Scenario	Source	Pathway	Receptor	Potential pollution linkage effect	Mitigation Measures	Residual Impact
Migration of contamination from site into surface water courses	Potential contaminants in the soil on site	Migration of contamination through surface water runoff.	Surface Water	*Minor* - No potentially significant sources of contamination have been identified on site. Impact from potential off-site sources has not been identified	On-going assessment of groundwater at boundary locations and nearby water courses during construction phase	Negligible
Migration of contamination to off-site receptors (i.e. nearby properties)	Potential contaminants in the soil on site	Migration of contamination from site through through-flow surface water runoff and through	Off-site Receptors	*Minor* - No potentially significant sources of contamination have been identified on site. Impact from potential off-site sources has not been identified	On-going assessment of boundary locations (i.e. soil and groundwater sampling) during construction phase	Negligible
Migration of contamination from off-site sources (i.e. power station, historical land uses, etc)	Potential off-site contaminants	Migration of contamination from off-site through wind-dispersal, through-flow and surface water runoff	Site Location	*Moderate* - Current and historical land use of the immediate surrounding area has been assessed. Potential of contamination from the surrounding areas has been identified. No contamination has been identified on site.	On-going / up-to-date assessment of ground conditions to ensure no contamination has been encountered as a result of contamination of the surrounding areas	Minor / Negligible

11.6 Conclusions of Contamination Assessment and Summary

11.6.1 The desk study research and review of previous site investigation works undertaken across the subject site and wider area had identified the presence of elevated concentrations of heavy metal determinants within the near surface Colliery Spoil Made Ground materials.

11.6.2 However, the additional trial pit site investigation works and geochemical laboratory analysis of selected near surface soils recorded all analysed determinant concentrations to be below the General Assessment Criteria and therefore do not pose a risk to future occupiers or users of the site for the proposed commercial end-use.

11.6.3 The main impacts relating to potential for soil and groundwater contamination result from the disruption to potential existing ground contamination during construction works and the potential risk of contamination to soil and groundwater from construction activities, including fuel storage and use of construction plant.

11.6.4 Mitigation measures which will be implemented during construction include appropriate personal protective equipment (PPE) for the construction workers, provision of a temporary surface water drainage and implementation of CEMP

11.6.5 The risk of exposure of future occupants to potential soil contamination and the risk of groundwater contamination at the completion of the development will be minimised where necessary through the implementation of appropriate remediation mitigation measures. The design of such mitigation measures will be further informed by on-going assessments during site works.

11.6.6 Following implementation of the recommended mitigation measures, overall there is likely to be a minor to negligible negative impact on the identified receptors.

12 ECOLOGY AND WILDLIFE

12.1 Introduction

12.1.1 Pryce Consultant Ecologists was commissioned by Energybuild Ltd in June 2013 to carry out an ecological assessment in support of their application to Neath Port Talbot County Borough Council in respect of the renewal of planning consent for the Aberpergwm Mine complex, Glynneath. The project elements included:

- Aberpergwm Surface Works
- Mine Waste Repository (MWR) and the existing haul road
- Underground working area

12.1.2 The application site area is shown on figure 12.1 and surveys and assessments included:

- Extended Phase 1 Vegetation Survey
- Bats
- Reptile and Amphibians
- Birds

12.2 Baseline data

Phase 1 Habitat Survey

12.2.1 The aims and objectives of this study were:

- To identify the habitat and vegetation types occurring within the survey site
- To assess the potential impact of the proposals on these habitats and vegetation types
- To identify constraints which might be imposed upon the proposals in order to retain and conserve habitats of significance
- To identify opportunities for habitat conservation which might be presented as a result of the development

Survey Methodology

12.2.2 The vegetation types present within the site were assessed by Barry Stewart using methodology based on that described in the Handbook for Phase 1 habitat survey – a technique for environmental audit (Nature Conservancy Council, 1990.). Where appropriate National Vegetation Communities have also been identified. The results of the survey are presented in the form of target notes (TN) for each habitat types recorded within the survey area as shown on figure 12.1. Species lists were compiled for each TN within each survey area. The characteristic and significant species are highlighted in the descriptive text for each area below and the full species list for each is reproduced at appendix 12.1.

- Aberpergwm Surface Works
- Mine Waste Repository (MWR) and the existing haul road
- Underground working area

12.2.3 This report identifies and assesses the significance and impact on habitat features within each element of the study site and is based on site visits made between 23rd January 2012 and 15th October 2013, though it should be noted that PCE have been involved with the site since 2003 and have a wealth of baseline data for most areas in and around the application site.

Survey Results

Aberpergwm Surface Works

12.2.4 The recent development of the large species-poor, semi-improved grassland field at **TN01** is largely without vegetation other than occasional ruderal weeds. Coal spoil around the margins of this area supports a limited number of bryophytes such as Taper-leaved Earth-moss *(Pleuridium acuminatum)* and Redshank *(Ceratodon purpureus).* Reinstated grassland around the margins of the site, shown by **TN02**, is mostly species-poor, semi-improved similar in character to that lost to the development and is of low ecological significance.

12.2.5 The northern boundary of the area comprises closed-canopy woodland and is mapped as a 'Restored Ancient Woodland Site' (RAWS) on the Forestry Commission Ancient Woodland Register (http://maps.forestry.gov.uk/imf/imf.jsp?site=fcwales_ext&). The

most frequent species recorded in the areas shown by **TN03** on figure 1 included Ash *(Fraxinus excelsior)*, Beech *(Fagus sylvatica*), Downy Birch (*Betula pubescens*), Pedunculate Oak (*Quercus robur*) and Sycamore (*Acer pseudoplatanus*) along with a number of ornamental specimen trees such as Wellingtonia (*Sequoiadendron giganteum*), Bhutan Pine (*Pinus wallichiana*), Western Red-cedar (*Thuja plicata*) and Morinda Spruce (*Picea smithiana*). Whilst the canopy was reasonably diverse, the field layer was generally impoverished with Bramble (*Rubus fruticosus agg*.) and Ivy (*Hedera helix agg*.) being the two most abundant species. Other woodland elements were generally no more than locally frequent and included Bluebell (Hyacinthoides non-scripta), Broad Buckler-fern (*Dryopteris dilatata*), Lady-fern (*Athyrium felix-femina*), Remote Sedge (*Carex remota*), Enchanter's-nightshade (*Circaea lutetiana*) and Wood-sorrel (*Oxalis acetosella*). Bryophytes were well represented with mostly common and ubiquitous species such as Common Feather-moss (*Kindbergia praelonga*), Common Striated Feather-moss (*Eurhynchium striatum*), Rough-stalked Feather-moss (*Brachythecium rutabulum),* Silky Forklet-moss (*Dicranella heteromalla*) and White Earwort (*Diplophyllum albicans*). No species of special significance were recorded during the surveys and the overall woodland assemblage is a generally species-poor example of the National Vegetation Classification (NVC) W10a/c Quercus *robur – Pteridium aquilinum – Rubus fruticosus* woodland: Typical / *Hedera helix sub*-community mosaic.

12.2.6 **TN04** marks the eastern boundary of the site which was defined by an unmanaged hedgerow and Nant Pergwm stream. The presence of 10 native woody species easily qualifies the boundary hedgerow as important under the terms of the Hedgerow Regulations, the main canopy component being Pedunculate Oak. The field layer also supported a good range of species including woodland indicators such as Broad Buckler-fern, Common Dog-violet (*Viola riviniana*), False-brome (*Brachypodium sylvaticum*), Hart's-tongue (*Asplenium scolopendrium*) and Lords-and-Ladies (*Arum maculatum*). No aquatics were noted in the polluted stream.

12.2.7 The short south-eastern boundary at **TN05** was marked by an unmanaged hedgerow. The presence of only one native woody species means this section fails to qualify as important under the terms of the Hedgerow Regulations. The main canopy component was again Pedunculate Oak, though the field layer supported few woodland indicators such as Enchanter's-nightshade (*Circaea lutetiana*), False-brome, Male-fern (*Dryopteris filix-mas*) and Wood Avens (*Geum urbanum*).

12.2.8 The southern boundary at **TN06** supports a line of mature trees running parallel with connected to a narrow woodland corridor flanking the Neath Canal, the 'canal woodland' element being mapped as a 'Ancient Semi-natural Woodland' (ASNW) on the Forestry Commission Ancient Woodland Register. There is an understory hedge with much Rhododendron (*Rhododendron ponticum*) and the presence of only five native woody species means this section fails to qualify as important under the terms of the Hedgerow Regulations. The main canopy species were Pedunculate Oak and Lime (*Tilia x europaea*), though the field layer was impoverished with few woodland indicators noted. A stand of Japanese Knotweed (*Fallopia japonica*) was noted at the eastern end of this boundary section; although mostly established on adjacent land it did penetrate the boundary.

12.2.9 **TN07** effectively is an extension to **TN06**, with the woodland corridor following the north bank of the canal westwards. The canopy was again diverse with the main species noted being Alder (*Alnus glutinosa*), Pedunculate Oak, Rusty Willow *(Salix cinerea ssp. oelifolia*) and Yew (*Taxus baccata*). Woodland components in the field layer included Lady-fern (*Athyrium felix-femina*), Soft Shield-fern (*Polystichum setifierum*), Broad Buckler-fern, Hart's-tongue, Yellow Pimpernel (*Lysimachia nemorum*), Herb-Robert (*Geranium robertianum*) and Remote Sedge (*Carex remota*). A drainage ditch running through the area had frequent Fool's-water-cress (*Apium nodiflorum*), but few other semi-aquatics.

12.2.10 At **TN08** the Nant Ysgwrfa flows through the western section of the study site woodland, which again loosely fits into the NVC community description for W10 *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland. The woodland is is mapped as a 'Restored Ancient Woodland Site' on the Forestry Commission Ancient Woodland Register. The canopy comprises a diverse mix of largely native species with abundant Pedunculate Oak, frequent Ash and occasional Beech and Downy Birch (*Betula pubescens*). The field layer was found to support a rather limited range of species in the southern section of the stream, the most frequent of which included Bramble, Lady-fern (*Athyrium filix-femina*) and Overleaf Pellia (*Pellia epiphylla*), with Greater Water-moss was occasional in the stream itself. In general terms plant diversity increased progressively up the stream valley with altitude.

12.2.11 Several stands of Japanese Knotweed were noted in the south-west section of this study area.

12.2.12 The weedy field margins and rank grassland around the car park supported 54 species, most fairly typical of mesotrophic grassland. Those species prominent in the sward included Bramble, Cock's-foot, Creeping Bent (*Agrostis stolonifera*), Creeping Thistle (*Cirsium arvense*), False Oat-grass, Glaucous Sedge (*Carex flacca*), Hard Rush, Selfheal (*Prunella vulgaris*), Springy Turf-moss (*Rhytidiadelphus squarrosus*) and Yorkshire-fog.

12.2.13 The existing car park area at **TN10** supports rank species-rich mesotrophic grassland with plantation belts around its boundaries. The mix of planted trees shown by **TN11** is both diverse and primarily comprised of native species, with species recorded including frequent White Willow (*Salix alba*), Hazel (*Corylus avellana*), Alder and Aspen (*Populus tremula*). In total 28 woody species were recorded including a few less common species such as Crab Apple (*Malus sylvestris*), Wayfaring-tree (*Viburnum lantana*), Wild Pear (*Pyrus pyraster*) and Wild Privet (*Ligustrum vulgare*).

12.2.14 Where the Nant Ysgwrfa crosses the reseeded flood plain at **TN09**, there is a modestly diverse mix of plantings and tall herb species, the most prominent species recorded including Hemlock Water-dropwort (*Oenanthe crocata*), Japanese Knotweed, Alder (*Alnus glutinosa*), Great Willowherb (*Epilobium hirsutum*), Bramble, Soft Rush, Hard Rush (*Juncus inflexus*) and Pendulous Sedge (*Carex pendula*).

12.2.15 The most important feature of the B2 area is the riparian woodland at **TN13**, which supports semi-natural deciduous woodland with some noteworthy ground flora elements such as Meadow Saxifrage (*Saxifraga granulata*). 13 woody species made up the canopy with the key species being Ash, Alder, and Wych Elm (*Ulmus glabra*). Woodland indicator species in the field layer noted included Atlantic Ivy (*Hedera hibernica*), Bluebell (*Hyacinthoides non-scripta*), Common Dog-violet (*Viola riviniana*), Fox-tail Feather-moss (*Thamnobryum alopecurum*), Ramsons (*Allium ursinum*), Wood Speedwell (Veronica Montana) and Woodsy Silk-moss (*Plagiothecium nemorale*).

Mine Waste Repository and existing Haul Road

12.2.16 The habitats through which the existing haul road is routed include clearfell plantation and mature coniferous plantation (**TN34** and **TN32** respectively), sparsely vegetated restored mine spoil (TN31), young mixed plantation (TN30, TN29 & TN27), scrub/grassland mosaic in clearfell and along the edge of the McClean Tip (TN26 & TN23) and semi-natural deciduous woodland (TN24 & TN22).

12.2.17 The plantations at TN32, TN30, TN29 & TN27 are all superficially similar, being dominated by closed canopy larch (*Larix spp*.), Norway Spruce (*Picea abies*) and Sitka Spruce (*Picea sitchensis*), which away from the margins support a rather impoverished field layer comprised predominantly of calcifuge bryophytes such as Common Feather-moss, Common Tamarisk-moss (*Thuidium tamariscinum*) and Waved Silk-moss (*Plagiothecium undulatum*). Other less frequent shade-tolerant species noted under the canopy included Rhododendron.

12.2.18 The margins of these planted woodlands were far more diverse than the interiors and a mix of woodland edge and grassland species characterised this vegetation, the most common species recorded including Bramble, Downy Birch, Neat Feather-moss (*Pseudoscleropodium purum*), Pointed Spear-moss and Springy Turf-moss. The wider tracks showed the highest level of diversity and species recorded of local interest were Bilberry (*Vaccinum myrtillus*), Big Shaggy-moss (*Rhytidiadelphus triquetrus*), Dense Fringe-moss (*racomitrium ericoides*), Heather (*calluna vulgaris*), Urn Haircap (*Pogonatum urnigerum*), Wavy Hair-grass (*Deschampsia flexuosa*) and the recent colonist alien liverwort Bifid Crestwort (*Lophocolea bidentata*). The waterfall at TN32 was by far the most interesting habitat alongside the route mainly due to the rich diversity of bryophytes such as Delicate Germanderwort (*Riccardia chamaedyfoli*a), Endive Pellia (*Pellia endiviifolia*), Greasewort (*Aneura pinguis*), Flagellate Feather-moss (*Hyocomium armoricum*), Fringed Bog-moss (*Sphagnum fimbriatum*), Mougeot's Yoke-moss (*Amphidium mougeotii)* and Shining Hookeria (*Hookeria lucens*).

12.2.19 Part of the application site comprises the realigned watercourse and adjacent young, mixed-wood plantation at TN24. This contains some naturally occurring tree and shrub species, such as Downy Birch and Rusty Willow; in total 10 woody species were recorded, eight of which are native. The non-native components noted were Hybrid Larch (*Larix x marschlinsii*) and Rhododendron. The field layer comprises largely remnant grassland, with a limited number of woodland colonists noted, such as Bramble, Ivy, ferns (*Dryopteris spp*.) and Wood Avens. The rock-lined channel in the section of the realigned water course, itself has no vegetation; the seasonal drying of the water course is likely to preclude the development of permanent aquatic vegetation and it is likely that rushes and bankside herbs will eventually establish a community characteristic of watercourses subject to seasonal drought. The adjacent land that was disturbed during the construction phase can be seen to

have an open sward of grassy vegetation. This vegetation has established sufficiently to consolidate the soils and in its current state the open, species-rich sward is of moderate conservation value, with the corridor as a whole providing a sheltered open sunny ride favourable for thermophilic invertebrates. The community as a whole was surprisingly diverse (a total of 69 plant species) with numerous species of value for supporting an invertebrate-rich assemblage. The poor quality soils will slow natural succession processes maintaining favourable conditions for botanical and invertebrate interest along the route for several years. Pioneer trees and shrubs were noted during the survey scattered along the corridor, primarily Rusty Willow and Downy Birch and it is likely these will quickly establish to form patches of scrub that will diversify the structure of the corridor, although without management it is anticipated a closed canopy will eventually establish. The sediment trap pool in the middle section was devoid of aquatic vegetation, though pioneer colonists around the margins included the very localised Slender Club-rush (*Isolepis cernua*)

12.2.20 The vegetation on the edge of the McClean Tip at TN23 was varied and largely scrubbed and the composition of the field layer was similar to the young mixed plantation at TN24. Where areas of spoil were more open, the most prominent components of the varied sward included Common Bent, Cladonia lichens, Maidenhair Pocket-moss, Glaucous Sedge (*Carex flacca*), Heather, Neat Feather-moss (*Pseudoscleropodium purum*) and Springy Turf-moss. This vegetation does not fit any of the NVC descriptions, but fits into the habitat definition for 'mosaic habitats on previously developed land'.

12.2.21 Semi-natural broad-leaved woodland founds at TN22 and TN24 is part of a much larger expanse of woodland mapped as a 'Restored Ancient Woodland Site' (RAWS) on the Forestry Commission Ancient Woodland Register. This secondary woodland had a canopy largely made up of Downy Birch, with frequent Pedunculate Oak and occasional Alder, Ash and Sycamore. Six native woody species were noted in the understorey which also supported frequent Rhododendron. The ground flora was moderately diverse with main components being Bramble and Common Ivy. The presence of Wood-sorrel (*Oxalis acetosella*) and mosses such as Broom Fork-moss (*Dicranum scoparium*), Bank Haircap (*Polytrichastrum formosum*), Little Shaggy-moss (*Rhytidiadelphus loreus),* Waved Silk-moss and Common Tamarisk-moss indicate the woodland has affinity to NVC community W17 woodland, but given the more extensive abundance of Ivy it is best fits the definition for W10 *Quercus robur* –

Pteridium aquilinum – Rubus fruticosus woodland. TN26 marks an area of clearfell replanted with Douglas-fir (*Pseudotsuga menziesii*) during the last year or two. Scrub was widespread with 12 species identified, the most frequent of which were Broom (*Cytisus scoparius*), Downy Birch, oak (*Quercus spp*.), Rowan (*Sorbus aucuparia)* and Rusty Willow. The field layer was rather rank with locally frequent Bracken and Bramble, the ain grassland elements including Common Bent, Heath Plait-moss (*Hypnum jutlandicum*), Pointed Spear-moss, Soft Rush and Yorkshire-fog. Whilst mesotrophic species were most abundant, a small selection of upland species were also recorded in this rather untidy woodland habitat.

12.2.22 Grassland restoration on the steep spoil slopes at TN31 was in an early phase with much bare ground between the clumps of pioneer vegetation. The most frequent species recorded were Common Bent and Urn Haircap, with locally frequent Pointed Spear-moss, Sand Spurrey (*Spergularia rubra*) and Sheep's Sorrel (*Rumex acetosella*). Other species characteristic this habitat were no more than occasional and included Dense Fringe-moss, Green-ribbed Sedge (*Carex binervis*), Heath Bedstraw (*Galium saxatile),* Heath Star-moss (*campylopus introflexus*), Juniper Haircap (*Polytrichum juniperinum*), New Zealand Willowherb (*Epilobium brunnescens*), Pearly Everlasting (*Anaphalis margaritacea*) and Small Cudweed (Filago minima).

Mine Waste Repository

12.2.23 All of the habitats in the area of the MWR had been stripped with the result that the area was devoid of vegetation, the exceptions being areas of recently restored ground with a young Sitka Spruce plantation at TN38 and regenerating acid grassland at TN36. The vegetation in the latter is part of ongoing vegetation restoration monitoring plots, which support a sparse assemblage of species found in acid grassland communities such as U4 *Festuca ovina - Agrostis capillaries - Galium saxatile* grassland. The principal species noted were Creeping Bent, Heath Bedstraw, Sheep's-fescue, Soft Rush and wavy Hair-grass.

Summary

12.2.24 Much of the application site has been significantly modified by former mining and forestry operations, the range of habitats recorded included deciduous woodland, coniferous plantation, scrub and secondary grassland (acid/neutral) on spoil, watercourses and bare ground along tracks and in areas of mining operations. The small areas of secondary grassland habitats on spoil provided the greatest diversity,

most notably where the project edges onto the Maclean Tip and along the haul road verges. No species of special significance were recorded within the study site.

12.2.25 Of the 2.25ha of Restored Ancient Woodland Site (RAWS), 0.61ha of Plantation on Ancient Woodland Site (PAWS) and 0.33ha of Ancient Woodland Site of Unknown Category (AWSU) that are established on site, most are of a secondary nature and in poor condition due to historical disturbance around the mine area. None of the woodland areas mapped will be directly affected by the proposed development, although potential risks from pollution, including dust and additional noise increase the possibility of of low-level indirect impacts.

12.3 Protected fauna

Badger

12.3.1 Badgers (*Meles meles*) are opportunistic omnivores, taking a range of fruits, nuts and cereals. In Britain, earthworms are the single most important prey item. Varied habitats, with a range of natural and semi-natural features, support the greatest numbers of animals. Woodland is usually chosen for main setts and areas of improved grazing are important sources of earthworms.

12.3.2 Badgers live in social groups, comprising 2-25 animals (average 6). The group defends a territory of 10ha to 300ha (average 50ha, depending on habitat quality). Such territories are stable over time and contain adequate food resources and underground shelters known as setts.

12.3.3 Setts comprise a series of tunnels and chambers in which badgers rest and breed. Woodland is favoured for sett sites and typically they are dug on south facing slopes, in free-draining soils. Different types of sett can be recognised:

- the main sett is in continuous use (in some cases for several hundred years) and is used for breeding
- annexe setts are close to main setts (usually <150m) and smaller. They are used infrequently as an alternative to the main sett (perhaps by individuals temporarily excluded because of breeding activity in the main sett)
- subsidiary and outlier setts are used sporadically, typically have one or two holes, and may be located anywhere in the territory.

12.3.4 The Badger and its underground sett are protected under various Acts of Parliament, most importantly the Protection of Badgers Act 1992. The badger is also included on schedule 6 of the Bern Convention. It is illegal to kill or injure any badger or to intentionally or recklessly damage, destroy or obstruct access to a sett. Any development work to be carried out within the vicinity of a sett requires a licence to be obtained in advance from the Welsh Assembly Government who will be advised by the Countryside Council for Wales. As a general rule, the use of machinery would not be permitted within 30m of an active sett during the "close season" which extends from December to June inclusive.

Survey methods

12.3.5 During the daytime walkover surveys, such field signs were sought as setts (the underground breeding/resting holes of badgers), latrines (dung pits, often used as territory-markers), footpaths (identified by footprints, hairs caught on wire fences) and feeding areas (identified by characteristically disturbed/uprooted ground).

Survey results

12.3.6 Whilst Badgers undoubtedly occur within the application site, there are no parts of it that are particularly productive for foraging animals and no evidence of their presence was found, nor was there any evidence that suggested any setts were on, or close to the application site. Whilst it is considered unlikely that a Badger sett is located within the application site, the dense vegetation in some of the marginal conifer blocks prevented a full examination and the possibility of a Badger sett being found during site clearance works cannot be discounted. Should such a sett be discovered at any time, works must stop immediately and a suitably qualified ecologist should be consulted before any further works proceed within a 30m radius of the sett. Heavy plant workings and the absence of attractive habitat within the site are likely to deter Badgers during the operational phase of the development.

Otter

12.3.7 The Otter (*Lutra lutra*) is a semi-aquatic mammal, dependent on fish and amphibians for food, and requiring dense vegetation and/or bankside holes for sheltered resting/breeding sites ("holts"). Individual animals inhabit territories which may extend along many km of watercourses. Such territories include many holts. The Otter is a species of high conservation concern in the UK, having disappeared from

most of its range during the 1950s and 1960s. The species has made a dramatic recovery during the past 10-15 years, following the withdrawal of various, largely agricultural, chemical pollutants, and efforts to improve water quality and riparian habitats.

12.3.8 The Otter is protected by the following legislation:

- Appendix II of the Bern Convention
- Annexes II and IV of the EC Habitats Directive,
- Schedule 2 of the Conservation (Natural Habitats etc) Regulations 1994 (regulation 38 includes the requirement to conserve linear features in the wider countryside)
- Appendix 1 of CITES
- Schedule 5 of the Wildlife and Countryside Act 1981. Section 9 of the Act provides that it is an offence to kill, injure or take an animal, to have an animal in one's possession, to offer an animal (or parts/derivatives thereof) for sale, or to damage, destroy or obstruct access to a place or structure being used for shelter or protection.

12.3.9 The above legislation affords complete legal protection to all individuals and their places of shelter. Any work which is likely to affect or destroy a known holt, can only be carried out under licence from the National Assembly for Wales who will be advised by the Countryside Council for Wales.

12.3.10 The Otter is also a UK Biodiversity Action Plan Priority Species and a Species of Principal Importance for Conservation of Biological Diversity in Wales under Section 42 of the Natural Environment and Rural Communities Act 2006. It is also a species for which a Species Action Plan has been implemented in the Neath Port Talbot Local Biodiversity Action Plan.

Survey methods

12.3.11 All water features within and adjacent to the study site were the subject of specific searches for Otter signs.

Survey results

12.3.12 Other than the ponds off the haul road at TN28 and TN33, which are likely to provide seasonal hunting opportunities in the way of amphibian prey, no other habitats where Otters may be expected to occur were noted within the application site. The Neath River provides the best feeding adjacent habitat and fresh spraint was recorded on the riverbank at TN13 (SN866057) on 12th July 2013. There are good resting-sites for the species throughout the riparian woodland corridor of the Neath River

12.3.13 The Neath Canal alongside also provides opportunities for the species. An Otter underpass below the B4242, immediately west of the survey site's western over-canal boundary, has shown evidence-of-use (pers. data) since its construction (by the WDA) in the early 2000s; this evidence-of-use is thought likely to indicate resting-site use at the canal-side, (parts of which lie within the study area at TN06, TN07), or at a hillside tributary stream (e.g. Nant Ysgwrfa, to the west of the study site).

12.3.14 Whilst surveys suggest no holts occur within the application area, the possibility of a well- hidden holt being located within these areas cannot be discounted.

12.3.15 Likely travel routes were identified along the Neath River and the Neath Canal and between catchments via the Nant Ysgwrfa and Nant Clwyd.

Brown Hare

12.3.16 Populations of Brown Hare (*Lepus europaeus*) are known to have decreased dramatically over the last thirty years, most particularly in pastoral western Britain. The Brown Hare is a UK Biodiversity Action Plan Priority Species and a Species of Principal Importance for Conservation of Biological Diversity in Wales under Section 42 of the Natural Environment and Rural Communities Act 2006. It is also a species for which a Species Action Plan has been implemented in the Neath Port Talbot Local Biodiversity Action Plan.

Survey methods

12.3.17 No systematic survey was carried-out but a general examination and assessment of the application site was undertaken in order to identify and assess features which might be used by Hares.

Survey results

12.3.18 A single Brown Hare was seen, during the course of other-survey on the evening of 14th July, at the side of the existing haul road mid-way between areas B5-B4; Hares are reported to be seen occasionally by the regular work force on site. Sparsely-vegetated land along the forest tracks and around the margins of the quarry are considered to provide sub-optimal habitats used by Brown Hares which occur at low density. The largely barren quarry void is unsuitable for this species and the high level of disturbance is likely to act as a deterrent.

Bats (Rob Colley)

Ecology & legal status

12.3.19 Different bat species have different life-cycle strategies but, in general, each requires the following features:

- hibernation roost sites, where stable winter temperatures allow a period of winter torpor (e.g. underground sites such as caves and mines, or crevices and hollows in mature standing trees),
- nursery roost sites, where females gather in the spring/early summer to give birth and rear their single offspring (e.g. roof spaces, crevices and hollows in mature standing trees),
- roost sites for individual, or small congregations of, males during spring-autumn (e.g. roof spaces, or crevices and hollows in mature standing trees),
- an insect-productive (usually ecologically diverse) feeding environment,
- additionally, there is, as yet, a poorly understood need for social-gathering sites at certain times of the year (e.g. the autumn mating season) for some, or all, species.

12.3.20 Most, if not all, British bat species are believed to be in decline; main threats to bat populations can be summarised as:

- the loss of invertebrate-rich foraging areas (e.g. woodland, hedgerows, ponds),
- the loss of nursery and hibernation roosts (e.g. Caves and mines, roof spaces, large standing trees), and

- the effects of toxic chemicals (e.g. timber preservatives in roof-space roosts, agricultural insecticides which reduce prey species).

12.3.21 All British bats, and their roosts (occupied or not) are protected by their inclusion in:

- The Conservation of Habitats and Species Regulations 2010 (the "Habitats Regs") this legislation implements the EC Habitats and Species Directive in the UK, and

- Schedule 5 of the Wildlife and Countryside Act (as amended).

12.3.22 A requirement of the Habitats Regulations is that all developments which compromise the protection afforded to a European Protected Species require licensing by Natural Resources Wales (which took-over this function from the Welsh Government on 1st April 2013). The granting of a licence will be conditional on:

- an agreed works methodology designed to minimise impact on the bat(s), and

- agreed mitigation to ensure the provision of alternative roost potential at or near the development.

12.3.23 Where planning permission is sought, the LPA will need to know, at application stage, what methodology/mitigation is being proposed. This is:

- to avoid changes in planning designs after the granting of planning permission,

- to ensure that LPAs comply with reg. 3(4) of the Habitats Regulations, and

- to allow Natural Resources Wales (NRW), the Statutory Nature Conservation Organisation, which replaced the Countryside Council for Wales (CCW) on 1st April 2013, to properly advise the LPA.

12.3.24 The Natural Environment & Rural Communities Act 2006 requires all public authorities/bodies to have regard for the conservation of biodiversity e.g. when considering planning applications. There is a particular requirement to address those species and habitats targeted by the UK Biodiversity Action Plan, in pursuance of which the WelshGovernment have listed Common and Soprano Pipistrelles, Noctule, Brown long eared, Greater and Lesser Horseshoe, Barbastelle and Bechstein

bats under Section 42 of the Act as Species of Principal Importance for Conservation of Biological Diversity in Wales.

12.3.25 Implementation of this responsibility varies across authorities but, typically, some LPAs ask for "bat accommodation" as a routine requirement and some require survey data to be passed to the Local Biological Records Centre.

Survey objectives

12.3.26 The objectives of the assessment included the following:

- the identification of bat-roost potential within the site
- the observation and recording of bat activity at the site, particularly by preferentially tree-roosting species
- detection of autumn-occurrence of migratory species (e.g. Pipistrellus nathusius)
- the recommendation of any appropriate further surveys in the future.

Nature and dates of survey field visits

12.3.27 The bat assessment included the following elements:

- Walkover surveys to assess the bat-roost potential of the site were carried out on 8th, 14th and 18th July 2013
- Walked and driven transects to survey, record and assess bat-activity over the site were carried out on 8th, 14th and 18th July 2013.
- Overnight bat activity was recorded using remote detector/recording instruments placed in suitable locations between 8th-14th July and 9th-14th October 2013.

Surveyors

12.3.28 The surveyors who undertook this assessment were as follows:

- Rob Colley: scientific/conservation bat licence holder 1999-, 42785:OTH:CSAB:2013

- Rob Taylor: scientific/conservation licence, 1995-
- Len Moran: named assistant 42785:OTH:CSAB:2013

Survey methods

12.3.29 Survey methodologies are implemented as appropriate, based upon experienced surveyors' assessment of the features at each site and with reference to the advice given in Bat Surveys: Good practice guidelines (Bat Conservation Trust, 2007) and Bat Workers' Manual 3rd ed. (JNCC, 2004).

12.3.30 The site was examined during daylight on 8th July 2013 in the company of the Site Manager, who indicated the extent of the survey-site area and the intended programme of works.

12.3.31 In order to detect and record bat species-identity and overnight patterns of bat activity, on the nights of the 8/9th-13/4th July 2013 inclusive, two Anabat frequency-division detectors including recorders, were placed at the side of forest rides within the plantation area which will be cleared as part of continuing site operations; overnight detection-recording was repeated at these locations in late September (25th-30th). Their locations are shown on figure 12.2.

12.3.32 On the 8th and 14th July 2013, between 22:00 and 23:45, a vehicle-based transect was made by two observers from the north of the site to the mine buildings in the valley bottom. Heterodyne detectors were deployed at each side of the vehicle, which was driven at 5mph. Ten stops of five minutes duration were made at roughly equidistant intervals, with one observer continuing detection at the vehicle and the second observer walking lateral/across-site tracks/rides. Locations are shown on figure 12.2.

12.3.33 On the same dates, a third observer made a walking-transect through the woodlands immediately to the north of the mine buildings. This observer used both heterodyne and frequency- division detection equipment throughout, with alternate periods of five minutes walking and five minutes stationary.

12.3.34 On the 18th July 2013, three observers made walking transects through the southern section of the site, including at and around the western mine buildings, along the derelict, roadside canal and along the right (west) bank of the River Neath.

12.3.35 On the 30th September and 2nd October, direct observation was made of the over-Neath footbridge where the proposed conveyor is to cross the river; simultaneous observation of the nearby, downstream, dual-carriageway over-river bridge was also made, to better determine local riverside bat movement.

12.3.36 All surveys were conducted during unusually warm, dry, weather, with very low wind speeds.

12.3.37 All records of bats seen and heard are shown on Figure 12.2.

Survey results

Potential bat roosts and assessment of foraging value

12.3.38 The north-western area of the site (area B4 on figure 12.2) is largely open, having been recently disturbed and restored, comprising of landscaped ground with peripheral forestry plantation and an area of recently replanted conifers. This area does not provide any potential roost sites for bats in trees and currently offers minimal foraging potential.

12.3.39 The areas adjacent to the haul road support young conifer plantation parts of which may be subject to future clearance. The trees are typically 4m-5m high, close-planted and etiolated. None of the trees examined at the plantation edges, including along the lateral rides, are large enough to have developed physical characteristics which would be suitable as bat-roost, such as holes or splits. The trees within the plantation can be assumed to be even less suitable than those receiving some light at the plantation edges. Foraging potential for bats is good at the plantation edges and along rides where some native trees and ground cover persist, but is very poor within the plantation blocks.

12.3.40 Between the southern end of area B5 and the mine buildings to the south-east, the conveyor route crosses young re-growth of birch. To the immediate south, the steep sided stream gully has birch and oak trees which are more mature. Close to the proposed route there is a line of medium-aged oak trees within the site below the existing north-westernmost mine building. Alongside the settlement ponds to the west of this building there is one mature oak and one dead oak. No bat emergence was seen at the southern end of the site from any of these features on the first two dates. Whilst considered unlikely, it is not possible to definitively conclude that bats

are not using these features for roosting. The predominance of mixed-age, native tree species in this area has potential to provide a rich foraging habitat for bats.

12.3.41 The trees along the roadside and canal side are generally too young and small to have bat roost features, with two exceptions; the oak tree near the centre of this area and a mature ash at the western end. No bat emergence was seen by the observer who carried out the July 18th transect. Whilst considered unlikely, it is not possible to definitively conclude that bats are not using these trees for roosting.

12.3.42 No roost potential was found in the trees between the B4292 road and the River Neath, including the line of trees along the river bank.

12.3.43 The area to the east of the mine entrance has trees around its perimeter that were the subject of a bat survey in August 2010 (Pryce Consultant Ecologists, 2010). The present investigation was restricted to surveillance of flight activity at the southern edge of this area.

12.3.44 The Aberpergwm Mine buildings were not examined for potential bat-roost use.

12.3.45 The area to the east of the mine entrance has trees around its perimeter that were the subject of a bat survey in August 2010 (Pryce Consultant Ecologists, 2010). The present investigation was restricted to surveillance of flight activity at the southern edge of this area.

12.3.46 The Aberpergwm Mine buildings were not examined for potential bat-roost use.

12.3.47 The area south of the river is included within the site boundary addressed by SLR Global Environmental Solutions who carried out and reported on a bat survey in 2011 (Unity Mine, Cwmgwrach Volume 2: Environmental Statement 07.03674.0001, SLR Global Environmental Solutions, November 2011). SLR's conclusion was:

> *"6.9.3 … during the field survey signs of bats were searched for particularly around the woodland area and associated derelict buildings to the south-east of the site and by the A465 underpass along the banks of the River Neath to the north. No field evidence for [bat] presence at these locations was found. Habitats within the red-line boundary are of low value for foraging bats and there are no obvious linear features suitable for bat commuting between for example any nearby roosts and foraging habitat."*

12.3.48 The present assessment did not repeat SLR's 2011 survey covering this area.

Bat activity within the site

Direct observation:

12.3.49 Five species of bat were recorded at the site: Common pipistrelle *Pipistrellus pipistrellus*, Soprano pipistrelle *Pipistrellus pygmaeus*, Whiskered bat *Myotis mystacinus**, Daubenton's bat *Myotis daubentonii* and Noctule *Nyctalus noctula*. (*Specific differentiation between *Myotis mystacinus*, *M. brandtii and M. alcathoe* is not possible without in-hand examination: M. *mystacinus* is used in the text and on figure 12.2, to indicate this group of species.)

Common pipistrelle

12.3.50 July, all site: Single animals were seen and/or heard across the site with their distribution during the two surveys of the buildings north of the mine being strikingly similar. On each date, single animals were foraging at the small settlement ponds, flying westwards to heathland vegetation and also at the more mature conifers flanking the existing haul road located to the east of the potential conveyor route. Two individual bats were also found foraging along the right bank of the River Neath and a single pass was recorded at the tree-line along the road/canal side.

12.3.51 No aggregations of feeding animals were observed. One individual was detected at 21:53 at the south end of the site but there were no other detections before 22:05: "expected" roost emergence time on the survey dates was 21:30 – 21:15, and the on-site detection times are consistent with animals having travelled 30+ minutes to the site.

12.3.52 September-October, River Neath & bridges: Single bats foraged, near continuously, at the footbridge riverbanks, on both dates. At the first date, arrival-to-site was seen (1905) from upriver (north-east); at the second date, an individual of this species "appeared" at the upstream left bank (1914). No bats emerged from either bridge.

Soprano pipistrelle

12.3.53 July, all site: Foraging individuals were recorded on the second visit (14th July 2013) at deciduous woodland to the north of the mine buildings and at the western end of the mine yard. Single foraging animals were also present at the side of the haul-road

east of the centre of the site, at the edge of the mature plantation, at the tree line along the derelict canal and at the right bank of the River Neath.

12.3.54 No detections were made before 22:15, some 50 minutes after the "expected" roost-emergence time. All detections were of single animals.

12.3.55 30th September, River Neath & two bridges: x2, possibly x3, "appeared" under the dual carriageway bridge (1905): these were believed to have emerged from under-deck expansion joints but this was not confirmed; x2-3 individuals foraged continuously under the road bridge, to 1940, with frequent social-calling heard; after 1940, x2-3 were frequently, but intermittently, seen/heard foraging above the river at both bridges, with Common pipistrelle.

12.3.56 2nd October, River Neath & footbridge: continuous foraging was seen/heard, 1905-45, and 1955-end, at/around the footbridge and adjacent banks; one bat was present throughout, with x2 others arriving (from downstream) at 1923.

Whiskered bat

12.3.57 July, all site Individuals were recorded at the mature conifers to the east of the haul road (8th & 14th July 2013), at the side of the pond south of the proposed potential future conveyor route (area B5, 8th July), and at the deciduous woodland north of the mine buildings (three detections/animals, 14th July).

12.3.58 30th September, River Neath & two bridges: an individual flew down the left bank to under-FB, 2020; this bat foraged at the under-bridge/left bank for c.2 mins before flying up-bank, over- bridge, and away.

12.3.59 2nd October, River Neath & footbridge: brief, single animal, passes were heard at the upstream left bank at 1940 & 1954; this/these bat(s) were not detected at the downstream side of the bridge, and to-site movement from upstream was presumed.

Daubenton's bat

12.3.60 July, all site Two animals were detected by the River Neath, immediately upstream of the dual-carriageway bridge on 18th July 2013.

12.3.61 September-October, River Neath & bridges: no Daubenton's were seen/heard at the river in September-October.

Noctule

12.3.62 Individuals overflew the river at 1855 and 1925, 30th September, and at 1914 & 1925, 2nd October.

12.3.63 Overnight recordings:

12.3.64 Anabat systems were placed at an off-ground height of 4m at each of two rides through the plantation. Electronic copies of data files are available on request: cite SN 04903 130708-2119 130714-1706.dat, and SN 01349 130708-2131 130714-1740.dat.

12.3.65 July (six nights): Common pipistrelle, Soprano pipistrelle and Whiskered bat were the only species detected. Recordings were throughout the night and there were no activity peaks at or around dusk or dawn which might have suggested nearby roosting.

Site shown on fig. 12.2	Total no. of files	Common pipistrelle	Soprano pipistrelle	Whiskered bat
North site ABT 6	239	229	7	3
South site ABT 3	391	310	53	28

12.3.66 Each system recorded a preponderance of Common pipistrelles with frequent multiple files over short time periods indicating foraging along the forest rides. All files were clean and uncluttered indicating the presence of single animals.

12.3.67 Soprano pipistrelles were less frequently recorded. Most detections were temporally distinct single files suggesting travel rather than foraging.

12.3.68 Most Whiskered bat recordings were between midnight and 02:00hrs. Temporally distinct single files suggest travel rather than concentrated foraging.

12.3.69 Late September (five nights): Common pipistrelle and Soprano pipistrelle were the only species detected. Recordings were throughout the night and there were no activity peaks, at or around dusk or dawn, which might have suggested nearby roosting.

Site shown on fig. 12.2	Total no. of files	Common pipistrelle	Soprano pipistrelle
North site ABT 5	107	64	43
South site ABT 6	164	131	33

12.3.70 No temporal patterns are discernible in the data; “first recordings” at each date were >30mins after “expected” emergence time, suggesting travel to-site; other recordings occur throughout the nights. Multiple files over short time periods indicate foraging at the rides, rather than travel.

12.3.71 The absence of other species (particularly, Myotis spp) is consistent with an expectation of seasonal movement to winter/hibernation sites. Continuing bat-activity was recorded by the surveyors at other S. Wales sites during the (mild) first half of October, suggesting that the survey data indicate Myotis autumn movement away from the higher/wooded Aberpergwm areas.

Summary/Discussion

Pipistrelles

12.3.72 The two pipistrelle species are widespread and abundant throughout Neath Port Talbot. Multi-animal (maternity) roosts are invariably in buildings and four such roosts are known in the valley bottom less than 800m from the Aberpergwm Mine buildings (pers. data). All the observation times made during the present survey are consistent with movement to the Aberpergwm site from these known roosts and the overnight data also suggest a valley locus of activity.

12.3.73 Single animal (male/non-breeding/dispersed animals post maternity colony) roosting is also typically in-building but also occurs at/in trees. Both pipistrelles are opportunist and generalist foragers with a preference for "edge habitats".

Whiskered bat

12.3.74 Multi-animal Whiskered bat roosts are also commonly found in buildings but maternity colonies in trees are not unusual and, although no aggregations which might suggest any close roost proximity were seen, the use of trees within or near the site cannot be discounted.

12.3.75 This species is more likely than the pipistrelles to forage within woodland but in the experience of the surveyors, it is considered that the conifer plantation to be affected by the proposed development is too dense and florally depauperate to provide significant potential for foraging. On the contrary, in common with the pipistrelles, the creation of a through-plantation swathe is thought likely to increase the feeding potential for this species.

Daubenton's bat

12.3.76 Daubenton's bat is known as a specialist over-water forager and is rarely encountered away from water features. This species has been recorded in the past from all of the River Neath and from many stretches of the canals within the Neath valley (pers. data). No Daubenton's bats were detected within the site during the present survey but it must be assumed that they are likely to forage at the settlement ponds within the site.

12.3.77 Most known roosts of this species are at built waterside features, typically bridges, but Daubenton's bat also frequently roosts in trees. Known tree roosts are usually less than 100m from significant water features. Daubenton's bats roosting in trees within or near to the site is thought to be unlikely but cannot be discounted. Both of the over-river bridges have possible roost potential but the surveys recorded no evidence of such use; however, as this species is known to use multiple roost sites during the spring-summer-autumn season, such use cannot be entirely discounted.

Noctule

12.3.78 This high flying, far travelling, species preferentially roosts in trees: no potential tree-roost features were identified on-site during the surveys, and no movement was seen to suggest nearby roosting.

Reptiles

12.3.79 Six native reptile species occur in Britain: Adder (*Vipera berus*), Grass Snake (*Natrix natrix*), Smooth Snake (*Coronella austriaca*), Sand Lizard (*Lacerta agilis*), Common Lizard (*Lacerta vivipara*) and Slow-worm (*Anguis fragilis*).

12.3.80 The Smooth Snake is not found in Wales and Sand Lizard is restricted to recent reintroduction sites.

12.3.81 Grass Snakes are most commonly associated with wet habitats and frequently feed on aquatic animals such as frogs.

12.3.82 The Adder and Slow-worm are typically associated with drier, heathland habitat and the Common Lizard is found in a wide range of habitats.

12.3.83 All these species are cold blooded, and need to bask in sunlight. Such basking opportunities are readily found on south-facing slopes, and habitats such as free-draining railway embankments and old quarry workings are characteristically good sites.

12.3.84 Schedule 5 of the Wildlife & Countryside Act 1981 provides varying levels of protection for these species. The Smooth Snake and Sand Lizard are afforded complete protection under schedule 5 of the Act. The other four species are protected in respect of killing, injuring and sale.

12.3.85 The Sand Lizard is a UK Biodiversity Action Plan Priority Species, and on the basis of historical records and current re-introduction experiments it is also included as a Species of Principal Importance for Conservation of Biological Diversity in Wales under section 42 of the Natural Environment and Rural Communities Act 2006.

Survey methods

12.3.86 A reptile survey of the mine waste repository area in the north-western section of the site (area B4 on figure 12.3) was undertaken in 2010, prior to the area's

development: small numbers of Common lizard Zootoca [Lacerta] vivipara were reported. (Pryce Consultant Ecologists, 2010). The subsequent clearance of ground cover at this area can be expected to have reduced/ended reptile use at the area, and no further reptile surveys have been carried out in this area during the present assessment.

12.3.87 To determine reptile presence/absence at other parts of the application site, survey was undertaken in late summer-autumn, when waning solar heat makes the thermal-gain advantage of the artificial refugia particularly attractive to reptiles. In the first week of August, 90 artificial refugia sheets of bituminised roofing felt, c.600x500mm, were placed at the site. These sheets offer good basking sites for reptiles, magnifying and retaining solar heat, and have some value as artificial refugia: the sheets are extremely effective attractants to all reptile, and most amphibian, species.

12.3.88 To maximise the chance of animal detection, all sheets were placed at unmanaged areas open to solar heat but, where possible, close to varied ground-vegetation structure- e.g. within 10m of scattered scrub (eg. gorse) or rubble. Each sheet was placed onto sward of <15mm height, to maximise the sheets' efficacy. To sample the varied on-site micro-habitats, sheets were placed at nine different areas:

- area 1: (top/north end of haul road). 10 sheets, at regenerating vegetation on a steep slope of stony spoil; conifer stand at south end, some fringing Juncus
- area 2: 10 sheets at grassy banks of through-conifer ride; pond within 50m
- area 3: 10 sheets at grassy banks of (wide, metalled) through-conifer ride
- area 4: 10 sheets at grassy banks of hillside-contouring track, birch/rhododendron at (north) verge; + 10 sheets at connected, to south/downhill, clear-felled area with 1m high forbs & birch/alder saplings
- area 5: 10 sheets at secondary grassland, with blockstone/gabion streamway through centre
- area 6: 10 sheets at vegetated bank tops alongside two settlement ponds

- area 7: 10 sheets at regenerating grassland, east end of "new" car park, north of B4242 road
- area 8: 5 sheets at banktop grass/forbs, south side of canal
- area 9: 5 sheets at perimeter bunds around south of B4242 road car park.

	25/08/13 1500- temp: 20°C 50% cloud	01/09/13 1300- temp: 16°C 70% cloud	09/09/13 1400- temp: 16°C 50% cloud	14/09/13 1300- temp: 13°C 70% cloud	25/09/13 1400- temp: 19°C 70% cloud
Area 1		1 Common toad	1 Common toad	1 Common toad	1 Common toad
Area 2					
Area 3					
Area 4	1 Common lizard				
Area 5		1 Slow worm sub-adult			1 Slow worm sub-adult
Area 6					
Area 7					
Area 8	1 Slow worm sub-adult		1 Common lizard	2 Slow worm sub-adult	3 Slow worm sub-adult 1 Slow worm adult
Area 9					

Summary/Discussion

12.3.89 The on-site conifer plantations are too heavily shaded and ground-flora depauperate to support reptiles, and these areas were not surveyed. Through-conifer rides offer fringes/verges of appropriate habitat but these fringes are narrow and are subject to roadway-maintenance disturbance: the assessment that these strips offer sub-

optimum reptile opportunity is supported by the absence of animals at the two survey areas through-plantation.

12.3.90 Clear-felled (e.g. south/downhill section of area 4) or recently re-instated areas (e.g. area 5) can be expected to become progressively more attractive to reptiles as ground flora establishes, and the presence of both Slow worm and common lizard at areas 4 and 5 indicate that there are reservoir/donor populations of these ubiquitous species which can be expected to colonise such areas. Reptile immigration can be expected, over the coming years, at the most recently cleared/re-instated areas (e.g. area 1, area 9), where no animals were found at this survey.

12.3.91 The southern banktop of the canal (area 8), alongside the B4242 road, offers a more stable habitat than is seen at the rest of the survey site: banktop ground vegetation is dense and varied, and a periodically mown verge, between the roadside and the canal bank vegetation, gives an appropriately diverse ground-vegetation structure. The number of animals found here indicates a well established Slow worm population at this area.

Amphibians

12.3.92 Six native amphibian species occur in Britain: Common Frog (*Rana temporaria*), Common Toad (*Bufo bufo*), Natterjack Toad (*Bufo calamita*), Smooth Newt (*Triturus vulgaris*), Palmate Newt (*T. helveticus*) and Great Crested Newt (*T. cristatutus*). All amphibians have aquatic egg and larval stages and are therefore dependent on water for successful breeding. Eggs are laid in suitable ponds during the spring and the larvae (tadpoles) remain in the water for several weeks or months. Adults of each of these species typically spend 6-9 months on land in invertebrate-rich feeding areas and in over-winter hibernacula.

12.3.93 The Wildlife & Countryside Act 1981 provides varying levels of protection for these species. The Great Crested Newt is afforded complete protection under schedule 5 of the Act. Any development work to be carried out within an area where this species occurs requires a licence to be obtained in advance from the Welsh Assembly Government who will be advised by the Countryside Council for Wales.

12.3.94 The Great Crested Newt is also a Species of Principal Importance for Conservation of Biological Diversity in Wales under section 42 of the Natural Environment and Rural Communities Act 2006 and a UK Biodiversity Action Plan Priority Species.

Survey methods

12.3.95 Site survey was commissioned too late in the season for definitive survey (i.e. search for in-water evidence of amphibian breeding, March-May) of amphibian use.

12.3.96 Torchlight search of ten ponds (eight alongside, or close to, the existing haul road; two behind the northernmost mine buildings) was made during night time bat surveys in July, in search for (late season) tadpoles; amphibian species were also noted at the artificial refugia (reptile) survey.

Results

12.3.97 Several of the examined ponds have bare stone/silt substrates, with no aquatic vegetations and with strong through-flows of drain water, that are sub-optimal for amphibian breeding but the two southernmost ponds (area 6) and three of the haul-roadside ponds have abundant aquatic vegetation (*Potamageton spp*) and marginal emergent vegetation (*Typha, Juncus*) and these would appear to offer suitable breeding conditions.

12.3.98 No amphibians were seen within in these water bodies, giving no evidence of amphibian breeding. Common Toad (possibly the same animal) was seen on four of five dates at the slope toe of area 1, demonstrating the species' presence at site along with the ubiquitous Common Frog *Rana temporaria* and Palmate Newt *Lissotriton [Triturus] helveticus* can be expected at the wider area.

12.3.99 No amphibians were seen (by at-night torchlight search) at that section of canal within the survey site but the habitat is judged to be very suitable for Common frog and Palmate newt.

12.3.100 Previous detailed surveys carried out in the area have failed to detect the presence of Great Crested Newt and no known populations exist within a 10km radius of the site.

Breeding birds (Mark Hipkin)

Introduction

12.3.101 Breeding Bird Surveys were split up into 3 groups, the methodologies used for each group being different:

Schedule 1 Raptor Species

12.3.102 This group includes Honey-buzzard, Red Kite, (Northern) Goshawk, (Eurasian) Hobby and Peregrine (Falcon). The methodology for surveying for Honey-buzzard presence involves a thorough surveying effort over the whole of the site and therefore it was deemed sensible to record all raptor species present found during these surveys.

12.3.103 The surveys are predominantly static watch point activities where locations, often referred to as Vantage Points, are chosen that offer a good view of the skies above the proposed development. The best part of the season to watch the behaviour of individual raptor species varies to a small degree, but one can expect to return enough data during a succession of Honey-buzzard surveys to produce robust data on all raptor species using the area. The surveys are generally conducted over eight hour periods on days that are favourable to watching birds of prey. The flight lines and behaviour of each raptor is noted and assessed as the season progresses. The positions of the static watch points are chosen to produce best results from any data that has been collected previously. The Honey-buzzard in particular can be very secretive and so even surveys that return no positive sightings don't necessarily mean that birds are not present. With this in mind surveys are generally continued through to the end of the season even if surveys completed during the early part of the summer do not produce definitive evidence of breeding evidence. A minimum of 12 x 8 hr surveys were undertaken so as to provide an accurate assessment of the area.

European Nightjar

12.3.104 Surveys to assess the presence of (European) Nightjar were conducted to check for Nightjar activity at peak times. These are widely accepted as being in the few hours around dusk and also around dawn. The surveys involved finding suitable habitats in daylight hours and then making visits to these locations at dawn and dusk. The surveys would involve stopping at regular intervals to check for Nightjar activity,

which might include males singing (churring), contact calls or observations. A recording of the churring and contact call was played to initiate a response at each site where no presence was initially detected. The periods that formed the focus of attention for checking Nightjar presence and behaviour was during territory setup and fledging young. The behaviour and timing of territorial behaviour was used to predict and subsequently avoid disturbance during the incubation period.

Common Crossbill plus Section 42 species

12.3.105 Breeding Bird Surveys (BBS) were completed to assess all the other species found on site. BBS were undertaken by walking a route, which allowed as much coverage of the proposed works as possible. Using an adapted field-by-field method (Bibby et al, 1992) birds were identified both visually (using x10 binoculars) and by vocalisations. 3NO surveys, conducted from 1 hour after first light have been allocated to these surveys. The majority of the development was covered during the course of the study and this was used together with existing experience of the types of birds that occur in the area.

General notes on Important Features

12.3.106 Every species of bird that was seen during the surveys was recorded and is listed in table 12.1. Emphasis has been placed on those species protected listed on Schedule 1 of the Wildlife and Countryside Act along with key Section 42 species.. Where possible a baseline appraisal of each species is provided and an assessment of any impacts expected as a result of the development.

Results

Honey-buzzard (Pernis apivoris)

12.3.107 The Honey-buzzard population in Neath Port Talbot can be treated as vulnerable. They occur in very small numbers with little opportunity to expand their range. The impending introduction of large scale wind farms into the region raises the value of suitable breeding habitat for Honey-buzzards considerably, especially where wind turbines are not planned or yet given approval. This development is located in an area that currently provides favourable conditions for Honey-buzzards, pairs having bred in close proximity to the site in the last decade.

12.3.108 The results of the 2013 survey recorded activity from a minimum of three individual birds, shown on figure 12.4. A female was seen flying towards the site in early June. In July, a sighting of a distant unsexed bird was observed as its flight path took it just south of the site. The only other sightings from the survey came on the same day in August, when two different males flew over the haul road and Penstar tip. One of the males was seen perched up in a tree and displayed active hunting behaviour close to the haul road. Sighting notes are given in Appendix 12.2.

12.3.109 Despite these sightings it is not likely that the Honey-buzzards bred on site during 2013. Given that they have done so in the past, the increase in wind farm activity from the surrounding areas in the future could encourage them to return to the same location. Therefore, the important baseline feature with respect to Honey-buzzards and this development must be that suitable breeding habitat for them occurs on site. The revised planning application, which no longer includes the discard conveyer at this stage, does reduce the potential for negative impacts in the near future. Therefore, the haul road activities present the greatest potential to impact adversely upon the Honey-buzzards due to the suitable breeding habitat that can be found along it.

12.3.110 An important point to appreciate, when determining any future negative impact, is to consider how much of the suitable breeding habitat occurs along the haul road, and how likely it is to be used by Honey-buzzards in the future. Honey-buzzards do favour rides and clearings to access nest locations and the haul road does produce a ride through mature conifers, which are suitable for holding a nest. A nest site is generally chosen in more secluded environments than an active haul road, although birds have nested immediately adjacent to an active haul road and at least some individuals appear tolerant of regular plant traffic. Therefore, to guard against disturbing an active Honey-buzzard nest by the action of felling trees, either as part of improvements to the haul road or as part of on-going maintenance, should be done outside the recognised breeding season. Limiting tree felling activities to the October-December period will also safeguard the vast majority of other tree nesting species.

12.3.111 Any active nest found on site in the future will need to be fully protected until the young have fledged. The management of this scenario will need to be overseen by the Honey-buzzard specialists that work in the area. Once any construction activities have been completed the development will have a very limited impact on Honey-

buzzards. Indeed new rides through conifer plantations will be beneficial to them. It will be possible to contribute to the overall value of the site to Honey-buzzards by introducing ponds, log piles and leaving dead wood to decay naturally. This will allow reptiles, amphibians and wasp species to flourish in the area and in turn provide valuable foraging grounds for Honey-buzzards.

12.3.112 Comprehensive studies of the movements of Honey-buzzards will be a constant feature in the Neath Port Talbot area for the foreseeable future. It will be in the interests of this development to allow recognised outside surveying projects controlled access to the site, if required.

Red Kite (Milvus milvus)

12.3.113 The surveys returned frequent sightings of Red Kites throughout the summer as represented in figure 10.4 and Appendix 12.2. Usually the sighting would involve a single bird passing over or close to the site, but occasionally it would involve two birds – a likely pair. The behaviour of the these birds suggested that the site formed part of their rangere was no evidence to indicate a nest was present in the vicinity of the site. This is backed up with knowledge of the local pair's preferred nesting area.

12.3.114 The day to day running of the works at Aberpergwm means that foraging habitat will always be available and the creation of suitable nesting habitat in the future seems unlikely. Therefore, the future development of this site, including assessment of cumulative impacts predicts a negligible impact.

Northern Goshawk (Accipiter gentilis)

12.3.115 The surveys returned few records that were made above, or near to, the development as shown on figure 12.4 and Appendix 12.2. Sightings made well outside the site were made more regularly in locations were Goshawks have bred in the past. The lack of any significant activity over the site indicates that Goshawks did not breed during 2013. However, suitable habitat is widespread on site and the species could breed in the future. The breeding requirements for Goshawk are fairly similar to Honey-buzzard. The implementation of appropriate precautionary measures to prevent disturbance to Honey-buzzards throughout the lifespan of the development will similarly protect Goshawks. It is important to note that the breeding season for Goshawk starts early in the breeding season, around March, which will impose constraints on tree felling or other clearance activities.

Eurasian Hobby (Falco subbuteo)

12.3.116 Hobby sightings were made regularly throughout the surveying period, particularly early in the season. The sightings are illustrated and described on figure 12.4 and Appendix 12.2. Typically, Hobby pairs can be difficult to track in order to find the nest site. It is likely that two pairs nest in the Neath Valley area, but this may vary from year to year. The regular sightings, especially in June never showed any behaviour that might suggest a nest site was nearby. Only a single bird was seen at any one time, although this may easily have involved two or more individuals. The frequency of sightings is explained by the fact that a Sand Martin colony is located along the river near the colliery surface and the abundance of House Martins and Swifts that breed around Glyn-neath.

12.3.117 Whilst there is potential for a pair of Hobby to nest inside the site boundary, the species typically prefers more secluded stands of trees where possible and therefore, the colliery surface and haul roads will be less attractive to them.

Peregrine Falcon (Falco peregrinus)

12.3.118 Peregrine sightings this season have been made throughout the survey period. The presence of birds is illustrated on figure 12.4 and Appendix 12.2. The site is situated close to two rocky outcrops, namely Craig Clwyd and Craig Clwyd Fechan. Both of these sites are close to the Mine Waste Repository and have held active Peregrine nests in the past. The surveys from this season have shown Peregrines to be present at Craig Clwyd and Craig Clwyd Fechan as well as regular sightings of a male bird in flight. However, no sightings of parent birds carrying food and no obvious presence of juveniles on the rocky outcrops indicated that neither rocky outcrop supported active nests during the 2013 season.

12.3.119 Peregrines regularly nest in areas that are subject to regular quarrying activities and the nest sites mentioned earlier have been active during operational opencast activities at Aberpergwm in the past. It is possible that Peregrines will choose to use the rocky outcrops in the vicinity of the mine waste repository once again in the future. If they return, the cumulative adverse impact on them will remain negligible, as long as activities are controlled within the vicinity of any nest sites.

European Nightjar (Caprimulgus europaeus)

12.3.120 Nightjars are one of the most notable features of the area and the surveys showed that they do well locally within the site. The site provides only small areas of suitable habitat for Nightjars as highlighted on figure 12.5 and Appendix 12.3. Survey results indicated that at least one permanent territory was present, with possibly as many as three within the eastern part of the mine waste repository area. Other activity away from these locations, both inside the site or just outside showed less indication of territories having been set up.

12.3.121 Birds were present through to August and although no juvenile sightings could be confirmed the indications were that at least one pair present was successful, based on late-season activity. The occupied habitat is threatened by the scope of this initial application and also in any further development of the site. Nightjars have a preference to nest amongst young or stunted conifer plantations. The management of forestry-controlled land, whose natural cycles creates areas of young conifer plantation that can be found across the region, and therefore favourable habitat for Nightjar is generally widely available. At Aberpergwm the Nightjars prefer an area of conifer plantation showing significant areas of stunted growth, which has maintained good breeding conditions than typical coniferous forest site.

Common Crossbill (Loxia curvirostra)

12.3.122 The Crossbill breeding season starts during mid-winter period and whilst no survey data are available from the site during 2013, across the wider area, Crossbill numbers and breeding activity were low. Three birds were seen in June, a male and two female types. These birds could have bred almost anywhere and so their presence at that time was not significant. There is suitable breeding habitat for Crossbills available in those parts of the site where there are mature conifer plantations, none of which will be impacted upon by the application.

12.3.123 It is not realistic to suggest mitigating measures to replace habitat loss, but felling trees at a time when Crossbills are less likely to have nests can greatly reduce disturbance. Whilst Crossbills can nest in almost any month in the year, limiting felling to the period October to December will reduce the risk of disturbance.

Common Cuckoo (Cuculus canorus)

12.3.124 Cuckoos were recorded on one BBS survey and during a Nightjar survey; the sightings are illustrated on figure 12.5. This might be expected given the number of

Meadow Pipits that can be found around the upper regions of the site, especially the mine waste repository. The conservation of them depends almost exclusively on the protection of their host species. The Meadow Pipits are doing well under the circumstance in which the opencast mine has been managed up to this point and future management of the mine waste repository should prove attractive to Meadow Pipit along with the Cuckoo.

Skylark (Alauda arvensis)

12.3.125 Skylarks occur in good numbers inside the mine waste repository and along the haul road as shown on figure 12.5. Their habitat requirements are in many ways similar to those of the Meadow Pipit and their distributions were closely correlated during the surveys. Conifer plantations and disturbed ground provide excellent habitats for Skylarks.

Spotted Flycatcher (Muscicapa striata)

12.3.126 Birds were observed on two of the BBS visits and occupied two territories; the sightings are illustrated on figure 12.5. This species is in decline in many areas, but can be found readily in the right habitat. The lower parts of the haul road and areas surrounding the surface developments provide the best habitats on site, most notably the workshops clearings. Any future developments around the lower parts of the development that creates similar clearings will likely also attract Spotted Flycatchers in the future. To further enhance the suitability of the site for this species it will be possible to encourage them to stay and breed at suitable locations found on site by placing specifically designed nest boxes for Spotted Flycatchers.

Tree Pipit (Anthus trivialis)

12.3.127 Birds were present at two separate locations during the BBS surveys and included three territories; the sightings are illustrated on figure 12.5. All three were outside the site boundary in a forestry clearing and the application will have no direct impact on the Tree Pipit numbers found on site.

Common Linnet (Carduelis cannabina)

12.3.128 Linnets were present at one location on multiple occasions during a BBS survey and during Raptor surveys; the sightings are illustrated on figure 12.5. Adult and juveniles were noticed together on more than one occasion where suitable habitat was found

next to the haul road. It is likely that they bred inside the site at this location although the juveniles were mature enough to have travelled from elsewhere.

Summary

12.3.129 The 2013 bird survey shows that birdlife at Aberpergwm is diverse and in good health. Many of the notable species present werecoexisting alongside the ongoing mining operations, indeed some species were present as a result of habitats created by former mining and forestry operations. Nightjar was the most significant species found to have bred successfully inside the project boundaries during 2013.

12.3.130 The Honey-buzzard survey returned no positive breeding observations over the area, although foraging behaviour was noted. This species has bred near to the site in the past and could return as suitable habitat is available on adjacent land.

12.3.131 Peregrines have nested on the nearby rocky outcrops in the past and they are likely to return again in the future. The development is sufficiently well buffered from the project and works will not affect these nest sites.

12.3.132 Any removal of trees should be carried out outside of the breeding season to eliminate any chance of accidentally removing a tree with a nest, the most appropriate period to do this being October-December. It is worth noting, however, that Crossbills may breed during any month of the year and therefore a careful check for Crossbill nests should precede any felling of mature conifers.

12.3.133 The most important feature of bird assemblage recorded during the 2013 surveys at Aberpergwm was the breeding population of Nightjar. These birds favour the small area of habitat that occurs in the eastern part of the mine waste repository boundary. It is the only area of previously undisturbed habitat inside and adjacent to the MWR and supported three pairs of birds.

12.3.134 With the exception of the Nightjar habitat, it is predicted that once construction activities have been completed, the operational activities should produce few negative impacts on birdlife. Opportunities exist to mitigate losses by means of introducing ponds, woodpiles and nest boxes. However, it is the mosaic of clearings, sparsely vegetated ground and young plantations on site that support the most significant bird species. The scheme is capabile of maintaining a continuum of these

habitats throughout its life and can support a healthy bird community into the foreseeable future.

12.3.135Table 12.1 lists all species recorded from the study area:

Table 12.1 – Species recorded on site		
Breeding Birds		
Scientific name	Common name	Protection/Concern Status
Accipiter nisus	Sparrowhawk	BoC, BeC
Buteo buteo	Buzzard	BoC, BeC, cRDB
Actitis hypoleucos	Common Sandpiper	BoC. BeC, BCC (A)
Columba palumbus	Wood Pigeon	
streptopelia decaocto	Collard Dove	
Cuculus canorus	Cuckoo	S42, BCC (R)
Strix aluco	Tawny Owl	BeC, BBWC (H)
Caprimulgus europaeus	Nightjar	ECB, S42, BCC (R)
Picus viridis	Green Woodpecker	BeC, BCC (A)
Dendrocopos major	Great Spotted Woodpecker	BeC,
Pica pica	Magpie	
Garrulus glandarius	Jay	
Corvus monedula	Jackdaw	BCC (R),
Corvus corone	Carrion Crow	
Regulus regulus	Goldcrest	BeC
Cyanistes caeruleus	Blue Tit	BeC
Parus major	Great Tit	BeC
Parus ater	Coal Tit	Bec
Alauda arvensis	Skylark	S42, BCC (R), BBWC (H)
Riparia riparia	Sand Martin	BeC, cRDB, BCC (A)
Hirundo rustica	Swallow	BeC, cRDB, BCC (A)
Delichon urbicum	House Martin	BeC, BCC (A)
Aegithalos caudatus	Long-tailed tit	BeC
Phylloscopus collybita	Chiffchaff	BeC
Phylloscopus trochilus	Willow Warbler	BeC, BCC (A), BBWC (H)
Sylvia atricapila	Blackcap	BeC
Sylvia borin	Garden Warbler	BeC
Sylvia communis	Whitethroat	BeC, cRDB, BCC (A)

Sitta europaea	Nuthatch	BeC
Troglodytes troglodytes	Wren	BeC
Sturnus vulgaris	Starling	S42, BCC (R), BBWC (M)
Cinclus cinclus	Dipper	BeC, cRDB
Turdus merula	Blackbird	BBWC (M)
Turdus philomelos	Song Thrush	S42, BCC (R), BBWC (H)
Turdus viscivorus	Mistle Thrush	BCC (A), BBWC (M)
Muscicapa striata	Spotted Flycatcher	BeC, S42, cRDB, BCC (H)
Erithacus rubecula	Robin	BeC
Phoenicurus phoenicurus	Redstart	BeC, BCC (A)
Prunella modularis	Dunnock	S42, Bec, BCC (A), BBWC (M)
Passer domesticus	House Sparrow	S42, BCC (R)
Montacilla cinerea	Grey Wagtail	BeC, BCC (A), BBWC (M)
Motacilla alba	Pied Wagtail	BeC, BBWC (M)
Anthus trivialis	Tree Pipit	S42, Bec, BCC (R), BBWC (H)
Anthus pratensis	Meadow Pipit	BeC, BCC (A), BBWC (H)
Fringilla coelebs	Chaffinch	
Carduelis chloris	Greenfinch	BeC, BBWC (M)
Carduelis carduelis	Goldfinch	BeC
Carduelis spinus	Siskin	BeC
Carduelis cannabina	Linnet	S42, BeC, cRDB, BCC (R)
Carduelis cabaret	Lesser Redpoll	S42, Bec, BCC (R), BBWC (H)
Pyrrhula pyrrhula	Bullfinch	S42, BeC, BCC (A), BBWC (H)
Non-breeding Birds		
Scientific name	Common name	Protection/Concern Status
Anas platyrhynchos	Mallard	
Mergus merganser	Goosander	
Ardea cinerea	Grey Heron	
Pernis apivoris	Honey-buzzard	ECB, BoC, BeC,WCA1, RDB
Milvus milvus	Red Kite	ECB, BoC, BeC,WCA1, RDB
Accipiter gentilis	Goshawk	BoC, BeC,WCA1,S42, RDB,
Falco subbuteo	Hobby	ECB, BoC, BeC,WCA1
Falco peregrinus	Peregrine	ECB, WCA1, RDB
Larus fuscus	Lesser Black-backed Gull	BCC (A)
Larus argentatus	Herring Gull	S42, BCC (R)

Hepialus lupulinus	Swift	BCC (A)
Corvus corax	Raven	cRDB
Loxia curvirostra	Crossbill	WCA1, BeC

Other Protected and Significant Fauna

12.3.136 The site does not support suitable habitat for other protected species or Species of Principal Importance for Conservation of Biological Diversity in Wales under section 42 of the Natural Environment and Rural Communities Act 2006 or UK Biodiversity Action Plan Priority Species. These include species such as Dormouse (Muscardinus avellanarius), Water Vole (Arvicola terrestris) and Marsh Fritillary butterfly (Eurodryas aurinia).

Impact Assessment

Assessment criteria

12.3.137 Impact significance has been assessed for each of the features using a three stage process; an assessment of ecological value, an assessment of the magnitude of the likely impacts of the proposals and a determination of impact significance based on a combination of ecological value and magnitude of impact.

Ecological Value

12.3.138 Each feature has been classified according to its nature conservation value using the examples provided in Table 12.2 below.

Table 12.2. Assessment of Ecological Value	
Value	Examples
International	Internationally designated or proposed sites such as Ramsar Sites, Special Protection Areas, Biosphere Reserves and Special Areas of Conservation, or otherwise meeting criteria for international designation. Sites supporting populations of internationally important species.
UK/National	Nationally designated sites such as Sites of Special Scientific Interest (SSSIs), or non-designated sites meeting SSSI selection criteria, National Nature Reserves (NNRs), Nature Conservancy Review (NCR) Grade 1 sites, viable areas of key habitats within the UK Biodiversity Action Plan. Sites supporting viable breeding populations of Red Data Book (RDB) species (excluding scarce

	species), or supplying critical elements of their habitat requirements.
Regional	Sites containing viable areas of threatened habitats listed in a regional Biodiversity Action Plan, comfortably exceeding Site of Importance for Nature Conservation (SINC) criteria, but not meeting SSSI selection criteria. Sites supporting viable populations of Nationally Scarce species or those included in the Regional Biodiversity Action Plan on account of their rarity, or supplying critical elements of their habitat requirements.
County	Sites meeting the criteria for a county or metropolitan area designation (such as SINC), which may include amenity and educational criteria in urban areas. Ancient semi-natural woodland. Designated Local Nature Reserves. Sites containing viable areas of any key habitat type identified in the Local Biodiversity Action Plan (LBAP). Sites supporting viable breeding populations of species known to be county/metropolitan rarities e.g. featuring in county 'red data book' or LBAP, or supplying critical elements of their habitat requirements.
District	Undesignated sites, or features considered appreciably to enrich the habitat resource within the context of the Borough or District, or included in the Borough or District LBAP. Amenity and educational functions will be recognised in urban areas. Sites with viable breeding populations of species listed as rare in the District or Borough LBAP or supplying critical elements of their habitat requirements.
Local	Undesignated sites, or features considered appreciably enriching the habitat resource within the context of the Parish or neighbourhood (e.g. a species-rich hedgerow).
Not important	Low-grade and widespread habitats

Magnitude of Impact

12.3.139 The magnitude of each predicted impact has been assessed on a scale of High, Medium, Low and Minimal according to the criteria provided in Table 12.3 below.

Table 12.3. Criteria for determining magnitude of impacts	
Magnitude	Criteria
High	Loss of about 50% or more of the site area. Other effects (e.g. disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of >50% of the site area.

Medium	Loss affecting 20-49% of the site area. Other effects (e.g. disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of 20-49% of the site area.
Low	Loss affecting 4-19% of the site area. Other effects (e.g. disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of 4-19% of the site area.
Minimal	Loss affecting up to 4% of the site area. Other effects (e.g. disturbance or damage arising from pollution) including indirect impacts having an adverse impact equivalent in nature conservation terms to a loss of 4% of the site area.
Negligible	No anticipated effects resulting from the implementation of the proposals.
Potential Net Gain	Mitigation will seek to increase the extent of existing habitats or replace lost habitats with larger areas of suitable habitats. Such areas will be established and, where significant species are to be displaced, will be in a state ready for colonisation prior to any proposed habitat disturbance.

Significance of Impact

12.3.140 Table 12.4. below illustrates how significance has been assigned to the impact, based on a combination of the value of the feature being assessed. This has been expressed on a five-point scale ranging from Severe to Negligible as shown below.

Table 12.4. Criteria for determining significance of impacts

Impact Magnitude	Ecological Value						
	Inter-national	UK/ National	Regional	County	District	Local	Not important
High	Severe	Major	Major	Major	Moderate	Minor	Minor
Medium	Major	Major	Moderate	Moderate	Moderate	Minor	Negligible

Low	Moderate	Moderate	Minor	Minor	Minor	Negligible	Negligible
Minimal	Minor	Minor	Negligible	Negligible	Negligible	Negligible	Negligible
No Impact	Negligible	Negligible	No Impact	No Impact	No Impact	No Impact	No Impact
Potential net gain	Potential Net gain	Potential Net gain	Potential Net gain	Potential Net gain	Potential Net gain	Potential Net gain	Potential Net gain

12.3.141 Any indentified impacts greater than 'moderate' are considered to be significant in EIA terms.

Assessment of significance of impact on plants and habitats

Statutory Sites

Protected Sites of International Significance

12.3.142 No statutory or non-statutory protected sites (including nature reserves) occur within or adjacent to the application site.

Protected Sites of National Significance

12.3.143 No statutory or non-statutory protected sites (including nature reserves) occur within or adjacent to the application site. The nearest designated site is Cwm Gwyrelach and Nant Llyn Fach Streams SSSI that lies 3km to the east.

Protected Sites of County or Local Significance

12.3.144 No statutory or non-statutory protected sites (including nature reserves) occur within the application site. Those County Sites of Importance for Nature Conservation (candidate SINCs) which have been designated by NPT in the Local Plan and which are located within the site or its close proximity include:

- Riparian woodland along the Neath River
- Sarn Helen Ridgeway

Habitats of European significance

12.3.145 No Annex 1 habitats as defined in the EC Habitats Directive occur in or adjacent to the study areas.

Ancient woodland inventory 2011

12.3.146 The Forestry Commission provides spatial data that show boundaries of Ancient Woodland sites in Wales. Each site is categorised as Ancient Semi Natural Woodland (ASNW), Restored Ancient Woodland Site (RAWS), Plantation on Ancient Woodland Site (PAWS) or Ancient Woodland Site of Unknown Category (AWSU). The application boundary includes following areas of the above types as shown on figure 12.6:

Designation	As mapped by FC (ha)	Detractions for existing development and structures (ha)	Actual areas of Ancient Woodland with application boundary	Ancient woodland affected by the development
ASNW	0.00	0.00	0.00	Nil
RAWS	4.62	2.37	2.25	Nil
PAWS	0.65	0.04	0.61	NIl
AWSU	0.59	0.26	0.33	Nil

Section 42 and UK BAP Habitats

12.3.147 Habitats of Principal Importance for Conservation of Biological Diversity in Wales listed under Section 42 of the Natural Environment and Rural Communities Act 2006 and UK Biodiversity Action Plan Priority Habitats which are present within the study areas include:

Lowland Mixed Deciduous Woodland (see above)

Impact Assessment:

12.3.148 Of the 2.25 ha of PAWS, 0.61 ha of PAWS and 0.33 ha of AWSU that are established on site, most are of a secondary nature and in poor condition due to historical disturbance around the mine area. None of the woodland areas mapped will be directly affected by the proposed development, although potential risks from pollution, dust and additional noise increase the possibility of indirect impacts resulting in minor adverse impact (Low magnitude at County level).

Mitigation:

12.3.149 New planting of an equivalent area to the discrepancy between the Ancient Woodland Register and the actual area of ancient woodland (i.e. 2.67 ha) will be carried out on appropriate land elsewhere within or adjacent to the application site, which will help re-establish Lowland Mixed Deciduous Woodland in the long term. Such a programme on poor mineral soils is feasible but it will be several decades before the canopy re-establishes itself. Only then will the understorey and field layers begin to recolonise and the process of re-establishing a semi-natural woodland assemblage could take considerably longer. Other measures will be implemented to ensure the impact on ancient woodland areas will be minimised from all works associated with the project, such as thinning of non-native canopy species and control of non-natives such as Rhododendron.

Residual Impact:

12.3.150 Re-establishment of woodland will be effective in the long-term and should reduce the impact of the scheme to negligible (Minimal magnitude at County level).

12.3.151 Inland rock outcrop and scree habitats are represented by the small outcrop over which the Nant Clwyd waterfall flows, as shown by TN32 on figure 12.1.

Impact Assessment:

12.3.152 The scheme will not directly impact upon this feature, but there is a risk that water quality might be affected during construction, operational and decommissioning phases, which could result in a moderate adverse impact (Medium magnitude at District level).

Mitigation:

12.3.153 Measures need to be put in place to ensure the waterfall retains its sheltered humid conditions and that water quality and flows are not adversely altered. Such measures might include use of silt traps where necessary and more importantly maintaining a permanent canopy of predominantly native deciduous trees and shrubs.

Residual Impact:

12.3.154 The implementation of preventative measures to ensure waterfall outcrop is kept in favourable condition will reduce the likely impact to minor adverse impact (Low magnitude at District level).

12.3.155 Open mosaic habitats on previously developed land are represented by the small area of Maclean Tip at TN23 and the reseeded/planted colliery spoil on the valley floor at TN10 on figure 12.1.

Impact Assessment:

12.3.156 The scheme will result in only minor losses of these habitats resulting in a minor adverse impact (Low magnitude at District level).

Mitigation:

12.3.157 It is likely that land within some of the areas referred to above can either be retained or reinstated. Where such opportunities exist, the habitats should be kept as low-nutrient, mineral soils suitable for the restoration and maintenance of habitats, fauna and flora characteristic of this type of spoil. This will be achieved by providing varied topography, aspect and saturation levels of the soils and management will aim to provide periodic successional rejuvenation in order to maintain a successional mosaic ranging from bare ground through to scrub.

Residual Impact:

12.3.158 Implementation of the above measures at a sufficient scale could reduce the overall impact of the scheme on this habitat to negligible impact (Minimal magnitude at District level).

Local BAP Habitats and Species

12.3.159 Additional habitats and species of concern which have been adopted in Neath Port Talbot County Borough in order to facilitate their conservation at a local level and which are included in the county borough's Local Biodiversity Action Plan will be affected by the scheme are:

12.3.160 Rivers and Streams are represented by sections of the Neath River TN13, Nant Ysgwrfa TN08-09 and Nant Clwyd TN32 waterfall as shown on figure 12.1.

Impact Assessment:

12.3.161 The scheme will only directly affect a short section of the Nant Ysgwrfa at TN08, a section that is already modified, so there is unlikely to be any modifications to in stream or riparian habitats. There is however, a risk that water qualify might be affected during construction, operational and decommissioning phases, which could result in a moderate adverse impact (Medium magnitude at District level).

Mitigation:

12.3.162 The realignment of the Nant Ysgwrfa will be ditched during the operational phase of the scheme, but the opportunity will be taken during the restoration phase to provide a range of features that will replicate those initially lost to the scheme. Elsewhere measures such as silt traps need to be put in place to ensure the water quality and flows are not adversely altered.

Residual Impact:

12.3.163 The re-established watercourse will mature relatively quickly and management will ensure that the restoration of associated riparian habitats will be achieved in conjunction with the maturation of the watercourse. It is anticipated, therefore, that these proposals will reduce the impact of the scheme on this habitat to minor adverse impact (Low magnitude at County level) in a few decades. It should also be noted that the existing central section of the Nant Ysgwrfa is conducted through a concrete-armoured channel. The scheme, therefore, provides the opportunity to restore the watercourse to a more natural feature, incorporating a range of associated aquatic and riparian habitats not currently present over this section of the stream.

Protected Plant Species

12.3.164 No protected plant species were recorded within the application site.

Plants of European Significance

12.3.165 No plant species of European significance were recorded within the application site.

Section 42 and UK BAP Plant Species

12.3.166 No plants within these categories were recorded within the application site.

Non-designated Habitats and Plant Species

12.3.167 Areas of sparse vegetation on spoil that loosely fit the definition for acid grassland occur in the car park area, the Maclean Tip and along the haul road verges as shown by TN10, TN23 and TN31 on figure 12.1.

Impact Assessment:

12.3.168 It is predicted that 4-19% of the this vegetation will be lost to the development resulting in a minor adverse impact (Low magnitude at District level).

Mitigation:

12.3.169 Restoration of 15% of the application site area to open grassland on poor mineral soils.

Residual Impact:

12.3.170 The re-establishment of habitats within the restored site will reduce the impact of the scheme to negligible impact (Minimal magnitude at District level).

12.4 Assessment of significance of impact on protected fauna

Badger

12.4.1 Whilst Badgers undoubtedly occur within the application site, there are no parts of it that are particularly productive for foraging animals and no evidence of their presence was found, nor was there any evidence that suggested any setts were on, or close to the application site. Whilst it is considered unlikely that a Badger sett is located within the application site, the dense vegetation in some of the marginal

conifer blocks prevented a full examination and the possibility of a Badger sett being found during site clearance works cannot be discounted. Should such a sett be discovered at any time, works must stop immediately and a suitably qualified ecologist should be consulted before any further works proceed within a 30m radius of the sett. Heavy plant workings and the absence of attractive habitat within the site are likely to deter Badgers during the operational phase of the development. Use of the site by Badger is likely to be very limited, negligible impact (minimal magnitude at low-local level).

Otter

12.4.2 Other than the ponds off the haul road at TN28 and TN33, which are likely to provide seasonal hunting opportunities in the way of amphibian prey, no other habitats where Otters may be expected to occur were noted within the application site. The Neath River provides the best feeding adjacent habitat and fresh spraint was recorded on the riverbank at TN13 (SN866057) on 12th July 2013. There are good resting-sites for the species throughout the riparian woodland corridor of the Neath River. The Neath Canal also provides opportunities for the species. An Otter underpass below the B4242, immediately west of the survey site's western over-canal boundary, has shown evidence-of-use (pers. data) since its construction (by the WDA) in the early 2000s; this evidence-of-use is thought likely to indicate resting-site use at the canal-side, (parts of which lie within the study area at TN06, TN07), or at a hillside tributary stream (e.g. Nant Ysgwrfa, to the west of the study site). Whilst surveys suggest no holts occur within the application area, the possibility of a well-hidden holt being located within these areas cannot be discounted. Likely travel routes were identified along the Neath River and the Neath Canal and between catchments via the Nant Ysgwrfa and Nant Clwyd. Negligible impact (minimal magnitude at low-local level).

Brown Hare

12.4.3 A single Brown Hare was seen, during the course of other-survey on the evening of 14th July, at the side of the existing haul road mid-way between areas B5-B4; Hares are reported to be seen occasionally by the regular work force on site. Sparsely-vegetated land along the forest tracks and around the margins of the quarry are considered to provide sub-optimal habitats used by Brown Hares which occur at low density. The largely barren quarry void is unsuitable for this species and the high

level of disturbance is likely to act as a deterrent. Use of the site by Brown Hare is likely to be very limited, negligible impact (minimal magnitude at low-local level)

Bats

Pipistrelles

Potential Impact & Significance:

12.4.4 Multi-animal (maternity) roosts are invariably in buildings and four such roosts are known in the valley bottom less than 800m from the Aberpergwm Mine buildings (pers. data). All the observation times made during the present survey are consistent with movement to the Aberpergwm site from these known roosts and the overnight data also suggest a valley locus of activity. The proposed expansion of the surface works around the main colliery, improvements to the haul road and tipping into the mine-waste repository will have no impact on this species: Negligible (County value, Minimal magnitude).

Mitigation measures:

12.4.5 None.

Residual Impact:

12.4.6 Unchanged

Whiskered bat

Potential Impact & Significance:

12.4.7 Multi-animal Whiskered bat roosts are also commonly found in buildings but maternity colonies in trees are not unusual and, although no aggregations which might suggest any close roost proximity were seen, the use of trees within or near the site cannot be discounted: Minor adverse impact (County value, Low magnitude).

Mitigation measures:

12.4.8 There are deciduous trees of varying age to the west of the northernmost mine building (area B3 on figure 12.2). Any trees with roost potential are to be surveyed for bat presence if future felling is required. Provision of replacement roost sites as

agreed with NRW under the terms of the Bat Licence which would need to be procured and implemented prior to the commencement of site operations.

Residual Impact:

12.4.9 Unchanged

Daubenton's bat

Potential Impact & Significance:

12.4.10 This species has been recorded in the past from all of the River Neath and from many stretches of the canals within the Neath valley (pers. data). No Daubenton's bats were detected within the site during the present survey but it must be assumed that they are likely to forage at the settlement ponds within the site. Both of the over-river bridges have possible roost potential but the surveys recorded no evidence of such use; however, as this species is known to use multiple roost sites during the spring-summer-autum season, such use cannot be entirely discounted: Negligible impact (County value, Minimal magnitude).

Mitigation measures:

12.4.11 There are deciduous trees of varying age to the west of the northernmost mine building (area B3 on figure 10.2). Any works affecting these and the older, brick footbridge, upstream of the A465, are to be undertaken >6 months after the reported surveys, it is recommended that a further emergence watch is undertaken in order to be confident of "no use" by Daubenton's bat.

Residual Impact:

12.4.12 Unchanged

Noctule

Potential Impact & Significance:

12.4.13 This high flying, far travelling, species preferentially roosts in trees: no potential tree-roost features were identified on-site during the surveys, and no movement was seen to suggest nearby roosting. The proposed expansion of the surface works around the main colliery, improvements to the haul road and tipping into the mine-

waste repository will have no impact on this species: Negligible (County value, Minimal magnitude).

Mitigation measures:

12.4.14 None.

Residual Impact:

12.4.15 Unchanged

Birds

Schedule 1 birds and nightjar

12.4.16 Six schedule 1 species plus Nightjar have been observed during the surveys so far. The surveys are ongoing therefore it is possible that the following assessment values might change in the final report.

Honey-buzzard

Potential Impact & Significance:

12.4.17 The impact assessment assumes that tree and scrub clearance is undertaken outside their breeding season (May to September inclusive). By not following the recommendations the potential impact during construction could rise to Major Adverse, which would also have a bearing on the residual impact. It should also be stated that the development project offers opportunities for habitat creation, enhancement and management which could improve the area for Honey-buzzards. Disturbance of nest sites during the breeding season could act as a deterrent to prevent nesting and/or cause nest failure resulting major adverse (UK/National value, High magnitude).

Mitigation:

12.4.18 To guard against disturbing an active Honey-buzzard nest,tree felling activities should be limited to the October-December period.

12.4.19 Increased volumes of heavy plant traffic might be considered to raise the risk of Honey-buzzard fatalities due to collision with moving plant. However, the low speeds

and early warning signs due to noise will reduce greatly any likelihood of accidental collisions with Honey-buzzards.

12.4.20 Any active nest found on site in the future will need to be fully protected until the young have fledged. The management of this scenario will need to be overseen by the Honey-buzzard specialists that work in the area. Post construction the development will have a minimal impact on Honey-buzzards. It will be possible to contribute to the overall value of the site to Honey-buzzards by introducing ponds, log piles and leaving dead wood to decay naturally. This will allow reptiles, amphibians and wasp species to flourish in the area and in turn provide valuable foraging grounds for Honey-buzzards.

Residual Impact:

12.4.21 Minor adverse (National value, Minimal magnitude) with potential gain (National value, Potential Gain) if additional habitat creation, enhancement and management is undertaken.

Red Kite

Potential Impact & Significance:

12.4.22 The Red Kite is only likely to use the site area as part of its hunting territory and the impact of the development on it is likely to be of little significance: Minor adverse (UK/National value, Minimal magnitude).

Mitigation measures:

12.4.23 None

Residual Impact:

12.4.24 Unchanged

Goshawk

Potential Impact & Significance:

12.4.25 This is a possible breeding species on adjacent land and as such would need to be treated in much the same way as Honey-buzzard. Any clearance of trees would need to be undertaken outside their breeding season (April to August). Disturbance of

nest sites during the breeding season could act as a deterrent to prevent nesting and/or cause nest failure resulting Major adverse (UK/National value, High magnitude).

Mitigation measures:

12.4.26 To guard against disturbing an active Goshawk nest, tree felling activities should be restricted to the October-December period. Any active nest found on site in the future will need to be fully protected until the young have fledged.

Residual Impact:

12.4.27 Minor adverse (UK/National value, Minimal magnitude).

Hobby

Potential Impact & Significance:

12.4.28 Hobby is of national significance and in Neath Port Talbot it is a rare breeder. Disturbance during the breeding season could act as a deterrent to nesting and/or cause nest failure resulting Major adverse (UK/National value, High magnitude).

Mitigation measures:

12.4.29 To guard against disturbing an active Hobby nest, tree felling activities should be restricted to the October-December period. Any active nest found on site in the future will need to be fully protected until the young have fledged.

Residual Impact:

12.4.30 Minor adverse (UK/National value, Minimal magnitude).

Peregrine

Potential Impact & Significance:

12.4.31 This species has used local breeding sites close to the Mine Waste Repository in previous years. If birds nest at these sites in the future, an expansion of the tipping area has the potential to disturb the active nests, although the construction and operational phases of the project are less likely to impact adversely on breeding birds. Disturbance of nest sites during the breeding season could act as a deterrent

to nesting and/or cause nest failure resulting Major adverse (UK/National value, High magnitude).

Mitigation measures:

12.4.32 To guard against disturbing an active Peregrine nest, tree felling in close proximity to known cliff ledges activities should be restricted to the October-December period. Any active nest found on site in the future will need to be fully protected until the young have fledged.

Residual Impact:

12.4.33 Minor adverse (UK/National value, Minimal magnitude).

Nightjar

Potential Impact & Significance:

12.4.34 Nightjar is the species most at risk from habitat loss and disturbance from the project. Breeding territories were recorded within the Mine Waste Repository area with two others on adjacent land. Some of the habitat created by previous land restoration schemes has the potential to become favourable to Nightjars in the near future: Moderate adverse (Regional value, Medium magnitude).

Mitigation measures:

12.4.35 The short to medium term mitigation is unlikely to be provided until the project sees the re-establishment of young coniferous woodland. Only then will holding capacity for Nightjars be restored on site, although the habitats occupied are rarely viable for more than eight years, until the forest cycle repeats. Scrub clearance and felling in adjacent areas would create habitat favourable to Nightjars and offset losses. Phasing of works in key areas should ensure a succession of opportunities for Nightjars is provided.

Residual Impact (medium-to-long term):

12.4.36 Minor adverse (Regional value, Low magnitude).

Crossbill

Potential Impact & Significance:

12.4.37 Crossbill is frequent in the conifer plantations of Neath Port Talbot. Disturbance during the breeding season could act as a deterrent to nesting and/or cause nest failure resulting moderate adverse (UK/National value, Medium magnitude).

Mitigation measures:

12.4.38 Crossbills generally breed in the local area from January to April but are known to breed at any time of year. Checking for Crossbill nests in the mature conifer plantations should be carried out whenever tree clearance is scheduled to be undertaken and should prevent accidental nest destruction, however, practical mitigation options are very limited and the impact of the scheme is unlikely to be changed.

Residual Impact:

12.4.39 MINOR ADVERSE (National value, Low magnitude).

Breeding birds

Potential Impact & Significance:

12.4.40 Section 42 Species of Principal Importance were recorded resulting in the significance of each area being classed as of District value. Many of the breeding birds found in this area used features within the works and adjacent woodland complex to their advantage, including activities such as nesting and feeding around the buildings. The clearings created by the tracks, car parks and storage areas also provide marginal habitats preferred by many bird species. Habitat loss and disturbance during the breeding season could prevent nesting and/or cause nest failure resulting in MODERATE ADVERSE (High-local value, High magnitude).

Mitigation measures:

12.4.41 To guard against disturbing S42 breeding birds during construction and operational phases, tree felling and scrub clearance activities should be restricted to the October-December period. Any active nest found on site in the future will need to be fully protected until the young have fledged.

Residual Impact:

12.4.42 Minor adverse (UK/National value, Low magnitude).

Reptiles

Potential Impact & Significance:

12.4.43 Edge habitats around the wooded parts of study site generally offer sub-optimum opportunities for reptiles, as demonstrated by the absence of animals at the two survey areas. Recently restored ground can be expected to become progressively more attractive to reptiles as ground flora establishes, and the presence of both Slow worm and common lizard at areas 4 and 5 indicate that there are reservoir/donor populations of these ubiquitous species which can be expected to colonise such areas. The south bank top of the canal (area 8), alongside the B4242 road, offers a more stable habitat than is seen at the rest of the survey site: bank top ground vegetation is dense and varied, and a periodically mown verge, between the roadside and the canal bank vegetation, gives an appropriately diverse ground-vegetation structure. The number of animals found here indicates a well established Slow-worm population at this area. Most of the areas which provide suitable habitats for reptiles are to be retained, though some limited disturbance along the haul road is expected: Minor adverse (District value, Low magnitude).

Mitigation measures:

12.4.44 All reptile species are (Wildlife & Countryside Act) protected against "deliberate killing", and "deliberate killing" is currently interpreted to include development-related damage/destruction of habitat where reptiles are known to be present. Prior to damage/destruction of ground-flora at those areas where Slow worm and/or Common lizard were found, it will be necessary to i) perimeter fence (with, e.g. 1m high heavy-polythene fencing) the to-be-affected habitat, and ii) remove all reptiles from the fenced area of works. A "receptor area" for these displaced animals will be required; in practice, this is likely to require the creation of appropriate "new" habitat, within the vicinity of the to-be-stripped area. A "method statement" detailing an appropriate capture-translocation methodology is a likely requirement of the LPA, at planning application.

Residual Impact (medium-to-long term):

12.4.45 Negligible adverse (Local value, Low magnitude).

Amphibians

Potential Impact & Significance:

12.4.46 The proposed development appears to avoid any impact on site ponds, in which case there is no amphibian-related constraint: Negligible (Local value, Minimal magnitude).

Mitigation measures:

12.4.47 Any ponds that are to be lost to the on going development, should be resurveyed, during the amphibian breeding season (March-May), in order to i) definitively exclude the presence of (European Protected Species) Great crested newt Triturus cristatus and ii) to identify any breeding site for other (NPTCBC LBAP priority species) amphibians.

Residual Impact (medium-to-long term):

12.4.48 Unchanged

Other Protected and Significant Fauna

12.4.49 The site does not support suitable habitat for Dormouse, Water Vole, Marsh Fritillary butterfly or other significant species. Scoping Opinion: These species are not considered to pose a constraint to development and further survey is considered unnecessary.

12.5 Assessment of the Potential Combined Effects

12.5.1 When the proposed mining operations are put into context alongside existing and proposed windfarm developments within the Neath Valley, the comparative significance of the mine works impacts are disproportionately small when considering the key habitats and species. For example the mine will have a minimal adverse impact on the populations and distributions of a highly protected bird species with extensive territories, such as Peregrine, Goshawk and Honey-buzzard, whereas the windfarms are known to have had a direct impact on the birds. Therefore the cumulative impact resulting from the Aberpergwm Mine proposals will be minimal.

12.5.2 The simultaneous effects of ongoing forestry operations, in particular the rapid and extensive clearance of Larch plantations within the Neath Port Talbot is also known to be having a significant and dramatic impact on the populations and distributions

of a number of bird species with extensive territories, by dramatically reducing nesting sites and hunting territories. The cumulative impact from an increase in clearfelling throughout the county is well above the normal rate and is again highly disproportionate to the relatively minor impact resulting from the Aberpergwm Mine proposals and the combined effects will be minimal.

12.5.3 None of the ancient woodland areas mapped will be directly affected by the proposed development and although there is the possibility of indirect impacts from pollution and an increase in noise, the impact on these designated woodlands will be very limited. In the context of the ongoing clearfelling throughout the county and permanent loss of woodland to turbine footprints the cumulative impact on ancient woodland resulting from the Aberpergwm Mine proposals will be negligible.

12.5.4 No other statutory or non-statutory protected sites (including nature reserves) occur within the application site.

12.5.5 No protected plant species were recorded within the application site.

12.5.6 No impact on badgers, otters or brown hare were identified.

12.5.7 The potential for impacts upon bats and Schedule 1 birds is low. With appropriate mitigation measures where required the residual impact for the bat and bird populations is low to negligible.

12.5.8 There are known areas where reptiles are likely to be found, with appropriate mitigation including translocation the residual impact upon reptiles is negligible.

12.5.9 The proposed development appears to avoid any impact on site ponds, in which case there is no amphibian-related constraint.

12.5.10 The site does not support suitable habitat for Dormouse, Water Vole, Marsh Fritillary butterfly or other significant species.

12.5.11 The potential effects do not come close to the thresholds of objectionability in respect of ecology, protected species and their habitats.

12.6 The Assessment of Potential Successive Effects

12.6.1 Combining the Effects of the Proposal with the Impact of Past Mining Operations

Development to provide mine ventilation and emergency access

12.6.2 The Treforgan site is a disused colliery and there will be no impact upon soils as the ground has been previously disturbed. However, areas of the site have naturally regenerated and therefore there is the potential for the re-opening of the Treforgan Mine to impact upon certain species and their habitats. Prior to the re-opening of the Treforgan Mine detailed additional ecological survey work would need to be undertaken to supplement recent baseline surveys which indicate there could be a limited adverse impact upon the local ecology. However, the site does not have any ecological designations and there are significant areas to allow for appropriate mitigation to be undertaken for any species/habitats located during detailed survey work. The potential impacts of re-opening the Treforgan Mine upon ecology are not considered to be significant.

Administration/welfare buildings and car park

12.6.3 The site identified comprises previously developed land and has limited ecological interest and minimal ecological impact.

12.6.4 There are no known designations of ecological interest within the site, but it lies adjacent to the Neath River Site of Importance for Nature Conservation and measures will need to be undertaken to ensure there is no impact on riparian habitats and/or species.

12.6.5 The potential impact of developing the administration/welfare buildings and car park is not likely to be significant.

Options to facilitate the transport of coal

12.6.6 Options for transporting coal from Aberpergwm Mine to the rail head include an overland conveyor, pipeline, HGV haul route or a combination of the above. Any of the above options are likely to be developed along the same broad corridor. The likely corridor for the transport of coal from Aberpergwm Colliery surface to the rail head at Unity Mine is shown on Drawing JNP/TRANS CORR/13 and follows a route south west from Aberpergwm Colliery surface along the river valley between the Neath Canal and the River Neath, crossing beneath the A465 at the same point that the River Neath crosses the A465 near Cwmgrach.

12.6.7 There would be potential for sensitive habitats and species within the river valley corridor, including loss of trees and shrubs. Of the available options the haul route would have the most impact upon habitats and species due to its invasive nature. A conveyor or pipeline would have impacts upon habitats during construction but once operational the impacts will be minor.

12.6.8 Whichever option is pursued a detailed ecological assessment would be required with appropriate mitigation/compensation incorporated within the planning application.

12.6.9 It is likely that a Haul Route has the potential for adverse impacts upon ecology during construction and throughout operations. The development of a pipeline/conveyor would primarily have impacts of an adverse nature during construction reducing once operational.

Options to facilitate the transport of larger volumes of discard to the mine waste repository

12.6.10 Options for transporting discard requiring disposal to the Mine Waste Repository include an overland conveyor, pipeline, HGV haul route or a combination of the above.

12.6.11 The haul route will continue along the existing route but will incorporate a series of improvements as set out in this planning application. If required the overland conveyor or pipeline would be developed broadly within the same corridor. The likely corridor is shown on drawing no JNP/TRANS CORR/13 and runs from Aberpergwm Colliery surface in a north westerly direction up the hillside to the Mine Waste Repository through Aberpergwm Wood.

12.6.12 There may be the potential for sensitive habitats and species to be impacted. Of the available options the haul route is likely to have the least impact upon habitats and species as it is already constructed and operational.

12.6.13 The conveyor/pipeline corridor runs through Aberpergwm Wood, it is accepted that the development along this corridor will have an impact upon primarily replanted coniferous trees and therefore potential impacts on habitats/species including Honey-buzzard. However, with careful siting and design at the relevant time any

impacts could be managed. A detailed ecological assessment would accompany any planning application with appropriate mitigation/compensation incorporated.

12.6.14 The continuation of use of the haul route has the potential for disturbance upon habitats/species throughout operations but given that the haul route is already in use these are assessed within the ES as minor.

12.6.15 The development of a pipeline/conveyor would primarily have impacts of an adverse nature during construction reducing once operational.

12.6.16 The cumulative impact from the existing and proposed windfarms, together with forestry operations, most notably the broad clearance of Larch from the Neath Port Talbot, is disproportionately vastly more significant in respect of breeding raptors and impacts on habitat quality within the Neath Valley than the relatively minor successive changes proposed at Aberpergwm mine and the cumulative impact of the scheme in this context is minimal.

12.7 Assessment of the Potential Positive Effects

12.7.1 The principal benefits for biodiversity are long-term particularly following the restoration of the MWR site. These will include the creation of wider conservation verges, ecologically sensitive planting schemes along with the creation of ponds and other water features that will be beneficial for amphibians and invertebrates with their associated predators such as Honey-buzzard and Otter.

12.7.2 The Aberpergwm surface mine development has in 2014 unexpectedly provided a nesting opportunity for Sand Martins and a colony with 42 active holes quickly became established in stored coal duff. The site has been safeguarded from disturbance for the duration of the breeding season. This provides a good example where unexpected opportunities can provide wildlife benefits and the management plan will be positively reactive to ensure such opportunities return the maximum benefits for wildlife.

13 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

13.1 Introduction

13.1.1 Wardell Armstrong was commissioned by Energybuild Ltd in winter 2012, to undertake a landscape and visual impact assessment (LVIA) of the planning application (application) site (the site). The application is for "the long-term development of Aberpergwm Mine, Glynneath, Neath in Neath Port Talbot County Borough (NPT) and includes:

- an extension to and development of underground coal workings;
- use of land for a mine waste repository, with associated haul road, to dispose of colliery mine waste and discard from coal preparation at Aberpergwm Mine;
- surface development and a time extension of operations at Aberpergwm Mine, including a consolidation of existing planning permissions"

13.1.2 The development area assessed in this LVIA considers elements 2 and 3 above. Element 1, the underground works, has been excluded because it will not cause landscape or visual effects.

13.1.3 The LVIA should be read in association with the drawing numbers set out in the Environment Statement and Design and Access Statement

13.1.4 The LVIA assesses the effects, which are changes arising from the proposed development, on the site and surrounding area. It predicts what effects are likely to occur at different stages of the project's life and identifies the likely receptors that will be affected by effects on:

- landscape as a resource including its constituent elements, its specific aesthetic and/or perceptual qualities and
- views and visual amenity receptors, that is the people who will be affected by changes in views or visual amenity at different places.

13.1.5 The European Landscape Convention (ELC) defines 'landscape' as an 'area, as perceived by people, whose character is the result of the action and interaction of

natural and/or human factors'. Landscape is not just a matter of aesthetics and visual amenity, but a resource in its own right. The ELC landscape definition covers 'natural, rural, urban and peri-urban areas. It includes land, inland water and marine areas. It concerns landscapes that might be considered outstanding as well as everyday or degraded landscapes'. Townscape and seascape are sub-sets of 'landscape'. 'Townscape' refers to areas where built environment is dominant. It means the landscape in the built-up area, including buildings, the relationship between them, the different types of urban open spaces including green spaces, and the relationship between buildings and open spaces. Historic landscape and townscape dimensions are important as evidence of the way villages, towns and cities develop over time contributes to their current form and character.

13.1.6 Landscape effects associated with a development relate to changes to the fabric, character and quality of the landscape resource and how it is experienced. Landscape is the result of the interplay of physical, natural and cultural components of our surroundings and different configurations and spatial distribution create different landscape characters. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of the landscape that make different places distinctive.

13.1.7 The landscape assessment includes:

- direct effects upon specific landscape elements, especially prominent and eye catching features;
- change in character, which is the distinct, recognisable and consistent pattern of elements that creates distinctiveness and a sense of place;
- subtle effects that contribute towards the experience of intangible characteristics such as tranquillity, wildness and cultural associations and
- effects on designated landscapes, conservation sites, and other acknowledged special areas of interest.

13.1.8 Visual effects relate closely to landscape effects, but are concerned with assessing effects on specific views and on the general visual amenity experienced by people. Visual assessment concerns people's perception and response to changes in visual

amenity. Effects may result from new landscape elements that cause visual intrusion or new features that obstruct views across the landscape.

13.1.9 The LVIA's emphasis is on identifying likely significant effects, although lesser effects are neither ignored nor their importance minimized. The identification of significant effects is appropriate and proportionate to the scale of the development.

13.1.10 The assessment considers:

- the direct landscape and visual effects as a result of the development itself;
- any indirect and secondary landscape and visual effects being consequential changes resulting from the development;
- whether landscape and visual effects are likely to be short term or carry on over a longer period of time;
- whether landscape and visual effects are likely to be permanent or temporary and
- whether landscape and visual effects are adverse (worsen), neutral (either do not change or change but neither worsen nor improve) or beneficial (improve) taking into account mitigation measures, and at different stages of the project lifecycle. Where no category is identified, the effect of the changes will be adverse.

13.1.11 Interrelationships with other disciplines have also been considered where appropriate. Examples of potential interrelated issues could include:

- Climate - climate change adaption, good design;
- Fauna and flora - mitigation design, multifunctional landscapes;
- Soil - ground conditions informing mitigation, use of cut and fill, recreation of soil creep, sheep tracks;
- Cultural heritage - historic landscape, setting of listing buildings/scheduled monuments;
- Air - effects of plumes, visibility, quality of environment;

- Noise - acoustic barrier design, consider joint acoustic/visual screens;
- Water - waterside amenity, develop integrated design/enhancement.

13.1.12 All elevations quoted are meters above ordnance datum (m AOD) and, including all dimensions and areas, approximate.

13.2 Methodology

13.2.1 The methodology for this assessment follows the recommendations and guidance set out in the Guidelines of Landscape and Visual Impact Assessment (GLVIA), 3rd Edition, edited by The Landscape Institute and Institute of Environmental Management and Assessment (April 2013).

13.2.2 The landscape and visual baseline survey was carried out by an initial desk based assessment of the 1:25000 scale Ordnance Survey map and plans of the site and the proposals to identify likely receptors, followed by a site survey and analysis to verify viewpoints. This identified representative public viewpoints (visual receptors) from where the site can be seen. Cross reference was made to the ES with regard to establishing potential visual receptor sensitivities at local landmarks and attractions.

13.2.3 A series of representative photographs facing the site was taken from available publically viewpoints, comprehensively covering the range of available views. Other views of the site may be available from private property.

13.2.4 The methodology used to reproduce the viewpoints follows recommendations and guidance set out in Landscape Institute Advice Note 01/11 and broadly represents peoples' natural view and average eye level. Photographs were taken using a digital camera with an equivalent of a 50mm lens mounted on a stable, levelled tripod with a professional panoramic head attached at an eye height of approximately 1.5m. This positions the focal centre of the camera lens above the tripod pivot and allows the photographs to be stitched together accurately using computer software.

13.2.5 Descriptions of existing and estimated potential views of the development and an assessment of the significance of changes to each viewpoint are included in Table 13.4 below.

13.2.6 Photomontages have been produced from agreed viewpoint locations. The methodology for their production is shown in Appendix 13.1.

13.3 Scope

13.3.1 NPT provided a scoping opinion dated 18th June 2013. This was based on a larger scheme than that proposed. That opinion identified that the LVIA for the original scheme should follow GLVIA3 and should consider the proposal's potential landscape and visual effects, including:

- lighting and night time impacts;
- all five LANDMAP data sets; and
- effects on St. Illtyd's Way and Sarn Helen Roman Road.

13.3.2 Separate formal consultation was also undertaken with NPT as part of the LVIA, again with regard to the initial larger scheme. Specific requirements were that 7 photomontages are produced and viewpoints be assessed from the vicinity of Rheola House, from Cwmgwrach and Blaengwrach and the authority's eastern boundary on the A465. Consideration should also be given to both scenarios of the forestry surrounding the waste repository being felled and being retained.

13.3.3 Brecon Beacons National Park Authority was also consulted also with regard to the initial larger scheme. The response identified that effects should be considered on viewpoints from:

- Sarn Helen (Roman Road);
- the convergence of roads and footpaths on Comin y Rhos near Ystradfellte;
- the summit of Fan Llia (continuation of the Sarn Helen Roman Road and Beacons Way), some 13.5km east of the site.
- A request was also made that regard be given to Brecon Beacons National Park's:
- Management Plan (2010);
- Local Plan (1999) and
- Unitary Development Plan (2007).

13.3.4 Subsequent consultation was not carried out on the revised smaller scheme.

13.3.5 National Resources Wales (NRW) (formerly Forestry Commission Wales) was contacted in August 2013 with specific regard to the extent and timing of potential tree felling in the site's vicinity. One of NRW's current prime objectives is to deal with the imminent threat of Phytophthora ramorum, a pathogen fatal to Larch and potentially other trees and shrubs. Larch trees produce high numbers of spores that spread the disease, with the result that infection spreads very quickly. The strategy, therefore, is to limit its spread by prioritizing larch tree felling. The situation is fluid and the timing of felling in the vicinity of the site (clear felling) is uncertain. The aim is, however, to have completed felling operations within 5 years. Restocking is likely to be of mixed and native woodland. Woodland management plans are increasingly going away from clear felling entire coups to embracing the Limited Impact Silvicultural System (LISS), where woodland is managed in a variety of ways but the main aim is minimum intervention with no systematic felling or planting of trees.

13.4 Baseline conditions

Landscape baseline

13.4.1 The site lies wholly within NPT. The landscape baseline has been established by visual survey, LANDMAP database and reference to the following documents:

- Neath Port Talbot Unitary Development Plan (UDP), adopted in March 2008;
- Neath Port Talbot LANDMAP Landscape Assessment (NPTLLA) of December 2004, which can be viewed and downloaded at http://www.npt.gov.uk/PDF/UDP_LandmapFinalReport.pdf.

13.4.2 Relevant national, regional and local mineral planning policy is included of the ES. Cross reference was also made to the wider content of the ES.

Landmap

13.4.3 The LANDMAP aspect areas covering a 4.5km radius of the site are listed and briefly summarized below and show in the appended drawings. Full documentation and maps for each aspect area can be found at http://test.landmap.ccw.gov.uk/

13.4.4 The following table shows those aspect areas relating to the site and their overall evaluations.

Table 13.1 – Aspect of evaluation		
Aspect area	Landscape Character Area	Evaluation
Mine Waste Repository (MWR)		
Cultural landscape	NPTCL045 - West Central High Ridge: Mynydd Marchywe	high
Visual and Sensory	NPTVS357 - Hirfynydd	moderate
Landscape habitats	NPTLH096 - Neath Port Talbot	moderate
Historic landscape	NPTHL027 - Hirfynydd	outstanding
Geological landscape	NPTGL015 - Hirfynydd	high
Mine surface and storage area		
Cultural landscape	NPTCL035 - Rheola and Aberpergwm	high
Visual and Sensory	NPTVS430 - Gelliceibryn/Pont Walaby	moderate
Landscape habitats	NPTLH024 - Neath Port Talbot	high
Historic landscape	NPTHL072 - Vale of Neath northern valley side	high
Geological landscape	NPTGL020 - Afon Nedd (eastern surface mine) NPTGL018 - Banwen (storage and haul road)	high high
Carpark		
Cultural landscape	NPTCL047 - Vale of Neath	outstanding
Visual and Sensory	NPTVS431- Neath Valley bottom	moderate
Landscape habitats	NPTLH026 - Neath Port Talbot	high
Historic landscape	NPTHL043 - Neath valley bottom	outstanding
Geological landscape	NPTGL020 - Afon Nedd	high

Cultural aspect areas

NPTCL045

Summary Description: Although connections are mostly Roman, the landscape contains many examples of prehistoric landscape use alongside the Roman camps and fortlets... The high ridge conveys the sense of the terrain having formed the ancient tribal frontier between the Silures and Demetae... Although now heavily forested in the east, open cast mining in the north of the Aspect Area also

demonstrates a geological ''frontier'' between surface outcrops and the deep mines of the Tawe, Dulais and Neath Valleys... The north-east is geologically and topographically dominated by sundry small rivers and waterfalls, suggesting a natural boundary between the CBC administrative area and the high moorland below the Breconshire Fans... This area is also notable for its SSSI...

Value: High: Containing evidence of geological, historically ancient, evolved and modern frontiers

Condition: Fair: Subject to encroachment by open cast mining activity

Existing management: Generally appropriate

Existing management remarks: Designation of large areas of statutory protection suggests good management

Principal management recommendations: Limit extent of landscape encroachment.

Management Guidelines: Long Term: Encourage sensitive felling by Forestry Commission; Long Term: Ensure protection of rare habitats of fauna and flora (especially red squirrels thought to live in the Rheola Forest)

Overall Evaluation: High as an evolved landscape containing evidence from prehistory, important Roman remains, open cast and forestry - but especially as a landscape containing evidence of being a frontier

NPTCL035

Summary Description: Two former gentry estates that add to cultural essence of Vale of Neath through their artistic and literary connections in addition to... Aberpergwm having been subsumed into the National Coal Board estate, and Rheola having a vast aluminium factory built to destroy its prospect during World War 2... Nonetheless, literary, musical and artistic connections survive along with Aberpergwm''s estate church of St Cadoc, its fine set of wrought-iron gates and Rheola''s registered estate landscape..

Value: High: As comparatively rare cultural attributes.

Condition: Good: Physically, Rheola good while Aberpergwm House is derelict; culturally both in good condition.

Trend: Constant.

Existing management: Generally appropriate.

Existing management remarks: Rheola is a well-maintained private house and estate (despite the aluminium factory), while Aberpergwm is declining rapidly.

Overall Evaluation: High: High as examples of high culture in the 18th/19th centuries and retaining their cultural essence.

Vulnerability: Low: Few threats as to the cultural essence are foreseen.

NPTCL047

Summary Description: From Aberdulais to Glynneath the Vale of Neath''s topographical beauties have attracted painters, poets, photographers in large numbers over several centuries... It is their interest and the result of their activities that have caused the identification of this Aspect Area...

Value: Outstanding.

Condition: Good.

Trend: Constant.

Existing management: Generally appropriate.

Overall Evaluation: Outstanding: as the subject matter for high quality depictions of topography and scenery, and for its literary and Welsh culture connections.

Vulnerability: Low.

Geological landscape aspect areas

NPTGL015

Geographical and topographical character: Upland plateau with NW-SE strike ridges of South Wales Pennant Formation (Llynfi-Brithdir Beds) sandstones with coals forming SW plunging regional synform, dissected deeply by N-S tributary valleys to Afon Nedd and E-W Crynant valley into Afon Dulais... N-S major faults (Dip Fach, Tweedle) controlling valleys... U-shaped Rheola Brook valley with cirque (Craig Clwtd Fechan) at head... Landslips on steep valley sides below sandstones at Craig Clwyd Fechan and Craig Clwyd... Waterfalls over sandstone steps in valley streams/rivers... Small opencasts, disused coal mines and pits... Boulder clay in valleys, peat on upland.

Value: High: Pennant sandstone succession in regional synform, forming plateau dissected by fault controlled valleys with cirques at heads; landslips.

Condition: Good.

Trend: Constant.

Existing management: Generally appropriate.

Existing management remarks: Neutral.

Principal management recommendations: Conserve as existing.

Management Guidelines: Long Term: Monitor levels of afforestation (Crynant Forest)

Overall Evaluation: High: Pennant sandstone succession in regional synform, forming plateau dissected by fault controlled valleys with cirques at heads; landslips.

NPTGL020

Geographical and topographical character: NE-SW fault controlled U-shaped broad valley floodplain and channel, flanked by steep valley slopes, broadening below Neath to plain with sand flats... Alluvium in valley floor... Terraces of sand and gravel flank floodplain in upper stretch, with alluvial fans at valley mouths... Glacial sand and gravel terraces, recessional moraine at Tonna, Aberdulais and Clyne, lake sediments at Resolven... Fluvioglacial terrace below Aberdulais, broadening at Neath... Sand flats on both sides and widely meandering channel at Briton Ferry...

Value: High: Neath Fault Zone tectonically controlled, major glacial valley.

Condition: Fair.

Trend: Constant .

Existing management: Generally appropriate.

Existing management remarks: Neutral.

Principal management recommendations: Conserve as existing.

Management Guidelines: Long Term: Conserve integrity of regional tectonic feature and glacial depositional features in valley.

Overall Evaluation: High: Neath Fault Zone tectonically controlled, major glacial valley.

NPTGL018

Geographical and topographical character: Upland plateau with NW-SE strike ridges of South Wales Pennant Formation (Llynfi-Brithdir Beds) sandstones with coals forming SW plunging regional synform, dissected deeply by N-S tributary valleys to Afon Nedd and E-W Crynant valley into Afon Dulais... N-S major faults (Dip Fach, Tweedle) controlling valleys... U-shaped Rheola Brook valley with cirque (Craig Clwtd Fechan) at head... Landslips on steep valley sides below sandstones at Craig Clwyd Fechan and Craig Clwyd... Waterfalls over sandstone steps in valley streams/rivers... Small opencasts, disused coal mines and pits... Boulder clay in valleys, peat on upland.

Value: High: Pennant sandstone succession in regional synform, forming plateau dissected by fault controlled valleys with cirques at heads; landslips.

Condition: Good.

Trend: Constant.

Existing management: Generally appropriate.

Existing management remarks: Neutral.

Principal management recommendations: Conserve as existing.

Management Guidelines: Long Term: Monitor levels of afforestation (Crynant Forest)

Overall Evaluation: High: Pennant sandstone succession in regional synform, forming plateau dissected by fault controlled valleys with cirques at heads; landslips.

NPTGL020

Geographical and topographical character: NE-SW fault controlled U-shaped broad valley floodplain and channel, flanked by steep valley slopes, broadening below Neath to plain with sand flats... Alluvium in valley floor... Terraces of sand and gravel flank floodplain in upper stretch, with alluvial fans at valley mouths... Glacial sand and gravel terraces, recessional moraine at Tonna, Aberdulais and Clyne, lake sediments at Resolven... Fluvioglacial terrace below Aberdulais, broadening at Neath... Sand flats on both sides and widely meandering channel at Briton Ferry...

Value: High: Neath Fault Zone tectonically controlled, major glacial valley.

Condition: Fair.

Trend: Constant .

Existing management: Generally appropriate.

Existing management remarks: Neutral.

Principal management recommendations: Conserve as existing.

Management Guidelines: Conserve integrity of regional tectonic feature and glacial depositional features in valley.

Overall Evaluation: High: Neath Fault Zone tectonically controlled, major glacial valley.

Historic landscape aspect areas

NPTHL027

Summary Description / Key Patterns and Elements: An extensive area of unenclosed upland situated between the Vale of Neath (HL39) and the Dulais Valley (HL48), with Banwen Tor y Betal (HL19) bounding the north..... Largely under modern forestry the aspect area has few surviving tracts of open moorland; Waun Glyn-nyd, Gelli-benuchel, and to the north of Craig Clwyd Fechan, for example..... The aspect area supports a wealth of archaeological monuments and records occupation evidence from the Bronze Age into the present.....
The most prolific monuments are those belonging to Bronze Age funerary and ritual activities; an extensive and impressive assemblage of cairns adorn the elevated slopes and the ridge crest of Mynydd Hirfynydd, they appear singularly, in pairs and in cemeteries..... The well-preserved Roman road of Sarn Helen runs along the ridge of Mynydd Hirfynydd; beacon towers are interspersed at regular intervals along the road..... This road continued in use into the medieval period and is used today as a byway..... Medieval house platform.

Value: Outstanding: This area has been assessed as ''outstanding'' as it represents a rich multi-period landscape with a wealth of surviving archaeological monuments attesting to occupation from the Bronze Age, Roman, medieval and post-medieval periods... Modern forestry plantation and opencast mining has detracted slightly from the coherence of the landscape but has not significantly affected its overall value...

Overall Evaluation: Outstanding.

NPTHL072

Summary Description / Key Patterns and Elements: Discontinuous area of similar landscape character and historical identity to the Vale of Neath (southern valley side); please refer to HL039 for technical information...

Value: High: Extensive modern forestry plantation has obscured and detracted from the coherence of the irregular fieldscape and pattern of dispersed settlement shown on the OS 1st-3rd edition maps, however the area does contain the historically important remains of Aberpergwm House, the residence of the influential Williams family and the site of a monastic grange of Neath Abbey during the medieval period... The industrial remains in this area, though extensive, are not of quite as high importance as those surviving on the southern slopes of the Vale (eg... Melincwrt Furnace) which have contributed to the overall decision to categorise this area as high rather than outstanding...

Overall Evaluation: High.

NPTHL043

Summary Description / Key Patterns and Elements: The Neath Valley Bottom is identified as a broad floodplain, a communications corridor characterised by roads, tramroads, railways, canals, and the meandering of the Afon Nedd through a fieldscape of large regular enclosures, which stretches northwest from Aberdulais to the Unitary Authority boundary at Pontneddfechan..... The aspect area is bounded on both the north and south sides by the enclosed fieldscape of the Vale of Neath (HL39)..... The Neath valley bottom resembles that of the Tawe valley in terms of its geological and early history..... However, the Neath valley is much broader than the Swansea valley with the slopes broken up by terracing and hanging valleys..... The character of the valley bottom can be identified as an almost entirely industrial aspect area interspersed with large wetland meadows and isolated farmsteads..... The modern settlements of Resolfen, Blaengwrach and Glynneath have been built on the floodplain and surrounding valley sides.....

Value: Outstanding: This area has been assessed as being of outstanding overall value as an historically important industrial communications corridor with key components, such as the Neath Canal and the Vale of Neath Railway, surviving in generally well-preserved condition, including some individual monuments of exceptional importance (e...g... the 10-arched Aberdulais Aqueduct and Basin)...

Overall Evaluation: Outstanding.

Landscape habitat aspect areas

NPTLH096

Key features: very large area of secondary semi-upland and upland conifer plantation.

Value: Moderate.

Existing management remarks: managed for commercial forestry.

Principal management recommendations: conversion to semi-natural broadleaves, or restoration to open upland habitats.

Threat: Low.

Overall Evaluation: Moderate.

NPTLH024

Key features: Aspect Area comprises eleven separate geographical units considered to be of similar character and value at the landscape level; mosaic areas of valley-side ffridd and woodland habitats on slopes above the valley of the Afon Neath.

Value: High: extensive areas of open valley-side and woodland above the Afon Neath; comprises comparatively unmodified ''ffridd'' habitats and woodlands; BAP habitats present (upland woodlands, heathlands, rhos pastures); key species present; low intensity agriculture.

Threat: Moderate: agricultural intensification; change in forestry practice; development; recreational use; fire.

Overall Evaluation: High: large areas of semi-natural upland and semi-upland habitats; BAP habitats well represented; relatively unmodified and undisturbed; low intensity agriculture; good range of characteristic and uncommon species likely.

NPTLH026

Key features: Aspect Area comprises two separate geographical units considered to be of similar character and value at the landscape level; major river valley floor flowing from semi-upland to sea level.

Value: High: major watercourse; important river system; riverine habitats; mainly improved grasslands, but with numerous areas of semi-natural habitats; BAP habitats present locally; good range of key species present, including otter.

Threat: Moderate: agricultural intensification; development; urbanisation; water quality; loss of habitat features; recreational use and disturbance; tipping.

Overall Evaluation: High: a major habitat feature; contains many remnant areas of semi-natural habitats, including BAP habitats; supports key species, including otter.

Visual and sensory aspect areas

NPTVS357

Summary description: Woodland stretching from Vale of Neath over shoulder to Dulais valley... Rising from approx 50m AOD in the Neath valley to 481m AOD forming the steep northern flank of the valley... The cover is almost entirely coniferous woodland with only small areas of open ground... The woodland and landform creates a constant and imposing feature along the Neath valley from Glynnedd to Clyne... In the Dulais valley fingers of woodland descend low down into the valley, breaking up the pastoral mosaic... Generally the forest edges contain deciduous vegetation or are irregular and are complimentary to the surrounding landscape ... In places, an abrupt edge and clear felling act as detractors... There is only minimal access into the area, with St Illtyds Way and the Roman road crossing... The absence of dwellings reinforce the remote character of this area.

Perceptual and Other Sensory Qualities: Tranquil, Remote.

Value: Moderate the area has a tranquil and remote feeling, removed from settlements and dwellings... The topography and woodland cover of the area makes this a significant and at times dramatic feature... It dominates the northern slopes of the Neath valley and southern slopes of Dulais... The management is consistent throughout.

Condition: Good, managed woodland, detraction of woodland edge in places

Trend: Constant, management evident.

Existing management: Generally Appropriate.

Existing management remarks: production forestry - coniferous plantation.

Principal management recommendation: Maintain existing deciduous edge.

Guideline: Medium Term: maintain deciduous edges; Medium Term: enhance edges of forest to improve integration with open landscape adjacent; Medium Term: maintain open areas.

Overall Evaluation: Moderate: three moderates and one low. The area has a tranquil and remote feeling, removed from settlements and dwellings... The topography and woodland cover of the area makes this a significant and at times dramatic feature. It dominates the northern slopes of the Neath valley and southern slopes of Dulais. The management is consistent throughout.

NPTVS430

Summary description: Both sides of Neath valley east of Glynnedd, deeply cut with minor valleys... The areas are heavily wooded with enclosed areas of pasture, boundaries of which are predominantly grown out hedges... The deciduous cover gives a more sheltered, settled feel than much of the surrounding area... The woodland hides evidence of workings to the south west... There are scattered settlements throughout the area and only minor roads and footpaths... Deciduous woodland contrasts with surrounding land cover - moorland/ coniferous plantations... This area appears run down with areas of encroachment of bracken and scrub...

Perceptual and Other Sensory Qualities: Attractive, Sheltered, Safe,Settled

Value: Moderate: Heavily wooded pastoral landscape with an intimate scenic quality... Although there has been some disturbance in areas, deciduous cover helps maintain a constant character throughout the area... To the east, in the Nedd Fechan valley, a series of waterfalls attract visitors, confirming the scenic quality of the area...

Condition: Fair: areas of bracken encroachment on higher ground

Trend: Declining: minimal management evident

Existing management: Generally Appropriate

Existing management remarks: upland grazed pasture with minimal management input

Principal management recommendation: maintain deciduous tree cover

Guideline: Medium Term: reinstate hedges, lay and replant gaps; maintain deciduous tree cover; maintain grazing regime; control bracken

Overall Evaluation: Moderate: Heavily wooded pastoral landscape with an intimate scenic quality... Although there has been some disturbance in areas, deciduous cover helps maintain a constant character throughout the area... To the east, in the Nedd

Fechan valley, a series of waterfalls attract visitors, confirming the scenic quality of the area...

NPTVS431

Summary description: Wide valley bottom of the Neath Valley gently rising from approx 20m AOD at Neath to approx 70m AOD at the county borough boundary... A mixture of settlements, individual dwellings and scattered commercial units lie within a mosaic of pasture, bounded predominantly by fences and deciduous woodland which enhances the sense of enclosure... In places, the boundary trees add interest and mark where boundaries once lay... The dualled A465(T) runs through the area, as do a number of minor roads which give a sense, with the Neath canal of a strong communication corridor... The River Neath winds its way down the valley and is complemented by the Neath canal - both containing attractive features including locks, bridges etc... which add to the settled character of the valley floor... The river has riparian vegetation and a natural course which has been canalised in places...The valley floor also contains a number of large tracts of water related to the A465 and industrial works... On the whole the main settlements are industrial in character and do not have a strong relationship with the river or with the surrounding landscape...

Perceptual and Other Sensory Qualities: Attractive; Noisy; Sheltered; Settled

Value: Moderate: The combination of river, canal and hidden elements among the wooded/pastoral mosaic provide a strong scenic quality through sections of the valley... This is enhanced by the sense of enclosure... However the presence of commercial developments and road corridor detracts from the area... Pleasant views are afforded to higher ground around..

Condition: Fair: intrusion of development around settlements..

Trend: Constant, management evident

Existing management: Generally Appropriate

Existing management remarks: grazed valley floor with commercial development

Principal management recommendation: maintain field pattern and pasture and natural river course

Guideline: Medium Term: enhance field pattern by replanting gaps in hedges; Manage riparian vegetation to emphasise watercourse; retain field trees and

replant to provide continuity; enhance and protect canal corridor and historical industrial heritage elements; Maintain grazing regime

Overall Evaluation: Moderate. The combination of river, canal and hidden elements among the wooded/pastoral mosaic provide a strong scenic quality through sections of the valley... This is enhanced by the sense of enclosure... However the presence of commercial developments and road corridor detracts from the area... Pleasant views are afforded to higher ground around.

13.4.5 The repository site lies in LANDMAP aspect areas evaluated as:

- Cultural Landscape - high
- Visual and Sensory - moderate
- Landscape Habitats - moderate
- Historic Landscape - outstanding
- Geological Landscape – moderate

13.4.6 The mine surface and storage site lies in LANDMAP aspect areas evaluated as:

- Cultural Landscape - high
- Visual and Sensory - moderate
- Landscape Habitats - high
- Historic Landscape - high
- Geological Landscape – high

13.4.7 The carpark site lies in LANDMAP aspect areas evaluated as:

- Cultural Landscape - outstanding
- Visual and Sensory - moderate
- Landscape Habitats - high
- Historic Landscape - outstanding

- Geological Landscape – high

13.4.8 Threats and vulnerabilities identified in the LANDMAP aspect areas covering the site are few but include:

- the extent of landscape encroachment should be limited where there is a threat of encroachment by open cast mining activity and
- agricultural intensification; change in forestry practice; development; recreational use; fire; urbanisation; water quality; loss of habitat features; recreational use and disturbance; tipping.

Landscape Value

13.4.9 Landscape value is subjective, and is based on the importance to society of the affected landscape, based on, and taking into account, views of consultees and the public. Information about what is important about the landscape and why, is required in order to:

- Establish the level of importance of the affected landscape and whether this is at a local, regional or national level;
- Enable any losses of landscape features, characteristics, or functions to be assessed in relation to the importance or value attached to them;
- Enable the effects on other, less tangible, perceptual landscape characteristics to be assessed such as scenic quality, tranquillity or wilderness;
- Assist in identifying features which could be enhanced;
- Identify mitigation proposals, through avoidance or relocation, by appropriate remedy or offsetting negative effects through compensatory measures.

13.4.10 The value of the landscape contributes to its overall sensitivity to development which is the degree to which a particular landscape type or area can accommodate change arising from a particular development, without detrimental effects on its character. This varies with:

- existing land use;
- the pattern and scale of the landscape;
- visual enclosure/openness of views, and distribution of visual receptors;
- the scope for mitigation which would be in character with, or capable of reinstating/retaining, the existing landscape;
- the value placed on the landscape.

13.4.11 With regard to the site's perceived value and sensitivity to development, the following factors have been taken into account:

- neither the site nor the landscape in which it is located has a landscape or preservation development plan designation;
- the mine surface site has limited intervisibility with its context and so neither is a direct influence on character; the MWR site has a far wider intervisibility in the locality due to its prominent location;
- the site has previously been developed in a functional and industrial manner and lacks landscape features of any particular note, and, therefore, does not currently represent the attributes of the wider landscape character area within which it falls, as identified in the NPTLLA.
- it would be possible to restore the mine surface site to, or very close to, its former presumably pastoral pre development state, on removal of the development;
- given the amount of material anticipated to be spread, the MWR cannot be restored to its previous topographic profile. It can, however, be profiled not to be wholly at odds with the character of the receiving landscape. The operational internal profile and spreading method takes into account the uncertainty of the amount of material to be spread in such a way that an acceptable final profile could be achieved at any stage of the filling works should material fall short of that anticipated.

13.4.12 The assessment analyses the value and sensitivity of the landscape, which is a measure of its capacity to accommodate change without loss of character. The magnitude of landscape effects depends on the type and character of development proposed compared with the type and character of the receiving landscape and its context. The criteria for establishing impact of the changes to the landscape resource are shown in Table 13.3. Any long-term residual changes are also noted.

Visual baseline

13.4.13 The visual survey established that, in general, observers beyond a distance of 3 km of the site would generally be unable to perceive detail particularly in a wide panorama, although, the effect of certain changes, particularly changes to skylines, at greater distances may still be perceptible. The site appearing in any views available beyond 3 km of the site would, therefore, form a very small percentage of the overall panorama, and potential changes to any available views would be imperceptible. Effects are likely to be imperceptible in panoramic views where the site is visible but forms a very small percentage of the overall view. However, consideration was also given to key locations, whether in terms of numbers of viewers, or sensitivity of feature, outside that radius, with a potential view of the site.

13.4.14 Photographs were taken in late November 2013, between 08.00 and 16.00 when weather conditions varied between clear and sunny with light cloud to heavily overcast. Leaf drop had not occurred when the photographs were taken (due to timescales of proposed submission) and so the site may become more obvious, where thin or narrow deciduous planting filters views, when this has occurred. Viewpoint locations are shown in the appendices and reproduced in figures 1 – 22.

Visibility of the site

13.4.15 A field investigation has identified representative public and private viewpoints, visual receptors, within an approximate 3.5 km radius of the site.

13.4.16 For the MWR site, the main publicly accessible viewpoints are likely to be at long distance, from the southern slopes of the Neath Valley and the A465 to the east and west.

13.4.17 There is an absence of residential properties and, therefore, particularly sensitive private visual receptors within approximately 2.5 km of the site. The closest available views are likely to be from the Sarn Helen Roman Road which is a byway open to all traffic, and passes within 100m of the MWR's northern tip. As no vehicular access is allowed during the winter and the track appears unsuitable to all vehicles other than the most rugged four wheel drive types, it is assumed that the majority of users of this track are pedestrians, horse riders and, to a lesser extent, cyclists (mountain bikes). It is also assumed that the use of this track would be in the main for recreational purposes, and that any users in vehicles would be using the track for work related purposes.

13.4.18 In broad terms, the land between Sarn Helen and the site is occupied by young forest plantation and rough grassland. A dry stone wall in varying degrees of disrepair, the top of which is generally below eye level, intermittently borders the track. In addition to the wall, overburden mounds from the current initial excavation in FQ2 lie south of Sarn Helen. The topography is such that views look over the MWR to the wider panoramic landscape, rather than into it.

13.4.19 There is a general absence of visual receptors within 1 km of the mine surface site, but potential close visual receptors are Manor Drive and the 4 residential properties off it, the southern end of Nanthir, St Cadoc's Church car park, the B4242 and land to its south, motorists on the A465. There are numerous private receptors and publicly available viewpoints facing the site in Resolven, Blaengwrach and Cwmgwrach. A limited number of views may also be available from Glynneath to the east.

13.4.20 Adjacent plantation trees do not restrict views of the MWR site because the topography of the bluff on which it is located falls away to the south (so views of the site from the north are limited) and there are no close receptors to the east, south or west.

13.4.21 Views of the site beyond a distance of approximately 5 km are generally unavailable. Where they are available, which may include views from the Brecon Beacons National Park, the site would be imperceptible and form an extremely small percentage of the view in a very wide panorama.

13.5 Site description

13.5.1 Strategically, the site is located broadly mid way between Merthyr Tydfil and Neath, being approximately 12 km north east of the latter. The site lies in the Vale of Neath, approximately 5 km north west of Resolven, on the western edge of Glynneath. The Brecon Beacons National Park lies within approximately 5km to the north east.

MWR

13.5.2 The repository site comprises 2 separate parts – Forest Quarry 2 (FQ2) to the west and Nant Y Mynydd (NYM) to the east. They are on the upper southeast slope of the south westerly/north easterly trending Hirfynydd ridgeline.

13.5.3 The piece of land on which the FQ2 site lies on the ridge formed between 2 small watercourses and markedly protrudes from the general wider ridge topography. The unrestored former open cast site being some 84.04ha in area, sits on the top of a promontory, is broadly south east facing and oval in shape. The main body of the site slopes southward from approximately 465 - 470 to 420, increasing in gradient towards the north and east boundaries, and particularly sharply towards to the west.

13.5.4 On site mineral related excavation and deposition locally disrupts the relatively smooth naturalistic profile. Open cast excavation has taken place over approximately 70% of the site area, with previous voids being backfilled with overburden and waste from the successive void. The site has been left with soil and overburden mounds located broadly on the west of the area. An area to the north and a smaller area near the western boundary have been planted relatively recently. Areas of more mature coniferous forest lie at the southern tip, on the eastern and western boundaries and a small area internal to the site. Water treatment lagoons lie on the eastern, western and southern boundaries. The site is accessed in the north east corner via an existing haul road from the Aberpergwm mine surface. Despite the limited coniferous cover, the site's landscape features are of little value or significance beyond forming part of the commercial forest that dominates the wider area.

13.5.5 The site has a general feeling of remoteness and tranquility.

13.5.6 The 24.3 ha NYM site is also a former open cast site. It forms part of the proposals as an area for peat recovery and deposition from the FQ2 excavation. Separated by dense plantation and the haul road east of FQ2, off which it is accessed in the north western corner, it falls south westward from approximately 466 to 454. Largely restored to grassland and relatively recently created areas of peat, as it currently stands its landscape features are insignificant and do not yet contribute to the cohesion of the wider landscape.

13.5.7 Both sites are located in an area of extensive forest plantation/woodland cover, the species on the eastern Hirfynydd slopes consisting of, but not limited to, Japanese Larch, Sitka Spruce, Norway Spruce and mixed broadleaves, with Douglas Fir, Oak, Scots Pine, Beech, Western Hemlock and Western Red Cedar further to the south and west.

13.5.8 The felling of the vast majority of woodland/plantation cover immediately adjacent to the sites, consisting mainly of Sitka Spruce, is planned for between 2032 and 2036.

13.5.9 Almost all the woodland to the south and south east of the sites is managed under the LISS approach. This system is based on a presumption against clear felling and uses natural regeneration to create a varied forest structure containing a range of species. Much of this area consists of Larch. NRW have a larch felling programme to aid the prevention of *Phytophthora ramouram* infection and spread. It is anticipated that larch coups will be felled by 2018, which will affect woodland/plantation cover on lower slopes to the south, south east and west. The felling of an area further to the north east, consisting of Spruce and Birch, is planned for between 2022 and 2026.

Mine surface site

13.5.10 The 9.6 ha surface mine site lies immediately north of, and is accessed from, the B4242. It rises broadly northward from approximately 45 to 52 and is broadly rectangular in shape. Boundaries are strong, consisting of a dense tree belt to the south, dense woodland on steeply sloping ground to the north and west and a well treed hedgerow to the east, east of which, outside the site, runs the Nant Pergwm. Another stream, the Nant Ysgwrfa, runs through the dense tree cover west of the site. The site supports numerous functional elements (shown on drawing number JNP/SRP/13 Surface Structure Plan) including access road, areas of hard standing, large sheds, small sheds, substations, workshops, offices, car parking, aggregate and

coal storage areas, depots, loading facilities, settlement and attenuation ponds and the underground mine entrance. A haul road to higher land northwest of the site is accessed via the mine surface.

13.5.11 Although well vegetated around the boundaries such that it is visually discreet, the site is a functional working area and supports no landscape features of value or significance. Consequently, there is no site landscape as such.

13.5.12 The site is in private ownership, to which the public currently has no access.

13.5.13 A carpark site amounting to 0.76 ha and at an approximate elevation of 46 lies south of the B4242, broadly opposite the mine surface site. It is broadly rectangular shaped and lies on the northern boundary of a relatively evenly graded wider area of made land, immediately north of the River Neath. The B4242 lies to its north, off which it is egressed via an existing junction spur, partially defined by random stone walling. It is bounded by dense mainly treed vegetation to the east and south, with a hedge vegetated embankment with timber post and rail fence to the north and more open ground to the west. A Dwr Cymru pumping station compound, surrounded by vegetation, is located immediately adjacent to its south east corner.

13.5.14 A linear proposed storage site extends to lies west of the Pwllfaron site, adjacent to, and south west of, the haul road. It slopes broadly east from 130 and 110and has been cleared of vegetation. But for separation caused by the haul road, coniferous and broadleaved woodland grows adjacent on all sides. The site is located above and to the north west of the Aberpergwm mine surface site, from which it is accessed via the haul road to its north west.

13.5.15 The site supports no landscape features of value forming part of the wider woodland area. It is not visually prominent. It is surrounded by commercial forest subject to the LISS approach.

Character of the surrounding area

13.5.16 The general area's dramatic and complicated folding topography gives rise to extensive coniferous plantations and areas of deciduous woodland, and concentrates settlements in the valley bottom. Landuses in the site's immediate context are both urban and rural, with few dispersed or isolated properties.

13.5.17 The site lies to the south east of Hirfynydd which achieves a local highpoint of some 480. Its lower slopes support dense plantations north and west of the site, interspersed by few open areas that are either pastoral fields or areas relating to past or current mining and quarrying operations. Pwllfaron Mine, Pen Star Tip and extensive areas of waste disposal in former open cast sites lie on the high ground northwest of the site amongst these plantations, and are all accessed via the site. These areas are, however, small in comparison with the large Selar opencast site across the valley, which extends over approximately 3 km eastward from the south eastern reaches of Blaengwrach.

13.5.18 The River Neath flowing southwest less than 0.5 km south of the site shares its valley bottom with the Neath Canal immediately north of the B4242, part of Glynneath, the A465 'Heads of the Valleys' road and, on the southern side of the valley bottom, the northern parts of the villages of Cwmgwrach and Blaengwrach. These settlements extend up the valley side to face the main site. Beyond, the topography continues to rise steeply to 600, and is again mainly clothed by dense plantation.

13.5.19 The site lies on the western edge of Glynneath, separated from built development by a pastoral field to the east of Cae Capel. St Cadoc's Church, a CADW listed building, lies on the separating field's eastern boundary, some 150 m from the site, with Glynneath Village Workshops a further 100 m to the east. Residential areas form the main land uses to the site's northeast and southeast. A Conservation Area lies southeast of the site covering Chain Walk, Avon Street and Pentre Street. The closest properties to the site are on Manor Drive, less than 50 m from the site's northeast corner. This is a cul-de-sac which leads to the site of the former Aberpergwm House, a listed building.

13.5.20 A substantial area of made ground known as Glynneath Business Park (as yet unbuilt) lies immediately south of the B4242, and is identified as an 'employment landbank' in the NPTCBC UDP.

13.5.21 The locality contains numerous rights of way, including a combined cycle way/ footpath along the south of the B4242 and Sarn Helen Roman Road which is a byway open to all traffic running the length of the Hirfynydd Ridge.

Relevant details of the development

13.5.22 A detailed description of the proposals is included in Section 2. Briefly, the works comprise the following:

13.5.23 ***MWR*** - this will accommodate waste material. Intermediate and final profiles will be determined by the amount of available material. In order to avoid unacceptable ground profiles and to allow for the uncertainty of quantities, material will be spread in deep layers over the surface of the area, bladed at the edges to marry with the existing ground profile. Drainage will be accommodated on site throughout and post the works, and includes standing water bodies and drainage channels.

13.5.24 Undisturbed peat and soil resources on site, mainly at the southern and eastern areas, will be excavated prior to the deposition of discard. Soils and inferior peat will be used to provide early restoration of the southern flank and progressive restoration of the repository as deposition proceeds. Excavated soils, currently stored in mounds on the eastern side of the site, will be used in a similar fashion.

13.5.25 Ultimate full restoration of the repository site will include areas of mixed coniferous plantation/acid grassland heathland mosaic and commercial forestry plantation which will promote suitable habitats for Skylark and Meadow Pipit. The coniferous plantation will be beneficial for Nightjar during the post planting and post felling periods. The creation of ephemeral ponds will promote colonisation by frogs and newts which in turn will be beneficial for Honey Buzzards.

13.5.26 ***Haul road*** - The proposals include modifying and upgrading the water treatment facilities. It is understood that clearance necessary to accommodate this will not include tree removal or substantial earthworks.

Mine surface works

13.5.27 The existing mine surface elements are shown on drawing JNP/SRP/13.

13.5.28 The elements of the proposals that have the potential to give rise to significant landscape or visual or both effects are shown below.

13.5.29 Construction and operational phases:

- movement of site personnel and plant including movement of lights (temporary);
- traffic management (temporary);
- works to B4242 (permanent);
- construction of built elements (temporary over 25 years);
- static site lighting (temporary over 25 years).

13.5.30 Restoration phase:

- movement of site personnel and plant including movement of lights (temporary);
- demolition of structures and removal of arisings (temporary action permanent result);
- groundworks, planting and grass seeding (permanent).

MWR and haul road

13.5.31 It is anticipated that works will be constructed and progressively restored over a period of approximately 25 years with final restoration sometime post 2038. 'Temporary' in the construction and operational phases means a minimum of 25 years.

13.5.32 Construction and operational phases:

- Widening of haul road and placement of aggregate (no vegetation clearance) (permanent);
- Construction of hydrological works (permanent);
- Sub and topsoil stripping (partially temporary, partially permanent);
- formation and grass seeding of sub and topsoil stock pile mound (temporary);
- movement of site personnel and plant (temporary);

- placement of offices, first aid, welfare, portakabin (temporary);
- construction of water treatment (permanent);
- raising levels by some 20 m from the site's current broad high point at the northern boundary of 465 – 470 on the north west to 486.2 in the centre;
- noisy operations may affect the tranquillity and wilderness of the area (temporary)

Restoration phase:

- movement of site personnel and plant including movement of lights (temporary);
- groundworks, woodland planting and grass seeding (permanent);
- provision of a dry stone wall viewing platform;
- noisy operations may affect the tranquillity and wilderness of the area (temporary).

13.5.33 The following options could be considered for future development:

- A potential re-opening of the existing Treforgan Colliery Main Intake and Main Return, and to use the drifts as emergency egress for the Aberpergwm Mine underground workings.
- Potential employment of either alternative methods of transportation of waste to the MWR, for example – pipeline or overland conveyor, or a mixture of methods of transport in order to minimize any potential impacts of haulage.
- Potential alternative or additional means of export/transport of coal from the mine site – with rail being the main potential method (potentially with associated overland conveyor).
- Potential additional accommodation facilities for the increased workforce and some associated alterations or additions to the mine surface layout.

13.5.34 Indirect off site operations with potential to give rise to effects may include:

- Increased traffic movements (temporary);
- Off site waste disposal of dismantled structures
- Noise – disruption of tranquillity

13.5.35 Site operational times are proposed as 07:00 to 19:00 Monday to Friday and 07:00 to 19:00 Saturdays. No Work on Sundays apart from maintenance and emergency operations. The use of plant and vehicle headlights associated with the development will be restricted to early mornings and evenings for a few months in the winter

13.5.36 It has been assumed that if the proposed development were not to go ahead, that the site would be restored as previously consented (P2003/1498).

13.5.37 Full design iteration is detailed in the DAS that accompanies this ES. Assumptions made regarding primary landscape and visual mitigation include that the layout design has incorporated/taken the following primary landscape and visual mitigation into account:

13.5.38 Progressive restoration of the MWR;

- Placement of discard on the MWR in layers such that the final profile will be acceptable should the quantity of material be less than anticipated;
- Restore the MWR to a profile and establish vegetation cover in character with the surrounding landscape;
- Restore the mine surface to a naturalistic landform and establish broadleaved woodland and pasture.

13.5.39 The LVIA has been undertaken based on the following assumptions:

- That no works will be undertaken to the carpark;
- That the quantity of material to be placed in the MWR will be such that the final restoration profile will produce a naturalistic feature, in character with the surrounding landscape;

- That works to the haul road will be accommodated without damage to, or clearance of, the existing surrounding woodland;

- That felling of larch areas in the immediate vicinity of the MWR will be complete by 2018 and that replacement planting will be a mix of broadleaf and coniferous trees managed under LISS;

- That, apart from the commercial forestry in the vicinity of the MWR, all off site vegetation screening the development that is not under the applicant's control will remain in place for the development's lifetime.

13.6 Significance

13.6.1 Assessing the significance of effect is derived from combining the following criteria:

- the nature of the receptor likely to be affected i.e. the receptor's susceptibility to the type of change arising and the value attached to the receptor (for landscape impacts) or by the receptor (for visual)

- the nature of the effect likely to occur i.e. its size and scale (e.g. complete loss of, or a minor change to, a particular landscape element), its geographical extent, its duration and its reversibility.

13.6.2 Significance of effects is a judgement made on the effect of changes to key characteristics of the landscape which are critical to its distinctive character, and whether the specific basis for the value attached to the landscape is compromised. Significances are categorized into:

major - total loss of, or major alteration to, key elements/features/characteristics of the baseline, i.e. pre-development landscape or view and/ or introduction of elements considered to be totally uncharacteristic of the receiving landscape character.

The proposals become a dominant or significant and immediately apparent feature of the view to which other elements become subordinate; significant affect and change in the character of the view.

Adverse proposals cannot be fully mitigated and are at considerable variance to the receiving landscape, degrading the integrity of the landscape, substantially damaging to a high quality landscape.

Beneficial proposals would fit in very well with the landscape character; repair landscape quality, remove key damaging elements or landuses.

Neutral proposals, although highly visible, would neither improve nor degrade the landscape or view.

moderate - partial loss of or alteration to key elements/features/characteristics of the baseline, i.e. pre-development landscape or view and/ or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic of the receiving landscape.

The proposals have a noticeable effect on the view. The proposals will be apparent and form a visible and recognisable new element in the overall view.

Adverse proposals would be out of scale with the landscape, at odds with the local pattern and landform or will partially damage a landscape of recognised quality.

Beneficial proposals would improve landscape quality and character; fit in with the scale, landform and pattern of the landscape; enable the restoration of valued characteristic features partially lost through other land uses.

Neutral proposals, although visible, would neither improve nor degrade the landscape or view.

minor - minor loss of or alteration to key elements/ features/characteristics of the baseline, i.e. pre-development landscape or view and/or introduction of elements that may not necessarily be considered to be uncharacteristic when set within the attributes of the receiving landscape.

The proposals would cause a barely perceptible change to the view and constitute only a minor component of the wider view, which might be missed

by the casual observer or receptor. Awareness of the proposals would not have a marked effect on the overall quality of the view.

Adverse proposals would not quite fit into the landform and scale of the landscape or affect an area of some landscape value.

Beneficial proposals would improve landscape quality and character; fit in with the scale, landform and pattern of the landscape or restore valued characteristic features partially lost through other land uses.

Neutral proposals would be barely perceptible and would neither improve nor degrade the landscape or view.

negligible - very minor loss of or alteration to key elements/features/characteristics of the baseline, i.e. pre-development landscape or view and/ or introduction of elements that are not uncharacteristic of the surrounding landscape. The degree of change is so small as to have little or no effect. Only a very small part of the proposals is discernible and/or they are at such a distance that they are scarcely appreciated.

13.6.3 Intermediate levels, such as minor - moderate, may also apply.

13.6.4 Major and moderate effects are considered to be significant in EIA terms.

13.7 Landscape sensitivity

13.7.1 Landscape value is subjective, and is based on the importance to society of the affected landscape, based on, and taking into account, views of consultees and the public. Information about what is important about the landscape and why is required in order to:

- Establish the level of importance of the affected landscape and whether this is at a local, regional or national level;
- Enable any losses of landscape features, characteristics, or functions to be assessed in relation to the importance or value attached to them;

- Enable the effects on other, less tangible, perceptual landscape characteristics to be assessed such as scenic quality, tranquillity or wilderness;
- Assist in identifying features which could be enhanced;
- Identify mitigation proposals, through avoidance or relocation, by appropriate remedy or offsetting negative effects through compensatory measures.

13.7.2 The value of the landscape contributes to its overall sensitivity which is the degree to which a particular landscape type or area can accommodate change arising from a particular development, without detrimental effects on its character. This will vary with:

- existing land use;
- the pattern and scale of the landscape;
- visual enclosure/openness of views, and distribution of visual receptors;
- the scope for mitigation, which would be in character with the existing landscape;
- the value placed on the landscape.

13.7.3 Landscape value categories include:

- International importance - World Heritage sites (WHS);
- Statutory national designations - National Parks, Areas of Outstanding Natural Beauty (AONB), national long distance trails, limestone pavements;
- Non - statutory designations - Heritage Coast, Register of Landscapes of Historic Interest, Register of Parks and Gardens of Special Historic Interest, registered battlefields;
- Statutory Local Planning Authority (LPA) designation - Green Belt, Country Park, Conservation Area;

- Non - statutory LPA designation - Special Landscape Area (SLA), Green Wedge or other non designated landscapes assessed as being of equivalent value using recognized criteria;

- National Trust land - land of historic interest or natural beauty owned or protected by covenant;

- Local landscapes without designation but value expressed for instance in demonstrable use or having some redeeming feature or features and identified for improvement;

- Individual elements such as trees, buildings and hedges may also have value.

13.7.4 Other areas and or features designated for biodiversity or geological importance may sit within the wider areas of landscape designation.

13.8 Visual sensitivity

13.8.1 Residential properties and places visited for leisure activities, for example footpaths and heritage features are considered to be of high sensitivity, whereas industrial landscapes, roads and places of work are considered to be of low sensitivity. Visual sensitivity is also affected by the distance of the receptor to the changes, the extent of change in the view, the number of viewers affected and the duration of activity apparent from each viewpoint, or a sequence of points that may have transient views (e.g. along a road).

13.8.2 The following have been used in establishing a judgement concerning visual effect significance.

- Large-scale views which introduce new, discordant or intrusive elements are more likely to be significant than small changes or changes involving features already present in the view;

- Changes in views from recognised and important or amenity routes are likely to be more significant than changes affecting less important paths and roads;

- Changes affecting relatively large numbers of people are generally more significant than those affecting a relatively small group of users. However,

the sensitivity of people in wilderness landscapes may be very high, but numbers may be small, and this could be reflected in the significance of the effect.

13.8.3 It is also recognized that landscape and, therefore, its value, can be perceived in different ways and consequently different opinions may be held on whether an effect is positive, negative or neutral. For instance, the visual effects of a proposed large footprint development providing much needed employment but set in a landscape of recognized quality is likely to generate very different attitudes according to the perception of the viewer.

13.9 Potential impacts

13.9.1 The following definitions apply:

- Impact - the action being taken;
- Effect - the change resulting from the action.

13.9.2 Clearly site vegetation will mature and increase in size, and visual effects will reduce over time. The following growth rates have been assumed in Table 13.2:

Table 13.2 Assumptions on Growth Rates	
Pre development site vegetation	
Vegetation type	Management
Hedges and tree lines	As current - broadly maintain existing dimensions and increase biodiversity potential
Grassland	Currently casual grazing by sheep to increase biodiversity potential
Peripheral woodland/ trees/copses	As current - broadly maintain existing dimensions and increase biodiversity potential
Restoration site vegetation	
woodland/ trees/copses	To provide closed canopy broad leaved woodland with shrub understory, and maximize biodiversity potential - see ES
Grassland	Grazing regime to be implemented to increase biodiversity potential
Hedges	to be managed to increase to 5m high and 3m wide

	within 5 years

13.10 Landscape

13.10.1 The main features of the development that will cause effects are listed above.

13.10.2 Nature of effects encompasses:

- Size /scale - extent and proportion of existing landscape elements lost/added to contribute to/alter the landscape character
- Extent - whether the effect is at site level/immediate setting/ landscape type or character area/larger scale influencing several landscape types or character areas
- Duration - short term being 0 - 5 years, medium term being 5 - 10 years and long term being 10 - 25 years
- Reversibility - the prospects and practicality of the particular effect being wholly or partially reversed and over what time scale

13.10.3 Table 13.3 summarises the potential effects upon the LANDMAP aspect areas within which the site lies.

Table 13.3 Potential Impact Upon Aspect Areas (which the site is within) during the Operation
Geological landscape
Area Name and ID NPTGL015 - Hirfynydd LANDMAP Overall Evaluation and justification High - Pennant sandstone succession in regional synform, forming plateau dissected by fault controlled valleys with cirques at heads; landslips. Geographical and Topographical Character Upland plateau with NW-SE strike ridges of South Wales Pennant Formation (Llynfi-Brithdir Beds) sandstones with coals forming SW plunging regional synform, dissected deeply by N-S tributary valleys to Afon Nedd and E-W Crynant valley into Afon Dulais... N-S major faults (Dip Fach, Tweedle) controlling valleys... U-shaped Rheola Brook valley with cirque (Craig Clwtd Fechan) at head... Landslips on steep valley sides below sandstones at Craig Clwyd

Fechan and Craig Clwyd... Waterfalls over sandstone steps in valley streams/rivers... Small opencasts, disused coal mines and pits... Boulder clay in valleys, peat on upland slopes...

Sensitivity

Low to Medium – existing ridge lines and existing opencast and coal mines.

Impact and Significance

Minor neutral during the works. Soil strip, further excavation, placement of discard, placement of material stored on site, rationalization and restoration, uplift in levels. Effects will be partially contained by previously placed landform but affects a wider but very localised area over short term.

Slight neutral at completion as disrupted landform removed but restoration landform will not be returned to pre existing profile, as final levels fall towards, rather than from, the existing ridge.

Area Name and ID

NPTGL020- Afon Nedd

LANDMAP Overall Evaluation and justification

High - Neath Fault Zone tectonically controlled, major glacial valley.

Geographical and Topographical Character

NE-SW fault controlled U-shaped broad valley floodplain and channel, flanked by steep valley slopes, broadening below Neath to plain with sand flats... Alluvium in valley floor... Terraces of sand and gravel flank floodplain in upper stretch, with alluvial fans at valley mouths... Glacial sand and gravel terraces, recessional moraine at Tonna, Aberdulais and Clyne, lake sediments at Resolven... Fluvioglacial terrace below Aberdulais, broadening at Neath... Sand flats on both sides and widely meandering channel at Briton Ferry...

Sensitivity

Low–valley floor.

Impact and Significance

Negligible during the works and on completion. The landform and scale of the area would not be notably affected by the development due to the topography of the valley remaining untouched.

Area Name and ID

NPTGL018- Banwen

LANDMAP Overall Evaluation and justification

High - Glacial drift covered Productive Coal Fm with large opencast; made ground in worked out areas.

Geographical and Topographical Character

Steep E and S facing slopes below South Wales Pennant Formation in S-W and N-dipping mudstones and coals of Productive Coal Formation around closure of plunging NE-SW regional synform, cut by major NNW-SSE faults and forming slopes to NW-SE Afon Pyrddin... Extensive cover of boulder clay on lower slopes and some peat... Very large worked out opencast area and opencast workings on E facing slopes, with areas of made ground...

Sensitivity

Low–valley floor.

Impact and Significance

Negligible during the works and on completion. The landform and scale of the area would not be notably affected by the development due to the topography remaining generally untouched.

Landscape habitats

Area Name and ID

NPTLH096- Unknown

LANDMAP Overall Evaluation and justification

Moderate.

Key Features

Very large area of secondary semi-upland and upland conifer plantation.

Sensitivity

Very Low- conifer plantation

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight to moderate beneficial at completion as land cover fills a previous 'hole' in the landcover. Small areas of coniferous vegetation will be removed and replaced with broadleaf, mixed planting and grassland and existing exposed ground will be planted with new broadleaf, mixed planting and grassland.

Area Name and ID

NPTLH024- Unknown

LANDMAP Overall Evaluation and justification

High - large areas of semi-natural upland and semi-upland habitats; BAP habitats well represented; relatively unmodified and undisturbed; low intensity agriculture; good range of characteristic and uncommon species likely.

Key Features

Aspect Area comprises eleven separate geographical units considered to be of similar character and value at the landscape level; mosaic areas of valleyside ffridd and woodland habitats on slopes above the valley of the Afon Neath.

Sensitivity

Low to Medium- woodland and mosaic areas

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight to moderate beneficial at completion. Existing exposed ground will be planted with new broadleaf, mixed planting and grassland.

Area Name and ID

NPTLH026- Unknown

LANDMAP Overall Evaluation and justification

High - major watercourse; important river system; riverine habitats; mainly improved grasslands, but with numerous areas of semi-natural habitats; BAP habitats present locally; good range of key species present, including otter.

Key Features

Aspect Area comprises two separate geographical units considered to be of similar character and value at the landscape level; major river valley floor flowing from semi-upland to sea level

Sensitivity

Low to Medium- river valley floor

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight to moderate beneficial at completion. Existing exposed ground will be planted with new grassland.

Visual & sensory

Area Name and ID

NPTVS357- Hirfynydd

LANDMAP Overall Evaluation and justification

Moderate- The area has a tranquil and remote feeling, removed from settlements and dwellings... The topography and woodland cover of the area makes this a significant and at times dramatic feature... It dominates the northern slopes of the Neath valley and southern slopes of Dulais... The management is consistent throughout...

Description

Woodland stretching from Vale of Neath over shoulder to Dulais valley... Rising from approx 50m AOD in the Neath valley to 481m AOD forming the steep northern flank of the valley... The cover is almost entirely coniferous woodland with only small areas of open ground... The woodland and landform creates a constant and imposing feature along the Neath valley from Glynnedd to Clyne... In the Dulais valley fingers of woodland descend low down into the valley, breaking up the pastoral mosaic... Generally the forest edges contain deciduous vegetation or are irregular and are complimentary to the surrounding landscape ... In places, an abrupt edge and clear felling act as detractors... There is only minimal access into the area, with St Illtyds Way and the Roman road crossing... The absence of dwellings reinforce the remote character of this area...

Sensitivity

Medium- coniferous woodland, landform, St Illtyds Way and the Roman road (Sarn Helen).

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight-moderate beneficial at completion as restoration removes a detractor in the wider landscape and the proposed land cover will fill a previous 'hole' in the land cover in views from sensitive areas such as St Illtyds Way and the Roman road (Sarn Helen).

Area Name and ID

NPTVS430- Gelliceibryn / Pont Walby

LANDMAP Overall Evaluation and justification

Moderate- Heavily wooded pastoral landscape with an intimate scenic quality... Although there has been some disturbance in areas, deciduous cover helps maintain a constant character throughout the area... To the east, in the Nedd Fechan valley, a series of waterfalls attract visitors, confirming the scenic quality of the area...

Description

Both sides of Neath valley east of Glynnedd, deeply cut with minor valleys... The areas are heavily wooded with enclosed areas of pasture, boundaries of which are predominantly grown out hedges... The deciduous cover gives a more sheltered, settled feel than much of the surrounding area... The woodland hides evidence of workings to the south west... There are scattered settlements throughout the area and only minor roads and footpaths... Deciduous woodland contrasts with surrounding land cover - moorland/ coniferous plantations... This area appears run down with areas of encroachment of bracken and scrub...

Sensitivity

Low-woodland cover, landform and run down appearance.

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight-moderate beneficial at completion as restoration removes a detractor in the wider landscape and the proposed land cover will fill a previous 'hole' in the land cover in views.

Area Name and ID

NPTVS431- Neath valley (bottom)

LANDMAP Overall Evaluation and justification

Moderate- The combination of river, canal and hidden elements amoung the wooded/pastoral mosaic provide a strong scenic quality through sections of the valley... This is enhanced by the sense of enclosure... However the presence of commercail developments and road corridor detracts from the area... Pleasant views are afforded to higher ground around...

Description

Wide valley bottom of the Neath Valley gently rising from approx 20m AOD at Neath to approx 70m AOD at the county borough boundary... A mixture of settlements, individual dwellings and scattered commercial units lie within a mosaic of pasture, bounded predominantly by fences and deciduous woodland which enhances the sense of enclosure... In places, the boundary trees add interest and mark where boundaries once lay... The dualled A465(T) runs through the area, as do a number of minor roads which give a sense, with the Neath canal of a strong communication corridor... The River Neath winds its way down the valley and is complemented by the Neath canal - both containing attractive features including locks, bridges etc... which add to the settled character of the valley floor... The river has riparian vegetation and a natural course which has been canalised in places...The valley floor also contains a number of large tracts of water related to the A465 and industrial works... On the whole the main setlements are industrial in character and do not have a strong relationship with the river or with the surrounding landscape...

Sensitivity

Low to Medium- River Neath and Neath Canal corridor, A465(T) corridor and the industrial character of settlements.

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight-moderate beneficial at completion as restoration removes a detractor in the wider landscape and the proposed land cover will fill a previous 'hole' in the land cover in views from the more sensitive areas such as the River Neath and Neath Canal corridor and the

A465(T) corridor.

Historic landscape

Area Name and ID

NPTHL027 - Hirfynydd

LANDMAP Overall Evaluation and justification

Outstanding - This area has been assessed as ''outstanding'' as it represents a rich multi-period landscape with a wealth of surviving archaeological monuments attesting to occupation from the Bronze Age, Roman, medieval and post-medieval periods... Modern forestry plantation and opencast mining has detracted slightly from the coherence of the landscape but has not significantly affected its overall value.

Description

An extensive area of unenclosed upland situated between the Vale of Neath (HL39) and the Dulais Valley (HL48), with Banwen Tor y Betal (HL19) bounding the north. Largely under modern forestry the aspect area has few surviving tracts of open moorland; Waun Glyn-nyd, Gelli-benuchel, and to the north of Craig Clwyd Fechan, for example. The aspect area supports a wealth of archaeological monuments and records occupation evidence from the Bronze Age into the present.

The most prolific monuments are those belonging to Bronze Age funerary and ritual activities; an extensive and impressive assemblage of cairns adorn the elevated slopes and the ridge crest of Mynydd Hirfynydd, they appear singularly, in pairs and in cemeteries. The well-preserved Roman road of Sarn Helen runs along the ridge of Mynydd Hirfynydd; beacon towers are interspersed at regular intervals along the road. This road continued in use into the medieval period and is used today as a byway. Medieval house platform.

Sensitivity

Medium – Roman road (Sarn Helen) and cairns

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight-moderate beneficial at completion as restoration removes a detractor in the wider landscape and the proposed land cover will fill a previous ‘hole’ in the land cover in views from the more sensitive areas such as the Roman road (Sarn Helen) and cairns. The Roman road (Sarn Helen) and cairns will not be physically affected due to being outside of the development boundary.

Area Name and ID

NPTHL072 - Vale of Neath (northern valley side)

LANDMAP Overall Evaluation and justification

High - Extensive modern forestry plantation has obscured and detracted from the coherence of the irregular fieldscape and pattern of dispersed settlement shown on the OS 1st-3rd edition maps, however the area does contain the historically important remains of Aberpergwm House, the residence of the influential Williams family and the site of a monastic grange of Neath Abbey during the medieval period.The industrial remains in this area, though extensive, are not of quite as high importance as those surviving on the southern slopes of the Vale (eg.Melincwrt Furnace) which have contributed to the overall decision to categorise this area as high rather than outstanding.

Description

Discontinuous area of similar landscape character and historical identity to the Vale of Neath (southern valley side); please refer to HL039 for technical information...

HL039 extract: *This aspect area is characterised by the enclosed irregular fieldscape which adheres to the valley sides of the Vale of Neath, from Aberdulais to the Unitary Authority boundary at Pontneddfechan..... The aspect area is bounded to the north by the unenclosed upland of Hirfynydd (HL027) and to the south by Afan Wallia (HL026), Cefn Morfudd (HL055) and the Gnoll Estate (HL017)..... The internal boundary of the aspect area follows the valley bottom, a communications corridor of roads, tramroads, railways, canals and the Afon Nedd, effectively cutting the aspect area in two..... This is an aspect area, which exhibits evidence of almost all periods..... During the Bronze Age the elevated slopes were chosen as funerary and ritual sites to build cairns; singular, in pairs and in cemeteries such as at Gwenffrwd..... To the east of this cairn cemetery lie the extensive remains of the Blaen-cwmbach Roman Marching Camp (Gm258) and Blaen-cwmbach Iron Age hillfort (Gm277)*

Sensitivity

Medium – Afon Nedd, enclosed irregular fieldscapes, unenclosed upland and funerary and ritual sites

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight-moderate beneficial at completion as restoration removes a detractor in the wider landscape and the proposed land cover will fill a previous 'hole' in the land cover in views from the more sensitive areas and of which will not be physically affected due to being outside of the development boundary.

Area Name and ID

NPTHL043 - Neath Valley Bottom

LANDMAP Overall Evaluation and justification

Outstanding - This area has been assessed as being of outstanding overall value as an historically important industrial communications corridor with key components, such as

the Neath Canal and the Vale of Neath Railway, surviving in generally well-preserved condition, including some individual monuments of exceptional importance (e.g. the 10-arched Aberdulais Aqueduct and Basin).

Description

The Neath Valley Bottom is identified as a broad floodplain, a communications corridor characterised by roads, tramroads, railways, canals, and the meandering of the Afon Nedd through a fieldscape of large regular enclosures, which stretches northwest from Aberdulais to the Unitary Authority boundary at Pontneddfechan. The aspect area is bounded on both the north and south sides by the enclosed fieldscape of the Vale of Neath (HL39). The Neath valley bottom resembles that of the Tawe valley in terms of its geological and early history. However, the Neath valley is much broader than the Swansea valley with the slopes broken up by terracing and hanging valleys. The character of the valley bottom can be identified as an almost entirely industrial aspect area interspersed with large wetland meadows and isolated farmsteads. The modern settlements of Resolfen, Blaengwrach and Glynneath have been built on the floodplain and surrounding valley sides.

Sensitivity

Low to Medium – Afon Nedd, fieldscape of large regular enclosures, industrial aspect area interspersed with large wetland meadows and isolated farmsteads

Impact and Significance

Minor neutral during the works. Existing ground cover and activity will remain.

Slight beneficial at completion as restoration removes a detractor in the wider landscape and the proposed land cover will fill a previous ‘hole’ in the land cover in views from the more sensitive areas and of which will not be physically affected due to being outside of the development boundary.

Cultural landscape

Area Name and ID

NPTCL045 - West Central High Ridge: Mynydd Marchywe

LANDMAP Overall Evaluation and justification

High - Of regional value as the distinctive landscape of the county.

Dominant cultural influences

Agricultural

Forestry

Minerals & Mining

Communications & Transport Defence & Security Sensitivity Very Low - Forestry Impact and Significance Minor neutral during the works. Existing activity will remain. Slight beneficial at completion as restoration will introduce additional principal cultural activities of farming and areas of forestry.
Area Name and ID NPTCL035 - Rheola and Aberpergwm LANDMAP Overall Evaluation and justification High - as examples of high culture in the 18th/19th centuries and retaining their cultural essence. Dominant cultural influences Forestry Minerals & Mining Communications & Transport Sensitivity Very Low - Forestry Impact and Significance Minor neutral during the works. Existing activity will remain. Slight beneficial at completion as restoration will introduce additional principal cultural activities of areas of forestry. Area Name and ID NPTCL047 - Vale of Neath LANDMAP Overall Evaluation and justification Outstanding - as the subject matter for high quality depictions of topography and scenery, and for its literary and Welsh culture connections. Dominant cultural influences Agricultural Forestry Fishing

Rural Settlement
Minerals & Mining
Power Generation & Distribution
Light Industry & Technology
Trade, Retail & Commercial
Urban Settlement
Communications & Transport
Tourism
Sensitivity
Low - Agricultural, Forestry, Urban Settlement and Rural Settlement
Impact and Significance
Minor neutral during the works. Existing activity will remain.
Slight beneficial at completion as restoration will introduce additional principal cultural activities of areas of forestry.

13.10.4 In summary, the proposed development would not result in prominent effects on the whole of the landscape character of the aspect areas in which the site falls. This is due to the varied scale and land cover of the landscape baseline, the presence of human activity and existing mineral extract character of the surrounding area within the landscape.

Geological Landscapes

13.10.5 No other Geological Landscape Aspect areas will be affected by the proposed development.

Landscape Habitats

13.10.6 No other Landscape Habitat Aspect areas will be affected by the proposed development.

Visual and Sensory

13.10.7 Aspect areas; NPTVS751, NPTVS967 and NPTVS967 fall within approximately 1km of the site and would experience some minor natural effects during the works, due to views of the proposed development being available from the more open and elevated areas of the aspect areas. Although, the proposed development would not

result in prominent effects on the whole of the landscape character of the aspect areas in which the site falls within, due to the varied scale and land cover of the landscape baseline, the presence of human activity and existing mineral extract character of the surrounding area within the landscape.

13.10.8 For all other aspect areas which fall between 1km and 4.5km of the site; the site would be seen along with other man made features, resulting in some effects on their landscape character, but these effects would not be sufficiently adverse to result in significant effects on the landscape character of the adjacent aspect areas as a whole.

13.10.9 On completion, there will be slight to moderate beneficial impacts as the restoration removes a detractor in the wider landscape and the proposed land cover will fill a previous 'hole' in the land cover in surrounding views.

Historic and Cultural Landscapes

13.10.10 There will be some adverse effects on the character of all the other aspect areas which fall between 1km and 4.5km of the site as the site will be visible, but will be seen alongside other man made features and will be partially screened by intervening landform and vegetation. Therefore, these effects would not be sufficiently adverse to result in significant effects on the landscape character of the adjacent aspect areas as a whole (not significant).

13.10.11 On completion, there will be slight beneficial impacts as the restoration will introduce additional principal cultural activities of areas of forestry and agriculture.

13.10.12 For aspect areas beyond a distance of approximately 5km only the visual aspect of the character of the area would be affected. Due to the increased distance from the proposed development, they were assessed as having a impact of minor neutral during works and slight beneficial at completion.

13.10.13 In summary, the development will not cause any significant landscape effects.

Visual

13.10.14 The main features of the development that will have a visual effect are listed above. A summary of representative view point descriptions is shown in Table 13.4 below. Changes to views have been assessed during operation and on day 1 of completion

of the restoration. Assumed numbers of viewers/receptors are relative to each other.

13.10.15 It should be remembered that:

- the volume of people experiencing the view is relative to each other and assumed;
- where thin or narrow deciduous planting filters views of the site, it is likely to be more obvious when leaf drop has occurred;
- sensitivities to adverse visual effects and the presence of large development generally reduces with time and

  the site will become progressively less obvious and better assimilated into the receiving landscape as vegetation matures.

Table 13.4 - Visual effect significance			
Receptor location, approx elevation and distance to site boundary, receptor's susceptibility to change	Nature of existing view - composition, focal points, skyline, scale and proportion, horizontal/vertical trends, key characteristics	Amount of development and elements visible; complexity, scale and visual enclosure changes; nature of effect/scale, extent, duration, reversibility	Visual effect significance
Viewpoint 1 From the B4242 at entrance to Rheola House viewing distance - 2200m; elevation - 32; direction - north east; receptor's vision splay - within Moderate number of people mainly motorists and passengers; undertaking leisure/work; low/moderate	Highway with private residence and vegetated edge; backdrop of woodland and commercial forestry on Hirfynydd ridge. The mast at the southern end of FQ2 is just visible on the sky line to the left of the view.	Direct effects - The glow of site plant and headlights will be visible. Works to the western part of FQ2 may be seen if larch west of the site is felled prior to this area being filled. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, medium, long term, permanent Reversibility - no	Effectively nil

sensitivity to change.		Indirect effects - N/A The proposals are shown on photomontage 1	
Viewpoint 2 From amenity area footpath south of the B4242 viewing distance – 300 m; elevation - 50; direction - north east. receptor's vision splay - within It is assumed that this view will be experienced by a moderate number of people mainly pedestrians undertaking leisure; high sensitivity to change.	Amenity area backed by wooded slopes.	Direct effects - N/A - works to neither the MWR nor the mine surface will be seen. Size /scale - N/A Extent - N/A Duration - N/A Reversibility - N/A Indirect effects – the sound of plant and machinery may disrupt the tranquillity and enjoyment of the area but this is a landscape rather than visual effect The proposals are shown on photomontage 2	Nil
Viewpoint 3 Empire Avenue viewing distance - 680 m direction - north west elevation - 650 receptor's vision splay - within It is assumed that this view will be experienced by few people -residents with high sensitivity to change and motorists and passengers with low/moderate sensitivity to change.	Semi urban panoramic view towards the application site. The western part of the mine surface works can be seen in the lower right mid distance, mainly screened by surrounding vegetation and foreground houses. Turbines on the Maes Gwyn wind farm development can be seen beyond the horizon on the sky line above. The mast at the southern end of FQ2	Direct effects - works to FQ2 will be seen in 5, 2a and 2b. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A The proposals are shown on photomontage 3	Negligible when felling and groundworks are undertaken in 5, 6, 2a and 2b in the short term, reducing to nil during the majority of the works and longterm

	is just visible on the sky line to the left of the view. A similar view may be available from upper floors to houses on this street.		
Viewpoint 4 Bridleway at end of Heol Wenallt viewing distance - 750m; elevation - 50; direction - north east receptor's vision splay - within It is assumed that this view will be experienced by a few people of which residents and users of the bridleway will have a high sensitivity to change and motorists and passengers with low/moderate sensitivity to change.	Panoramic view towards the application site from the south west. The mine surface site lies hidden by vegetation near the apex of the converted barn. A similar panoramic view is likely to be available from the houses in the view.	Direct effects - N/A - works to neither the MWR nor the mine surface will be seen. Size /scale - N/A Extent - N/A Duration - N/A Reversibility - N/A The glow of site plant and headlights moving around the site may be visible as well as that of vehicles using the haul road during the hours of darkness. Indirect effects - N/A The proposals are shown on photomontage 4	Effectively nil
Viewpoint 5 lay by on the A645 viewing distance - 4100 m elevation -125 direction - west receptor's vision splay - within It is assumed that this view will be experienced by a large number of people mainly motorists and passengers; undertaking work/ leisure; low/moderate sensitivity to change.	View towards Hirfynydd, dominated by the carriageway and roadside vegetation, behind which the mine surface works are hidden. The MWR lies beyond the central horizon and falls away below, beyond the Maes Gwyn turbines seen breaking the central skyline.	Direct effects - N/A - works to neither the MWR nor the mine surface will be seen. Size /scale - N/A Extent - N/A Duration - N/A Reversibility - N/A The glow of site plant and headlights may be visible during the hours of darkness. Indirect effects - N/A The proposals are shown on photomontage 5	Effectively nil
Viewpoint 6	View looking across and down towards	Direct effects - works to the northern part of FQ2 areas 7 and 8	Nil during the majority of

Sarn Helen right of way viewing distance - 100m elevation - 480 direction - south receptor's vision splay - at 90̊ It is assumed that this view will be experienced by a moderate number of people mainly pedestrians undertaking leisure; high sensitivity to change.	FQ2 through peripheral off site forestry to the north. FQ2 falls away from the viewer. It is thought that this view will not be subject to the larch felling programme. The trees in the foreground are due to be felled and restocked between 2032 -2036 during the lifetime of the development.	will be seen when the trees are felled north of the site. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - long term, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible. Indirect effects - the sound of plant and machinery may disrupt the tranquillity and enjoyment of the area but this is a landscape rather than visual effect The proposals are shown on photomontage 6	the works becoming negligible when works are undertaken in 7 and 8, reducing to nil longterm
Viewpoint 7 Roman Road right of way viewing distance - 1700 m elevation - 280 direction - south west receptor's vision splay - within It is assumed that this view will be experienced by a moderate number of people mainly pedestrians undertaking leisure; high sensitivity to change.	Panoramic view towards Hirfynydd of typical upland landscape featuring land with impeded drainage and commercial forestry. Maes Gwyn wind farm turbines form noticeable focal points on the middle distance left horizon. The site cannot be seen	Direct effects - the glow of site plant and headlights moving around the site may be visible. Indirect effects - the sound of plant and machinery may disrupt the tranquillity and enjoyment of the area but this is a landscape rather than visual effect The proposals are shown on photomontage 7	Nil
Viewpoint 8 A4109 viewing distance - 1600 m	View of urban/semi urban built development with a backdrop of Hirfynydd. The mast at the southern tip of	Direct effects - works to the southern part of FQ2 area 2b will be seen but then form a screen to works to the remainder of the site. Works to the mine surface will not	Negligible when works are undertaken in 2b in the short term,

elevation - 85 direction - south west receptor's vision splay - 90̊ It is assumed that this view will be experienced by a moderate number of people mainly motorists and passengers; undertaking work/ leisure; low/moderate sensitivity to change.	FQ2 can be seen on the horizon above the stand in the foreground. FQ2 lies on and behind the horizon.	be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration – short permanent Reversibility - no The glow of site plant and headlights moving around the site may be visible.	reducing to nil during the majority of the works
Viewpoint 9 B4242 opposite southern end of Morfa Glass viewing distance - 600 m elevation - 50 direction - west receptor's vision splay - within It is assumed that this view will be experienced by a moderate number of people mainly motorists and passengers; undertaking work/ leisure; low/moderate sensitivity to change.	View of urban/semi urban built development dominated by the B4242, with a backdrop of Hirfynydd. Maes Gwyn wind farm turbines form noticeable focal points on the right distant horizon. Neither the MWR nor the mine surface site can be seen	Direct effects – N/A Indirect effects – N/A	Nil
Viewpoint 10 B4242 viewing distance - 200 m elevation - 50 direction – north west receptor's vision splay	Panoramic view across Glynneath Business Park land, of Aberpergwm Wood with a backdrop formed by Hirfynydd. The mine surface site is screened by dense vegetation below and to the right of the view. Lighting	Direct effects - works to the eastern and southern parts of FQ2 will be seen. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised	Negligible when felling and groundworks are undertaken in 5, 6, 2a and 2b in the short term, reducing to nil during the

- 90̊ It is assumed that this view will be experienced by a moderate number of people mainly motorists and passengers; undertaking work/ leisure; low/moderate sensitivity to change.	columns on the B4242 are clearly visible. Parts of some of the operational site's buildings can just be made out filtered through dense vegetation behind and views of cars in the carpark south of the B4242 are also heavily filtered by intervening vegetation The mast at the southern tip of FQ2 can be seen on the centre left horizon	Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	majority of the works and longterm
Viewpoint 11 Lay by on the A 645 viewing distance - 500 m elevation - 50 direction - north receptor's vision splay - within 90̊ It is assumed that this view will be experienced by a large number of people mainly motorists and passengers; undertaking work/ leisure; low/moderate sensitivity to change.	View towards Hirfynydd. The mine surface site is obscured by vegetation below and to the right. The mast at the southern tip of FQ2 can be seen on the centre left horizon. FQ2 lies on and behind the horizon. Maes Gwyn wind farm turbines can be seen on the right distant horizon.	Direct effects – removal of trees from, and works to, the southern part of 2b in FQ2 will be seen. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	Negligible when felling and groundworks are undertaken in 2b in the short term, reducing to nil during the majority of the works and longterm
Viewpoint 12 Beacons Way long distance footpath on Gan Llia Brecon Beacons viewing distance - 13100 m elevation - 580 direction – south west	Panoramic view towards Hirfynydd of typical upland landscape featuring land with impeded drainage and commercial forestry. The site cannot be seen	Direct effects – N/A Indirect effects – N/A	Nil

receptor's vision splay - within It is assumed that this view will be experienced by few/moderate number of pedestrians undertaking leisure; high sensitivity to change.			
Viewpoint 13 Parish Road viewing distance - 1000 m elevation - 130 direction - north west receptor's vision splay - within It is assumed that this view will be experienced by a few people of which residents will have a high sensitivity to change and motorists and passengers with low/moderate sensitivity to change.	Semi urban panoramic view towards the application site. The mine surface works lies screened by foreground vegetation to the right of the road. Turbines on the Maes Gwyn wind farm development can be seen in front of the horizon on the sky line above the houses on the right of the view. The mast at the southern end of FQ2 is just visible on the sky line to the left of the left hand telegraph pole. A similar view may be available from upper floors to houses on this street.	Direct effects - works to the southern part of 2b in FQ2 will be seen as well as works in NYM. Plant may be seen moving on the horizon. Works to the mine surface will just be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	Negligible when felling and groundworks are undertaken in 2b in the short term, reducing to nil during the majority of the works and longterm
Viewpoint 14 Footpath to the South East viewing distance - 1100 m elevation - 145 direction - north west receptor's vision splay -	Panoramic view towards Hirfynydd from the south east. NYM forms the view's high point in the centre horizon, with turbines on the Maes Gwyn wind farm development seen in front of the horizon on the sky line to its right.	Direct effects – felling works to the southern part of 2b in FQ2 will be seen as well as works in NYM. Plant may be seen moving on the horizon. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised	Negligible when felling and groundworks are undertaken in 2b in the short term, reducing to nil during the majority of the works and

90̊ It is assumed that this view will be experienced by few pedestrians undertaking leisure; high sensitivity to change.	FQ2 is just beyond the horizon. The buildings in the view are on the mine surface site.	Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	longterm
Viewpoint 15 Parish Road viewing distance - 750 m elevation - 95 direction - north west receptor's vision splay - 90̊ It is assumed that this view will be experienced by a few people of which residents will have a high sensitivity to change and motorists and passengers with low/moderate sensitivity to change.	Semi urban panoramic view towards the application site. The mine surface works is seen, partially screened by vegetation, between the buildings. The mast at the southern end of FQ2 is just visible on the sky line to the left of the left hand building. A similar view may be available from upper floors to houses on this street.	Direct effects - works to the southern part of 2b in FQ2 will be seen as well as works in NYM. Plant may be seen moving on the horizon. Works to the mine surface will just be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	Negligible when felling and groundworks are undertaken in 2b in the short term, reducing to nil during the majority of the works and longterm
Viewpoint 16 Footpath south of Heol Wenallt viewing distance - 750 m elevation - 75 direction - north west receptor's vision splay - 90̊ It is assumed that this view will be experienced by few pedestrians undertaking leisure; high sensitivity to change.	Panoramic elevated view over Cwmgwrach towards the application site from the south. Turbines on the Maes Gwyn wind farm development form focal points on the sky line to the right of the view with the mast at the southern tip of FQ2 on the skyline beyond the telegraph wires.	Direct effects – removal of trees from, and works to, the southern part of 2b in FQ2 will be seen. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	Negligible – nil when felling and groundworks are undertaken in 2b in the short term, reducing to nil during the majority of the works and longterm

Viewpoint 17 Heol Wenallt viewing distance - 650 m elevation - 55 direction - north west receptor's vision splay - 90° It is assumed that this view will be experienced by a few people of which residents will have a high sensitivity to change and motorists and passengers with low/moderate sensitivity to change.	Semi urban panoramic view towards the application site. The mine surface works cannot be seen. The mast at the southern end of FQ2 is just visible on the sky line to the right of the 'half timbered' building. A similar view may be available from upper floors to houses on this street.	Direct effects – removal of trees from, and works to, the southern part of 2b in FQ2 will be seen. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	Negligible - nil when felling and groundworks are undertaken in 2b in the short term, reducing to nil during the majority of the works and longterm
Viewpoint 18 Junction of Edward Street and Cefn Gelli viewing distance - 500 m elevation - 55 direction - north west receptor's vision splay - within It is assumed that this view will be experienced by a few people of which residents will have a high sensitivity to change and motorists and passengers with low/moderate sensitivity to change.	Semi urban panoramic view towards the application site. The mine surface works cannot be seen. The mast at the southern end of FQ2 is just visible on the sky line between the 2 buildings on the left of the view. Turbines on the Maes Gwyn wind farm development form focal points on the sky line to the right of the view A similar view may be available from upper floors to houses on this street.	Direct effects – removal of trees from, and works to, the southern part of 2b in FQ2 will be seen. Works to the mine surface will not be seen. Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	Negligible – nil when felling and groundworks are undertaken in 2b in the short term, reducing to nil during the majority of the works and longterm
Viewpoint 19 Lay by on A465 viewing distance - 2100 m	View towards Hirfynydd. The mine surface site is obscured by vegetation below and	Direct effects – removal of trees from, and works to, the southern part of 2b in FQ2 will be seen. Works to the mine surface will not be seen.	Negligible – nil when felling and groundworks are

elevation - 45 direction - north receptor's vision splay - 90 It is assumed that this view will be experienced by a large number of people mainly motorists and passengers; undertaking work/ leisure; low/moderate sensitivity to change.	to the right. The mast at the southern tip of FQ2 can be seen on the centre left horizon to the left of the telegraph pole. FQ2 lies on and behind the horizon.	Size /scale - small scale changes, no loss of key components, no new features out of character, long term glimpsed view Extent - localised Duration - short, permanent Reversibility - no The glow of site plant and headlights moving around the site will also be visible as well as vehicles using the haul road. Indirect effects - N/A	undertaken in 2b in the short term, reducing to nil during the majority of the works and longterm
Viewpoint 20 Eastern end of Ynys Fawr Avenue viewing distance - 4000 m elevation - 30 direction – north east receptor's vision splay - within It is assumed that this view will be experienced by a few people of which residents will have a high sensitivity to change and motorists and passengers with low/moderate sensitivity to change.	Long distance panoramic view. The site is not visible.	Direct effects – N/A Indirect effects – N/A	Nil
Viewpoint 21 St Illtyd's Way long distance footpath viewing distance - 5800 m elevation - 150 direction - north east receptor's vision splay -	Panoramic view across Resolven. Maes Gwyn turbines form clear focal points on the skyline to the right. The mast at the southern tip of FQ2 can be seen on the skyline centre left.	Direct effects – N/A. Plant movement, including headlights during the hours of darkness, on the skyline undertaking works to the western side of FQ2. Too distant to be noticeable. Indirect effects – N/A	Nil

within It is assumed that this view will be experienced by a few pedestrians with a high sensitivity to change.			
Viewpoint 22 viewing distance - 5000 m elevation - 2200 direction – south west receptor's vision splay - within It is assumed that this view will be experienced by a few pedestrians with a high sensitivity to change.	Panoramic view towards Hirfynydd of typical upland landscape featuring land with impeded drainage and commercial forestry. Maes Gwyn wind farm turbines form noticeable focal points on the middle distance right horizon. The site cannot be seen	Direct effects - the glow of site plant and headlights moving around the site may be visible. Indirect effects - the sound of plant and machinery may disrupt the tranquillity and enjoyment of the area but this is a landscape rather than visual effect The proposals are shown on photomontage 7	Nil

13.10.16 It should be noted that the colour of the stone in the opencast is brighter and paler when caught by the sun.

13.10.17 The mine surface site's location and configuration is such that it is extremely well screened from view to all but the closest viewpoints. External views of the MWR are also limited because of its relative remoteness from visual receptors and the fact that its topography is such that it falls away from potential viewers on Sarn Helen. As a consequence, the proposals will result in no significant adverse visual effects. Where works can be seen, their part of the view, in all cases, is minor, and of such a distant nature as to be barely noticeable. Although remaining minimal, the effects caused by movement of site plant and lights will be more noticeable than the works themselves.

13.10.18 Any landscape and visual impacts caused as a result of increased traffic numbers would be negligible.

13.11 Secondary mitigation measure

13.11.1 The EIA regulations require that any identified significant adverse effects should be mitigated by secondary mitigation measures, sitting outside the scheme described, designed to prevent/avoid, reduce, offset or compensate for the significant effects caused. As there are no significant adverse effects identified in the Landscape and Visual Impact Assessment no further preventative or avoidance mitigation measures are required. The submitted scheme includes site restoration proposals which will provide a number of slight beneficial effects to the landscape setting.

13.12 Residual Impacts

13.12.1 There will be no residual impacts significant in EIA terms.

13.13 Cumulative Impacts

13.13.1 The following schemes (other developments) have been considered with regard to potential cumulative effect:

- P2008/0024 – Hirfynydd Windfarm.
- P2011/1147– Outline application for mixed use development comprising of up to 60 residential units, up to 100 units of holiday accommodation, up to 350sq.m retail and up to 1000sq.m of leisure complex with associated access, footpaths, ecological improvements, landscaping, boundary treatments and services at Rheola House.
- P2013/0366 – Scoping for Windfarm at Maesgwyn.
- P2009/0637 – Health Centre, Glynneath (Outline).
- P2012/1126 – Selar Opencast - Request for Scoping Opinion under Regulation 10 of the Town & Country Planning (Environmental Impact Assessment) (England & Wales) Regulations 1999 (as amended) in respect of a central extension to Selar open cast. It should be noted that a formal application is due to be submitted shortly.

13.13.2 In addition, potential future other developments (that formed part of the originally scoped scheme) are to be considered with regard to potential cumulative effect. These are:

- waste transfer to the repository via run of mine conveyor or pipeline or the continued haulage;
- product transfer to rail loading facility at, and overland conveyor or pipeline or overland haul route or a mix of methods/routes to, Unity land;
- re-opening of the Treforgan drift access;
- new welfare/ office building and car park south of the B4242.

13.13.3 The cumulative effect significance of potential future other developments can only be determined by understanding their size, location, scale and timing. As this is unknown, cumulative effects cannot be accurately estimated as part of this assessment.

13.13.4 Generic cumulative effects have been defined as “impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project” (Hyder 1999). More recently (2012), Scottish Natural Heritage produced a more targeted definition that, although specifically related to wind turbines, is relevant to all developments where cumulative effects could arise. This defines:

- Cumulative effect as “the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments taken together”;
- Cumulative landscape effects as effects that “can impact on either the physical fabric or character of the landscape, or any special values attached to it”;
- Cumulative visual effects as effects that can be caused by combined visibility, which “occurs where the observer is able to see two or more developments from one viewpoint” and/or sequential effects which “occur when the observer has to move to another viewpoint to see different developments” for example travel along major transport routes.

13.13.5 In terms of EIA, the emphasis must remain on how and whether the application proposals add to, or combine with, the other developments to create a significant cumulative effect.

13.13.6 Given the development's proximity to the other developments identified above, there is potential for cumulative effect to be caused which, if caused, will be during any overlapping development lifetimes and, therefore, be of a temporary nature. Life times are unknown and so the duration of any temporary effects is unknown. Views from moving receptors, for example along roads and footpaths, will be intermittent and will vary according to the amount of intervening topography and vegetation.

13.13.7 Although the assessment has shown the proposals will generally be visually and physically discreet on the baseline conditions, during operation and at restoration, individual elements of the site's physically dispersed components could give rise to cumulative effects, separately from the main proposals. The significance of the visual effect of each of the elements of the mine proposals combined with the cumulative effect of the other developments is summarized in Table 13.5 below:

Table 13.5 - Visual effect significance

Element of proposal	**Other development**	**Potential for cumulative effect**	**Anticipated potential combined view**	**Significance Adverse/Beneficial**	
				Landscape	Visual
Mine surface	Hirfynydd Windfarm	No	Up to 8 turbines and or blade tips potentially visible from the B4242 at entrance to mine	-nil	Negligible Adverse
	Rheola House	No	-	- nil	- nil
	Maesgwyn Windfarm	No	-	- nil	- nil
	Healthcentre	No	-	-nil	-nil
	Selar Opencast	No	-	-nil	-nil

	Mine Waste Transfer	No	-	-nil	-nil
	Product Transfer	No	-	-nil	-nil
	Treforgan drift	No	-	-nil	-nil
	Building and car park	Yes	Glimpsed views with bridge over B4242 from B4242 during winter at entrance to mine	-nil	Negligible Adverse
Haul Road	Hirfynydd Windfarm	Yes	All turbines and or blade tips potentially visible from the east and or Sarn Helen.	Negligible Adverse	Negligible Adverse
	Rheola House	No	-	-nil	-nil
	Maesgwyn Windfarm	Yes	All turbines and or blade tips potentially visible from long distances from the southern Neath Valley slopes	Negligible Adverse	Negligible Adverse
	Health Centre	No	-	-nil	-nil
	Selar Opencast	Yes	Void will be seen from Sarn Helen and Brecon Beacons National Park -	-nil	-nil
	Mine Waste Transfer	Yes	Potentially visible from long distances from the southern Neath Valley slopes - visibility depends on amount of vegetation clearance undertaken	Negligible Adverse	Negligible Adverse
	Product transfer	No	-	-nil	-nil
	Treforgan drift	No	-	-nil	-nil
	Building and car park	No	-	-nil	-nil
Waste Respository	Hirfynydd Windfarm	Yes	All turbines and or blade tips potentially visible from the east and or Sarn Helen.	Negligible Adverse	Negligible Adverse

	Rheola House	No	-	-nil	-nil
	Maesgwyn Windfarm	Yes	All turbines and or blade tips potentially visible from long distances from the southern Neath Valley slopes	Negligible Adverse	Negligible Adverse
	Health Centre	No	-	-nil	-nil
	Selar Opencast	Yes	Void will be seen from Sarn Helen and Brecon Beacons National Park -	Negligible Adverse	Negligible Adverse
	Mine Waste Transfer	Yes	Potentially visible from long distances from the southern Neath Valley slopes - visibility depends on amount of vegetation clearance undertaken	Negligible Adverse	Minor Adverse
	Product transfer	Yes	Potentially visible from long distances from Sarn Helen - visibility depends on amount of vegetation clearance undertaken	Negligible Adverse	Minor Adverse
	Treforgan drift	No	-	-nil	-nil
	Building and car park	Yes	viewed with bridge over B4242 from B4242 during winter	-nil	-nil

13.14 Conclusions

13.14.1 A landscape and visual impact assessment has been carried out, following recommendations and guidance set out in the GLVIA, third edition, for the long-term development of Aberpergwm Mine, Glynneath.

13.14.2 The site's visual envelope is defined by high ground and extensive forest cover to the north, south and west, while it's relatively low lying elevation protects it from views from the east. Views are further constrained by urban paraphernalia, localised topography and the site's boundary vegetation.

13.14.3 The main impact on the landscape character will be caused by topographic changes whereas that to visual amenity by works to the MWR.

13.14.4 The site is located in an area outside landscape designation. The baseline landscape value on the working area western part of the site is very poor and it is currently a detractor within the wider landscape. The site's quality and overall sensitivity to development is low.

13.14.5 The landscape impact significance of the proposals will be slight adverse during the lifetime of the development and nil on completion of restoration. That of the current working site will be nil during the lifetime of the development and slight beneficial impact on completion of restoration.

13.14.6 Visual impacts vary depending on the proximity of the viewpoint. The scale of the proposals will remain local because topography and screening vegetation allow a limited number of clear viewpoints. Views from the wider landscape are also relatively few, again constrained by topography and vegetation and are at a distance from the site. Overall, the operational proposals will result in a temporary (20 year) slight adverse visual impact (although some individual views will tend towards moderate adverse). When works are complete, the visual impact of effectively removing a detractor from the wider landscape will be beneficial, resulting in an overall permanent visual impact of negligible to minor beneficial.

14 TRANSPORT AND ACCESS

14.1 Introduction

14.1.1 This chapter of the environmental statement investigates the local transport systems serving the proposed development site, including the highway network, public transport infrastructure, and pedestrian/cycle facilities. This section also identifies the impact of the proposed development on the surrounding highway network.

14.1.2 The proposed planning application is for the long-term development of Aberpergwm mine, including:

- An extension to and development of underground coal workings;
- Use of land for mine waste repository, with associated road haul, to dispose of colliery mine waste and discard from coal preparation; and,
- Surface development and a time extension of operations at Aberpergwm Mine, including a consolidation of existing planning permissions.

14.2 Assessment methodology

14.2.1 As stated earlier, the purpose of this chapter (of the Environmental Statement) is to; outline the development proposals, review the development proposals in relation to national and local planning policies; assess the impact of the proposed development on the surrounding transport network and identify any mitigation measures and residual impacts.

14.2.2 The scope of the Transport Assessment has been discussed and agreed with officers of Neath Port Talbot County Borough Council (NPT) as follows:

- Capacity analysis to be undertaken at the following junctions:
    - Access to the car park to the south of the B4242
    - Access to Aberpergwm mine from the B4242
    - B4242 Glyn-neath Road/B4242 Park Avenue/B4242 Chain Road priority junction;

- B4242 Chain Road/Unity Mine access; and,
- B4242 Glyn-neath/A465 roundabout.

- Capacity analysis to be undertaken for a weekday (am + pm);
- Future year assessments to be undertaken in 2013 (base year), 2014 (opening year) and 2029 (year of opening + 15 years);
- Future flows to be obtained by factoring the surveyed flows using National Traffic Model (NTM) growth factors.

14.3 Legislative and planning policy context

One Wales: Connecting the Nation 'The Wales Freight Strategy'

14.3.1 The 'Wales Freight Strategy' sets out high-level aims and policies for freight transport, and identifies a series of 'steps' towards their delivery. A high priority is placed on freight transport playing its part in ensuring a sustainable environment. Many of the 49 steps set out in the strategy contain elements that are aimed at reducing the overall environmental impact of freight transport, through modal shift or efficiency measures, in particular the contribution of freight transport to greenhouse gas emissions.

Road freight

14.3.2 The strategy recognises that road freight is the most flexible freight mode, with:

- the greatest geographical coverage;
- good motorway and trunk road network in North and South Wales; and
- a comprehensive highway authority road network.

14.3.3 However, the strategy also acknowledges that the CO2 emissions and other environmental impacts of road transport are greater than other surface modes.

14.3.4 Of the 9 steps toward delivering the 'road' strategy, only one (Ro5) is of particular relevance to the proposed development, which states:

'…..local authorities and/or regional consortia should seek to develop more localised lorry route maps, in particular to confirm where goods vehicles should be accommodated and where they should be restricted. These should specifically include consideration of access to key freight generating sites.'

14.3.5 As outlined in the previous chapters, the colliery is located in close proximity to the A465 Heads of the Valley route, which is a major east west Trunk Road serving south Wales. Road freight generated by the development is prohibited from using local roads in the vicinity of the colliery, and is routed via appropriate roads, including the A465.

Rail freight

14.3.6 In relation to rail freight, the strategy identifies that:

- The existing rail infrastructure within Wales is good, providing rail links to most of the main centres;
- The majority of rail freight in Wales is running without subsidy; and
- Generates lower CO2 emissions compared to road freight.

14.3.7 The strategy does, however, acknowledge that the biggest weakness with rail freight is the high fixed costs.

14.3.8 There are 7 steps toward delivering the rail strategy, the most relevant are:

- Ra4 - Continually review the way that grants and subsidy schemes are implemented in Wales, with a view to encourage modal shift to rail; and
- Ra6 - land-use policies should seek to ensure that opportunities for promoting rail freight facilities are protected, particularly relating to protection of former rail lands that could potentially be returned to use as direct rail connections or road-rail interchanges.

Planning Policy Wales Technical Advice Note 18: Transport

14.3.9 The National Assembly seeks to extend the choice in transport and secure accessibility in a way, which supports sustainable development by establishment of an integrated transport system, which is safe, efficient, clean and fair.

14.3.10 With regard to freight and employment uses, the objectives are to:

> *'support the provision of a reliable and efficient freight network'*
>
> *and,*
>
> *'promoting the location of warehousing and manufacturing developments to facilitate the use of rail and sea transport for freight.'*

14.3.11 The document also indicates that:

> *'Wherever possible, planning authorities should promote the carriage of freight by rail, water or pipeline rather than road, where it forms a feasible alternative for part or all of the journey.'*

14.3.12 In relation to the development proposals, it is recognised that for 'local' deliveries, rail does not offer the flexibility to be able to meet the demand, particularly for domestic fuel. It is therefore anticipated that some of the output from the colliery will be transferred by road. However, for longer distance deliveries, rail offers a real alternative to road for part (and in some cases all) of a journey.

14.3.13 There are currently no rail-head facilities at Aberpergwm colliery. However, Walter Energy has an agreement with Unity Mine Tower Colliery to use the rail head [west of the A465] at Unity.

14.4 Baseline conditions

Site location

14.4.1 The site comprises Aberpergwm Mine and the Cae Capel development, extending over more than 2,000 ha.

14.4.2 Aberpergwm Mine is located along the B4242 west of Glyn-neath, between the river Neath to the south-east, the old Severn Sisters mine working to the north-west, and the Hirfynydd ridge and the Sarn Helen Roman Road to the west.

14.4.3 The extent of the development site is shown in Figure 14.1, and the highway network in the vicinity of the site is shown in Figure 14.2.

Local Highway Network

14.4.4 The site is bounded to the south by the B4242 Glyn-neath Road, which runs roughly parallel to the A465 from Aberdulais to Glyn-neath.

14.4.5 The junction with the B4242 Park Avenue lies approximately 190 metres east of the site access. Park Avenue is the main road running through the Town of Glyn-neath and connects to the A465 via a 4 arm roundabout approximately 360 metres south of the colliery.

14.4.6 The A465 is the main west-east trunk road running through the region, connecting Glynneath to Swansea in the south-west and Merthyr Tydfil and Abergavenny in the east.

14.4.7 Situated approximately 5.85 miles east of the Glyn-neath/A465 roundabout is the A465/A4059/A4061 roundabout (Hirwaun) providing access to Rhigos and Tower Colliery to the south and Penderyn to the north.

14.4.8 The A4059 via Penderyn connects to the A470, which is a major long-distance connective spine road running from Cardiff to Llandudno.

Traffic flows

14.4.9 In order to obtain the most recent traffic flows within the study area, fully classified turning counts have been undertaken at the following junctions:

- B4242 Glyn-neath Road/B4242 Park Avenue;
- B4242 Glyn-neath/A465 roundabout;
- B4242 Glyn-neath/Unity Mine access road; and,
- A465/A4059/A4061 roundabout.

14.4.10 The surveys were undertaken on Thursday 14 March 2013 (between 0730- 0930 and,1630-1830) during the school term, and are presented in full in Appendix 14.1.

14.4.11 From the surveys, the peak periods on a weekday have been determined as 0800-0900 and 1630-1730 and are summarised in Figures 14.3 and 14.4.

14.5 The development proposal

14.5.1 As outlined above, the current planning application is for the long-term development of Aberpergwm Mine, Glynneath, including:

- An extension to and development of underground coal workings;
- Use of land for mine waste repository, with associated road haul, to dispose of colliery mine waste and discard from coal preparation; and,
- Surface development and a time extension of operations at Aberpergwm Mine, including a consolidation of existing planning permissions.

14.5.2 The three main elements are described in more detail below.

Extension and development of underground workings

14.5.3 Energybuild proposes to extend their planning permission for underground coal workings to facilitate the long-term development of the mine business. An extension to the underground workings will enable maximum exploitation of the coal resources from the 18 Feet Seam and the Nine Feet Seam and secure the supply of high quality coals. The underground application area is approximately 2,318 ha and contains in excess of 70 million tonnes of coal.

14.5.4 Aberpergwm Colliery mines high quality Anthracite coal from the 18 feet and 9 feet seam resource situated between the Neath and Dulais valleys in the County of Neath and Port Talbot. The customer base for the product includes metallurgical coal for use in pulverised coal injection (PCI) techniques at the nearby Tata steel works – which will be transferred by road to Port Talbot; and thermal product used at Aberthaw power Station – which will be transferred by road to the rail head at Unity, and then by rail to Aberthaw.

14.5.5 With the planned increase in mine production, the haulage of thermal product to Unity mine has the potential to be replaced or supplemented by alternative means, including a corridor to facilitate the movement of coal, which could be achieved with a product conveyor or dedicated haul route.

14.5.6 The development of the underground workings will be designed to sustain coal extraction and supply in the long-term and to increase the levels of coal production

in a phased manner. Although the underground development and increases in tonnages will be influenced by the prevailing geological conditions, the objective for the Mine is to increase production of coal year on year from 2014 – 2020, with maximum production being sought and sustained beyond 2020. Table 14.1 below outlines the anticipated coal outputs (Run of Mine - ROM) up to 2020.

Table 14.1 – ROM outputs

	Annual ROM (tonnes)	Product		Discard
		Thermal product to Aberthaw	PCI to Tata (Port Talbot)	
Year 1 - 2014	233,000	83,880	55,920	93,200
Year 2 – 2015	233,000	83,880	55,920	93,200
Year 3 – 2016	670,000	241,200	160,800	268,000
Year 4 – 2017	833,000	299,880	199,920	333,200
Year 5 – 2018	1,000,000	360,000	240,000	400,000
Year 6 – 2019	1,000,000	360,000	240,000	400,000
Year 7 - 2020	2,500,000	900,000	600,000	1,000,000

Anticipated staff numbers

14.5.7 In association with the underground development, it is anticipated that the number of miners will increase from 166 in 2014 to 529 in 2020, which includes between 23 and 44 trainees/apprentices.

14.5.8 The mine will operate on a 7 day week/24 hours a day basis, with four shifts of roughly 110 staff working in overlapping periods. The shift patterns are set out below:

- 06:00 – 14:00;
- 13:00 – 21:00;
- 18:00 – 02:00; and,
- 20:00 – 0600.

Mine waste repository

14.5.9 To ensure the long-term production and supply of coal, and the planned increases in output, a long-term location needs to be secured for the deposit of colliery mine waste, including discard from coal preparation and waste rock from underground

mining development. The application therefore includes a mine waste repository (MWR), situated on the former Forest Quarry open-cast sites, capable of accommodating approximately 10.4million m3 of material, together with the continued use and improvement of the existing haul road.

14.5.10 During the early years of operation the discard material will be transported by means of articulated dump trucks (ADTs) via the existing haul road, which interconnects the sites. With the planned increase in mine production, the haulage of discard by ADT has the potential to be replaced or supplemented by alternative means, including product conveyor.

Surface development and extension of existing planning permissions

14.5.11 The planning history for the surface developments and operations at Aberpergwm Mine is complex, with numerous planning permissions for a whole range of both large scale and small scale developments and operations.

14.5.12 This application therefore proposes the consolidation of the existing permissions and planning controls for the surface development and operations into a single set of planning conditions covering a defined area of the site. The application therefore includes a red line boundary around the area of surface development/operations that are necessary to operate the mine taking account of the planned underground development and the use of the associated MWR and haul road.

Means of access - mine surface

14.5.13 As noted in relation to the 'Regularisation' application (ref. 2012/0995), note 5:

14.5.14 'The applicant is advised that due to the short life span of this application, the conditions relating to the traffic light scheme have not been imposed on this application. However, please note that this is very likely to be a requirement in terms of highway safety on any future application that may be submitted. Similarly, whilst the dry coal store is not conditioned to be constructed as part of this application given the short life-span, it is very likely to form part of any potential future application in terms of noise, visual and dust mitigation.'

14.5.15 Therefore, in order to access the mine surface, it is proposed to upgrade the existing (priority junction) access to the mine, to incorporate traffic signal control (see Figure 12.5). The upgraded junction also includes a formal pedestrian crossing (across the

B4242 western approach to the junction), in order to accommodate the movement of miners between the proposed car park and the mine.

Means of access - staff car park

14.5.16 Initially, it is proposed to access the staff car park (to the south of the B4242) via the existing priority junction on to the B4242. It is anticipated that as the volume of staff increases (in line with the increases in underground development), the access to the car park will need to be upgraded (refer to Figure 14.6). The 'trigger-point' (to implement the proposed improvements) will need to be discussed and agreed with the local highway authority.

Trip generation

14.5.17 In order to assess the impact of the colliery/development proposals on the surrounding highway network, it is necessary to estimate the likely volumes of vehicles (HGVs and cars) accessing the site in the future.

14.5.18 This section of the report outlines the methodology used to predict future vehicle (HGV and car) trip generation.

Development scenarios

14.5.19 As outlined above, we have assessed the following 4 scenarios:

- Base (existing) scenario - 2013 existing situation;
- 2014 (opening year) – Run of Mine (ROM) at 233,000 tonnes,
- 2020 (peak mine output) – assumed annual ROM increases to 2,500,000 tonnes; and,
- 2035 (year of opening + 15 years).

Traffic generation – HGVs

14.5.20 Future traffic volumes have been calculated based on the planned increase in mining activity (as set out in Table 14.2 above) and the type and size of vehicles as set out below:

- Thermal product to railhead – 20 tonne rigid tipper trucks

- PCI to Tata (Port Talbot) – 30 tonne vehicles.

14.5.21 Table 14.2 below outlines the anticipated volumes of HGV traffic generated by the Mine per day.

Table 14.2	**Daily traffic generation**		
Year	Trucks per day		Total
	Thermal product to rail head	PCI to Tata	
Year 1 - 2014	15	7	22
Year 2 - 2015	15	7	22
Year 3 - 2016	44	19	63
Year 4 - 2017	55	24	79
Year 5 - 2018	65	29	94
Year 6 - 2019	65	29	94
Year 7 - 2020	164	73	237

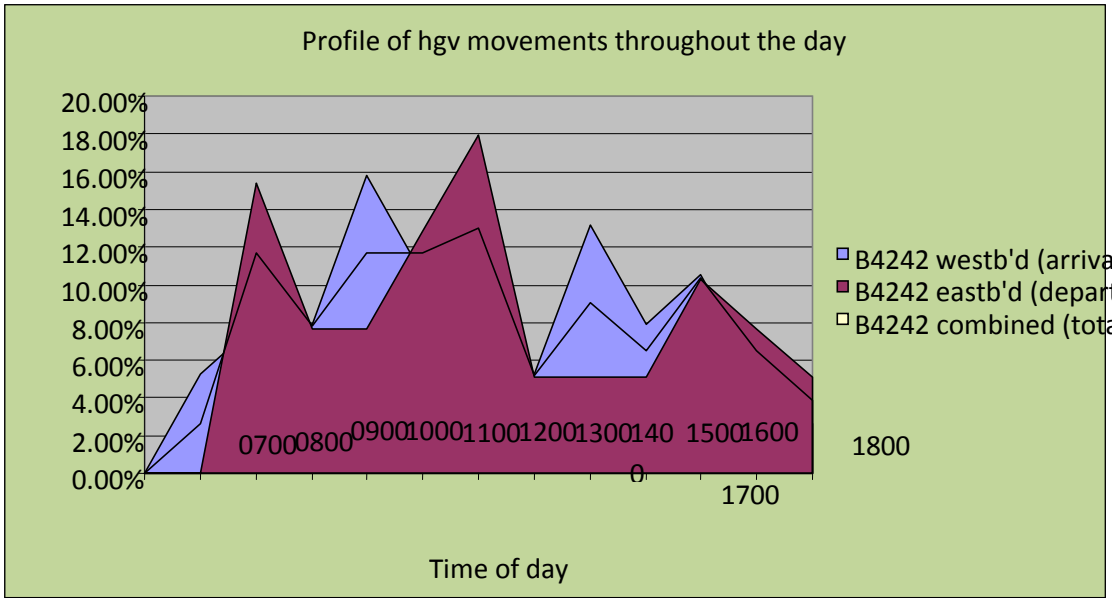
14.5.22 It should be noted that there is an existing planning permission for the mine complex, limiting the number of HGVs per day at 180, in addition to planning consents for open cast mining with a limit of between 70 and 110 HGVs per day, as follows:

- Nant Y Mynnydd (P2004/0443), condition 12 – 80 lorries transporting coal on any working day;
- Forest Quarry (P2009/0216), condition 11 – 70 lorries transporting coal on any working day; and,
- Forest Quarry 2 (P2010/0666), condition 12 – 110 lorries transporting coal on any working day

14.5.23 It can be seen from the table above that, as a 'worst-case' scenario, the proposed development could generate up to 237 HGVs per working day, compared with between 250 and 290 HGVs per day (mine complex and open cast mining combined).

Daily profile – HGVs

14.5.24 The daily profile of hgv movements, shown below, has been determined form ATC data supplied by NPT (refer to Appendix 14.2). From this profile, the changes in hgv generation throughout the day is determined for each vehicle category and development scenario, refer to Appendix 14.3.



Traffic generation – staff vehicles

14.5.25 As outlined above it is anticipated that once production at the mine commences, the site will employ approximately 166 staff, increasing to 529 staff (in line with increases in underground development). However, all shift changeovers occur outside of the network peak hours, and therefore no staff traffic is included within the peak hour assessments.

Distribution and assignment of development trips

14.5.26 The distribution and assignment of HGV traffic is based on the anticipated end user (and hence vehicle category), as set out below:

- Thermal product to Aberthaw – as stated above the thermal product is to be transferred to the rail head at Unity by road, for onward transfer by rail);
- PCI to Tata (Port Talbot) – this will be transferred by road, and will travel south along the A465.

14.5.27 The changes in HGV generation for each development scenario is set out in the following diagrams:

- 2014 am and pm peak periods (Figures 14.7 and 14.8);
- 2020 am and pm peak periods (Figures 14.9 and 14.10); and,
- 2029 am and pm peak periods (Figures 14.11 and 14.12).

Future traffic flows - background growth

14.5.28 In accordance with the local authority's requirements, the impact of the development is assessed for the following future year scenarios:

- 2013 surveyed flows;
- 2014 (year of opening);
- 2020 (peak mine output); and,
- 2029 (year of opening + 15 years).

14.5.29 In order to obtain the base traffic flows (i.e. with no development traffic) in 2014 and 2029, the surveyed traffic flows (20113) have been factored using NTM growth factors. The factors to be applied to the base (surveyed) flows are identified in Table 14.3 below.

Table 14.3 NTM growth factors

	NTM growth factors	
	Am peak	Pm peak
2013 to 2014	1.0060	1.0062
2013 to 2020	1.0822	1.0823
2013 to 2029	1.2185	1.2183

Future traffic flows – base flows

14.5.30 The future base traffic flows (i.e. with no development) for all assessment periods have been obtained by factoring the surveyed flows (Figures 14.13 to 14.14). The 2014, 2020 and 2029 flows are set out in the following diagrams:

- 2014 am (Figure 12.15) and pm (Figure 12.16);
- 2020 am (Figure 12.17) and pm (Figure 12.18); and,
- 2029 am (Figure 12.19) and pm (Figure 12.20).

Future traffic flows – final flows

14.5.31 The final future traffic flows have been obtained by combining the development generated traffic flows (identified in Figures 5.2 to 5.7) with the future base traffic flows (identified in Figures 5.8 to 5.13). The final future flows in 2014, 2020 and 2029 are set out in the following diagrams:

- 2014 (year of opening) - am and pm peak periods (Figures 14.21 and 14.22);
- 2020 (peak output) – am and pm peak periods (Figures 14.23 and 14.24); and,
- 2029 (year of opening + 15 years) - am and pm peak periods (Figures 14.25 and 14.26).

14.6 Assessment of Potential Impacts

Construction traffic

14.6.1 In terms of the mine surface development, the application proposes a consolidation of existing permissions (as outlined in paragraph 12.2 above), and the majority of the infrastructure that is needed has already been constructed. However, whilst there is some limited construction of surface infrastructure programmed over the 18 months, a substantial amount of the construction materials are already on site. In addition, there will be a need (on a year on year basis) to bring some materials/infrastructure/plant in to the site for underground and tip development, but this will be at similar levels to what is already permitted and assumed for the operation of the site. Therefore, there is no major phase of development proposed that will result in a concentrated period of construction traffic.

14.6.2 It is anticipated that if the mine development programme is successful, may lead to a need for further development, including the potential for:

- New surface infrastructure including office accommodation, welfare facilities etc – which will not lead to excessive HGV movement and would constructed over a short period; and,

- New transport infrastructure including a corridor to facilitate the movement of coal, such as a waste conveyor, product conveyor, and new rail loading facilities – whilst this will lead to construction traffic and some local disturbance, this would be a short-term impact to achieve a longer term transport benefit.

14.6.3 Overall, therefore, it is considered that construction vehicle activity will be low, will be over short periods, and should not have a material impact on the operation of the highway network within the study area.

Junction capacity

Access to the mine car park (south of the B4242)

14.6.4 The operation of the existing junction (see Figure 14.27) has been assessed, for each of the assessment periods in 2013, 2014, 2016 and 2017 and 2035 using the TRL program PICADY/5.0.

14.6.5 The results of the PICADY analysis are presented in full in Appendix 14.4, and summarised in Table 14.4 below.

Table 14.4 Access to Aberpergwm mine car park – PICADY results

	No development				With development			
	0800-0900		1700-1800		0800-0900		1700-1800	
	RFC	Max q	RFC	Max q	RFC	Max q	RFC	Max q
2013 (base)								
Car park access	0.000	0.000	0.000	0.000				
B4242 (w)	0	0	0	0				
2014 (year of opening)								
Car park access	0.000	0.000	0.000	0.000	0.000	0	0.038	< 1
B4242 (w)	0	0	0	0	0.014	< 1	0.000	0
2020 (peak mine output)								
Car park access	0.00	0.000	0.00	0.000	0.00	0	0.03	< 1

	0		0		0		8	
B4242 (w)	0	0	0	0	0.014	< 1	0.000	0
2029 (year of opening + 15 years)								
Car park access	0.000	0.000	0.000	0.000	0.000	0	0.038	< 1
B4242 (w)	0	0	0	0	0.014	< 1	0.000	0

14.6.6 It can be seen from the table above that the junction above has sufficient capacity to accommodate all future development scenarios. It is predicted that a maximum RFC of 0.038 will occur during the 2029 Pm peak period on the Site access road, with a mean maximum queue of less than vehicle.

Access to Aberpergwm mine from the B4242

14.6.7 The operation of the proposed traffic signal controlled junction (see Figure 14.28) has been assessed, for each of the assessment periods in 2013, 2014, and 2029, using the JCT program Linsig.

14.6.8 The results of the analysis are presented in full in Appendix 14.5, and summarised in Table 14.5 below.

Table 14.5 Access to Aberpergwm mine on the B4242 – Linsig results

	No development				With development			
	0800-0900		1700-1800		0800-0900		1700-1800	
	DoS	Max q	DoS	Max q	DoS	Max q	DoS	Max q
2013 (base)								
B4242 (e)	20.6	1	15.3	< 1				
B4242 (w)	21.8	1	15.1	< 1				
Mine access	4.9	< 1	0.4	0				
2014 (year of opening)								
B4242 (e)	20.6	1	15.3	< 1	24.1	2	18.0	< 1
B4242 (w)	21.8	1	15.1	< 1	23.3	1	17.7	1
Mine access	4.9	< 1	0.4	0	6.2	< 1	0.4	0
2020 (peak mine output)								
B4242 (e)	22.2	1	16.4	< 1	39.6	3	22.9	1
B4242 (w)	23.3	1	16.3	1	24.9	1	20.8	1
Mine access	5.3	< 1	0.4	0	35.5	2	17.7	< 1

2029 (year of opening + 15 years)								
B4242 (e)	24.8	2	18.4	1	47.2	3	25.1	2
B4242 (w)	26.0	1	18.1	1	27.6	1	25.5	1
Mine access	5.8	< 1	0.4	0	49.3	2	24.8	1

14.6.9 It can be seen from the table above that the junction above has sufficient capacity to accommodate all future development scenarios. It is predicted that a maximum degree of saturation of 49.3% will occur during the 2029 Am peak period on the mine access road, with a mean maximum queue of 3 vehicles on the B4242 (e) arm.

B4242 Glynneath Road/B4242 Park Avenue/B4242 Chain Road junction

14.6.10 The operation of the existing junction (see Figure 14.29) has been assessed, for each of the assessment periods in 2013, 2014, 2016 and 2017 and 2035 using the TRL program PICADY/5.0.

14.6.11 The results of the PICADY analysis are presented in full in Appendix 14.6, and summarised in Table 14.6 below.

Table 14.6 B4242 Glynneath Road/ B4242 Park Avenue/B4242 Chain Road – PICADY results

	No development				With development			
	0800-0900		1700-1800		0800-0900		1700-1800	
	RFC	Max q	RFC	Max q	RFC	Max q	RFC	Max q
2013 (base)								
B4242 Glynneath Road	0.113	< 1	0.116	< 1				
B4242 Park Avenue	0.088	< 1	0.032	< 1				
2014 (year of opening)								
B4242 Glynneath Road	0.113	< 1	0.121	< 1	0.127	< 1	0.153	< 1
B4242 Park Avenue	0.091	< 1	0.032	< 1	0.115	< 1	0.040	< 1
2020 (peak mine output)								
B4242 Glynneath Road	0.124	< 1	0.128	< 1	0.262	< 1	0.201	< 1
B4242 Park Avenue	0.100	< 1	0.035	< 1	0.204	< 1	0.101	< 1
2029 (year of opening + 15 years)								
B4242 Glynneath Road	0.141	< 1	0.163	< 1	0.335	< 1	0.272	< 1

B4242 Park Avenue	0.112	< 1	0.084	< 1	0.134	< 1	0.088	< 1

14.6.12 It can be seen from the table above that the junction above has sufficient capacity to accommodate all future development scenarios. It is predicted that a maximum RFC of 0.335 will occur during the 2029 Am peak period on the Site access road, with a mean maximum queue of less than one vehicle.

B4242 Glyn-neath Road/Unity Mine access road

14.6.13 The operation of the existing junction (see Figure 14.30) has been assessed, for each of the assessment periods in 2013, 2014, 2016 and 2017 and 2035 using the TRL program PICADY/5.0.

14.6.14 The results of the PICADY analysis are presented in full in Appendix 14.7, and summarised in Table 14.7 below.

Table 14.7 B4242 Glyn-neath Road/Unity Mine access road – PICADY results

	No development				With development			
	0800-0900		1700-1800		0800-0900		1700-1800	
	RFC	Max q	RFC	Max q	RFC	Max q	RFC	Max q
2013 (base)								
Unity Mine - right	0.032	< 1	0.026	< 1				
Unity Mine - left	0.138	< 1	0.075	< 1				
B4242 Chain Road	0.036	< 1	0.061	< 1				
2014 (year of opening)								
Unity Mine - right	0.033	< 1	0.026	< 1	0.033	< 1	0.026	< 1
Unity Mine - left	0.137	< 1	0.075	< 1	0.142	< 1	0.078	< 1
B4242 Chain Road	0.036	< 1	0.061	< 1	0.041	< 1	0.062	< 1
2020 (peak mine output)								
Unity Mine - right	0.035	< 1	0.027	< 1	0.080	< 1	0.057	< 1
Unity Mine - left	0.149	< 1	0.079	< 1	0.154	< 1	0.084	< 1
B4242 Chain Road	0.039	< 1	0.065	< 1	0.138	< 1	0.114	< 1
2029 (year of opening + 15 years)								
Unity Mine -	0.04	< 1	0.03	< 1	0.08	< 1	0.06	< 1

right	0		2		5		1	
Unity Mine - left	0.172	< 1	0.093	< 1	0.178	< 1	0.094	< 1
B4242 Chain Road	0.044	< 1	0.074	< 1	0.144	< 1	0.124	< 1

14.6.15 It can be seen from the table above that the proposed site access junction has sufficient capacity to accommodate all future development scenarios. It is predicted that a maximum RFC of 0.124 will occur during the 2025 Pm peak period on the B4242 Chain Road approach, with a mean maximum queue of less than one vehicle.

B4242 Chain Road /A465 roundabout

14.6.16 The operation of the existing junction (see Figure 14.31) has been assessed, for each of the assessment periods in 2013, 2014, 2016 and 2017 and 2035 using the TRL program ARCADY/6.0.

14.6.17 The results of the PICADY analysis are presented in full in Appendix 14.8, and summarised in Table 14.8 below.

Table 14.8 B4242 Chain Road/A465 roundabout – ARCADY results

	No development				With development			
	0800-0900		1700-1800		0800-0900		1700-1800	
	RFC	Max q	RFC	Max q	RFC	Max q	RFC	Max q
2013 (base)								
B4242 Chain Rd	0.217	< 1	0.156	< 1				
A465 (e)	0.380	< 1	0.493	1				
High Street	0.453	< 1	0.476	< 1				
A465 (w)	0.371	< 1	0.361	< 1				
2014 (year of opening)								
B4242 Chain Rd	0.218	< 1	0.157	< 1	0.239	< 1	0.170	< 1
A465 (e)	0.382	< 1	0.496	1	0.391	< 1	0.508	1
High Street	0.456	< 1	0.480	< 1	0.497	1	0.555	1
A465 (w)	0.373	< 1	0.363	< 1	0.380	< 1	0.370	< 1
2020 (peak mine output)								

B4242 Chain Rd	0.247	< 1	0.175	< 1	0.272	< 1	0.189	< 1
A465 (e)	0.413	< 1	0.535	1	0.427	< 1	0.549	1
High Street	0.512	1	0.549	1	0.579	1	0.633	2
A465 (w)	0.405	< 1	0.394	< 1	0.414	< 1	0.401	< 1
2029 (year of opening + 15 years)								
B4242 Chain Rd	0.300	< 1	0.210	< 1	0.328	< 1	0.227	< 1
A465 (e)	0.462	< 1	0.599	2	0.476	< 1	0.613	2
High Street	0.606	1	0.672	2	0.677	2	0.767	3
A465 (w)	0.455	< 1	0.444	< 1	0.465	< 1	0.455	< 1

14.6.18 It can be seen from the table above that the junction above has sufficient capacity to accommodate all future development scenarios. It is predicted that a maximum RFC of 0.767 will occur during the 2025 Pm peak period on the High Street approach, with a mean maximum queue of 3 vehicles.

14.7 Cumulative impacts

14.7.1 Cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable developments, together with the proposed development itself. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

14.7.2 The purpose of this section is to assess the potential cumulative impact generated by the proposed development at Aberpergwm Mine. The main categories (of cumulative impacts) are as follows:

- Potential simultaneous effects from concurrent developments;
- A potential combination of effects from the same development;
- Potential successive effects having regard to past, present and foreseeable future development.

14.7.3 Each of these categories, and the potential impacts arising under the three categories is described in more detail below.

Potential simultaneous effects

14.7.4 Simultaneous effects comprise the impacts arising from multiple developments, occurring at different locations within the locality.

Approach

14.7.5 As per the EIA scoping opinion, the following potential schemes should be considered with regard to potential simultaneous cumulative effects:

- P2008/0024 - Hirfynydd wind farm;
- P2011/1147 - outline application for mixed development comprising up to 60 residential units, up to 100 units of holiday accommodation, up to 350sq.m retail and up to 1000sq.m of leisure complex with associated access, footpaths, ecological imporvements, landscaping, boundary treatments and services at Rheola House;
- P2013/0366 – Wind farm at Maesgwyn;
- P2009/0516 – Health Centre, Glynneath (Outline);
- P2012/1126 – Selar Opencast.

14.7.6 The majority of potential schemes are remote from Aberpergwm surface mine and therefore there will be no simultaneous impacts arising. However, the traffic generated by the Health Centre, Glynneath (P2009/0516), which is on the opposite side of the B4242, has been included in the analysis presented in the 'Junction Capacity Analysis' outlined above.

14.7.7 The results of the analysis indicate that the existing and proposed highway network has sufficient capacity to accommodate the level of demand generated by the developments outlined above (including the prposed development at Aberpergwm), and it is therefore considered that there will be no major adverse impacts arising from potential simulateous effects. Potential combined effects

14.7.8 In order to assess the combined effects of the impacts of the proposed development of Aberpergwm Mine, it is necessary to consider whether some or all of the individual impacts are close to being unacceptable, that when combined together, the combined impact is unacceptable.

14.7.9 A Transport Assessment (which has been produced in support of this planning application) investigates the local transport network serving the proposed development site, including the highway network, public transport infrastructure, and pedestrian/cycle facilities. The TA also identifies the impact of the proposed development on the surrounding highway network.

14.7.10 It is anticipated that, as a 'worst-case', the proposed development could generate up to 237 HGVs per working day, which is less than the volumes of traffic currently consented on the site (i.e. between 250 and 290HGVs per working day).

14.7.11 The analysis within the TA (and outlined in the 'Assessment of Potential Impacts' above) demonstrates that with the proposed mitigation measures, no major adverse impacts will remain and it is therefore considered that the proposed development will not represent a significant impact in terms of traffic, transport and movement.

Potential successive effects

14.7.12 Potential successive effects comprise the potential impacts of the proposed development when combined with the effects of past development, as well as the effects of present development and development that is foreseeable in the future.

14.7.13 The effects of present development has been dealt with in the 'Assessment of Potential Simultaneous Effects' above, therefore this section considers the cumulative effect of the proposals taking account of past mining activities in this location as well as foreseeable further development (of the mine and other potential development).

Combining the effects of the proposal with the impact of past mining activity

14.7.14 In terms of past levels of impact it is apparent that the Vale of Neath has experienced periods where there have been substantial cumulative impacts resulting from the operation of a number of collieries, surface mine sites and associated infrastructure to handle both coal products and mine discard. In the last 30 years, the level of coal mining activity in the UK has declined substantially, with a

corresponding reduction in related impacts in terms of traffic, transport and movement. At the same time, major infrastructure projects (including the A465 Heads of the Valleys route) have been constructed that have increased connectivity and capacity, and thereby imporved traffic conditions locally.

14.7.15 It should be noted that there is an existing planning permission for the mine complex, limiting the number of HGVs per day at 180, in addition to planning consents for open cast mining with a limit of between 70 and 110 HGVs per day, as follows:

- Nant Y Mynnydd (P2004/0443), condition 12 – 80 lorries transporting coal on any working day;
- Forest Quarry (P2009/0216), condition 11 – 70 lorries transporting coal on any working day; and,
- Forest Quarry 2 (P2010/0666), condition 12 – 110 lorries transporting coal on any working day

14.7.16 It is estimated that, as a 'worst-case' scenario, the proposed development could generate up to 237 HGVs per working day, compared with between 250 and 290 HGVs per day (mine complex and open cast mining combined).

14.7.17 It is therefore considred that the effects of the current proposals, when combined with the effects of reduced levels of mining activity over the last 30 years do not result in an unacceptable level of environmental impact.

Combining the effects of the proposal with potential future development

14.7.18 The objectives for the Mine involve planned growth in the mine's output (ROM) from 233,000 tonnes in 2014, to 1m tonnes in 2019, and maximum output at 2.5m tonnes from 2020 onwards.

14.7.19 To achieve this planned growth there is a requirement for staged investment over a five (or more) year period. This is needed to:

- Ensure maximum exploitation of the coal reserves;
- Provide additional ventilation of the underground workings and improve emergency access;

- Enable phased increase in the mine's workforce; and,
- Potentially deliver additional transport infrastructure.

14.7.20 The TA which has been produced in support of the application identifies the impact (on the surrounding highway network) of the:

- proposed development;
- increases in the mine's workforce; as well as,
- future increases in background traffic growth, to take account of future development.

14.7.21 The analysis within the TA (and outlined in the 'Assessment of Potential Impacts' above) demonstrates that with the proposed mitigation measures, no major adverse impacts will remain and it is therefore considered that the proposed development will not represent a significant impact in terms of traffic, transport and movement.

14.8 Mitigation measures

Construction traffic

14.8.1 It is anticipated that a Construction Environmental Management Plan (CEMP) will be required. This document will indicate the construction phasing, hours of operation, the level of vehicle activities, and measures undertaken to prevent the spread of waste materials onto the highway. Submission of this document offers the opportunity for any potential impact of construction traffic on the surrounding highway network to be minimised.

Operational traffic

14.8.2 It is anticipated that, as a 'worst-case' scenario, the proposed development could generate up to 237 HGVs per working day, which is less than the volumes of traffic previously consented on the site (i.e. between 250 and 290 HGVs per working day).

14.8.3 Whilst the analysis has shown that there is adequate highway/junction capacity it is acknowledged that there may be a minor adverse impact on highway safety, road traffic noise, and air quality, resulting from the likely increase in traffic volumes.

14.8.4 It is acknowledged that there is both potential economic and environmental benefit of hauling an increasing proportion of coal by rail, which could be achieved by providing a corridor to facilitate the movement of coal (from Aberpergwm Mine to the Unity Mine rail head) such as a product conveyor or dedicated haul route. However, this would need to be the subject of further investigation/ consideration (not least of which would be the specific environmental/amenity impacts, and the viability and deliverability), and a separate planning application.

Residual impacts

14.8.5 Following consideration of the potential impacts of the development on traffic, transport and movement interests during the construction and operation phases, and also the implementation of described mitigation measures, the residual impact of the scheme is summarised in Table 14.9 below.

14.8.6 Overall, it is considered that with the introduction of the proposed mitigation measures, the impacts will be reduced at both construction and operational phases. No major adverse impacts will remain and it is therefore considered that the proposed development will not represent a significant effect on the environment from a traffic, transport and movement standpoint.

Table 14.9 Summary of Residual Effects of the Proposed Development					
Traffic, Transport & Movement Topic	Description of Impact		Description of Mitigation Measures	Description of Residual Impact	
	Description	Significance		Description	Significance
Traffic generation	It is anticipated that, as a 'worst-case' scenario, the proposed development could generate up to 220 HGVs per working day. This volume of traffic will contribution to noise and air quality pollution locally.	Moderate adverse	Increasing the proportion of coal transferred by rail. Consider the implementation of a product conveyor between Aberpergwm Mine and Unity Mine rail head.	Residual HGV movements, which will have an adverse impact on noise and air quality levels locally.	Moderate adverse
Junction capacity	It is anticipated that traffic generated by the proposed development will contribute to queues and delays at existing junctions with in the study area.	Minor adverse	None proposed		Minor adverse

15 NOISE

15.1 Introduction

15.1.1 This chapter has been prepared by Acoustics and Noise Ltd.

15.1.2 Noise and vibration can have a significant effect on the environment and on the quality of life enjoyed by individuals and communities.

15.1.3 The perception of noise may be reflected by many factors (acoustic and non-acoustic) but in general the impact in response to noise depends on the level of the noise, the margin by which it exceeds the background noise level, its spectral character and temporal variation. In some cases, other factors such as the time of the day, day of the week, duration and other acoustic features such as tonality and impulsiveness will be important.

15.1.4 Noise can cause annoyance, interfere with communication, cause fatigue, increase heart rate, reduce sleep quality and sense of well being. In some cases it can also lead to a loss of amenity.

15.1.5 Vibration, even of very low magnitude, may be perceptible to some people and can interfere with the satisfactory conduct of certain activities, e.g. delicate procedures in hospital operating theatres, use of sensitive laboratory equipment etc. Vibration nuisance is frequently associated with the assumption that if vibration can be felt, then damage is inevitable. However, greater levels of vibration are required to cause damage to building structures or to cause computers and other similar electronic equipment to malfunction.

15.1.6 Vibration transmitted from site activities to the neighbourhood may cause anxiety as well as annoyance and can also disturb sleep, work or leisure activities.

15.1.7 This chapter assesses the noise and vibration impacts associated with the long-term development of Aberpergwm Mine, Glynneath, Neath and Port Talbot County Borough, including: an extension to and development of underground coal workings; use of land for a mine waste repository (MWR), with associated haul road, to dispose of colliery mine waste and discard from coal preparation at Aberpergwm Mine; and, surface development and a time extension of operations at Aberpergwm Mine, including a consolidation of existing planning permissions.

15.2 The development proposals

15.2.1 Energybuild proposes to extend their planning permission for underground coal workings to facilitate the long-term development of the mine business. An extension to the underground workings will enable maximum exploitation of the coal resources from the 18 Feet Seam and the Nine Feet Seam and secure the supply of high quality coals.

15.2.2 Although the underground development and increases in tonnages will be influenced by the prevailing geological conditions, the business plans for the mine are to increase production of coal year on year from 2014 – 2020, with maximum production being sought and sustained during 2020 and beyond. There is therefore the potential for "Run of Mine" coal output from the underground operations to increase as follows:

- 2014 – 233,000 tonnes
- 2015 – 233,000 tonnes
- 2016 – 670,000 tonnes
- 2017 – 833,000 tonnes
- 2018 – 1,000,000 tonnes
- 2019 – 1,000,000 tonnes
- 2020 – 2,500,000 tonnes

15.2.3 The recently installed coal processing plant currently has the capacity to wash 400 tonnes per hour of run of mine material, and is designed and constructed to allow this to increase to a capacity of 600 tonnes per hour. Based on table 15.1 and the surface hours of operation the coal processing plant has an overall capacity to process approximately 2 million tonnes of run of mine material per annum.

15.2.4 As underground workings progress it is anticipated that run of mine material will have a lower dirt content and efficiencies in processing can be achieved. The need for some additional processing capacity may arise as run of mine production reaches its highest planned levels although this is by no means certain at this stage.

15.2.5 If there were a need for additional capacity, and noting it is not possible to be precise on what may or may not be needed in the future, this could include some modest increase in operating hours (to facilitate an increase in plant throughput), the installation of additional plant/processing infrastructure, or some adjustments to the existing plant.

15.2.6 Having regard to potential future (cumulative) effects it is evident that some increase in operating hours and/or additional plant has the potential to give rise to additional noise outputs. At the same time, the ongoing monitoring of noise outputs from coal production within the current operating hours will inform the design of any additional mitigation that could be employed should there be a need for further mitigation in association with increasing production capacity. Such mitigation could take the form of additional measures in the site's noise management plan and include additional noise attenuation/suppression to be installed on existing items of plant, or additional noise mitigation facilities on the site.

15.2.7 Notwithstanding these points on potential future development, this assessment focuses on the potential noise impact of maximum production levels of 2,500,000 tonnes of "run of mine" coal, including the associated increase in haulage traffic which is anticipated during 2020 and beyond.

15.2.8 To ensure the long-term production and supply of coal, and any future increases in output, a long term location needs to be secured for the deposit of colliery mine waste, including discard from coal preparation and waste rock from underground mining development.

15.2.9 The application therefore includes a long term mine waste repository (MWR) capable of accommodating approximately 10.4 million m3 of material. The deposition of discard at the MWR will be carried on in conjunction with the continued use and improvement of the existing haul road, including water pollution control measures, and also the provision of an associated inspection and maintenance regime which will ensure that discard haulage operations are carried out in an environmentally acceptable manner.

15.2.10 For the purposes of maximising the use of land previously disturbed by surface mining operations and consequently minimising potential negative environmental impacts it is planned to construct the repository on the now defunct Forest Quarry series of opencast sites.

15.2.11 The proposed mine waste repository location is situated on high ground on the Hirfynydd mountain to the south of the Sarn Helen Roman Road, 2km west of the village of Glynneath and 3km to the east of Seven Sisters. It sits in a location bounded by areas of partially harvested commercial forestry plantation and areas of open grassland. Its remote location together with the relatively low intensity operations proposed to be carried out on site indicate an ideal facility for the deposition of mine waste which is most unlikely to impinge on the amenity or wellbeing of residents residing within the local communities.

15.3 Operational activities

15.3.1 The operational activities considered in this assessment are restricted to those associated with the surface area (including the operation of the CPP washery) at Cae Capel, the activities at the MWR, the internal haul road connecting the surface area with the MWR and the increased traffic along the existing highways.

15.3.2 The assessment considers the planned production as at 2020 and beyond, where it is anticipated that production output will reach 2,500,000 tonnes.

15.3.3 All other activities associated with this development will take place underground.

15.3.4 The assessment considers the potential for the operational activities associated with the development to affect existing noise levels at the nearest noise sensitive properties.

Development Operational Times

Table 15.1 – Development Operational Times

Period	Underground Support Operations	Surface Operations	MWR Operations	Haulage Movement
Monday to Friday	00:00 – 07:00 19:00 – 00:00	07:00 – 19:00	07:00 – 19:00	07:00 – 19:00
Saturday	00:00 – 07:00 16:00 – 00:00	07:00 – 16:00 07:00 – 12:00 (Washery Operation only)	07:00 – 19:00	07:00 – 12:00

Sundays, Public Holidays	00:00 – 16:00 22:00 – 00:00	No activities proposed	No activities proposed	No activities proposed

15.3.5 The Underground Support Operations are to facilitate the continuous operations taking place underground.

15.4 Noise sensitive locations

15.4.1 Any impacts from the activities associated with the development have been assessed at the nearest sensitive locations. A 'sensitive location' is described as any occupied premises, outside the noise emitting premises, used as a dwelling (including gardens), place of worship, educational establishment, hospital or similar institution, or any other property likely to be adversely affected by an increase in noise or vibration level. Due consideration is also given to national parks, areas of outstanding natural beauty or other outdoor spaces where members of the public might reasonably expect peaceful enjoyment of the area.

15.4.2 The main receptors that have the potential to be affected by noise from the operational phases of the development are considered to be the nearest noise sensitive locations located at:-

Table 15.2 – Noise Sensitive Locations

Noise Sensitive Location	Description
Engine Cottage	Located approximately 570m from the centre of the CPP building to the west.
Elmwood	Located approximately 360m from the centre of the CPP building to the east.
Manor Drive	Located approximately 385m from the centre of the CPP building to the north-east.
Chain Road	Located approximately 385m from the centre of the CPP building to the south-east.
St Cadocs Church	Located approximately 425m from the centre of the CPP building to the east.
Roman Road, Banwen	Located approximately 2.8km from the MWR site to the north-east

Sarn Helen Roman Road	Approximately 185m north of the nearest path of the haul route to the MWR site.
Scheduled Monument "Roman Fortlet"	Approximately 1.2km west of the centre of the MWR site.

15.4.3 Given the relatively large distance from the noise sources at the MWR, a less detailed assessment has been made for the properties at Roman Road, Banwen.

15.4.4 The assessment is based on the design layouts, production schedules and traffic flows supplied by Walter Energy Western Coal.

15.5 Methods of assessment

Vibration

15.5.1 It is generally accepted that for the majority of people vibration levels in excess of between 0.15 and 0.3 mms-1 peak particle velocity are just perceptible. Table 15.3 below details the distance at which certain activities give rise to a just perceptible level of vibration; these figures are based on historical field measurements.

15.5.2 From the list of activities listed in Table 15.3, the only potential source of vibration generated by the proposed activities that could affect the nearest sensitive properties has been identified as the movement of heavy vehicles along the haul route.

15.5.3 It can be seen from Table 15.3 that given the distances to the nearest properties, there is very little risk of the haulage movements causing any perceptible vibrations.

Table 15.3 – Distances at which Ground Borne Vibration may just be perceptible.

Construction Activity	Distance from activity when vibration may just be perceptible (m)
Excavation	10 to 15
Compaction	30 to 40
Heavy Vehicles (e.g. dump trucks)	5 to 10
Hydraulic Breaker	15.to 20
Auger Piling (e.g. CFA piling)	15 to 20

Noise

15.5.4 This assessment considers the noise emissions from the general operations at the Cae Capel surface development including the haulage movements within the surface area and the haul road to the MWR.

15.5.5 An additional assessment of the supporting operations at the surface associated with the continuous underground work is detailed to consider any potential noise impact occurring during periods outside the proposed hours for the general operations associated with the coal processing, transportation and sales.

15.5.6 There are two significant categories of noise source associated with the development – noise from the operation of the fixed plant and machinery and noise from the associated haulage movements.

15.5.7 The production schedule is detailed in Table 15.4.

Table 15.4 – Production Schedule

	2020 and Beyond (tonnes)
ROM	2,500,000
Product	1,500,000
Discard	1,000,000

15.5.8 The product is transported off site by way of 20T and 30T trucks and the discard is transported to the MWR site along the internal haul road using 35T trucks.

15.5.9 As a matter of best practice, this assessment has been undertaken based on the relevant guidance on noise and vibration. This includes:

- Minerals Technical Advice Note 2 : Coal
- Calculation of Road Traffic Noise (CRTN)
- Design manual for Roads and Bridges (DMRB)
- ISO 9613
- Existing Planning Conditions P2012/0995

15.5.10 These documents are discussed in the following sections in relation to the operations at the Cae Capel development.

15.5.11 Furthermore where agreements with regard to noise criteria have been made with Neath Port Talbot CBC, these are also referenced within the following sections as appropriate.

Minerals Technical Advice Note 2: Coal

15.5.12 The main guidance used for the assessment was taken from Minerals Technical Advice Note 2: Coal particularly the following paragraphs

15.5.13 Para 170. *'To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady continuous noise would need not to exceed 55dB LAeq 1 hour on outdoor living areas. To protect the majority of people from being moderately annoyed during daytime, the outdoor sound level should not exceed 50dB LAeq 1 hour'*. (Institute for Environment and Health, 1997)

Planning Conditions for Noise

15.5.14 Para 173. 'Planning Conditions should apply absolute controls on noise emissions, with limits normally but not exclusively set at particular noise-sensitive properties.

15.5.15 MPAs should establish a noise limit at sensitive locations of background plus 10dB LAeq 1hr or 55dB LAeq, 1hr (free field), or whichever is the lesser, during normal working hours (0700 -1900, Monday to Friday excluding Public Holidays)

15.5.16 In some noise sensitive locations, 0800 - 1800 hours may be more appropriate, with reduced levels defined for the dawn and evening one-hour periods

15.5.17 When working is agreed between 0800 and 1200 on Saturdays, MPAs may consider it appropriate to establish a reduced noise level

15.5.18 At all other times, limits should not exceed 42dBLAeq, 1hr (free field) at sensitive locations.

15.5.19 Where tonal noise contributes significantly it may be appropriate to set specific limits for this element.

15.5.20 Peak or impulsive noise, which may include some reversing bleeper's, may also require separate limits that are independent of background noise and should only exceptionally be permitted at night.'

Short-term operations

15.5.21 Para 174. 'Short-term operations that cannot easily meet these noise limits might include soil stripping, the construction and removal of baffle mounds and soil storage mounds construction of new permanent landforms and aspects of site road construction and maintenance. These activities can bring longer-term environmental benefits. Minerals advice in Wales has been that increased noise limits between 1000 and 1600 hours on Monday to Friday excluding Public Holidays of up to 67 dB (A)LAeq 1hr (free field) should be considered for periods of up to 8 weeks in a year, monitored at the noise-sensitive properties nearest to the source. However, this is approaching levels identified by the WHO as having the critical health effect of hearing impairment – 70dB for 24 hours. (WHO Guidelines p. XVIII). The MPA should assess the predicted noise for such operations, consider proposed and potential mitigation, and have evidence of the long-term benefits before agreeing the level, duration and frequency of such exceptions, and not to exceed 67 dB (A)LAeq 1hr (free field) for the hours identified above'

Calculation of Road Traffic Noise (CRTN)

15.5.22 The main method of calculating road noise is defined in Calculation of Road Traffic Noise (CRTN). This method of predicting noise at a reception point from a road scheme, a formal procedure originally issued in accordance with the requirements of the Noise Insulation Regulations 1975, consists of five main parts:

15.5.23 Divide the road scheme into one or more segments such that the variation of noise within the segment is small;

15.5.24 Calculate the basic noise level at a reference distance of 10 m away from the nearside carriageway edge for each segment;

15.5.25 Assess for each segment the noise level at the reception point taking into account distance attenuation and screening of the source line;

15.5.26 Correct the noise level at the reception point to take into account site layout features including reflections from buildings and facades, and the size of the source segment;

15.5.27 Combine the contributions from all segments to give the predicted noise level at the reception point for the whole road scheme.

15.5.28 For this project, the CRTN methodology has been used in a simplified form to predict changes in road traffic noise levels along route sections, i.e. calculations have not been carried out at individual receptors but for sections of road subject to the same changes in traffic flow. On this basis, all receptors along a route section will be subject to the same change in noise level.

15.5.29 The assessment has been informed by the predicted traffic flow figures provided in Chapter 14 of this ES and the methods outlined in 'Calculation of Road Traffic Noise' (CRTN), Charts 3 & 4 to obtain the basic noise level, LA10,18hr.

15.5.30 The basic noise level was calculated for both 'with and without development' scenarios. For detailed calculations see Appendix 15.3.

15.5.31 The difference between the 'with and without' noise levels for each road is then compared to the values in Table 3.1, 'Design Manual for Roads and Bridges' reproduced in Table 15.13.

15.5.32 The magnitude of the traffic noise impact for each of the roads due to the development is summarised in Table 15.12.

Design Manual for Roads and Bridges (DMRB) Noise and Vibration (Vol.11, Sec.3, Part 7)

15.5.33 The Design Manual for Roads and Bridges is a series of 15 volumes that provide official standards, advice and guidance relating to the design, assessment and operation of roads, including motorways, in the U.K.

15.5.34 The guidance contained in 'Volume 11, Section 3, Part 7, Noise and Vibrations' has been used to assess the significance of the impact of the noise generated by the additional vehicle movements on the public highway due to the proposed development.

ISO 9613

15.5.35 Part 1 of this standard specifies an analytical method of calculating the attenuation of sound as a result of atmospheric absorption for a variety of meteorological conditions

15.5.36 Part 2 describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in ISO1996) under meteorological conditions.

15.5.37 This assessment uses the results of a 3D acoustic model to inform its conclusions. The calculation methods used follow the methods described in ISO 9613-2

Existing planning conditions p2012/0995

Condition 28

15.5.38 The sound pressure level for operational noise from the site, measured at any noise sensitive property, within 300m of the site boundary shall not exceed 55dB LAeq, 1hr free field under the measurement criteria of BS4142 between 07:00 and 19:00 hours Mondays to Fridays and between 07:00 and 12:00 hours on Saturdays.

Condition 29

15.5.39 The sound pressure level for operational noise from the site, measured at any noise sensitive property, within 300m of the site boundary shall not exceed 42 dB LAeq 1hr (free field) under the measurement criteria of BS4142 between 06:00 and 07:00, 19:00 and 22:00 hours Mondays to Fridays and 07:00 to 08:00 and 12:00 to 16:00 hours on Saturdays.

Condition 30

15.5.40 At all other times, outside those identified in Conditions 28 and 29, the sound pressure level for operational noise from the site, measured at any noise sensitive property, within 300m of the site boundary shall not exceed 42 dB LAeq 5mins (free field) under the measurement criteria of BS4142.

15.6 3D Acoustic CAD Modelling

15.6.1 The proposed site is large and benefits from acoustic CAD modelling of the operational noise levels across the whole of site using B&K Predictor Type 7870 V9.01 Software. This noise prediction software allows for the investigation of noise emissions in complex or large outdoor environments. The software can be used to analyse industrial noise sources and traffic measurements to the latest European and U.K. Standards.

15.6.2 A major advantage of using this method is the ability to remodel changes and alterations to the site and/or sources.

15.6.3 All calculations are made following the methods set out in ISO9613-2.

CAD Model Construction

15.6.4 Topographical information for the site and surrounding areas was obtained from 'Stanfords Planning Portal' in the form of contour height data.

15.6.5 This data was imported into the CAD software and used to construct the 3D terrain for the site.

15.6.6 A vector drawing of the site was also downloaded from Stanfords Planning Portal and used to accurately position the existing residential buildings onto the terrain.

15.6.7 Development drawings provided by Walter Energy Western Coal were used to position the development buildings, noise sources and haul roads onto the terrain.

CAD Model Noise Sources

15.6.8 The following significant operational noise sources have been identified and included in the 3D acoustic prediction model:

Table 15.5 – Significant Operational Noise Sources (General Operations)	
Noise Source	Comment
CPP Washery Building	Modelled as emitting facades (including roof). Internal noise levels were measured within the existing washery building at Cae Capel. The sound reduction performance of each façade is calculated based upon the 'as built' construction.
Transfer House Building	Modelled as emitting facades (including roof). Internal noise levels were predicted based upon power rating and rotational speed of two 300kW drive motors. The sound reduction performance of each façade is calculated based upon the drawings CA 10475-102 and J243L013.
Conveyor Belts	ROM conveyors (x2), Silo Feed Conveyor (SFC), 8xcoveyors associated with CPP building.
Silo	1xFeed conveyor drive motor @ 14m high, 2xsilo load out motors @5m high all operating continuously during assessment period
Mobile Plant	2xCaterpillar loaders associated with the surface works. 4xADT and 1x dozer associated with the MWR site.
Internal Haul Roads (Internal Haul Road and Haul Road to MWR carrying Discard)	Modelled as moving sources. Flow rates depend on maximum production output during 2020 and beyond.
External Road Lorries (20T and 30T)	Transporting coal to Unity mine and TATA. The on-site traffic movements are modelled as moving sources. Flow rates depend on maximum production output during 2020 and beyond. The impact from the lorry movements along the highways are assessed against the predicted baseline traffic movements during 2020.

15.6.9 An assessment period of 1 hour is chosen to represent the criteria detailed in MTAN2.

15.6.10 The CPP washery building, Transfer House Building, Conveyor Belts, Silo drive units and mobile plant are assumed to be operating continuously throughout the one hour assessment period to represent worst case.

15.6.11 The vehicle flows along the internal haul roads are determined from the maximum production capacities during 2020 and beyond. The flows are calculated as return journeys/hour and have been derived from the anticipated volumes of HGV traffic generated by the mine per 12 hour day (see Table 15.1) as detailed in Table 14.2 in Chapter 14 of this ES.

Table 15.6 – Truck Movements		
Description	2020 Truck Movements per 12 hour day	2020 Truck Movements Per Hour
20T Trucks to Unity (per hour)	164	14
30T Trucks to TATA (per hour)	73	7
35T Trucks to MWR (per hour)	100	10

15.6.12 The truck movements detailed in Table 15.6 are single journeys. The flow rates used in the model for the truck movements are double these values to represent return journeys for worst case conditions.

15.6.13 Table 15.7 provides information on the significant operational noise sources of the support operations.

Table 15.7-Operation	
Noise Source	Comment
Transfer House Building	Modelled as emitting facades (including roof). Internal noise levels were predicted based upon power rating and rotational speed of two 300kW drive motors. The sound reduction performance of each façade is calculated based upon the drawings CA 10475-102 and J243L013.
Conveyor Belt	ROM conveyor (x1)

Coal Tipping	Noise as the coal falls to the ground from the ROM conveyor. Modelled as a point source based on measurements made during earlier surveys.
Mobile Plant	1 x FSV, 1 x Telehandler and 1 x shovel loader. Modelled as point sources due to the short traverse distances
Fixed Plant	1 x Generator. Modelled as a point source.

15.6.14 For the assessment of noise emissions attributable to the support operations detailed in Table 15.7, an assessment period of 5 minutes is chosen to represent the criteria detailed in Condition 30 of P2012/0995.

15.6.15 All activities associated with the support operations are assumed to be operating continuously throughout the 5 minute assessment period to represent worst case.

15.6.16 These operations are to be restricted to the lower surface area at Aberpergwm Colliery only.

CAD Model Prediction

15.6.17 A noise receiver was placed into the model at the position of each of the noise sensitive locations.

15.6.18 Using the Predictor 9.01 software, calculations are made, at each receiver position, of the free-field noise emissions during the operational activities at the site.

15.6.19 Each receiver is modelled to calculate free-field noise emission levels at a height of 1.2m, to satisfy the measurement criteria detailed in MTAN2.

15.6.20 The above procedures are repeated for the noise emission levels during the Support Operation activities.

15.6.21 All calculations are made following the methods set out in ISO9613-2.

15.7 Baseline conditions

Table 15.8 – Background Noise Levels		
Location	LA90,1hour (dB)	Comment
Chain Road	42	Minimum 1 hour value measured during 07:00 – 23:00 hours
Elmwood	42	Assumed to be the same as Chain Road
Engine Cottage	44	1 hour measurement made during plant shutdown at a site overlooking Engine Cottage
Manor Drive	37	Minimum 1 hour value measured during 07:00 – 23:00 hours
St Cadocs Church	37	Assumed to be the same as Manor Drive

15.7.1 Background levels exclude the existing contribution to noise from mineral, waste, and similar operations so that cumulative and in-combination effects can be assessed.

15.7.2 The noise levels at all locations were dominated by road traffic noise.

Traffic noise

15.7.3 Road capacity analysis has been undertaken at the following junctions:

- Junction 1 – B4242 Glynneath Road/B4242 Park Avenue/B4242 Chain Road
- Junction 2 – B4242 Chain Road/Unity Mine Access
- Junction 3 – B4242 Glynneath/A465 roundabout
- Junction 4 – A465/A4059/A4061 roundabout

15.7.4 The junction numbers refer to the traffic impact assessment provided by others as part of this application (see Chapter 14).

15.7.5 The traffic flow figures used in this analysis have been used to predict a basic noise level, LA10,18hr, for each of the roads that will potentially be affected by the development.

15.7.6 The traffic noise impact assessment has been made using the predicted traffic flow figures for Year 2020, and the methods outlined in 'Calculation of Road Traffic Noise' (CRTN), Charts 3 & 4 to obtain the basic noise level, LA10,18hr.

15.7.7 The basic noise level has been calculated for both 'with and without development' scenarios. Detailed calculations are shown in Appendix 15.5.

15.7.8 The difference between the 'with and without' noise levels is compared to the values in Table 3.1, 'Design Manual for Roads and Bridges'(see Table 15.13).

15.7.9 The magnitude of the traffic noise impact for each of the roads due to the development is summarised in Table 15.12.

Summary of Calculated Noise Levels

15.7.10 The calculated free field noise levels at the noise sensitive properties are shown in Table 15.9 below:

Table 15.9 – Calculated Free Field Noise Levels at the Noise Sensitive Locations

Assessment Location	General Operation LAeq,1hr (dB)	Support Operation LAeq,5 mins (dB)
Engine Cottage	54	26
1 Manor Drive	44	33
Elmwood	43	36
10 Chain Road	42	35
St Cadocs Church	42	35
Banwen	23	10
Sarn Helen Roman Road	33	1
Scheduled Monument "Roman Fortlet"	32	9

15.8 Impact criteria

15.8.1 This assessment considers the noise impact from the development against the limit criteria detailed in MTAN2 and the existing planning conditions 28, 29 and 30 which are summarised in Table 15.9.

15.8.2 Condition 28 has set the noise limit for Saturdays based on the limits set for Mondays to Fridays. The assessment criteria for Saturdays used in this chapter adopts the same strategy to reflect the reduced MTAN2 limits for Mondays to Fridays.

15.8.3 Condition 30 has set the noise limit for 'all other times' outside those identified in Conditions 28 and 29. These periods reflect the times when the support operations are the only activities taking place at the surface. The assessment criteria for 'all other times' used in this chapter adopts the same strategy detailed in Condition 30 to reflect the more stringent limits during these more sensitive hours.

Table 15.10– Summary of Impact Criteria

Operational Times	MTAN2 Limit Monday – Friday 07:00 – 19:00 LAeq,1hr (dB)	Condition 28 Limit Saturday 07:00 – 12:00 LAeq,1hr (dB)	Condition 29 Limit Saturday 12:00 – 16:00 LAeq,1hr (dB)	Condition 30 Limit 'at all other times' LAeq, 5 mins (dB)
Engine Cottage	54	54	42	42
1 Manor Drive	47	47	42	42
Elmwood	52	52	42	42
10 Chain Road	52	52	42	42
St Cadocs Church	47	47	42	42

15.8.4 The criteria limits that apply to operations during Monday to Friday are determined by the 'background plus 10' limit at each of the sensitive locations as detailed in MTAN2.

15.8.5 The criteria limits that apply to operations during Saturday 07:00 - 12:00 hours are determined by the existing planning condition 28 which are based on the latest reduced limits for Monday to Friday as determined by MTAN2.

Assessment of impact significance

15.8.6 Comparing the predicted operational noise levels at each of the noise sensitive locations with the limit criteria detailed in Table 15.10, the significance of the impact from the operations is assessed as per Table 15.11.

Table 15.11 – Subjective Response to Noise

Change in Sound Level dB(A)	Subjective Impression	Human Response to Noise
0 - 2	Imperceptible change in loudness	Marginal
3 – 5	Perceptible change in loudness	Noticeable
6 - 10	Up to a doubling of halving or loudness	Significant
11 - 15	More than a doubling or halving of loudness	Substantial
16 – 20	Up to quadrupling or quartering	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

15.8.7 For the sensitive properties at Banwen, the predicted noise levels from the operations at the MWR are at least 19dB below the 'at all other times' criteria detailed in MTAN2. This will result in an insignificant noise impact on these properties from the operational activities at the MWR.

15.8.8 For the sensitive locations at Sarn Helen Roman Road and the Scheduled Monument 'Roman Fortlet', the predicted noise levels from the operations at the MWR are at least 9 dB below the 'at all other times' criteria detailed in MTAN2. This will result in an insignificant noise impact at these locations from the operational activities at the MWR.

15.8.9 Full details of the assessments of impact significance are presented in Appendix 15.4 with summaries presented in Table 15.12.

Table 15.12 – Summary of Impact Significance		
Location	General Operations	Support Operations
Engine Cottage	Equal to limit	Substantially below limit
1 Manor Drive	Noticeably below limit	Significantly below limit
Elmwood	Significantly below limit	Significantly below limit
10 Chain Road	Significantly below limit	Significantly below limit
St Cadocs Church	Noticeably below limit	Significantly below limit
Sarn Helen Roman Road	Significantly below limit	Very Substantially below limit
Scheduled Monument "Roman Fortlet"	Significantly below limit	Very Substantially below limit

Traffic impact assessment

Table 15.13 – Summary of Traffic Impact Assessment	
Location	2020 and Beyond
1 B4242/Glyneath Road	Moderate
1 Park Avenue	No Change
1 B4242/Chain Road	Minor
1 B4242/Chain Road (n)	Minor
2 Unity Mine	Minor
2 Chain Road (s)	Negligible
3 B4242/Chain Road	Negligible

3 A465 (e)	No Change
3 High Street	No Change
3 A465 (w)	Negligible
4 A4059	No Change
4 A465 (e)	No Change
4 A4061 Rhigos Road	No Change
4 A465 (w)	No Change

15.8.10 The significance of the traffic impact is rated as per Table 15.14 below.

Table 15.14 – Classification of Magnitude of Noise Impacts (DMRB)	
Noise Change, LA10,18hr (dB)	Magnitude of Impact
0	No Change
0.1 - 0.9	Negligible
1.0 - 2.9	Minor
3.0 - 4.9	Moderate
5.0 +	Major

Extracted from 'Design Manual for Roads and Bridges'; Volume 11, Section 3, Table 3.1

15.9 Mitigation measures

15.9.1 No additional mitigation is required.

15.10 Residual impacts

15.10.1 There is no residual impact.

15.11 Cumulative Impact

15.11.1 In terms of consideration of cumulative effects and development alternatives the increases in mine output over time may result in a need for additional or alternative

means of transport of mine waste and discard to the MWR. The EIA Scoping Report outlined a potential discard conveyor (as one means of alternative transport) and this highlights the potential that exists to mitigate noise increases that might result from future needs to increase the volumes of discard/mine waste to be transported to the MWR. Clearly, further noise assessments would be required in respect of any new proposals for additional transport infrastructure but it is worth noting that such infrastructure has the potential to minimize the noise effects of haulage of mine waste to the MWR as production levels increase towards maximum production.

15.11.2 The Heath Care Centre to the south of the colliery has not yet been developed, this assessment considers the potential successive impact the mine development may have on this potential future development.

15.11.3 As assessed in the main body of this chapter, this section considers the potential noise impact at the proposed Health Care Centre during maximum production output of 2,500,000 tonnes ROM during 2020 and beyond.

15.11.4 Outline Planning Permission was granted on 9th June 2010 for a 'Primary Healthcare Resource Centre with associated parking and landscaping' on land at B4242, Glynneath, Neath.

15.12 Conclusions

Vibration

15.12.1 There are no predicted adverse impacts associated with the proposed development activities.

Noise

15.12.2 Operational activities will have an insignificant noise impact on the properties located at Roman Road, Banwen for all production output levels up to 2,500,000 tonnes which is anticipated during 2020 and beyond.

15.12.3 Operational activities will have an insignificant noise impact on the locations at Sarn Helen Roman Road and the Scheduled Monument 'Roman Fortlet' for all production output levels up to 2,500,000 tonnes which is anticipated during 2020 and beyond.

15.12.4 For all production output levels up to 2,500,000 tonnes, this assessment concludes that for operations as specified in the planning application document and Environmental statement conducted during 07:00 – 19:00, Monday to Friday and 07:00 - 12:00, Saturdays there is an insignificant impact at all sensitive locations.

15.12.5 Outside these hours there is to be minimal surface activity in support of the continuous underground working. These minimal activities have been assessed to have an insignificant impact at all sensitive locations.

Traffic Impact

15.12.6 For production output levels of 2,500,000 tonnes there will be a moderate impact from the increased traffic flows at one of the junctions assessed and a minor noise impact from the increased traffic flows at three of the junctions assessed.

15.12.7 Although the assessment concludes moderate or minor noise impact at four junctions it is worth noting that there is the potential for any impacts to be mitigated through greater use of rail transport. Whilst this in itself could increase rail freight movements, the EIA Scoping Report identifies the potential for the construction of a coal product conveyor to transport coal to the rail head at Unity Mine. The delivery of such infrastructure would be linked to a move towards the maximum mine output – circa 2,500,000 tonnes per annum - but has the potential to increase exportation of coal to market by rail and thus minimizing the noise impacts of road borne coal haulage at these higher production levels.

15.12.8 In June 2013, the applicant (The Healthcare Property Company Wales) applied to Neath Port Talbot CBC to vary Condition 3 of the Outline Planning Permission to extend the period of time for the submission of reserved matters. The reason for this proposed extension was that 'the process of obtaining Welsh Government approval for the proposed development took far longer than envisaged leaving the development of the scheme on hold'. This application was granted approval on 18th July 2013. This permission extends the period for submission of reserved matters to 18th July 2016.

15.12.9 To date, no reserved matter applications have been submitted to Neath Port Talbot CBC in respect of the Healthcare Centre. As such, Planning Permission remains in Outline only and is subject to the approval of a reserved matters application(s).

15.12.10 The proposed Healthcare Centre is located approximately 250m south of the centre of the CPP building and has the potential to be impacted upon by noise from the activities associated with the mine development.

15.12.11 An assessment of the potential noise impact at the proposed Health Care Centre has been made following the same procedures and methods used in the main assessment.

Table 15.15 – Impact Assessment Summary for Health Care Centre, 2020 and beyond	
Description	Value
Location	Not yet developed at the time of this assessment. The proposed centre is located approximately 250m from the centre of the CPP building to the south. (ref: Table 15.2)
Baseline Conditions	42 dB LA90,1hr. Assumed to be the same as at Chain Road. (ref: Table 15.8)
Calculated Free Field Noise Levels	47 dB LAeq,1hr for General Operations 41 dB LAeq,1hr for Support Operations (ref: Table 15.9)
Impact Criteria	52 dB LAeq,1hr 07:00 - 19:00 Mon-Fri 52 dB :Aeq,1hr 07:00 - 12:00 Sat 42 dB LAeq,1hr 12:00 - 16:00 Sat 42 dB LAeq,5mins 'at all other times' (ref: Table 15.10)
Summary of Impact Significance	Noticeably below limit for General Operations

	Marginally below limit for Support Operations (ref: Table 15.11 and 15.12)
Traffic Impact Assessment	Moderate Impact at B4242/Glynneath Road (ref: Table 15.13 and Table 15.14)

15.12.12 Table 15.15 details the results of the impact assessment for the proposed Health Care Centre following the procedures and methods used in the main assessment. The table references refer to the main body of this chapter.

Health Care Centre Impact Assessment Summary

15.12.13 The assessment of the potential noise impact at the proposed Health Care Centre for maximum production output of 2,500,000 tonnes during 2020 and beyond concludes that for operations as specified in the planning application document and Environmental Statement conducted during 07:00 – 19:00, Monday to Friday and 07:00 - 12:00, Saturdays there is an insignificant impact.

15.12.14 Outside these hours there is to be minimal surface activity in support of the continuous underground working. These minimal activities have been assessed as marginally below the criteria limit at the proposed Health Care Centre.

15.12.15 The proposed Health Care Centre is located at the junction of B4242/Glynneath Road at which there is a Moderate impact from the increased HGV movements from the development.

16 DUST AND AIR QUALTY

16.1 Introduction

16.1.1 This chapter has been prepared by Wardell Armstrong LLP and assesses the potential dust and air quality impacts associated with the long-term development Aberpergwm mine, Glynneath. Section 2 of the ES provides a detailed description of the sites location and of the proposed development.

16.1.2 The boundary of this application area is shown on drawing number CA10605/001. The application area is centred on approximate grid reference E 284800, N 208200. The Aberpergwm Surface Mine operations are located north of the B4242 and approximately 400m north of the A465 in a semi-rural area centred on approximate grid reference E 286585 N 206027. The village settlement of Morfa Glas is located to the north east (north of the B4242), Glynneath to the east, and Blaengwrach and Cwmgwrach settlements south of the A465.

16.1.3 In summary, the application comprises three elements as follows:

- A consolidation and time extension of existing planning permissions for surface development and operations at Aberpergwm Mine;
- Use of land for a mine waste repository (MWR), with associated haul road, to dispose of colliery mine waste and discard from coal preparation at Aberpergwm Mine;
- Extension to and development of the underground coal workings at Aberpergwm mine.

16.1.4 There is potential for air quality and dust impacts associated with the construction and operational use of the developments at Aberpergwm mine, including the impact from development generated traffic. There are also potential cumulative air quality and dust impacts associated with the following possible future developments at the Aberpergwm Mine:

- A potential re-opening of the existing Treforgan Colliery Main Intake and Main Return, and to use the drifts as emergency egress for the Aberpergwm Mine underground workings;

- potential employment of either alternative methods of transportation of waste to the MWR, for example – pipeline or overland conveyor, or a mixture of methods of transport in order to minimize any potential impacts of haulage;

- potential alternative or additional means of export/transport of coal from the mine site – with rail being the main potential method (potentially with associated overland conveyor); and

- potential additional accommodation facilities for the increased workforce and some associated alterations or additions to the mine surface layout.

16.1.5 There are also off-site developments which could be considered as having potential for adverse cumulative air quality and dust impacts in the locality of Aberpergwm Mine. These are:

- Hirfynydd Windfarm;

- Outline application for mixed use development comprising of up to 60 residential units, up to 100 units of holiday accommodation, up to 350sq.m retail and up to 1000sq.m of leisure at Rheola House;

- Wind Farm at Maesgwyn;

- Health Centre, Glynneath (Outline);

- Selar Opencast.

16.1.6 This chapter considers the existing baseline conditions, the site activities that could lead to dust and pollution emissions, forecasts potential impacts and finally identifies effective mitigation measures and residual impacts, where appropriate.

16.2 Planning policy context, legislation and guidance

Relevant Planning Policy

16.2.1 Minerals Planning Policy Wales 2000 sets out the land use planning policy guidance of the Welsh Assembly Government for mineral extraction. One of the key principles of sustainable mineral development is to limit the environmental impact of mineral operations.

16.2.2 MPPW states that Unitary Development Plans should set out the criteria that will be applied to minerals proposals to ensure that they do not have an unacceptable adverse impact on environment and amenity of nearby residents. Further advice is available in Technical Advice Notes and relevant to the proposals at Aberpergwm Mine is Minerals Technical Advice Note (MTAN) 2: Coal.

Minerals Technical Advice Note 2: Coal (January 2009)

16.2.3 MTAN 2: Coal sets out detailed advice on the mechanisms for delivering the policy for coal extraction by mineral planning authorities and the coal industry in Wales. MTAN 2: Coal sets out the potential impacts and guidance to reduce the impacts of coal workings including dust.

Dust

16.2.4 There is no universally recognised definition of dust, but for the purposes of this assessment dust is taken to comprise solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air. In this report dust has been used to include the particles that give rise to soiling and to human health and ecological effects. MTAN 2 makes reference to dispersal of dust which is described in the Department of Environment (DoE) report, The Environmental Effects of Dust from Surface Mineral Workings[2]. In particular, the evidence regarding the extent of dust disposition from surface mineral workings is considered. It was found that for dust emitted from mineral workings approximately 95% of particles are between 30 and 75µm and have a relatively high mass and settling velocity. Particles of this size generally deposit within 100m of a point of release. Particles in the size range of 10-30µm therefore make up only a minor proportion of dust from mineral sites and these will also tend to fall out of the atmosphere within 250m of the point of release. Additionally, modelling studies have shown that deposition rates decrease significantly (in an almost logarithmic manner) with increasing distance from the source.

16.2.5 The potential for dust to arise from mineral sites is generally a matter of public concern. There may be the perception that the annoyance created during works

2 '*The Environmental Effects of Dust from Surface Mineral Workings*' Volume Two, Technical Report, Arup Environmental Ove Arup & Partners, Department of the Environment. HMSO. December 1995.

could affect local amenity value and quality of life for the period during operations. The level of concern and potential for statutory nuisance may be directly related to the number and proximity of residential areas to the site.

16.2.6 The amount of dust that might cause complaint or annoyance in a particular circumstance is very difficult to determine and there are no statutory limits such as those applicable to suspended particulates or gaseous pollutants. The 'Environmental Effects of Dust from Surface Mineral Workings' (HMSO, 1995) suggests that there is little consensus about possible deposited dust levels, and there is little basis for applying any of the published guidelines as a definitive absolute dust nuisance standard for the UK.

16.2.7 Dust complaints are usually associated with periods of peak deposition, occurring during particular weather conditions. There is a "normal" level of dust deposition in every community and it is only when the rate of deposition is high relative to the norm that complaints tend to occur. The effect of dust on a community can be determined by five main factors:

- The location of the potential dust source relative to the community;
- The duration of the site activities that contribute to dust;
- The short-term dustiness during periods of dry weather (climatic factors);
- The frequency or regularity with which these occur; and
- The effectiveness of dust control measures adopted by the site operator.

16.2.8 Whilst there are no statutory air quality criteria for dust nuisance set in the UK (as 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred), various documents suggest a mean average rate of 200mg/m^2 per day as a guideline limit value[3].

16.2.9 Research undertaken by Goodquarry has however concluded that the 'unofficial' limit UK rate of 200mg/m^2 per day, or where the colour of dust is taken into account

3 Department of Environment ' *The Environmental Effects of Dust from Surface Mineral Workings*'. 1995; The Environment Agency, Technical Guidance Document (Monitoring) M17 ' *Monitoring of Particulate Matter in Ambient Air Around Waste Facilities'*, March 2004.

(20-25% Effective Area Coverage (EAC)) soiling units per week, is too high to be acceptable for amenity purposes[4].

16.2.10 MTAN 2 says that: "for coal working the Minerals Planning Authority should set conditions of a maximum 80mg/ m^2 per day as a weekly average or set limiting criteria as the combination of 100% Absolute Area Coverage (ACC%)[5] across a single 450 sector over a seven day period or the dusting effect or discolouration where the EAC is greater than 25% for a single sector within the same period".

Fine Particulate Matter (PM10 , PM2.5)

16.2.11 MTAN 2 states that "there is no known safe level of exposure to particulate matter and exposure can lead to impacts ranging from minor effects on the respiratory system to premature mortality". Research indicates that adverse health effects are dominant in more vulnerable groups such as the elderly, children and people affected by pre-existing health issues such as heart or lung disease or diabetes.

16.2.12 As a result of the potential impact on health, standards and objectives for PM10 and PM2.5 (fine particulates with a diameter less than 10µm and 2.5µm respectively are prescribed in the AQS and regulations.

16.2.13 MTAN 2 also refers to a Department of Health Report (1999) which concluded that it is relevant to consider the contribution of opencast coal sites to PM10 levels in communities up to 1km from a site. A 1999 report prepared by Newcastle University, titled "Do Particles from Opencast Mining Impair Children's Respiratory Health?", concluded that the average increment in ambient concentrations of PM10 experienced by communities close to opencast mines (less than 750m between the active part of the site and the centre of the community) and control sites with no opencast mines was 2.1µg/m^3. The mine surface operations and use of the MRW does not comprise opencast coal operations but there will be minor construction and earthworks and therefore there is potential for small contributions of PM10 and PM2.5 from these operations.

4 MTAN 2: Coal: January 2009

5 ACC% = a measure of the proportion of an area that has been dusted irrespective of dust colour.

Unitary Development Plan (UDP) 2008

16.2.14 The objectives of the UDP with regard to mineral operations include ensuring that mineral operations minimise adverse effects on communities, the landscape, water resources, wildlife and habitats. The policies which reflect these objectives relating to air quality are:

16.2.15 Policy 4:"The creation of pollution or risk to health and amenities that would have unacceptable impacts upon the environment, communities or individuals will be resisted".

16.2.16 Policy 20: This policy states that proposals for coal extraction will be favoured where they contribute to the County Borough's share of local, regional or national production subject to (a) ensuring that the impacts on the environment and local communities are acceptable.

16.2.17 Policy GC2: Engineering Works and Operations (including minerals and waste) refers to ENV15.

16.2.18 Policy ENV15 of the UDP regarding air quality states: 'Proposals which would be likely to have an unacceptable adverse effect on air quality, or would expose people to an unacceptable level of air pollution will not be permitted'.

Relevant Legalisation and Guidance

Air Quality Standards and Objectives

16.2.19 The UK National Air Quality Strategy (NAQS) was published in March 1997 fulfilling the requirement under the Environment Act 1995 for a national air quality strategy setting out policies for the management of ambient air quality. The Strategy sets objectives for eight pollutants, which may potentially occur in the UK at levels that give cause for concern. These pollutants are: nitrogen dioxide, sulphur dioxide, carbon monoxide, lead, fine particulates (PM10), benzene, 1,3–butadiene and ozone.

16.2.20 The Strategy was reviewed and a Review Report[6] and Consultation Document[7] were published by the Department of the Environment, Transport and the Regions in

6 Department of the Environment, Transport and the Regions, January 1999. Report on the Review of the National Air Quality Strategy, Proposals to amend the Strategy.

1999. A revised version (The Air Quality Strategy (AQS) 2000), which supersedes the 1997 Strategy, was published in January 2000. The AQS 2000 strengthens the objectives for a number of pollutants with the exception of that for particulates, which was replaced with the less stringent EU limit value.

16.2.21 The objectives for the eight pollutants in the Strategy provide the basis of the implementation of Part IV of the Environment Act 1995. The Air Quality Strategy objectives for each pollutant, except ozone, were given statutory status in the Air Quality (Wales) Regulations, 2000[8] and Air Quality (Wales) (Amendment) Regulations 20029 ('the Regulations').

16.2.22 In 2007 the Air Quality Strategy was revised. This latest strategy[10] does not remove any of the objectives set out in the previous strategy or its addendum, apart from replacing the provisional 2010 objective for PM10 in England, Wales and Northern Ireland with the exposure reduction approach for PM2.5. The UK Government and the Devolved Administrations have now therefore set new national air quality objectives for particulate matter smaller than 2.5µm diameter (PM2.5).

16.2.23 EU Directive 2008/50/EC[11] came into force in June 2008 and was transposed into legislation in Wales on 11th June 2010 as 'The Air Quality Standards Regulations 2010'[12.] This EU Directive consolidates existing air quality legislation and provides a new regulatory framework for PM2.5.

16.2.24 The current Air Quality Standards and Objectives, as set out in the Air Quality Standards Regulations 2010, are detailed in Appendix 16.1 and details of the PM10 and PM2.5 and NO2 standards and objectives are outlined in Table 16.1:

7 Department of the Environment, Transport and the Regions 1999, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. A consultation document.

8 The Air Quality (Wales) Regulations 2002 SI No 1940 (W138).

9 The Air Quality (Amendment) Regulations 2002 SI No 3182 (W298).

10 Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007.

11 Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe.

12 Statutory Instruments 2010 No. 1433 (W.126) The Air Quality Standards (Wales) Regulations 2010.

Table 16.1: Air Quality (Wales) Regulations 2010. Summary of Current Air Quality Standards and Objectives for Nitrogen Dioxide and Fine Particulates		
PM10	1 day	50µg/m3 not to be exceeded more than 35 times a calendar year
	Calendar year	40µg/m3
PM2.5	Calendar year	25µg/m3 to be met by 1st January 2015
Nitrogen Dioxide	1 hour	200µg/m3 not to be exceeded more than 18 times a calendar year
	Calendar year	40µg/m3

Examples of where the Air Quality Objectives should/should not apply are included in Table 16.2. This table is taken from Local Air Quality Management Technical Guidance document LAQM.TG (09)[13].

Table 16.2: Examples of where the Air Quality Objectives Should/Should Not Apply		
Averaging Period	Objectives Should Apply At	Objectives Should Generally Not Apply At
Annual Mean	All background locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, libraries, etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites or any other location where public exposure is expected to be short term.
24 hour (daily) mean 8 hour mean	All locations where the annual mean objectives would apply together with Hotels. Gardens of residential properties1	Kerbside sites, or any other location where public exposure is expected to be short term.
1 hour mean	All locations where the annual mean and 24 and 8-hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and railway stations etc. which are not fully enclosed where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend one hour or longer.	Kerbside sites where public would not be expected to have regular access.
15 min	All locations where members of the public might	

13 Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance 2009.

Table 16.2: Examples of where the Air Quality Objectives Should/Should Not Apply		
Averaging Period	Objectives Should Apply At	Objectives Should Generally Not Apply At
mean	reasonably be exposed for a period of 15 minutes or longer.	
1: Such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens although local judgement should always be applied.		

Environmental Permitting (England and Wales) (Amendment) Regulations 2012

16.2.25 Part 1 of the Environmental Protection Act (EPA) 1990 brought emissions to air from certain industrial processes under the direct control of Local Authorities. Under old legislation (The Pollution Prevention and Control (PPC) (England and Wales) Regulations 2000), Part 1 of EPA 1990 Part A processes were controlled by Integrated Pollution Control (IPC) by the Environment Agency and Part B processes were controlled for emissions to air by local authorities[14].

16.2.26 Following The Pollution Control Act 1999, the Integrated Pollution Prevention and Control regime (IPPC) implemented Part A1 (large installations regulated by The Environment Agency), Part A2 (medium sized installations regulated by Local Authorities) and Part B classifications of industrial processes. The Part B system is known as Local Authority Pollution Prevention Control (LAPPC) and The Part A2 system is Local Authority Integrated Pollution Prevention and Control (LA-IPPC).

16.2.27 In 2008 the IPPC regime was superseded by the Environmental Permitting regime following the implementation of The Environmental Permitting (England and Wales) Regulations 2007. The classification of industrial processes remains the same but includes Waste Management Licences within the same permit system to simplify the process. These environmental permitting regulations have since undergone several amendments with the latest version 'The Environmental Permitting (England and Wales) Regulations 2010 (revised 2013)'. The operations at Aberpergwm Mine are covered by the existing LAPPC permit reference E3/1/40 – permit variation 24th February 2012.

14 http://www.mapac.org.uk

Local Air Quality Management Guidance

16.2.28 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007, establishes the framework for air quality improvements based on measures agreed at a national and international level. However, despite these measures, it is recognised that areas of poor air quality will remain and these should be dealt with through the Local Air Quality Management (LAQM) process using locally implemented measures.

16.2.29 Local Air Quality Management (LAQM) legislation in the Environment Act 1995 requires local authorities to conduct periodic review and assessments of air quality. These aim to identify all those areas where the air quality objectives are being, or are likely to be, exceeded.

16.2.30 All Authorities were required to undertake the first stage of review and assessment which concluded in September 2001. In those areas identified as having the potential to experience elevated levels of pollutants the authority was required to undertake a more detailed second stage review comprising two steps; Updating and Screening Assessments and Detailed Assessments. Where it was predicted that one or more of the air quality objectives would be unlikely to be met by the end of 2005, local authorities were required to proceed to a third stage, and if necessary, declare Air Quality Management Areas and make action plans for improvements in air quality, in pursuit of the national air quality objectives.

16.2.31 In 2007 an Evaluation Report was commissioned by the UK Government and Devolved Administrations. Following this review revised LAQM Technical Guidance was published in February 2009 comprising LAQM. TG(09). This revised guidance draws together previous guidance and the recommendations of the 2007 Evaluation Report. TG(09) maintains the phased approach to review and assessment established in previous technical guidance. The intention is that local authorities should only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded.

16.2.32 Where a Detailed Assessment indicates that any of the air quality objectives are likely to be exceeded, an Air Quality Management Area (AQMA) must be designated, or the geographical boundaries of an existing AQMA must be confirmed. An AQMA should only be declared if a Detailed Assessment has been undertaken.

16.2.33 Once an AQMA has been declared the local authority is required to undertake a further assessment within 12 months of the declaration.

16.2.34 A rolling programme of Updating and Screening Assessment and Detailed Assessment based on a three-year cycle has been laid down by Defra in its TG(09) policy guidance (Defra 2009). This is supplemented by Progress Reports which are intended to maintain continuity in the LAQM process between the three-yearly cycle of Review and Assessment. Progress Reports are required in the years when the authority is not completing an Updating and Screening Assessment.

DEFRA Technical Guidance Note LAQM.TG (09) (Feb 2009)

16.2.35 The primary guidance for local authorities relating to the assessment of ambient air quality is Technical Guidance Note LAQM .TG (09) (Feb 2009). It provides a summary of emission sources and relevant pollutants to be considered as part of the Updating and Screening Assessment. With regard to vehicle emissions the relevant pollutants are Nitrogen Dioxide (NO2) and PM10. For materials handling and opencast coal mining the relevant pollutant is PM10.

Neath Port Talbot County Borough Council

16.2.36 The most recent air quality report available from the NPTCBC is the Annual Air Quality Reports and Updating and Screening Assessment (October 2011)[15].

16.2.37 Taiback/Margam AQMA was declared by Neath and Port Talbot County Borough Council in 2004 for PM10, however this is located approximately 18 km to south west of the site.

16.2.38 Neath Port Talbot County Borough Council (NPTCBC) undertake dust and grit monitoring at 12 monitoring locations across the county.

16.2.39 For the purposes of comparing fallout levels, NPTCBC categorise fallout levels as shown in Table 16.3. These are categories defined by NPTCBC and are not official categories.

15 http://pollution.npt.gov.uk/reports/a_q_prog_2011_npt.pdf

Table16.3: Dust fallout categories as defined by NPTCBC	
Fallout rate mg/m2/day	Category
< 40	Low
to 79	Moderate
to 159	High
>159	Very High

16.2.40 NPTCPC reference a "nuisance limit" of 200 mg/m2/day in the Local Air Quality Management Progress Report, 2011, and state "which some recognise as relevant for this method of monitoring".

Guidance on the Assessment of Dust from Demolition and Construction', February 2014.

16.2.41 The Institute of Air Quality Management (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' '(February 2014), and provides guidance on undertaking a construction impact assessment with emphasis on classifying the risk of dust impacts from a site and appropriate mitigation proportionate to the level of risk identified.

16.3 Potential for air quality and dust impacts

Introduction

16.3.1 The following section outlines the potential for dust and air quality impacts associated with each of the three elements of proposed development at Aberpergwm and potential cumulative impacts associated with the potential future developments.

Details of the Proposed Development

Surface Mine Operations

16.3.2 The application is to retain existing built structures as per drawing number JNP/SRP/13. Additional proposed elements are:

- Storage of coal until Construction of a Dry Coal Store building (steel frame).
- Construct Transfer House;

- Installation of overland ROM conveyor (steel work);
- Construct spiral chute bunker;
- Phase 1 drainage works;
- Installation of landscaping and security fencing.

16.4 Potential Dust Impacts

Construction Operations

16.4.1 The main activities involved with the construction phase of works are as follows:

- Earthworks which may be required prior to the construction phase of works and can include:
    - Cleaning the site;
    - Ground excavation of old concrete hardstanding near the FSV Garage;
    - Earthworks for the foundations of transfer house;
    - Storage, subsequent transport and use of concrete/aggregate materials.
- Construction which will involve the construction of transfer building, dry coal storage building, small scale operations involving processes such as cutting and drilling. Unsurfaced haulage roads are also typically a significant source of dust on construction sites.
- Trackout which is the transport of dust and dirt by vehicles travelling from a construction site on to the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the site. This dust and dirt can then be deposited and re-suspended by other vehicles.

16.4.2 There are no proposed demolition activities associated within the development site. Demolition activities are not therefore considered within this assessment.

Operational phase

16.4.3 It is reported in MTAN 2 that dust from open cast sites is mainly coarse (10μm - 75μm). Aberpergwm is an underground mine, but will have ancillary surface operations including materials handling, movement and storage, however these would not be on the scale associated with an opencast site (i.e. significant extraction and storage operations).

16.4.4 There is potential for dust to arise during coal handling (conveyors, loading and unloading of materials) storage activities and transportation activities during the operational phase.

Mine Waste Repository and Haul Road

16.4.5 The proposal is for a long term MWR capable of accommodating 10.4 million m3 of material along with water treatment facilities and retention of the associated existing haul road. It is proposed to modify the haul road to provide a suitable operational width and surface (including a crushed stone surface with additional roadway fabric on high wear areas) to allow increased usage by haulage dumper traffic and to modify and upgrade the existing water treatment facilities as well as additional water treatment facilities and additional discharge points.

16.4.6 There is potential for dust impacts, associated with the waste repository operations through transportation, tipping and restoration works. Air quality at the site is affected by releases of air pollutants to the local environment through exhaust emissions generated by site plant and from vehicle movements to and from the MWR. There will be no off-site vehicle movements of mine waste discard.

16.4.7 The mechanical action of wheels on the road surface causes dust lying on the road surface to be thrown up and become entrained in a moving airflow. The deposition of this dust is dependent upon particle size and meteorological conditions. The erosivity of haul road traffic depends on the number and size of wheels, vehicle speeds and the moisture content of the surface material.

Extension to and development of the underground coal workings at Aberpergwm mine.

16.4.8 Energybuild propose to increase coal production at the mine year on year from 2014 - 2020, with maximum production being sought and sustained beyond 2020.

16.4.9 The customer base for the product includes metallurgical coal for use in pulverised coal injection (PCI) techniques at the nearby Tata steel works – which will be transferred by road to Port Talbot; and thermal product used at Aberthaw power Station – which will be transferred by road to the rail head at Unity, and then by rail to Aberthaw

16.4.10 There will be air quality impacts associated with the transportation of coal from the site.

16.5 Cumulative Impacts

Future Potential Developments at Aberpergwm Mine

16.5.1 With regard to the potential future developments at Aberpergwm Mine there is potential for air quality impacts associated with a change in sources of air quality emissions.

16.5.2 As the quantity of coal production increases there may be a need to provide some alternative or additional transport options to coal movements by road. In general the only feasible alternative is for the greater use of rail to haul the coal.

16.5.3 The nearest access to a rail head is at Unity Mine. Therefore options for transporting coal from Aberpergwm Mine to the rail head could be considered. The possible options available include:

- Overland conveyor;
- Pipeline;
- HGV haul route;
- A combination of the above.

16.5.4 Any of the above options could be developed along the same broad corridor.

16.5.5 A potential corridor for the transport of coal from Aberpergwm Colliery surface to the rail head at Unity Mine is shown on Drawing No JNP/TRANS CORR/13 Rev1 (See Section 20) and follows a route south west from Aberpergwm Colliery surface along the river valley between the Neath Canal and the River Neath, crossing beneath the A465 at the same point that the River Neath crosses the A465 near Cwmgrach.

16.5.6 The use of a conveyor/and or pipeline and rail loading facility at Unity land would reduce emissions associated with transportation of coal by road but emissions via train would increase.

16.5.7 With the planned increase in mine production, the haulage of discard to the MWR by ADT (dumpers) could be replaced or supplemented by alternative means within a notional corridor, e.g. a conveyor or pipeline which would limit the vehicle emissions produced by ADT associated with an increase in production.

16.5.8 There would be potential for dust and fine particulate emissions associated with any construction activities, including the re-opening the Treforgan drift access and construction of new welfare and offices to be located in the existing car park south of the B4242.

Off-site cumulative development schemes

16.5.9 With regard to the potential off-site developments there is potential for dust and air quality pollutants associated with construction of wind farms, mixed-use and health centre developments and operation of Selar Opencast. Vehicle movements associated with these developments will also give rise to emissions of nitrogen dioxide and fine particulates.

16.6 Assessment methodology

Consultation and Scope of Assessment

16.6.1 Consultation regarding the scope of the assessment was undertaken by e-mail on the 5th and 14th February 2013 with Mr Martin Hooper, Pollution Control Officer at NPTCBC. The following points were agreed:

- A semi-quantitative assessment for dust impact assessment using the following Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction' (February 2014), to assess the impacts;
- Assessment of possible health effects associated with fine particulate matter with reference to background concentration of PM10 from review of the Defra Local Air Quality Management website;

- To use the Highway Agency's Design Manual Roads and Bridges (DMRB) screening method to assess the impact of traffic emissions on air quality;

- The assessments will also qualitatively assess any potential impacts on any surrounding ecological sensitive habitats.

16.6.2 Mr Hooper was also contacted in August 2012 in connection with the preparation of an individual air quality report for the MWR operations. It was agreed that the assessment of the potential impacts of emissions from haulage trucks, transporting discard between Aberpergwm Mine and the MWR could be scoped out due to the site being in a remote location.

Construction Phase Assessment – Dust Emissions

16.6.3 To assess the impacts associated with dust and PM10 releases, during the construction of structures at the surface mine area an assessment has been undertaken in accordance with the Institute of Air Quality Management (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (February 2014)'.

16.6.4 Whilst the MWR operations relate to mineral workings it is considered that the criteria referenced in this document, regarding sensitivity of the location, dust risk categories and assessment of significance, can also be used to assess the potential deposition dust impacts from the proposed earthworks and vehicles using the haul road.

Step 1

16.6.5 Step 1 of the assessment is to screen the requirement for a more detailed assessment. The guidance states that an assessment will normally be required where there are existing sensitive receptors within 350m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance.

16.6.6 With regard to ecological receptors, the guidance states that an assessment will normally be required where there are existing ecological receptors within 50m of the site boundary and /or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

16.6.7 The exact route of the construction vehicles to construct the outstanding structures associated with the surface mine area is not known at this stage. There are however existing sensitive receptors located within 350m of the site boundary. It is therefore, necessary to proceed to Step 2 of the assessment.

Step 2

16.6.8 Step 2 of the assessment determines the potential risk of dust arising in sufficient quantities to cause annoyance, or health effects and/or ecological impacts. The risk is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc);
- The duration of these activities;
- The size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of receptors to dust.

16.6.9 The risk of dust effects is determined using four risk categories: negligible, low, medium or high risk. A site is allocated to a risk category based upon two factors:

- Step 2A – the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large; and
- Step 2B – the sensitivity of the area to dust impacts which is defined as low, medium or high sensitivity.

16.6.10 These two factors are combined in Step 2C to determine the risk of dust impact with no mitigation applied.

16.6.11 The risk of dust effects is determined for four types of construction phase activities, with each activity being considered separately. If a construction phase activity is not

taking place on the site, then it does not need to be assessed. The four types of activities to be considered are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (transport of dust and dirt by vehicles travelling from a construction site on to the public road network).

Step 3

16.6.12 Step 3 of the assessment determines the site-specific mitigation required for each of the activities, based on the risk determined in Step 2. Mitigation measures are detailed in guidance published by the Greater London Authority16, which is recommended for use outside the capital by LAQM guidance, and the IAQM guidance document itself. If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

Step 4

16.6.13 Step 4 assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

Surface Mine Operations – Existing Dust Sensitive Receptors

16.6.14 The closest existing human sensitive receptors to the surface mine operations are residential in nature and are detailed in Table 16.4. This table also lists the ecological receptors, or potentially dust sensitive statutory designated habitat sites, within 50m of the site and /or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Table 16.4: Existing Sensitive Receptors: Construction Phase Dust Assessment

Receptor	Direction from the Site	Approximate Distance from the Site Boundary	Approximate Distance from Construction Activities

16 Greater London Authority (2006) The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance

Table 16.4: Existing Sensitive Receptors: Construction Phase Dust Assessment			
Receptor	Direction from the Site	Approximate Distance from the Site Boundary	Approximate Distance from Construction Activities
Residential			
Aberpergwm House	North east	70m	90m
1 Manor Drive	North east	55m	190m
St Cadoc's Church	East	155m	260m
Elmwood	South East	90m	120m
Potential Health Centre	South	20m	80m
Vegetation and Ecosystems			
Cwm Gwrelych and Nant Llyn Fach Streams Site of Special Scientific Interest (SSSI)17	South	350m	350m
Lowland mixed deciduous woodland (a Section 42 and UK Biodiversity Action Plan (BAP) Habitats of Principal Importance for Conservation of Biological Diversity in Wales under Section 42 of the NERC Act 2006 and UK BAP Plan Priority Habitat);	North	Adjacent	100m
Neath Canal runs parallel to the southern boundary. Local BAP habitat	South	Adjacent	15m
Nant Pergwm. Local BAP habitat.	East	Adjacent	20m

MWR and Haul Road - Existing Dust Sensitive Receptors

The closest existing human sensitive receptors to the MWR are residential in nature and are detailed in Table 16.5.

17 SSSI is are nationally important sites designated under the Wildlife and Countryside Act 1981 (as amended).

Table 16.5: Site Separation Distances and Distances from Nearest Communities		
Community	Approx Distance from Site (Km)	Direction
Banwell (Roman Road)	1.2	North east
Seven Sisters	2.2	North west
Glynneath	2.9	East
Resolven	4.0	South West
Dyffryn Cellwen/Onllwyn	4.0	North

16.6.15 The haul route of mine waste and washery discard, from Aberpergwm Mine to the MWR site, is shown on the Scope Plan. Table 16.6 below outlines the distances from the haul road to the nearest residential properties:

Table16.6: Site Separation distances from Nearest Properties		
Property	Distance from Haul road (m)	Direction
Engine Cottage	60m	West
Pant y Gwarthog	350m	West

16.6.16 Table 16.7 outlines the distances from the application boundary to the nearest statutory protected sites of nature conservation interest.

Table 16.7: Site Separation distances from nearest Statutory Protected Habitats/Conservation Areas		
Site	Approximate Distance from Site (km) and direction	Designation
Coedydd Nedd a Mellte / Dyffrynoedd Nedd a Mellte a Moel Penderyn	5 to east	Special Area of Conservation (SAC[18)] and Site of Special Scientific Interest (SSSI[19])
Nant y Rhos	4 to west	SSSI
Gorsllwyn, Onllwyn	4 to north east	SSSI

18 SAC is an internationally protected site designated under the EC Habitats Directive (92/43/EEC).

19 SSSI is are nationally important sites designated under the Wildlife and Countryside Act 1981 (as amended).

16.6.17 Table 16.8 below outlines the distances from the nearest archaeological sensitive receptors.

Table 16.8: Site Separation distances from Sensitive Archaeological Receptors		
Site	Distance from Site (Km)	Description
Section of Sarn Helen Road	90m at its closest point to the MWR site boundary	Roman Road
Roman Fort on the Roman Road – SN8284 0663	Beyond 1km to the west	Scheduled Monument

16.7 Operational Phase Assessment

Fine Particulate Emissions

16.7.1 To assess the possible health effects associated with fine particulate matter background concentrations of PM10, taken from the Defra Local Air Quality Management website together with the findings of research published "Do Particulates from Opencast Mining Impair Children's Respiratory Health" 1990, will be used to estimate likely particulate levels at sensitive receptors.

Vehicle emissions

16.7.2 There will be changes in vehicle movements on the roads near the site because of the proposed development. This has the potential to change the air quality experienced by existing sensitive receptors located near these roads. The potential changes in emissions of NO2 and PM10 have been assessed using the screening methodology outlined in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1, HA207/07, May 2007. DMRB contains a spreadsheet identified as 'The Local Impacts Screening Method'. This has been used to predict the concentrations of NO2 and PM10 at existing sensitive receptor locations; as these pollutants are considered to be the most likely to exceed the air quality objectives.

16.7.3 A DMRB screening assessment has been undertaken to consider the potential air quality impacts associated with the operational phase of the proposed development. The predicted impacts have been assessed against the air quality objectives and standards set out in the Air Quality Standard Regulations (2010). Changes in concentrations of these pollutants between 'with' and 'without development'

scenarios are also assessed against a set of significance criteria, detailed in Table 16.20.

16.7.4 The DMRB provides a prediction method for assessing the air quality relating to vehicle emissions up to 200m from a road. However the DMRB spreadsheet used only provides an indication as to whether there is likely to be a breach in air quality standards resulting from emissions from vehicles and whether further detailed forecast assessment work is required.

16.7.5 Four of the five residential receptors chosen for the assessment and road links are shown on Drawing Number CA10605/16.1 and are listed in Table 16.9. Receptor 5 is a property located at Redhill Close which lies close to a roundabout junction where the A4059, A4061 and A465 meet. The assessment also considers committed development traffic development for other schemes as considered in the transport chapter.

Table 16.9: Sensitive Receptor Locations

Receptor	Address	Grid Reference		Type of Receptor
		Easting	Northing	
1	Proposed Health Centre	286761	205849	Health Centre
2	Chain Road	286982	205736	Residential
3	2 Church Crescent, Cwmgrach	286936	205549	Residential
4	53 Cefn Gelli	286582	205392	Residential
5	Redhill Close	295096	205555	Residential

16.7.6 The DMRB screening assessment requires the input of detailed road traffic flow information for those routes which may be affected by the proposed development. The air quality assessment has been undertaken based on Annual Average Daily Traffic (AADT) flows and HGV percentages obtained from Asbri Transport for the following scenarios:

- Scenario 1 : 2014 (opening year) – baseline flow
- Scenario 2 : 2014 (opening year) – baseline flow + Committed development;

- Scenario3: 2014 (opening year) – baseline flow + Committed development Aberpergwm development;
- Scenario 4 : 2018 (interim year) – baseline flow;
- Scenario 5: 2018 (interim year) – baseline flow + Committed development;
- Scenario 6: 2018 (interim year) – baseline flow + Committed development + Aberpergwm development;
- Scenario 7: 2020 (Peak traffic flow – i.e. traffic flows associated with the maximum projected outputs for the mine) – baseline flows
- Scenario 8: 2020 (Peak traffic flow) – baseline flows + Committed Development;
- Scenario 9: 2020 (Peak traffic flow) – baseline flows + Committed Development + Aberpergwm development.

16.7.7 Scenarios up to 2020 have been considered because scenarios 7, 8 and 9 modelled are associated with the worst case traffic flows when the mine is operating at its peak production level. Development traffic levels will be expected to remain at these levels into future years unless an alternative means of transport is used which will replace some of the vehicle movements by road.

16.7.8 The road links and traffic information for each development scenario relevant to each receptor is presented in Appendix 16.2. This appendix also provides the distances of each receptor to the road link modelled.

16.7.9 Future traffic volumes have been calculated based on the planned increase in mining activity (as set out in Table 16.2 above) and the type and size of vehicles as set out below:

- Thermal product to railhead – 20 tonne rigid tipper trucks. The thermal product is to be transferred to the rail head at Unity by road, for onward transfer by rail.
- PCI to Tata (Port Talbot) – 30 tonne vehicles. This will be transferred by road, and will travel south along the A465.

16.7.10 Inputs required for the screening assessment include background concentrations of pollutants. To assist local authorities with their review and assessment of local air quality estimated background air pollution maps are available on the Defra website. The background concentrations for the relevant pollutants NO2 and PM10 were obtained for the nearest 1km x 1km data set to the receptors. The background concentrations are outlined in Table 16.24 in the Baseline Section. The assessment considers a worse case, by assuming that there will be no improvement in background pollution levels from 2013.

16.8 Information Sources

16.8.1 The information sources used within this ES chapter are:

- Part IV Environment Act, Chapter 25, Air Quality, 1995;
- DEFRA, The UK National Air Quality Strategy, March 1997;
- The Air Quality Standards Regulations 2010;
- Department for the Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(09), published February 2009;
- Environment Protection UK (EPUK) Development Control: Planning for Air Quality (2010 Update), 2010;
- NPTCBC Annual Air Quality Reports and Updating and Screening Assessment - Local Air Quality Progress Report (October 2011);
- NPTCBC - AirWise: Clean Air for Everyone (Nov 2013);
- Defra Background Pollution Concentration Maps [20];
- Design Manual for Roads and Bridges (DMRB) Screening Assessment Methodology[21] (Version 1.03c July 2007) and traffic flow data provided by Asbri Transport (Appendix 16.2);

20 http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

21 http://www.dft.gov.uk/ha/standards/guidance/air-quality.htm

- Information from Energybuild including LAPPC permits;
- Annual wind rose data and rainfall data from ADM Ltd (copies attached as Appendix 16.3);
- Deposit gauge monitoring results for the periods between March 2012 and February 2014.

16.9 Assessment of significance

Dust Impact Assessment - Construction Phase of Surface Mine Operations and Use of MWR Haul Road.

16.9.1 The Institute of Air Quality (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (February 2014), details the significance criteria for assessing the sensitivity of an area to dust soiling effects, health effects of PM10 and ecological effects as summarized in Tables 16.10 to 16.14 below.

16.9.2 The guidance then goes to provide significance criteria for the classification of dust effects from demolition, earthworks, construction activities and trackout, as summarized in Tables 16.15 to 16.16 below:

16.9.3 Trackout within the IAQM guidance report relates to the transport of dust and dirt by vehicles travelling from a construction site on to the public road network. The MWR proposals do not involve transportation of materials off-site; however it is considered that the potential risk of dust generated by trucks, using the haul road to the MWR site, can be adequately determined using the risk category from trackout criteria.

16.10 Sensitivity of the Area for Human Receptors

16.10.1 The sensitivity categories for different types of receptors, to both dust soiling and the health effects of PM10 are described in Table 16.10.

Table 16.10: Sensitivity Categories for Human Receptors		
Sensitivity Category	Dust Soiling Effects	Health effects of PM10
High	Users can reasonably expect to enjoy a high level of amenity; Appearance, aesthetics or value of a property would be diminished; Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car show rooms.	Locations where member of the public are exposed over a period of time relevant to the air quality objective for PM10; Examples include residential properties, hospitals, schools and residential care homes.
Medium	Users would expect to enjoy a reasonable level of amenity as in their home; The appearance, aesthetics or value of their property could be diminished; People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time; Examples include parks and places of work.	Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM10; Examples include office and shop workers but will generally not include workers occupationally exposed to PM10.
Low	Enjoyment of amenity would not reasonably be expected; Property would not be diminished in appearance, aesthetics or value; People or property would be expected to be present only for limited periods of time; Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	Locations where human exposure is transient; Examples include public footpaths, playing fields, parks and shopping streets.

16.10.2 Based upon the category of receptor sensitivity, the sensitivity of the area to dust soiling effects is determined using the criteria detailed in Table 16.11.

Table 16.11: Sensitivity of the Area to Dust Soiling Effects on People and Property					
Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20m	<50m	<100m	<350m
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low

Table 16.11: Sensitivity of the Area to Dust Soiling Effects on People and Property					
Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20m	<50m	<100m	<350m
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

16.10.3 Based upon the category of receptor sensitivity, the sensitivity of the area to the health effects of PM10 is determined using the criteria detailed in Table 16. 12.

Table 16.12: Sensitivity of the Area to Human Health Impacts							
Receptor Sensitivity	Annual Mean PM10 Concentration	Number of Receptors	Distance from Source (m)				
			<20m	<50m	<100m	<200m	<350m
High	>32µg/m3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

16.11 Sensitivity of the Area for Ecological Receptors

16.11.1 Dust deposition has the potential to affect sensitive habitat and plant communities in two ways: physical and chemical. Direct physical effects include smothering, which can lead to reduced photosynthesis or transpiration. Chemical effects relate to changes in soils or watercourses, such as increased acidity.

16.11.2 The sensitivity categories for different types of receptors to ecological effects are described in Table 16.13.

Table 16.13: Sensitivity Categories for Ecological Receptors	
High	Locations with an international or national designation and the designated features may be affected by dust soiling; Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain; Indicative examples include a Special Area of Conservation (SAC) designated for acid heath lands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; Locations with a national designation where the features may be affected by dust deposition; An indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	Locations with a local designation where the features may be affected by dust deposition; An indicative example is a Local Nature Reserve (LNR) with dust sensitive features.

16.11.3 Based upon the category of receptor sensitivity, the sensitivity of the area to ecological effects is determined using the criteria detailed in Table 16.14.

Table 16.14: Sensitivity of the Area to Ecological Effects		
Receptor Sensitivity	Distance from Source (m)	
	<20m	<50m
High	High	Medium
Medium	Medium	Low
Low	Low	Low

16.12 Risk of Dust Impacts

16.12.1 The risk of dust being generated by earthworks and construction activities at the site is determined using the criteria in Table 16.15.

Table 16.15: Risk of Dust Impacts – Earthworks and Construction			
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk

Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

16.12.2 The risk of dust being generated by trackout from the site and use of the haul road is determined using the criteria in Table 16.16.

Table 16.16: Risk of Dust Impacts - Trackout			
Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Medium Risk	Low Risk	Negligible

16.13 Operational Phase Assessment- Transportation of Coal

Air Quality Significance Criteria

16.13.1 The detailed significance criteria for assessing the air quality impacts for NO2 and PM10 arising from vehicle emissions are shown in Table 16.17. The criteria relate to NO2 and PM10 only as these are the pollutants most likely to exceed the air quality objectives. The criteria are taken from Environmental Protection UK (EPUK) document 'Development Control: Planning for Air Quality (2010 update)'.

Table 16.17: Definition of Impact Magnitude for Changes in Annual Mean NO2 and PM10 Concentration	
Magnitude of change	Annual Mean
Large	Increase/decrease >4µg/m3
Medium	Increase/decrease 2-4µg/m3
Small	Increase/decrease 0.4-2µg/m3
Imperceptible	Increase/decrease <0.4µg/m3

16.13.2 The EPUK document indicates that when describing an air quality impact at a specific receptor, the actual concentration at the receptor should be taken into account, in

combination with the magnitude of change, using the approach detailed in Table 16.18 This approach is appropriate for the assessment of annual mean concentrations of NO2 and PM10 in Wales i.e. where the objective concentration is 40µg/m^3.

Table 16.18: Air Quality Impact Descriptors for Changes to Annual Mean NO2 and PM10 Concentrations at a Receptor			
Absolute concentration in relation to objective / limit value	Change in concentration*		
	Small	Medium	Large
Increase with scheme			
Above objective/limit value with scheme (>40µg/m3)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just below objective/limit value with scheme (36-40µg/m3)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below objective/limit value with scheme (30-36µg/m3)	Negligible	Slight Adverse	Slight Adverse
Well below objective/limit value with scheme (<30µg/m3)	Negligible	Negligible	Slight Adverse
Decrease with scheme			
Above objective/limit value without scheme (>40µg/m3)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just below objective/limit value without scheme (36-40µg/m3)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below objective/limit value without scheme (30-36µg/m3)	Negligible	Slight Beneficial	Slight Beneficial
Well below objective/limit value without scheme (<30µg/m3)	Negligible	Negligible	Slight Beneficial

*An imperceptible change (see Table 16.17) would be described as negligible

16.14 Impact Magnitude and Receptor Sensitivity

16.14.1 The significance of an environmental impact for vehicular emissions is determined by the interaction of magnitude and sensitivity. The methodology for determining the sensitivity of the receptor is shown in Table 16.19.

Table 16.19: Methodology for Determining Sensitivity	
Sensitivity	Methodology
High	The location has little ability to absorb change without fundamentally altering its present character, or is of international or national importance. e.g. a hospital
Moderate	The location has moderate capacity to absorb change without significantly altering its present character, or is of high importance. e.g. a residential dwelling
Low	The location is tolerant of change without detriment to its character, is of low or local importance. e.g. an industrial development

16.14.2 The Impact Significance Matrix used in this assessment is shown in Table 16.20.

Table 16.20: Impact Significance Matrix			
Magnitude of Impact	Sensitivity		
	High	Moderate	Low
Substantial	Substantial Adverse/Beneficial	Substantial – Moderate Adverse/Beneficial	Substantial – Minor Adverse/Beneficial
Moderate	Substantial – Moderate Adverse/Beneficial	Moderate – Slight Adverse/Beneficial	Slight Adverse/Beneficial
Slight	Moderate – Slight Adverse/Beneficial	Slight Adverse/Beneficial	Slight – Negligible
Negligible	Negligible/Not Significant	Negligible/Not Significant	Negligible/Not Significant

16.15 Fine Particulates Assessment

16.15.1 A qualitative assessment has been undertaken to assess the potential effects of fine particulates of the operations and the potential effects of the cumulative impact schemes. The assessment considers background concentrations of fine particulates in the vicinity of the surface mine operations and MWR and refers to the primary guidance for local authorities relating to the assessment of ambient air quality is Technical Guidance Note LAQM .TG (09) (Feb 2009).

Baseline situation

Meteorological Data

16.15.2 Meteorological data for the closest recording station – Mumbles Head is attached as Appendix 16.3. The wind rose data covers the period 2003 to 2012 and indicates that the prevailing wind directions are south west and west followed by the west south west.

Existing dust levels

16.15.3 There have been no complaints from local residents regarding dust emissions from the site except in 2005 which related to mud deposits on the highway.

16.15.4 Standard documentation often refers to dust deposition as mg/m2/day. The levels of dust typical of a range of areas are given in Table 16.21. Deposition in this case is

measured using British Standard Deposit Gauges (BS 1747 Part 1[22]). The data demonstrates that a relatively wide monthly variation is usual in all environments. Short-term, daily variation will be even wider than this monthly variation, and could be expected to extend to two or five times the upper monthly value.

Table B16.21: Typical levels of deposition and obscuration dust gauges	
Situation	Deposition (mg/m2/d)
Rural	10-50 A
Rural summertime	
Suburban small town	30 – 80A
Urban	
Town centre – industrial	80 – 160 A
Note: A The Environmental Effects of Surface Mineral Workings, HMSO, 1991	

Surface Mine Operations – Existing Dust Levels

16.15.5 The long term median dust levels in the vicinity of Glynneath, independent of the Abpergwm Mine, would therefore be in the order of 30 – 80 mg/m^2/d, as measured with a British Standard Deposit Gauge.

MWR and Haul Road – Existing Dust Levels

16.15.6 The site is located in a rural setting with forestry surrounding the site in the vicinity. The long term median dust levels in the vicinity of the site, would therefore be in the order of 10 - 50 mg/m2/d, as measured with a British Standard Deposit Gauge.

16.16 Dust Monitoring Results

Surface Mine Operations

16.16.1 Walter Energy commenced a scheme of dust monitoring at the Aberpergwm Surface Mine site in March 2012.

16.16.2 The monitoring is being co-ordinated by Walter Energy. Environmental Scientifics Group (ESG) supplies the dust monitoring equipment and undertakes the laboratory analysis.

22 British Standard – Methods for the Measurement of Air Pollution. Deposit Gauges. Dec 1969.

16.16.3 Dust monitoring using three BS 1747 deposit gauges has been conducted and results are available for 20 periods between March 2012 and March 2014.

16.16.4 Dust monitoring location 1 is located at the western end of the site, south of the loading pad at the New Drift mine entrance. Dust monitoring locations 2 and 3 are located at the eastern side of the site. Location 2 is situated at the eastern part of the site, to the east of the attenuation pond. Dust gauge 3 is located to the north of gauge 2 in the south western corner of the soil storage area, and to the east of the location of the proposed dry coal storage building. The locations of the dust monitoring gauges are shown on drawing number CA10605/16.2.

16.16.5 Copies of the full results from ESG can be made available upon request. Table 16.22 provides information on the Dust Mass (mg) and Dust Deposition Rates (mg/m^2/d) for the monitoring locations shown on drawing number CA10605/16.2.

Table 16.22: Dust Mass (mg) and Dust Deposition Rate(mg/m2/d) results from Deposit Gauges 1 to 3 at Aberpergwm Surface Mine Operations											
Sampling period: Dates	19.03.12-14.05.12	14.05.12-04.07.12	04.07.12-06.09.12	06.09.12-30.10.12	30.12.12-25.12.12	25.12.12-21.01.13	21.01.13-22.02.13	20.02.13 – 20.03.13	20.03.13-17.04.13	17.04.13 – 15.05.13	15.05.13 – 12.06.13
No Days	56	51	64	54	52	35	30	28	28	28	29
Location											
1.New Drift (Yard Sample 1 in Laboratory results)	471 mg	316 mg	272 mg	85 mg	53mg	124mg	36mg	175 mg	262 mg	77 mg	143mg
	111 mg/m2/d	82 mg/m2/d	56 mg/m2/d	21 mg/m2/d	13 mg/m2/d	47 mg/m2/d	16 mg/m2/d	82 mg/m2/d	123 mg/m2/d	36 mg/m2/d	65 mg/m2/d
2. East of attenuation pond (Yard sample 2 in laboratory results)	111 mg	94mg	108mg	27mg	26mg	39mg	17mg	35 mg	54 mg	56 mg	46 mg
	26 mg/m2/d	24 mg/m2/d	22 mg/m2/d	7 mg/m2/d	7 mg/m2/d	15 mg/m2/d	7 mg/m2/d	16 mg/m2/d	25 mg/m2/d	26 mg/m2/d	21 mg/m2/d
3. South western corner of soil storage area (Yard Sample 3 in laboratory results)	154 mg	373 mg	246 mg	42 mg	51 mg	56 mg	32mg	44 mg	61mg	124 mg	110 mg
	36 mg/m2/d	96 mg/m2/d	51 mg/m2/d	10 mg/m2/d	13 mg/m2/d	21 mg/m2/d	14 mg/m2/d	21 mg/m2/d	29 mg/m2/d	58 mg/m2/d	50 mg/m2/d

Table 1622: Dust Mass (mg) and Dust Deposition Rate(mg/m2/d) results from Deposit Gauges 1 to 3 at Aberpergwm Surface Mine Operations											
Sampling period: Dates	12.06.13-10.07.13	10.07.13-07.08.13	07.08.13 – 04.09.13	04.09.13 – 03.10.13	04.10.13 – 01.11.13	01-11.13 – 27.11.13	18-12-13 – 15.01.14	15.01.14 – 12.02.14	12.02.14 – 12.03.14		
No Days	28	28	28	29	28	26	28	28	28		
Location											
1.New Drift (Yard Sample 1 in Laboratory results)	137 mg	287 mg	80 mg	206 mg	143 mg	29 mg	63 mg	49 mg	51 mg		
	64 mg/m2/d	135 mg/m2/d	38 mg/m2/d	93 mg/m2/d	67 mg/m2/d	15 mg/m2/d	30 mg/m2/d	23 mg/m2/d	24 mg/m2/d		
2. East of attenuation pond (Yard sample 2 in laboratory results)	59 mg	76mg	31 mg	52 mg	45 mg	22 mg	74 mg	22 mg	30 mg		
	28 mg/m2/d	36 mg/m2/d	15 mg/m2/d	24 mg/m2/d	21 mg/m2/d	11 mg/m2/d	35 mg/m2/d	10 mg/m2/d	14 mg/m2/d		
3. South western corner	81 mg	186 mg	77 mg	107 mg	69 mg	13mg	66 mg	44 mg	116mg		

Table 1622: Dust Mass (mg) and Dust Deposition Rate(mg/m2/d) results from Deposit Gauges 1 to 3 at Aberpergwm Surface Mine Operations											
of soil storage area (Yard Sample 3 in laboratory results)	31 mg/m2/d	87 mg/m2/d	36 mg/m2/d	49 mg/m2/d	32 mg/m2/d	7 mg/m2/d	31 mg/m2/d	21 mg/m2/d	55 mg/m2/d		

16.16.6 Table 16.22 indicates that the dust mass recorded adjacent to the New Drift mine entrance (location 1) ranged between 29mg and 471mg. The range for the deposition rate at this location was between 13 mg/m2/d and 135 mg/m^2/d (ranging between 'Low' category to 'high' according to criteria used by NPTCBC (refer to Table 16.3).

16.16.7 For gauge 2 the dust mass recorded over all the sampling periods ranged between 17mg and 111mg. The deposition rates were similar for the spring/summer months between March and September 2012-2014; 16mg/m2/d and 36 mg/m2/d. All the deposition rates are equivalent to category 'low' according to criteria used by NPTCBC (refer to Table 16.3).

16.16.8 For gauge 3 the dust mass recorded over all the sampling periods ranged between 32mg and 373mg. The deposition rates for the spring/summer months between March and September 2012; 36 and 96 mg/m2/d and 21 to 87 mg/m2/d between March and September 2013. These deposition rates range between categories 'low' and 'high' according to criteria used by NPTCBC (refer to Table 16.3). In the autumn/winter months in 2012- 2014 the deposition rates were lower between 10 and 21 mg/m2/d.These deposition rates are equivalent to category 'low' according to criteria used by NPTCBC (refer to Table 16.3).

16.16.9 ESG also characterised each dust deposits by using a Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Analysis (EDXA). A summary of the composition of the deposits for each sampling period is provided in Table 16.23.

Table 16.23 Dust deposits by SEM-EDS

	No of days	Dust Monitoring Location		
Sampling Period Dates		1.New Drift (Yard Sample 1 in Laboratory results)	2. East of attenuation pond (Yard sample 2 in laboratory results)	3. South western corner of soil storage area (Yard Sample 3 in laboratory results)
19.03.12-14.05.12	56	42% calcium rich 34% unburnt coal/ carbonaceous matter 14% plant/animal fragments 10% sand	40% unburnt coal/ carbonaceous matter 34% sand 14% general dirt 10% plant/animal Fragments 2% Iron rich	60% unburnt coal/ carbonaceous matter 14% general dirt 14% plant/animal Fragments 12% sand
14.05.12-04.07.12	51	34% general dirt 24% unburnt coal/	34% unburnt coal/ carbonaceous	36% unburnt coal/ carbonaceous matter

Table 16.23 Dust deposits by SEM-EDS				
	No of days	Dust Monitoring Location		
		carbonaceous matter 22% sand 10% plant / animal fragments 10% iron rich	matter 34% plant /animal fragments 22% sand 10% general dirt	24% sand 22% plant /animal fragments 16% calcium rich 2% iron rich
04.07.12-06.09.12	64	42% unburnt coal/ carbonaceous matter 28% general dirt 16% sand 10% plant/animal fragments 4% iron rich	42% unburnt coal/ carbonaceous matter 28% general dirt 16% sand 10% plant/animal fragments 4% iron rich	36% sand 30% unburnt coal/ carbonaceous matter 28% general dirt 16% sand 6% plant/animal fragments
06.09.12-30.10.12	54	32% general dirt 30% unburnt coal/ carbonaceous matter 26% sand 10% plant/animal fragments 2% iron rich	36% sand 30% unburnt coal/ carbonaceous matter 18% plant/animal Fragments 14% general dirt 2% iron rich	56% unburnt coal/ carbonaceous matter 18% general plant/animal Fragments 14% general dirt 2% iron rich
30.10.12-25.12.13	52	46% unburnt coal/ carbonaceous matter 30% general dirt 12% plant/animal fragments 10% sand 2% calcium rich	34% general dirt 30% unburnt coal/ carbonaceous matter 20% sand 12% plant/animal Fragments 2% iron rich 2% calcium rich	44% unburnt coal/ carbonaceous matter 26% sand 18% general dirt 8% plant/animal Fragments 2% iron rich 2% calcium rich
25.12.12-21.01.13	35	48% general dirt 34% sand 14% unburnt coal/ carbonaceous matter 4% plant/animal fragments	38% unburnt coal/ carbonaceous matter 30% general dirt 20% sand 12% plant/animal fragments	40% general dirt 36% unburnt coal/ carbonaceous matter 16% sand 6% plant/animal fragments 2%iron rich
21.01.13-22.02.13	30	46% general dirt 22% sand 18% unburnt coal/ carbonaceous matter 10% plant/animal fragments 4% iron rich	40% unburnt coal/ carbonaceous matter 26% sand 20% general dirt 12% plant/animal fragments 2% iron rich	34% sand30% unburnt coal/ carbonaceous matter 26% general dirt 8% plant/animal fragments 2% iron rich

Table 16.23 Dust deposits by SEM-EDS				
	No of days	Dust Monitoring Location		
20.02.13-20.03.13	28	48% unburnt coal/ carbonaceous matter 32% general dirt 14% sand 4% iron rich 2% plant/animal fragments	32% general dirt 28% unburnt coal/ carbonaceous matter 26% sand 4% plant/animal fragments 4% calcium rich 2% iron rich	44% unburnt coal/ carbonaceous matter 34% general dirt 18% sand 2% plant/animal fragments 2% iron rich
20.03.13-17.04.13	28	54% unburnt coal/ carbonaceous matter 34% sand 18% general dirt 2% iron rich	36% general dirt 30% sand 22% unburnt coal/ carbonaceous matter 10% plant/animal fragments 2% calcium rich	30% general dirt 30% unburnt coal/ carbonaceous matter 30% sand 6% plant/animal fragments 4% iron rich
17.04.13-15.05.13	28	30% unburnt coal/ carbonaceous matter 28% sand 20% general dirt 18% plant and animal fragments 2% iron rich 2% calcium rich	8% general dirt 12% sand 48% unburnt coal/ carbonaceous matter 30% plant and animal fragments 2% iron rich	8% general dirt 10% sand 72% unburnt coal/ carbonaceous matter 8% plant and animal fragments 2% iron rich
15.05.13–12.06.13	29	30% general dirt 14% sand 20% unburnt coal/ carbonaceous matter 26% plant and animal fragments 10% calcium rich	14% general dirt 12% sand 52% unburnt coal/ carbonaceous matter 16% plant and animal fragments 6% calcium rich	16% general dirt 24% sand 42% unburnt coal/ carbonaceous matter 16% plant and animal fragments 2% calcium rich
12.06.13-10.07.13	28	28% general dirt 26% sand 36% unburnt coal/ carbonaceous matter 8% plant and animal fragments 2% iron rich	30% general dirt 22% sand 26% unburnt coal/ carbonaceous matter 18% plant and animal fragments 4% iron rich	10% general dirt 8% sand 70% unburnt coal/ carbonaceous matter 12% plant and animal fragments
10.07.13 - 07.08.13	28	22% general dirt 8% sand 46% unburnt coal/ carbonaceous	30% general dirt 20% sand 34% unburnt coal/ carbonaceous	14% general dirt 6% sand 62% unburnt coal/ carbonaceous matter

Table 16.23 Dust deposits by SEM-EDS				
	No of days	Dust Monitoring Location		
		matter 24% plant and animal fragments	matter 16% plant and animal fragments	18% plant and animal fragments
07.08.13-04.09.13	28	28% general dirt 14% sand 54% unburnt coal/ carbonaceous matter 6% Iron rich 10% plant/animal fragments	22% general dirt 54% unburnt coal/ carbonaceous matter 8% sand 16% plant/animal fragments	14% general dirt 76% unburnt coal/ carbonaceous matter 6% sand 4% plant/animal fragments
04.09.13-03.10.13	29	20% general dirt 4% sand 62% unburnt coal/ carbonaceous matter 14% plant/animal fragments	24% general dirt 40% unburnt coal/ carbonaceous matter 22% sand 10% plant/animal fragments 2% calcium rich 2% iron rich	4% general dirt 82% unburnt coal/ carbonaceous matter 4% sand 10% plant/animal fragments
04.10.13 - 01.11.13	28	66% unburnt coal/ carbonaceous matter 18% general dirt 6% plant and animal fragments 6% iron rich 2% calcium rich 2% sand	42% unburnt coal/ carbonaceous matter 26% plant and animal fragments 18% general dirt 14% sand	68% unburnt coal/ carbonaceous matter 14% general dirt 12% plant and animal fragments 4% sand 2% calcium rich
01.11.13-27.11.13	26	58% unburnt coal/ carbonaceous matter 18% general dirt 16% sand 4% plant and animal fragments 4% calcium rich	64% unburnt coal/ carbonaceous matter 20% plant and animal fragments 10% general dirt 4% sand 2% iron rich	64% unburnt coal/ carbonaceous matter 14% general dirt 10% plant and animal fragments 8% sand 2% iron rich
18.12.13-15.01.14	28	40% unburnt coal/ carbonaceous matter 38% general dirt 14% sand 6% plant and animal fragments 2% calcium rich	46% unburnt coal/ carbonaceous matter 34% general dirt 10% sand 8% plant and animal fragments 2% iron rich	52% unburnt coal/ carbonaceous matter 22% general dirt 12% plant and animal fragments 12% sand 2% iron rich

Table 16.23 Dust deposits by SEM-EDS				
	No of days	Dust Monitoring Location		
15.01.14–12.02.14	28	56% unburnt coal/ carbonaceous matter 28% general dirt 8% plant and animal fragments 4% sand 4% iron rich	42% unburnt coal/ carbonaceous matter 26% general dirt 18% sand 10% plant and animal fragments 4% iron rich	68% unburnt coal/ carbonaceous matter 12% general dirt 8% plant and animal fragments 6% iron rich 4% sand
12.02.14-12.03.14	28	70% unburnt coal/ carbonaceous matter 12% general dirt 10% plant and animal fragments 4% calcium rich 4% sand	50% unburnt coal/ carbonaceous matter 22% general dirt 16% sand 8% plant and animal fragments 4% iron rich	44% plant and animal fragments 42% general dirt 12% unburnt coal/ carbonaceous matter 2% iron rich

16.17 Discussion of dust monitoring results

16.17.1 The closest residential development (worst case in terms of distance and situated in the direction of the prevailing wind) to the site is located to the north east of the site. Aberpergwm House is approximately 40m from the site boundary and 90m from the interim coal stocking area. Number 1 Manor Drive is located approximately 55m from the planning application boundary and 190m from the interim coal stocking area. 1 Manor Drive is located 170m to the north east of deposit gauge 3 which is the closest monitoring point to this property. Monitoring stations 1 and 2 are located beyond 250m from this property. Generally since monitoring commenced the average daily deposition rates were below 80 mg/m^2/d at monitoring station 3. The exception was for the period of results between May and July 2012 when the average daily deposition rate was 96 mg/m^2/d and the month 10th July and 7th August 2013 when the daily deposition rate was 87 mg/m^2/d. This is above the MTAN 2 guidance level of 80 mg/m^2/d and is equivalent to fallout category 'high' used by NPTCBC. Review of the composition for both periods however shows that dust comprising unburnt coal matter is actually lower as a percentage (36%) during the period of monitoring between May and July 2012 even though the deposition rate was higher (96 mg/m^2/d) . In July 2013 the % of unburnt coal was 62% where the deposition was 87 mg/m^2/d. Therefore mitigation is

required to ensure that dust deposition rates are minimised as far as possible to ensure that no significant adverse dust impacts arise at nearby off-site residential properties, and particularly during summer months when rainfall is expected to be lower.

Surface Mine Operations – off-site existing dust levels

16.17.2 Research of baseline dust conditions near to the site has been undertaken from a review of NPTCBC website which provides details of grit and dust monitoring which has been undertaken since 1993. The results of the particulate monitoring have been detailed in Annual Reports. In 2010 twelve deposit gauges were used across the County.

16.17.3 The nearest dust monitoring location to the site is number 2 Llygad yr Haul, Glynneath located approximately 250m to the north east of the site within the residential area of Morfa Glas. From the wind rose diagram attached as Appendix 16.3 it can be seen that this location was presumably chosen to represent sensitive air quality receptors located within the zone experiencing the prevailing wind direction and is downwind from the Aberpergwm site.

16.17.4 The deposit gauges measure the fallout rate but also Scanning Electron Microscopy and Energy Dispersive X-ray analysis was used to characterise the deposit.

16.17.5 The 2010 results indicate that the 'nuisance limit of 200mg/m^2/d referenced in NPCBC air quality report was not exceeded and no samples reached 10% of the 200mg/m^2/day.

16.17.6 The maximum fallout rate was 33 mg/m^2/day and the average fallout rate was 18 mg/m2/day. These are well below the 80mg/m^2/day threshold level suggested in MTAN 2.

16.17.7 Table 16.24 indicates the fallout rate between 1993 and 2010.

Table 16.24: Average Fallout Rates (mg/m2/day) recorded during each year at Llygad Yr Haul dust monitoring location	
Year	mg/m2/day
1994	30
1995	27

1996	28
1997	32
1998	26
1999	18
2000	33
2001	20
2002	16
2003	18
2004	19
2005	11
2006	15
2007	19
2008	25
2009	18
2010	20
2012*	22

Footnote: Results for 2012 from AirWise: Clean Air for Everyone (Nov 2013).

16.17.8 Table 16.24 indicates that the fallout deposition rates over the last 10 years are generally lower compared with records in the nineties. The highest fallout rate since 2000 was in 2008 (25 mg/m^2/day).

16.17.9 Table 16.25 provides a comparison of fallout composition over the last ten years.

Table 16.25: Percentage composition recorded during each year at Llygad Yr Haul dust monitoring location

Composition	Year										
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Coal	18%	16%	29%	29%	32%	30%	25%	15%	20%	14%	22%
Sand	15%	26%	18%	18%	21%	20%	25%	30%	24%	28%	26%
Dirt	24%	36%	35%	41%	36%	40%	31%	35%	32%	29%	26%
Plant /Animal	34%	11%	12%	6%	11%	10%	13%	15%	20%	25%	22%
Iron Rich	6%	11%	6%	6%	-	-	6%	5%	4%	4%	4%

Table 16.25: Percentage composition recorded during each year at Llygad Yr Haul dust monitoring location											
Carbonised	3%	-	-	-	-	-	-	-	-	-	-

Footnote:
Carbonised: partly burnt carbon based material that may be derived from combustion of coal, oil, wood etc.
Plant/animal: miscellaneous fragments of insects, plant material.
Dirt: mineral material typically found in soil and earth.

16.17.10 The data in Table 16.25 indicates that coal particles are contributing to dust fallout in nearby residential properties. Comparing the percentage figures to the data in Table 16.25 indicates the average daily contribution of coal particles in 2010 was 4mg/m^2/day and to 2.52, 5.0 and 2.85 mg/m^2/day for the years 2009, 2008, and 2007 respectively.

MWR

16.17.11 Dust monitoring using gauges at the site is not a requirement under their existing permit, however Walter Energy commenced a scheme of dust monitoring in the area using BS1747 Deposit Gauges. The monitoring is being co-ordinated by Walter Energy. Environmental Scientifics Group supplies the dust monitoring equipment and undertakes the laboratory analysis.

16.17.12 The locations of these gauges are shown on drawing number CA10605/16.3.

16.18 Dust Monitoring Results

16.18.1 A copy of the results from Environmental Services Group can be made available upon request. The results provide information on the dust mass and dust deposition rates and an examination of the contribution of particles from various sources using SEM-EDS Method Number SEMDG7. Table 16.26 provide dust mass and deposition rates from the BS Deposit Gauges.

Table 16.26: Dust Mass (mg) and Dust Deposition Rate(mg/m2/d)results from BS Deposit Gauges at current dust emissions areas around Forest Quarry 2 OCCS (Location 1)*and MWR (Location 2)*		
Location	Forest Quarry 2 Extension	MWR- Area '2' Nant Y Mynydd
19/03/12 – 24/5/12	309mg	444mg
(days = 66)	62 mg/m2/d	89 mg/m2/d

24/05/12 – 09/07/12 (days = 46)	269mg	57mg
	77 mg/m2/d	16 mg/m2/d
09/07/12 – 15/08/12 (days = 37)	507mg	179mg
	180 mg/m2/d	64 mg/m2/d
25/11/12 – 12/01/13 (days 48 days)	583mg	84mg
	160 mg/m2/d	23mg/m2/d
14/01/13 -14/02/13 (days =31)	117mg	30mg
	50 mg/m2/d	13mg/m2/d
20/02/13 – 22/03/13 (days = 30)	148mg	12mg
	65mg/m2/d	5mg/m2/d
22/03/13 – 30/04/13 (days = 39)	96mg	32mg
	32mg/m2/d	11mg/m2/d
30/04/13 – 07/06/13 (days = 38)	170mg	No result – equipment vandalised
	59mg/m2/d	No result – equipment vandalised
*locations as presented on Laboratory Analysis sheets		

16.18.2 The results indicate that the dust deposition at the dust monitoring location 2 is not above 80mg/m^2/d. Dust deposition results for the Forest Quarry 2 Extension location indicates that there have been daily rates up to 180 mg/m2/day but the extraction works are complete. Due to the remote location of this site from local communities and sites of importance for nature conservation, the deposition rates recorded at this location are not considered to bring adverse cumulative effects to communities or statutory sites of nature conservation.

16.19 Background Air Pollution Concentrations

16.19.1 The DMRB needs to take into account a background concentration for the relevant pollutants; NO2 and PM10, upon which local, traffic derived pollution is superimposed. The data may be derived through long term measurements at background sites, remote from immediate sources of air pollution. As an alternative to measured background levels, DMRB recommends the use of background concentrations obtained from default concentration maps, which have been provided for use with the revised LAQM. TG (09) guidance.

16.19.2 In the absence of data being available from a representative background continuous analyser, background pollution concentrations have been obtained from default

concentrations maps provided by Defra on their Local Air Quality Management web pages (http://laqm.defra.gov.uk/review-and-assessement/tools/background-map.html).

16.19.3 Current evidence suggests that nitrogen dioxide (NO2) concentrations are not decreasing in accordance with expected reductions. At present, there is uncertainty about how background NO2 concentrations will change in future years.

16.19.4 To provide a robust assessment, 2013 background concentrations and 2014 emission factors have been used in the opening and future year model scenarios. This approach assumes that there will be no improvement although in reality it is considered likely that there will be some improvement in background concentrations and emission factors by 2018 and 2020 and beyond. Therefore the assessment has modelled the worst case in terms of traffic levels (i.e. peak production from the mine) and worst case in terms of background concentrations and emission factors (using 2013/2014 data respectively).

16.19.5 The background concentrations for pollutants NO2 and PM10 were obtained for the nearest 1km x 1km data set to the receptors. The nearest available data set for receptors 1, 2, 3 and 4 is centred on the grid square (E) 286500, (N) 205500. For receptor 3 grid square this is grid square 287500 and 205500. The nearest available data set for receptor 5 is (E) 295500 and (N) 205500 (located within the Rhonda Cynon Taff area). The estimated background pollutant concentrations for the year 2013 are shown in Table 16.27.

Table 16.27: Background Pollutant Concentrations used in DMRB Air Quality Screening Model – Version July 2007 (V1.03c)

Background values of pollutants		
	Grid square 286500 and 205500	Grid square 295500 and 205500
	2013	2013
NO2 (µg/m3)*	7.98	10.58
NOx (µg/m3)	10.31	14.00
PM10 (Total) (µg/m3)	12.83	12.64

16.19.6 The above background concentrations are well below the national Air Quality Objective limits (refer to Appendix 16.1).

Other pollutants

16.19.7 From review of NPTCBC's Air Quality Report (2011) no air quality management areas have been declared in Neath Port Talbot or Rhondda Cynon Taff for sulphur dioxide or ozone.

16.20 Summary of air quality in the surrounding area

16.20.1 In summary, the monitoring of NO2 and dust levels in the local area by NPTCBC indicates that the air quality in the surrounding area is good when compared to respective Local air quality standards and dust 'nuisance' threshold values.

16.21 Impact assessment

Surface Mine Operations

Construction Phase - Dust Impact Assessment

16.21.1 Step 2A of the construction phase dust assessment has defined the potential dust emission magnitude from earthworks, construction activities and trackout in the absence of site specific mitigation measures.

16.21.2 Examples of the criteria for the dust emission classes are detailed in the IAQM guidance.

16.21.3 Step 2B of construction phase dust assessment has defined the sensitivity of the area, taking into account the significance criteria detailed in Tables 16.10 to 16.14, to earthworks, construction activities and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling, human health and ecological impacts.

Surface Mine Operations

16.21.4 For earthworks and construction activities there are approximately 4 residential receptor locations located within 100m of where these activities may take place. Two Local Biodiversity Action Plan (BAP) habitats are located within 20m of the proposed earthworks and construction activities. A UK BAP woodland habitat is

located within 100m of the proposed construction works for the dry coal storage building.

16.21.5 For trackout, there is one property within 20m of where trackout may occur, for a distance of up to 500m from the site entrance. Neath Canal and Nant Pergwm, both Local BAP habitats are located within 20m of where trackout may occur; i.e. roads within 500m of the site entrance on which construction vehicles may travel.

16.21.6 Step 2C of the construction phase dust assessment has defined the risk of impacts from each activity. The dust emission magnitude is combined with the sensitivity of the surrounding area.

16.21.7 The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in Tables 16.15 and 16.16.

Summary

16.21.8 Table 16.28 details the results of Step 2 of the construction phase assessment for human receptors.

Table 16.28: Construction Phase Dust Assessment (Step 2) – Human Receptors				
	Activity			
	Demolition	Earthworks	Construction	Trackout
Step 2A				
Dust Emission Magnitude	N/A	Mediuma	Smallb	Smallc
Step 2B				
Sensitivity of Closest Receptors	N/A	High	High	High
Sensitivity of Area to Dust Soiling Effects	N/A	Low	Low	Medium
Sensitivity of Area to Human Health Effects	N/A	Lowd	Lowd	Lowd
Step 2C				
Dust Risk: Dust Soiling	N/A	Low Risk	Negligible	Negligible
Dust Risk: Human Health	N/A	Low Risk	Negligible	Negligible

Table 16.28: Construction Phase Dust Assessment (Step 2) – Human Receptors				
	Activity			
	Demolition	Earthworks	Construction	Trackout
Total site area of between 2,500m^2 and 10,000m^2 Total building volume estimated to be less than 25,000m^3 and constructed with material with low potential to release dust Estimation of the dust emission class based on surface material with low potential for dust release. d. Background annual mean PM10 concentration is considered to be 12.83µg/m^3 (taken from the Defra default concentration maps, for the appropriate grid squares, for 2013).				

16.21.9 Table 16.29 details the results of Step 2 of the construction phase assessment for ecological receptors.

Table16.29: Construction Phase Dust Assessment (Step 2) – Ecological Receptors				
	Activity			
	Demolition	Earthworks	Construction	Trackout
Step 2A				
Dust Emission Magnitude	N/A	Mediuma	Smallb	Smallc
Step 2B				
Sensitivity of Closest Receptors	N/A	Lowd	Lowd	Lowd
Sensitivity of Area to Ecological Effects	N/A	Low	Low	Low
Step 2C				
Dust Risk: Ecological Impacts	N/A	Low	Negligible	Negligible
Total site area of between 2,500m^2 and 10,000m^2 Total building volume estimated to be less that 25,000m3 and constructed with material with low potential to release dust c Estimation of the dust emission class based on surface material with low potential for dust release. d. Ecological receptors considered to be Low as Local Biodiversity Action Plan habitats and not statutorily protected.				

Construction phase – Vehicle emissions

16.21.10 The majority of the earthworks operations have been completed and minor construction operations including erection of steel frame buildings remain. Construction related vehicles will have an impact on traffic levels and the local air quality near the site but the effects are likely to be small in comparison with the overall traffic flows currently experienced along the B4242 and will be temporary. It is therefore considered the impact will be negligible.

Operational Phase -Dust

16.21.11 During the operation phase, potential dust emissions will arise from depositing coal into bulk coal storage stocking areas including an interim stocking area to be located in the location of the proposed dry coal storage building; depositing ROM coal into the ROM coal storage area (drop height 7.5m), loading coal onto CPP ROM feed conveyor, depositing sized products into coal product bins (approx. 2m drop height), use of bulk sales boom loaders and coal weighing hoppers, loading 'duff' and discard onto transport vehicles, use of internal site access roads and removing sediments from settlement lagoons.

16.21.12 The closest of these operations (storage of coal at interim stocking area) to any off-site sensitive property is 90m (Aberpergwm House). Properties located along Manor Drive will be located approximately 190m from the interim stocking area.

16.21.13 Property Elwood is located approximately 130m from the settlement lagoons with the proposed health centre located at a distance from them at 90m.

16.21.14 Due to the distances of these activities from off-site residential properties there is a potential risk of disposition dust arising during the operational phase of the development at these properties in the absence of mitigation measures.

16.21.15 There have however been no complaints from these off-site properties since 2005 relating to dust deposition therefore it is considered that with the implementation of appropriate of mitigation measures, the potential for adverse impacts will be minor. There are habitats within 200m of the site that are of local and non-statutory importance for nature conservation and therefore there is potential for minor adverse impacts without mitigation.

Operational Phase - Fine Particulate assessment

16.21.16 There is potential for plant (e.g. loading shovels, dump trucks) used at the site to generate fine particle emissions. During the operation phase, potential dust emissions will arise from; depositing ROM coal into ROM coal storage area (drop height 7.5m), loading coal onto CPP ROM feed conveyor, depositing sized products into coal product bins (approx. 2m drop height), use of bulk sales boom loaders and coal weighing hoppers, loading 'duff' and discard onto transport vehicles.

16.21.17 As there are residential properties within 1km of the site activity, the possibility of PM10 exceeding the Air Quality Objective needs to be considered.

16.21.18 Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance 2009 (TG(09)) identified that dust emissions from uncontrolled and fugitive sources such as mineral sites can give rise to elevated PM10 emissions. The updating and screening checklist detailed in TG (09) has been used to determine whether there is any relevant exposure to elevated PM10 concentrations from the proposed surface mine operations.

16.21.19 The first step is in the updating and screening checklist is to establish whether there is any relevant exposure 'near' to the source of dust emissions. Near is defined in relation to the local background PM10 concentrations taken from the national maps which are available from the Defra LAQM website. In accordance with (TG(09)), near is considered to be within:

- 1000 for a background > 17 µg/m^3
- 400m for a background > 16 µg/m^3; and
- 200m for any background.

16.21.20 The above distances for relevant exposure are measured from the source. If the relevant exposure is within 50m of a road used to access the site (not within the site itself) and there are visible deposits on the road, then these sections of road, which may extend up to 1000m from the site entrance are considered to be 'near', as long as the background is above 25µg/m3.

16.21.21 The background at sensitive receptors in the vicinity of the site is around 12.83µg/m3 and therefore only those receptors within 200m of the source of dust emissions should be considered as 'near' in accordance with TG (09).

16.21.22 It is not possible to accurately model the release of PM10 from material handling operations. However, the 1999 Newcastle University report concludes that the average increment in PM10 experienced by communities close to opencast mines is 2.1µg/m^3. This figure has been added to the background PM10 figures from the Defra LAQM website to allow for the release of fine particulates from the soil and aggregate handling, in the overall process contribution.

16.21.23 When the contribution of PM10 from the site is added to the existing background concentrations of PM10 in the locality, the increase in overall concentration is marginal and the daily and annual air quality objectives are not exceeded.

16.21.24 In summary, the background level is well below the Air Quality Standard value of 40µg/m^3. The relevant exposure (the distance between the nearest off-site receptors and the proposed internal roads, site access and operations) is greater than 200m. A variety of measures at the site will be employed to minimise dust emissions including fine particles, including covering ROM conveyors, minimising drop heights where possible, hard surfacing internal roads and use of water sprays. Overall it is considered the impact of PM10 upon local residents from handling of coal and sandstone material and with a variety of dust mitigation measures in place, will be minor/negligible.

Underground Coal Workings - Transportation of Coal

Air Quality Impacts on Existing Residential Receptors

16.21.25 The results of the DMRB screening assessment is presented in Table 16.30.

Table 16.30: Results for NO2 and PM10 at Receptors Modelled

	2014			2018			2020		
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9
Receptor 1									
NO2 Annual Mean µg/m3	11.38	11.56	11.80	11.58	11.72	12.81	11.62	11.81	14.98

Table 16.30: Results for NO2 and PM10 at Receptors Modelled									
PM10 Annual Mean µg/m3	13.37	13.41	13.44	13.39	13.44	13.56	13.41	13.46	13.84
Receptor 2									
NO2 Annual Mean µg/m3	10.55	10.57	10.57	10.62	10.63	10.63	10.65	10.66	10.66
PM10 Annual Mean µg/m3	13.17	13.17	13.17	13.18	13.18	13.18	13.18	13.18	13.18
Receptor 3									
NO2 Annual Mean µg/m3	14.85	14.9	14.9	15.05	15.07	15.09	15.12	15.15	15.19
PM10 Annual Mean µg/m3	13.92	13.93	13.93	13.95	13.96	13.96	13.97	13.97	13.98
Receptor 4									
NO2 Annual Mean µg/m3	14.95	14.92	14.93	15.06	15.05	15.19	15.56	15.56	15.58
PM10 Annual Mean µg/m3	13.80	13.80	13.80	13.82	13.82	13.84	13.83	13.83	13.87
Receptor 5									
NO2 Annual Mean µg/m3	23.98	28.24	28.24	24.35	24.34	24.35	24.57	24.54	24.54
PM10 Annual Mean µg/m3	15.27	16.15	16.15	15.34	15.34	15.34	15.39	15.38	15.38

16.21.26 NO2 concentrations obtained by inputting predicted NOx concentrations into the NOx to NO2 calculator[23] in accordance with LAQM.TG(09)

16.21.27 The background NO2 figures in Table 16.27 for the grid squares for the receptor site locations ranged between 7.98 µg/m^3 and 10.58 µg/m^3.

16.21.28 The results of Table 16.30 have been assessed against the current national air quality objectives. The results of the DMRB air quality assessment indicate that none of the air quality objectives are predicted to be exceeded for any of the air pollutants assessed at receptors 1 to 5 for all scenarios i.e. 'with' or 'without' the proposed mine traffic. This assessment has considered the worst case scenarios of peak development traffic (i.e. peak mine production) and worst case background concentration levels (i.e. no improvement in background air quality from 2013).

Changes in concentration

16.21.29 The significance of any difference in concentrations of NO2 and PM10 between the 'with development' and 'without development' scenarios for each receptor for the years 2014, 2018 and 2020, have been assessed. Table 16.31 shows the differences

23 NO_x to NO_2 Calculator, Defra Local Air Quality Management web pages (http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html)

in concentration and the percentage changes. Negative changes represent a beneficial impact and positive changes indicate an adverse impact.

Table 16.31: Predicted NO_2 and PM_{10} Concentrations at Receptor Locations for 2014, 2018 and 2020 'Without Development' and 'With Development' Scenarios (Uncorrected)

Receptor	Level of Development	NO_2			PM_{10}		
		2014	2018	2020	2014	2018	2020
1	With Committed Traffic but Without Aberpergwm Development (*)	11.56	11.72	11.81	13.41	13.44	13.46
	With Development	11.80	12.81	14.98	13.44	13.56	13.84
	With - without Development	+0.24 µg/m3	+1.09 µg/m3	+3.17 µg/m3	+0.04 µg/m3	+0.12 µg/m3	+0.38 µg/m3
2	Without Development (as *)	10.57	10.63	10.66	13.17	13.18	13.18
	With Development	10.57	10.63	10.66	13.17	13.18	13.18
	With - without Development	0.00 µg/m3	0.00 µg/m3	0.00 µg/m3	0.00 µg/m3	0.00 µg/m3	0.00 µg/m3
3	Without Development (as*)	14.9	15.07	15.15	13.93	13.96	15.15
	With Development	14.9	15.09	15.19	13.93	13.96	15.19
	With - without Development	0.00 µg/m3	+0.02 µg/m3	+0.04 µg/m3	0.00 µg/m3	0.00 µg/m3	+0.04 µg/m3
4	Without Development (as*)	14.92	15.05	15.56	13.80	13.82	13.83
	With Development	14.93	15.19	15.58	13.80	13.84	13.87
	With - without Development	+-0.01 µg/m3	+0.14 µg/m3	+0.02 µg/m3	0.00 µg/m3	+0.02 µg/m3	+0.04 µg/m3
5	Without Development (as*)	28.24	24.34	24.54	16.15	15.34	15.38
	With Development	28.24	24.35	24.54	16.15	15.34	15.38
	With - without Development	0.00 µg/m3	+0.01 µg/m3	0.00 µg/m3	0.00 µg/m3	0.00 µg/m3	0.00 µg/m3

16.21.30 The results in Table 16.31 indicate that the greatest change in annual mean concentrations of NO2 at any receptor is likely to be +3.17µg/m3 with the Aberpergwm development traffic at receptor 1 in 2020 and this represents a medium change in concentration. The greatest change in PM10 at any receptor is +0.38 µg/m3 at receptor 1 and this also represents an imperceptible change in concentration.

16.21.31 Using the air quality significance criteria, the impact of the development on each of the 5 receptors can be assessed.

16.21.32 The assessment of the NO2 concentrations with and without the Aberpergwm development confirms that changes in NO2 concentrations would be approximately +3µg/m^3. In accordance with the significance criteria the impact of the development traffic on air quality at sensitive receivers modelled is negligible. This assessment has considered the worst case scenarios of peak development traffic (i.e. peak mine production) and worst case background concentration levels (i.e. no improvement in background air quality from 2013).

16.21.33 The assessment of the PM10 concentrations with and without the Aberpergwm development confirm that changes in PM10 concentrations would be <1µg/m3. In accordance with the significance criteria the impact of the development traffic on air quality at sensitive receivers modelled is negligible. This assessment has considered the worst case scenarios of peak development traffic (i.e. peak mine production) and worst case background concentration levels (i.e. no improvement in background air quality from 2013).

16.22 Air quality impacts on vegetation and ecosystems

16.22.1 The predictions for the road traffic emissions do not indicate that there will be an exceedance of the 30µg/m^3 annual mean level for nitrogen dioxides.

16.23 MWR and Haul Road

Operational Dust Impact Assessment

Earthworks at the MWR

16.23.1 Earthworks are required are part of the proposals. Potential sources of dust of earthwork activities include:

- Stripping and stockpiling of topsoil and subsoil;
- Ground excavation;
- Bringing in, tipping and spreading materials on site;
- Stockpiling materials;
- Levelling ground;
- Haul road construction;
- Vehicle movements on site roads; and
- Windblown materials from the site.

16.23.2 The dust emission magnitude is considered large.

16.23.3 However as there are no dust sensitive premises or statutory protected sites of nature conservation within 1km of the MWR site therefore the risk of deposited dust is negligible at residential receptors or sites statutory protected for their nature conservation value. No further assessment has been undertaken.

16.23.4 There is an archaeological site (Roman Road) located approximately 90m from the MWR boundary. It is not considered that dust emissions would cause a significant adverse impact on the integrity of this feature. There is also an ancient monument (Roman Fort) but this is located beyond 1km from the site boundary and is outside the prevailing wind direction. No significant adverse dust deposition at this feature as a result of the MWR and operations at Forest Quarry 2 Extension site are therefore expected.

Haulage between Aberpergwm Mine and MWR site

16.23.5 Traffic flows of up to 40 trips per day of 35T trucks are expected.

16.23.6 The only existing sensitive receptor located within 100m of the haul road is located approximately 60m to the west.

16.23.7 Taking into account that the magnitude of the dust emission would be categorised as 'Medium' within a Construction Impact Assessment, when considering the distance of the closest receptor to the haul road the risk is considered to be low in the absence of mitigation measures.

16.24 Cumulative impacts

Construction of Future Aberpergwm Schemes and Other Off-site Schemes

16.24.1 No cumulative dust or air quality impacts are expected for sensitive receptors close to the mine surface operations at Aberpergwm mine if the Treforgan Colliery is brought into operation. This is because of the distance between these two sites and no significant traffic flows will be generated as a result of the Treforgan Colliery area becoming operational.

16.24.2 There may be potential in the future for haulage of discard or haulage of coal from the site to be replaced or supplemented by alternative means e.g. conveyors/and or pipelines and for haulage of coal use of the railway. There will be potential for dust generation during any future construction works to alternative transport means (e.g installation of conveyors and/or pipelines) and other additions to the mine surface layout. Construction of windfarms, the health centre and mixed use development at Rheola House has the potential to generate dust emissions. With appropriate dust mitigation measures employed during construction operations of cumulative impact schemes and the future operation of any pipelines and/or conveyors (i.e. such as having the conveyor belts covered), the potential for any cumulative dust impacts will be minimised.

Operation of Future Aberpergwm Mine Schemes and Other Off-Site Schemes

16.24.3 The DMRB has not indicated that additional traffic on the roads in combination with the Aberpergwm mine development traffic (peak production traffic) will cause any significant adverse impacts in terms of air quality on sensitive properties within 200m of the main road links modelled. Scenario 9; 2020 (peak mine development traffic flows) modelled the baseline traffic flow with Committed Development and Aberpergwm Development.

16.24.4 The haulage of coal from the mine may in future be replaced or supplemented by transport by rail. The Defra technical guidance document LAQM.TG(09) provides

guidance on the railway lines which experience heavy diesel traffic and that may therefore need to be assessed in detail.

16.24.5 A detailed assessment may be required, for these specific railway lines, where background NO2 concentrations are higher than 25µg/m^3 and there is existing or proposed relevant exposure within 30m of the edge of the railway line.

16.24.6 The 2009 progress report indicates that "Neath Port Talbot lies on the Paddington to Swansea main railway line and therefore qualifies as having a large number of diesel locomotive movements. But according to the 2008 background air pollution maps for NO2 for the County Borough, the only location with an annual average NO2 concentration in excess of 25 µg/m3 can be found at 278500, 186500. This location lies just outside the boundary of the steel works at Margam Moors and is approximately 90 metres from the railway line. There is no residential exposure at this location. Consequently, there are no locations with a large number of movements of diesel locomotives, with potential long-term exposure within 30m of the railway line."

16.24.7 From review of background maps in 2013 there are no background levels for NO2 above 25 µg/m^3 across the County Borough. It is considered therefore that if transport of coal increased the rail traffic along the Swansea to Paddington railway line, due to background levels being lower than 25 µg/m^3, the impact on any nearby residential properties within 30m of a railway line is therefore unlikely to be significant.

16.24.8 The use of conveyors or pipelines to transport coal to the rail head would reduce the number of vehicle movements on the roads. Therefore if rail is used and / or conveyors or pipelines as an alternative means in the future, the long term operational impact on air quality will be beneficial compared by transport by road.

16.24.9 An application was submitted in July 2013 for a proposed extension to the Selar Surface Mine for phased extraction of approximately 800,000 tonnes of coal integrated into the existing and permitted operations at Selar North with associated relocation of workshop, internal access road, offices and site infrastructure. The conclusion of the air quality assessment in the Environmental Statement submitted with the application is:

16.24.10 "The findings of the dust and air quality assessment and the proposed mitigation measures comply fully with the relevant UDP policies for NPTCBC. Nuisance dust and fine particulate matter emissions from the proposed extension to Selar Mine are unlikely to cause any significant amenity or health impacts".

16.24.11 No cumulative adverse impact on air quality from the Selar mine and Aberpergwm Mine operations operating simultaneously is therefore expected.

16.24.12 In summary, no significant cumulative adverse impacts in terms of air quality or dust emissions of the proposed operations at Aberpergwm Mine have been identified.

16.25 Mitigation

Surface Mine Operations and MWR and Haulage of discard operations

Existing air quality and dust mitigation measures

16.25.1 Energybuild's operations at Aberpergwm Mine are currently regulated by a Local Authority Pollution Prevention Control (LAPPC) permits as outlined in Table 16.32:

Table 16.32: LAPPC permits for Walter Energy operations at Aberpergwm

Reference	Area	Guidance Note
E3/1/40 – 12.05.04	Aberpergwm Mine	PG3/05 (04)
E3/1/131 – 21.07.09	Forest Quarry Area Opencast	PG3/05 (04)

16.25.2 Footnote: The guidance note relating to each permit is PG3/05 (04) –Process Guidance for Coal, Coke, Coal Product and Petroleum Coke Processes.

16.25.3 From a review of the schemes, the general dust generating activities are minerals movement and loading of vehicles, use of site roadways and storage operations.

16.25.4 The primary means of dust control at the Aberpergwm Mine site are:

- conducting visual assessments twice daily and maintaining a log book indicating type of emission noted;
- action to be taken to prevent emissions of dust or particulates immediately on detection;

- tractor driven water bowsers and associated spray equipment kept on site and maintained in such a condition to meet all dust suppression requirements;
- during weather conditions which are likely to facilitate dust emissions all stockpiles which are likely to propagate dust are wetted;
- mineral movements or loading activities which are seen to generate dust are stopped until corrective measures are taken;
- drop heights are maintained to a minimum;
- stockpile areas do not encroach onto haul roads;
- all vehicles are maintained in good state of repair;
- any vehicles emitting abnormal quantities of exhaust smoke or raises abnormal quantities of dust when in operation will be withdrawn from service until the problem has been rectified;
- all site vehicles are maintained in clean condition, in particular undersides of loader mudguards and underbodies of dumper trucks;
- all vehicles observe the site speed limit set by the site manager;
- site haulage routes kept free from any accumulations of minerals;
- all site haulage routes and vehicle working areas are kept wet;
- any complaints will be recorded and reported to the Local Authorities Environmental Health Department; and
- maintaining staff training.

16.25.5 The above mitigation measures will be employed for all future operations at Aberpergwm Mine.

16.25.6 Monitoring has identified 'high' fallout rates within the surface mine operations area and therefore site specific mitigation measures are needed to be implemented to

ensure that the dust effects will not be significant in the locality and cause a nuisance to local residents.

16.25.7 In addition to the measures listed above, the following provides a summary of other dust suppression measures that will be used to limit the effect of airborne dust arising from the proposed activities at the Surface Mine Operations:

- The installed 3m high acoustic barrier to screen the properties to the south east of the site from noise from the internal site road will assist in minimising fugitive dust emissions from the site in a south/south easterly direction;
- The modular coal preparation plant is housed and fully enclosed within a building to limit airborne dust;
- The site access road will be hard surfaced, regularly cleaned and watered during dry conditions;
- There are wheel washing facilities;
- The risk of dust blow will be minimised by enclosing ROM conveyors;
- Each chute will have a Sonic spray fitted into it whilst the top belt will have a conflow controlled spray 15 metres from delivery and the bottom belt worked off the same control unit have a spray near the tail end;
- Drop heights have been minimised as far as practically possible;
- Sized coal material will be stored in sized coal product bins;
- Use of water sprays to control dust when appropriate, including the interim coal stocking area;
- The discard stockpile is located adjacent to the access road to Pwllfaron and Nant y Mynydd so as to reduce truck movements;
- Vehicle speeds will be controlled within the site;
- Lorries will be sheeted.

16.25.8 An Operational Procedure note for Dust will be prepared by Walter Energy for the future operations at the site to ensure that dust generated at the site will be managed and reduced. It is proposed to maintain a dust monitoring programme and monitoring locations will be agreed with Neath Port Talbot Borough Council.

16.25.9 All site staff will receive appropriate training in order to ensure that employees are conversant with the site dust control strategy relating to the Environmental Permit.

Dust and Fine Particulates during construction operations

16.25.10 As best practice, dust control measures which may be employed during future construction activities include:

- Use of water sprays to control dust when appropriate;
- Vehicle speeds will be controlled within the site;
- Minimising drop heights for tipping of excavated material;
- Sheeting all lorries when leaving the site;
- Wheel washers will be provided for vehicles leaving site;
- Monitoring of wind speed and direction.

16.25.11 Should dust generation become excessive as a result of unforeseen combinations of site activities and complaints are received from nearby residents during the construction and operations the site management will have authority to suspend operations until weather conditions have changed or dust levels have been brought under control.

Air quality effects due to development and construction traffic

16.25.12 It is not considered necessary to recommend measures to mitigate vehicle exhaust emissions from site generated traffic other than ensuring plant and vehicles undergo routine maintenance to minimise potential emissions.

16.26 Residual impacts

16.26.1 The effective implementation of the proposed dust mitigation measures outlined in the Operational Procedure note for Dust prepared by Walter Energy will ensure that dust generated at the site will be managed and reduced such that any residual effect at nearby sensitive receptors will be minimal.

16.27 Summary

16.27.1 The effective implementation of the proposed dust mitigation measures outlined in the Operational Procedure note for Dust prepared by Walter Energy will ensure that dust generated at the site will be managed and reduced such that any residual effect at nearby sensitive receptors will be minimised.

16.27.2 There is also potential for local non-statutory habitats to experience increased levels of dust deposition during the construction and operational phases without the implementation of appropriate mitigation measures.

16.27.3 A dust monitoring programme will be maintained with dust monitoring locations and agreed with Neath Port Talbot Council.

16.27.4 There have been no complaints about dust since 2005. The last complaint related to mud on the highway.

16.27.5 A DMRB screening assessment has been undertaken to assess the potential impact of emissions from traffic generated by the proposals at existing sensitive receptor locations at 5 locations in the surrounding area. The predicted changes in concentrations of NO2 and PM10 due to the mine traffic are all less than 3 µg/m3 and these changes were determined as a negligible impact on the receptors considered. This assessment has considered the worst case scenarios of peak development traffic (i.e. peak mine production) and worst case background concentration levels (i.e. no improvement in background air quality from 2013). Alternative options of transport of mine waste or coal products (by rail/conveyor and/or pipelines) are not expected to give rise to any significant adverse air quality impacts above those already predicted for transportation by HGV.

16.27.6 No significant cumulative dust and air quality impacts are expected with the proposed Aberpergwm Mine with other developments identified in the locality and other future proposed development at Aberpergwm Mine.

17 ARCHAEOLOGY AND CULTURAL HERITAGE

17.1 Summary

17.1.1 The archaeological and cultural heritage impact of the proposals has been assessed by Industrial Archaeology Services (IAS). The full reports by IAS form part of the Technical Appendices to the Environmental Statement and can be found at Technical Appendices 17.1, 17.2, 17.3 and 17.4.

17.1.2 This section of the ES summaries the assessment and the significance of archaeological and cultural heritage assets within the application area and its immediate environs. It assesses the potential for impacts upon the significance of any identified assets and outlines the necessity of any mitigation or planning control that nay be required to minimise potential for impact.

17.2 Survey Work Undertaken

17.2.1 The archaeological and cultural heritage impact of the proposals has been assessed by IAS, who has undertaken an Archaeological Desk-Based Assessment as part of the EIA. Desk based assessment was supplemented by field walking and evaluation.

17.2.2 A desk search was implemented from the Historic Environment Record retained by Glam- - Gwent Archaeological Trust and an inventory of all recorded sites within the study area was drawn up.

17.2.3 The inventory data has been further enhanced by information sourced from the following:-

- Cadw data – Scheduled Ancient Monuments / Listed Buildings & Historic Landscapes.
- RCHM data – National Sites and Monuments Record.
- HER data - Regional Sites and Monuments Record.
- Registered Public Rights of Way
- Neath Port Talbot Landscape Assessment (Landmap) 2004 (In essence this Landscape Assessment was prepared for the County Borough, based on the Landmap Process. It includes 48 Cultural Landscape Areas, three of the areas

embraced the total footprint of the mines development area. Area 19 – Neath Valley, Area 21 – Hirfynydd and Area 24 – Dulais Valley.)

17.3 Policy Context

Planning Policy Wales

Chapter 6 - Conserving the Historic Environment

17.3.1 Paragraphs 6.5.1 & 6.5.9 make specific reference to "settings". Paragraph 6.5.1 identifies the desirability of preserving an ancient monument. It establishes setting as a material consideration in determining a planning application, whether that monument is scheduled or unscheduled. Where nationally important archaeological remains, whether scheduled or not, and their settings are likely to be affected by proposed development, there should be a presumption in favour of their physical preservation in situ.

17.3.2 Paragraph 6.5.9 states that where a development proposal affects a listed building or its setting, the primary material consideration is the statutory requirement to have special regard to the desirability of preserving the building, or its setting.

Minerals Technical Advice Note 2: Coal

17.3.3 Particular reference was given to the Historic Environment. Also in accordance with Minerals Technical Advice Note 2 (226), which refers to underground mining and the level of likely subsidence at the surface.

Local Development Plan

17.3.4 Consideration has been given to the Neath Port Talbot Unitary Development Plan (2008). The UDP identifies the following assets with the potential to be affected by the proposed development. These are as follows:

- Conservation Area - Glynneath Woollen Mill
- Historic Landscapes, Parks and Gardens – Rheola

Relevant Circulars/Directives

- EIA Directive 85/337 EEC & Directive 2011/92/EU
- Welsh Office Circular 60/96
- Welsh Office Circular 60/96/98
- Welsh Office Circular 61/96
- IFA – Guidance Documents
- Planning (Listed Buildings and Conservation Areas) Act 1990
- Cadw – Conservation Principles 2011
- English Heritage – Conservation Principles, Policies and Guidance 2008
- English Heritage Guidance – The Setting of Heritage Assets

17.3.5 The implementation of the above policy was supported by the guidance notes set out in the following documents:

- English Heritage – The Setting of Heritage Assets
- Cadw – Conservation Principles March 2011
- Cadw/CCW – Landscapes of Historic Interest in Wales.

17.3.6 The Cadw guidance of landscapes and historic interest in Wales identifies that there is no statutory definition of setting; however “Setting” is an established concept that relates to the surroundings which a place is experienced, its local context, embracing present and past relationships to the adjacent landscape. Definition of the setting of a significant place will be guided by the extent to which material change within it could affect (enhance / diminish) the place’s significance. Setting should not be interpreted too narrowly, each category of indirect physical impact identified, described and an assessment made of its severity, based on professional judgement and graded as follows:

- Very severe;
- Severe;

- Considerable;
- Moderate;
- Slight; or
- Very Slight.

17.4 Methodology

17.4.1 The main assessments consider and evaluates impacts resulting from each of the three elements of the proposals. Specifically:

- Direct impacts on recorded/unrecorded features affected by the proposed underground mining extension;
- Direct impacts on recorded/unrecorded features within the area proposed for the MWR;
- Direct impacts on recorded/unrecorded features within the haul road footprint;
- Direct impacts on recorded/unrecorded feature as a result of the proposed surface developments;
- In direct impacts on features of archaeological and cultural heritage significance resulting from the use of the application area and haul road;

17.4.2 In addition to the above, the assessment has identified suitable mitigation measures to avoid, reduce or remedy significant adverse effects.

17.4.3 The search areas are identified within the plans contained within the appendices associated with each Archaeological report refer to Appendices 17.1, 17.2, 17.3 and 17.4 of the Environmental Statement.

17.4.4 A search was implemented from the Historic Environment Record retained by Glam-- Gwent Archaeological Trust and an inventory of all recorded sites within the study area was drawn up.

17.4.5 The inventory data has been further enhanced by information sourced as follows:-

- Cadw data – Scheduled Ancient Monuments / Listed Buildings & Historic Landscapes.
- RCHM data – National Sites and Monuments Record
- HER data - Regional Sites and Monuments Record.
- Registered Public Rights of Way
- Neath Port Talbot Landscape Assessment (Landmap) 2004. In essence this Landscape Assessment was prepared for the County Borough, based on the Landmap Process. It includes 48 Cultural Landscape Areas, three of the areas embraced the total footprint of the mines development area. iz. Area 19 – Neath Valley, Area 21 – Hirfynydd and Area 24 – Dulais Valley.

17.4.6 Assets identified within the Local Development Plan:

- Conservation Area – Glynneath Woollen Mill (Nprn 415137)
- Historic Landscapes, Parks and Gardens – Rheola.

17.4.7 OS map regression and various Abandoned Mine Plans applicable to the study area were also appraised and unrecorded features noted.

Visual Assessment Methodology

17.4.8 Key visual receptors / viewpoints were identified from the inventories prepared from the search of the Historic Environment Record and the subsequent field walk and evaluation of unrecorded sites and features.

17.4.9 In essence Cadw and Nprn recorded features would provide viewpoints and thus be subjected to visual impact appraisal. Viewpoints positioned on registered public rights of way which are routed within the study area will also subjected to visual appraisal.

17.4.10 The environmental assessment process is comprehensively defined in the Department of Transport (Welsh office – Scottish office) Design Manual for Roads and Bridges and where applicable was applied to this project.

17.4.11 Minerals Technical Advice Note 2: Coal makes reference to Guidelines for Landscape and Visual Impact Assessment 3rd Edition.

17.4.12 These documents are considered at a national level to provide the framework for suitable guidance criteria which can be applied in the evaluation of the impacts of the works on the archaeological resource.

17.4.13 Elements of the criteria will be applied as appropriate to suit the circumstances and status of these works. The advice sets out the framework for the environmental assessment process, which in essence, encompasses the sub-topics of Archaeological Remains, Historic Buildings and Historic Landscapes. The main stages of the framework which will allow an assessment of visual impacts on the cultural heritage assets are as follows:-

Value Designation of the Archaeological Resource

17.4.14 In general the archaeological sites and features will be categorised as follows:-

- Category A: national importance
- Category B: regional importance
- Category C: local importance
- Category D: low importance

Criteria to be applied to enhance Appraisal:-

(a) Condition of the Archaeological Resource - Each of the recorded and unrecorded sites and features has been appraised from site reports and site visits.

(b) Rarity of the Archaeological Resource - Established by referral to site reports, map regression and printed documents – local knowledge.

(c) Group Association of the Archaeological Resource - Can be demonstrated with early evidence, indicated on maps and site visits, of the association of several mining features.

Severity of direct/indirect visual impacts

17.4.15 From the inventory of recorded / unrecorded sites and features a number of key receptors has been identified and subjected to appraisal by photography and visual aspect from application area to receptor with a survey of landform, elevations, distance, etc. also considered.

17.4.16 IAS used judgement and considered it appropriate that the key receptors would be the listed buildings, recorded national sites and certain viewpoints located on the registered public rights of way.

17.4.17 Each site has been visited and elevation, distance from application area and existing mitigation at each site noted. The view from receptor to application area has been observed and camera angle noted.

17.4.18 Results will allow severity of visual impacts to be indicated – it was evident from initial survey of the application area that the extent of the "built in mitigation" will substantially reduce or eliminate adverse visual impacts.

17.4.19 The following table indicating the significance criteria for visual indirect impacts will apply:-

The significance criteria for visual indirect impacts	
Level	Typical Criteria
No change	No discernible deterioration from selected viewpoint to development/groundworks
Imperceptible	The degree of change is so small as to have little or no effect.
Slight	The development/groundworks would cause a barely perceptible change to the view.
Moderate	The development/groundworks have a noticeable effect on the view.
Substantial	The development/groundworks would cause a substantial effect on the view.
Severe	The development/groundworks become the dominant feature with significant effect.
Very Severe	The development/groundworks compromises the cultural integrity of the

	feature/setting

17.5 Consideration of the Potential for Impact

17.5.1 The assessment has focused primarily on the Licensed Area Boundaries/zones 0-3 (first 15 years of mining). Whilst, there will be mining undertaken in the future, these phases (4-6) will be post Mineral Review (ROMP) and therefore the detailed impact of future mining in the latter zones on potential archaeological assets will be further assessed at this stage having regard to further geological feedback and resultant mining design.

Underground Mine

17.5.2 The desk based assessment identified the following schedule of Cadw Scheduled Ancient Monuments (SAM) and Listed Buildings (LB) located within the Licensed Area Boundary (Zones) 0 - 3.

NUMBER	NAME	EAST	NORTH	ZONE	NOTES
SAM – GM275	Carn Cornel Round Cairn	281676	206294	3	Description suggests a protrusion at one point of approximately 0.9 metres
SAM-GM592	Coed Ddu ring Cairn	280734	206284	3	Description suggests a protrusion at one point of 0.3 metres.
SAM – GM593	Coed Ddu house platforms and enclosure	280609	206343	3	Description suggests a protrusion at one point of approximately 2 metre
SAM – GM274	Hirfynydd Roman Earthwork	282881	296684	2	Description suggests a protrusion at one point of

					0.9 metres.

17.5.3 Schedule of National Sites and Monuments (NPRN)

NPRN	Name	East	North	Zone	
308372	Cemmaes Farm Building	284030	206170	1	
102				1	
93165	Hirfynydd Earthwork Enclosure	282840	206630	2	
3033	Brynteg Farmstead	281890	207650	2	
405177	Dulais Tramway	280760	206590	3	
304455	Carn Cornel Round Cairns	281700	206300	3	
304760	Carn Cornel Cairn	281660	206290	3	
304759	Gelli-Benuchel Cairn	281180	205900	3	
18462	Crynant Grange	280670	205400	3	

17.5.4 The archaeological assessment considered the above sites. The criteria for site selection were SAM sites and those protruding above the landform which would make these sites more susceptible to subsidence damage.

17.5.5 The depth of coal seams and the mine design, particularly methods of coal extraction are important factors that influence the level of subsidence at the surface.

17.5.6 To further enhance the appraisal, the zones were field walked. There were a number of the features that could not be detected due to damage caused by forestry planting and harvesting.

Zone 1

17.5.7 The depth of seam within this area varies between 150 metres in the north and 577 metres in the south west. A mix of multi entry, short wall and long wall panels are proposed for coal extraction. Greater magnitude of subsidence is likely to occur in the north and south west areas of zone 1 where long wall/short wall panels are proposed to be used. Where multi-entry systems are proposed in the north part of the zone, the magnitude of subsidence is likely to be low.

17.5.8 The magnitude of impacts on the two NPRN sites within zone 1 has been assessed as negligible. The magnitude of impact on the section of bridleway (Sarn Helen) has been assessed as low.

Zone 2

17.5.9 Depth of seam varies within zone 2 between 275 metres to the north and 675 metres to the south. Mining methods include a mixture of pillar and stall, short wall and long wall panels.

17.5.10 The magnitude of impact has been assessed as no adverse effect on SAM GM274 (Hirfynydd Roman Earthwork). There would be negligible impact on NRPN 3033 (Brynteg Farmhouse).

Zone 3

17.5.11 Coal seam depths in this area vary between 360 metres and 683 metres. Methods of coal extraction include a mix of long wall panels, short wall panels and multi entry systems.

17.5.12 The potential for impact upon SAM GM275, GM592, GM593 and the Crynant Grange (NPRN) has been assessed. The majority of these registered assets are earth works and not structures and therefore the effect of subsidence is 'no significance'. There are two structures above ground: Brynteg Farm and Crynant Grange. Brynteg Farm has been abandoned for many years and allowed to deteriorate. Subsidence would not produce measurable damage. Crynant Grange is a dwelling and barn. The barn is occasionally used by a local farmer but the dwelling would be costly to make habitable. Subsidence would cause minor damage over a period of time and due to the status of the buildings the potential for impact is classed as minor. The status of

this building was given consideration and discussed with the Royal Commission on Ancient and Historical Monuments in Wales as part of a previous Planning Application. Given the derelict status, it was agreed that the remains should be preserved by record and no further form of mitigation was necessary. IAS would recommend similar action be applied to the Crynant Grange.

Summary

17.5.13 The subsidence report suggests the zone 0-3 area is not sensitive mainly due to the increasing depth of coal seams in these zones.

17.5.14 In general terms, it is clear that the level of impact of the underground workings in zones 1 – 3 on assets of archaeological significance, is negligible. There are a limited number of features, and these features, by reason of their status (low level earth works) have a low sensitivity to development and the subsidence that may occur as a result of deep mining methods.

Future Development – Zones 4 – 6

17.5.15 It is anticipated that the seams and therefore depth of working within zones 4-6 will be reflective of that in zones 0-3. By reason of this, it is likely that the methods of working will be reflective of those undertaken in zones 0-3. However, until the commencement of mining and a better understanding of the geology there are no details at this stage on mining methods or layout.

17.5.16 Notwithstanding this, the later phases of mining (zones 4-6), particularly in zones 4 and 6 contain a greater number of surface constraints, including features of archaeological and cultural heritage importance (conservation areas and listed buildings). Most notably as these zones of mining are under the village of Crynanyt/Creunant. These areas are likely to be more susceptible to underground mining subsidence and the potential for adverse impact is greater. This increase in sensitivity would result in additional mitigation being required in the form of mine design to ensure the potential for impact is minimized. These constraints, and the mine design are likely to impact upon the amount of coal able to be recovered.

17.5.17 The following provides a summary of archaeological records within the village.

Cadw number	Description	NGR	Comment
11848	Gelligaled farmhouse	7852 0515	Grade 11 Listed Building
11849	Gelligaled barn walls	7851 0517	Grade 11 Listed Building
23080	Godre'rhos Independent chapel	7912 0654	Grade 11 Listed Building
82547	Crynant Chapel of Ease church	7941 0476	Grade 11 Listed Building
82548	Ynys y bont bridge	7928 0579	Grade 11 Listed Building
NPRN number	**Description**	**NGR**	**Comment**
28119	Ynysfadog dwelling	7911 0528	
28129	Ynys y bont farmstead	7912 0581	
9497	Bethel Wesleyan chapel	7950 0513	
9489	Saron Independent chapel	7941 0510	
9487	Godre'rhos Independent chapel	7912 0654	LB 23080
310484	Ynys y bont bridge	7929 0579	LB 82548
18730	Gellidochlithe dwelling	7925 0679	
18738	Gelligaled farmhouse	7853 0516	LB11848
19231	Llwyn-on dwelling	7842 0641	
18821	Gould Farm dwelling	7966 0555	
9494	Salem Calvinistic Methodist chapel	7956 0481	
9492	Bethania Baptist chapel	7932 0491	
13421	Crynant Chapel of Ease church	7942 0477	LB 82547
37546	Gelligaled Barn walls	7852 0517	LB 11849

85016	Dulais Resolven Colliery coal mine	8005 0438	
9496	Zion Calvinistic Methodist chapel	7937 0525	
85015	Blaenant Colliery coal mine	7959 0495	
408303	Gelligaled Farmstead complex	7853 0516	
PRN number	**Description**	**NGR**	**Comment**
00525w	Crynant chapel of ease	7942 0477	Listed building 82547
00870w	Gelligaled Farmstead	7852 0517	Listed building 11848
00525w	Crynant chapel of ease	7942 0477	Listed building 82547
00870w	Gelligaled Farmstead	7852 0517	Listed building 11848
01676w	Gould Farm	7965 0555	NPRN 18821
02658w	Llwyn onn Farmstead	7841 0640	NPRN 19231
02659w	Ynys y bont House	7913 0582	NPRN 38129
02813.3w	Crynant Railway Station	7948 0487	
03656w	Pen Pentre Cottages	7970 0461	
03685w	Llwyn onn coal level	7842 0648	
03686w	Dan y Graig Colliery	7852 0652	
03687w	Old Tom Hopkins Mine	7841 0665	Site levelled
03693w	Waun y caur Farmstead	7819 0619	Presumed destroyed
03694w	Waun y caur coal levels	7818 0629	Unlocated
03695w	Tynewydd Farmstead	7831 0594	abandoned
03696w	Tynewydd Coal Level 1	7833 0584	Unlocated (forestry)

03697w	Tynewydd Coal Level 2	7849 0558	Unlocated (forestry)
03755w	Byr – Nant Plantation coal levels	7838 0670	Old coal level
03786w	Llwynllanc Uchaf coal pit	7938 0422	unknown
03810w		7838 0616	E0001083
04727w	Gould Farm Longhouse	7970 0560	occupied
05228w	Crynant churchyard	7942 0477	
05280w	Crynant Grange	7910 0470	Pos. loc. Crynant Chapel
05958w	Bryn Rhug Tramroad	7986 0468	
05961w	Bryn Rhug Structure	8005 0475	Condition unknown
05963w	Bryn Rhug Sheepfold	7986 0468	Condition unknown
05964w	Bryn Rhug Sheepfold	8019 0487	Condition unknown
05965w	Bryn Rhug Quarry	8001 0475	Condition unknown

Mine Waste Repository

17.5.18 The proposed MWR covers an area of approximately 84 ha. The area includes the more recent Forest Quarry Extension, the Forest Quarry Site and two additional parcels of land to the east and south which are situated on previously undisturbed land. Approximately 70% of the MWR has been surface mined whilst the remainder is rough part harvested commercial forestry. An area of peat will be recovered and deposited at a peat mitigation area.

17.5.19 The site to accommodate the MWR has been subject to extensive ground works, activities including harvesting of mature forest plantation, topsoil stripping, coal recovery and restoration. These works have been subject to previous planning permissions and due to archaeological potential, desk based evaluation of recorded sites and features, followed by schemes of investigation including a watching brief during topsoil stripping.

17.5.20 A desk based study of environmental features identified the following records in proximity to the proposed MWR:

Cadw Number	**Description**	**NGR**	**Comment**
CM274	Hirfynydd Roman Earthwork	282881 206684	
NRPN Number	**Description**	**NGR**	**Comment**
93165	Hirfynydd Roman Fortlet	SN8284 0663	
308372	Cemmaes Farm Buildings	SN8403 0617	Incorrect Location
304620	Roman Road, Neath to Coelbren	SN8588010720	Road ID RR622-02 (Sarn Helen)
PRN Number	**Description**	**NGR**	**Comment**
00541W	Hirfynydd Signal Station	SN8284 0663	
01111W	Unknown Enclosure	SN8396 0759	
01469W	Rheola – Clwydd stone	SN840 060	Unlocated
03734W	Aberpergwm Sheepfolds	SN84899 06566	Damaged Stone walls
03706W	Rhaedr Colliery	SN83400 06700	No evidence
03744W	Rhaedr Mine Building	SN83280 06557	No evidence
03785W	Rhaedr Mine Building	SN83280 06557	No evidence.

Archaeology

17.5.21 The appraisal has shown that there are no recorded sites located within the study area identified for the MWR and therefore the direct impact upon these sites is nil.

17.5.22 In order to safeguard any potential archaeological features/assets, excavation or ground works on virgin ground will be subject to archaeological watching brief.

Cultural Heritage

17.5.23 Key viewpoints/receptors were identified and subject to appraisal by photograph and visual aspects from application area to receptor with a survey of landform, elevation, distance etc also considered. Existing mitigation was noted. The archaeological feature susceptible to the higher degree of visual impact would be the section of Sarn Helen to the north of the application area. Mitigation was provided in the form of tree cover, distance and the presence of the overburden mound. The level of significant adverse impact was considered low varying between no change and slight. The potential for impact was reduced to negligible following site restoration.

Haul Road

17.5.24 A desk based study of environmental features identified the following records in proximity to the haul road:

Cadw Number	**Description**	**NGR**	**Comment**
11769	Aberpergwm House	286710 206250	Destroyed
11847	Gates Driveway Aberpergwm	286840 206240	
11842	Aberpergwm Aquaduct Canal	286350 205850	
82449	Yscwrfa canal lock bridge	286170 205680	
11867	Church of St Cadoc	286980 206140	
82447	St Cadoc church yard gate/railings	286990 206150	
82448	Manor Drive, bridge, piers, railings	287110 206070	
NPRN Number	**Description**	**NGR**	**Comment**
9482	Siloh Chapel	286730 205230	
9483	Calfaria Chapel, Cwmgwrach	286800 205270	
34448	Maesmarchdog Canal Branch	287622 206230	
403790	Yscwrfa canal bridge	286130 205570	
403791	Yscwrfa canal	286130 205630	

	cottage		
404069	Aberpergwm colliery dock	286400 205870	
PRN Number	**Description**	**NGR**	**Comment**
06112w	Neath to Brecon Turnpike Road	286391 206053	

17.5.25 The appraisal has shown that there are no recorded sites within the study area identified for the haul road and therefore the direct impact upon these sites is nil.

Surface Development

17.5.26 The proposed development at the surface of the mine fall onto two areas of land. The Cae Capel area and the existing mine surface area.

Archaeology

17.5.27 The Cae Capel area was subject to archaeological investigation as part of a previous planning application. The appraisal indicated a single feature which necessitated trial trenching and the implementation of a watching brief. These concluded that there would be nil direct impacts on features of archeological significance but a number of indirect visual impacts required evaluation.

17.5.28 Development on the mine surface areas is to primarily be carried out on 'made up ground' (primarily waste material). The only structure that had below surface excavation was the receiving bunker. This development was monitored during excavation for any items/features of interest.

17.5.29 The development subject to this application does not extend beyond the boundaries already subject to archaeological investigation. It is therefore concluded that the potential for impact on yet undiscovered archeological remains is minimal.

Cultural Heritage

17.5.30 The assessment has concluded that the potential for impact on features of cultural heritage is limited to visual impact.

17.5.31 The listed buildings – 11769 Aberpergwm House, 11847 Gates at driveway to Aberpergwm House, 11867 St Cadocs Church, 82447 St Cadocs Church yard gate and railings and 82448 Manor Drive bridge, piers and railings the NPRN sites located along the canal and the conservation area – Glynneath Woolen Mill amd the Historc Landscapes Parks and Gardens – Rheola were identified as the most sensitive to development on the mine site.

17.5.32 The site benefits from substantial boundary screening. The potential for impact reflects that undertaken within the Landscape and Visual Impact assessment that the significance of impact does not exceed slightly adverse.

17.5.33 There is one recorded feature in the vicinity of the car park – the Listed Building 11847 – Canal Aqueduct. The aqueduct is a structure, it is a cast iron trough supported on masonary piers crossing the canal. It serves to carry water from the Ysgwrfa stream, over the canal, to its discharge point into the River Neath further downstream. The aqueduct is located adjacent to the B4242 highway. The aqueduct is one of three cast iron features surviving along the route of the canal.

17.5.34 The original setting of this feature would have changed over many years due to industrial and urban advances. The severity of visual impact was assessed as moderate due to the infrequent use of the carpark. It is not considered that there would be other significant adverse environmental impacts due to the proximity of the site to the existing mine site. The application is for the extension of time to use these facilities. Whilst there may be an increase in vehicle movements over time, vehicles are not routed past the aqueduct. The potential for adverse impact is therefore considered slightly adverse.

17.6 Consideration of Potential Mitigation

Underground Mine

Zones 0-3

17.6.1 The assessment has identified the presence of two structures of national importance which could be vulnerable to subsidence. However, due to their derelict state, the potential for impact is considered minimal. The only necessary form of mitigation would be to record by photograph the buildings in their current condition.

Zones 4-6

17.6.2 Although there are no detailed mining plans for zones 4-6, it is anticipated that the depths of coal and method of working would be similar to that undertaken in zones 0-3. As outlined above, there is the presence of a greater number of surface constraints, particularly in the form of archaeological/heritage assets within the village of Crynant. By reason of this, consideration should be given to available mitigation measures to be carried out at each structure and the design of an appropriate mine layout once the mining reaches these zones.

Mine Waste Repository

Archaeology

17.6.3 Groundworks such as peat removal on any previously unworked areas will be subject to a watching brief as is current practice.

Cultural Heritage

17.6.4 The importance of the Sarn Helen Roman Road was considered as part of the application proposals. The design of the application area included a minimum standoff between the northern boundary and Sarn Helen of 67metres.

17.6.5 The view from Sarn Helen of the application proposals was given consideration. The presence of tree screens and land levels were factored into the design to safeguard the amenity of users of the public right of way.

Surface Development

Archaeology

17.6.6 The areas proposed for surface development have been subject to archaeological investigation as part of previous planning applications. Development does not extend beyond the environs of these applications and therefore there is not considered to be a need for further archaeological investigation.

Cultural Heritage

17.6.7 The mine site is located on the relatively flat area of the Neath Valley floor and is considered visually well screened by tree cover. It is proposed to maintain and supplement this tree cover so as not to exacerbate the visual impact on nearby heritage assets.

17.7 Cumulative Assessment

Simultaneous Effects

17.7.1 The EIA Scoping Opinion has identified a number of schemes which should be considered in regards to the potential for simultaneous cumulative effect as a result of the development. That is the potential for impact from this development on archaeology and cultural heritage in combination with impacts on archaeology and cultural heritage arising from other identified developments.

17.7.2 The archaeological assessment has identified that the potential for impact upon assets of archaeological importance are negligible due to their low archaeological significance/value and therefore minimal sensitivity to mining activity and particular subsidence. By reason of this, it is considered that the simultaneous effect of this development combined with the identified developments will have minimal impact upon existing and as yet undiscovered heritage assets.

17.7.3 The proposed MWR, haul road and the proposed Hyrfynydd and Maesgwyn windfarms are all visible from Sarn Helen. The potential for adverse visual impact on the amenity of users arising from the developments has been assessed. The potential for adverse environmental impact on users of Sarn Helen is considered to be minor adverse. The potential for impact from the MWR and haul road has been reduced by the sites topography and the presence of boundary screening to the extent that this element of the proposal has been classed as having a potential for minor adverse impact. The mining activities are temporary operations and therefore the restoration of the site will result in no impact. The combination of these developments together would therefore have a potential for impact, although this is not considered to be a long term impact.

Successive Effects

17.7.4 Successive effects relates to the effects of this proposal and extending the life of mining activity at Aberpergwm in combination with the effect of past mining activity on the local area. In addition, it is necessary to consider the effects of the proposal with potential future development for the mine.

17.7.5 In regards to the continuation of mining activity, the Vale of Neath has been subject to a considerable amount of coal mining activity. The level of activity has reduced in recent years with Aberpergwm being the only remaining deep mine in the local area in combination with the Selar opencast site which has been operational since 1997. Whilst once the legacy of mining activity and the concentration of collieries would have had an adverse impact upon the local area, this level of combined environmental impact is significantly reduced.

17.7.6 The level of past activity and the legacy of mining in the local area has resulted in mining infrastructure and surface structures being listed as assets of archaeological and heritage importance.

17.8 Conclusions

17.8.1 The surface area overlying the application area is predominantly not sensitive to mining induced movement. The Scheduled ancient monuments located within zones 2 and 3 are ground soil structures and unlikely to be vulnerable to subsidence. The monument footprints are small and any ground movement would not be localized but over a wider area therefore offering a degree of protection. The two structures of national importance could be vulnerable to subsidence but due to their derelict state, the potential for impact is considered minimal. The only necessary form of mitigation would be to record by photograph the buildings in their current condition.

17.8.2 The aspect of the proposals considered to have the potential for the most significant impact upon archaeological assets is the MWR and associated Haul Road and the potential for impact upon Sarn Helen. The first point to note is that apart from an area of peat removal, there is no new ground works required. The desk based assessments have not identified high levels of potential for as yet undiscovered features. In addition, the areas have already been subject to opencast coal recovery and an archaeological watching brief has been implemented. It is proposed that where groundwork is proposed, a watching brief will satisfactorily mitigate the potential for as yet undiscovered archaeological assets to be recorded or allow for

further investigations if necessary. The application has been designed so as to mitigate against any potential for impact upon Sarn Helen. Primarily, this has included a minimum standoff distance between the northern boundary and Sarn Helen. In addition tree cover and land levels largely screen users of Sarn Helen of the development areas.

17.8.3 Development at the surface of the mine does not extend the environs of previous archaeological investigation. Previous investigation has not identified any buried or as yet undiscovered features of archaeological importance. Effects on the nearby cultural heritage are limited to the potential for adverse visual impact. Due to the significant boundary screening, the potential for impact was considered minimal. As part of the proposals this boundary screening is to be retained.

17.8.4 Zones 0-3, in archaeological terms are relatively free of constraint to underground mining. There are limited features and these features are not considered to be sensitive to issues of subsidence. In these areas, archeology would not constrain coal recovery. By comparison, the later phases of mining (zones 4-6), particularly in zones 4 and 6 contain a greater number of surface constraints, including features of archaeological and cultural heritage importance (conservation areas and listed buildings) which would be more susceptible to subsidence and the potential for adverse impact is greater. This increase in sensitivity would result in additional mitigation being required in the form of mine design to ensure the potential for impact is minimized. These constraints, could in turn impact upon the amount of coal able to be recovered from the later zones.

17.8.5 In terms of archaeology and cultural heritage, the proposal will not cause an unacceptable impact on material assets and the cultural heritage in accordance with EIA regulations.

18 MANAGEMENT OF WASTE GENERATED BY THE DEVELOPMENT

18.1 Introduction

18.1.1 This section considers the effects of waste associated with the operation of the mine surface development.

18.1.2 During the operational phase, two type of waste will be generated: discard from the coal preparation process, comprising principally of mudstone and siltstone with subordinate quantities of sandstone and ironstone and a mixture of controlled waste streams from office activities and staff facilities. The mine waste will be dispose of at the proposed MWR and therefore is not considered further in this chapter.

18.1.3 Neath Port Talbot County Borough Council is responsible for waste planning in the area and has been involved with other authorities in the region in drawing up the South West Wales Regional Waste Plan. The Council has adopted its own waste management strategy in 2004 and has set overall waste minimisation targets as well as specific targets for reduction and recycling waste.

18.1.4 This section considers the waste likely to arise from the completed development, including the following:

- The types of waste to be produced by the proposed development;
- Methods and measures to be employed to reduce the volume of waste requiring final disposal;
- The final destination of the residual waste.

18.2 Baseline conditions

18.2.1 The South West Wales Region – Regional Waste Plan (RWP) identified as "controlled" waste the following waste streams:

- Municipal Solid Waste (MSW);
- Industrial Waste;
- Commercial Waste;

- Construction & Demolition Waste (C&D);
- Hazardous Waste, and
- Agricultural Waste (the proportion requiring external management only).

Waste Strategy Principles

18.2.2 The Plan sets out the main principles of the waste strategy in the South West Region (Wales), which are the followings:

18.2.3 Regional self sufficiency: As far as is practicable, all wastes produced within the Region shall be managed by the Region.

18.2.4 The proximity principle: As far as is practicable, all waste shall be effectively managed as close to its point of origin.

18.2.5 The waste hierarchy: Where possible, waste management decisions will follow the waste hierarchy which at the top encourages waste reduction and in descending order of preference waste re-use, recycling and composting, waste recovery and waste disposal.

18.2.6 Sustainability: A commitment to promoting sustainable development is at the heart of the decision making process and is a fundamental consideration for assessing possible sites and proposals for new waste management facilities.

Controlled waste streams arising in South Waste Wales

18.2.7 The Plan includes a summary of the waste arising in 2001 and predicted trends in 2013 in South West Wales for the main “controlled” waste streams. The Plan also reports the breakdown of the waste arising for each Unitary Authority. The volume of waste is shown on table 18.1 below:

Table 18.1- Summary of controlled waste arising (in tonnes) in the South West Wales Region and Neath Port Talbot							
	Year	Municipal Solid Waste	Commercial Waste	Industrial Waste	Construction & Demolition	Agricultural Waste	Total Controlled Waste
South West Wales	2001	463,648	337,634	1,852,585	1,461,172	16,737	4,131,776
	2013	583,501	415,198	1,642,103	1,461,172	14,836	4,116,810
Neath Port Talbot CBC	2001	86,362	270,900	217,243	237,825	563	812,893
	2013	108,687	333,134	192,561	237,825	499	872,706

Source: The South West Wales Region – Regional Waste Plan, November 2003

18.2.8 Approximately 80% of the controlled waste arising in Neath Port Talbot was deposited in landfills in 2001[24]. The Plan identified the need to "move away" from landfill to other waste management methods.

Annual Monitoring Reports

18.2.9 Three Annual Monitoring Reports (AMR) have been prepared to collect and analyze the information regarding the waste situation in the South West Wales region and the implementation of the RWP. The latest AMR has been published in March 200725. The report shows the targets of the National Waste Strategy for Wales for each of the principal waste streams along with the current levels of waste arising in South West Wales. The AMR includes the current management systems.

18.2.10 In 2003 the levels of Industrial & Commercial waste arising in Neath Port Talbot were approximately 1,365,000 tonnes (industrial waste, including production waste chemical, metallic and mineral waste) and 36,000 tonnes (commercial waste). The Assembly Government encourages businesses to divert waste from landfills. They

[24] See Table 4.3: *Summary of waste deposited at licenced waste management facilities in South West Wales in 2000/01 (in tonnes)* in the South West Wales Region – Regional Waste Plan, November 2003.

[25] South West Wales Regional Waste Group, Annual Monitoring

should reduce the amount of waste going to landfills to less than 80% of that landfilled in 1998, by 2010. According to the 2007 AMR, Neath Port Talbot is unlikely to achieve this target.

18.3 Potential Impacts

Waste generated by staff use of the site

18.3.1 The proposed development will require additional staff, in addition to the present workforce. A small amount of domestic waste will be generated by the additional workforce on site during activities.

Significance of the impacts

18.3.2 The majority of this domestic waste will be recyclable. Types of waste generated will include plastic packaging (recyclable), glass, paper, cans and other miscellaneous waste. Paper, bottle, plastic and cans can be collected with collection facilities provided on site. Two companies currently provide waste disposal collection services which will continue during operation of the proposed development. Therefore, the significance of the effects of the waste generated by the staff use of the site will be negligible.

18.4 Mitigation Measures

18.4.1 Domestic waste will be collected and managed by the existing waste disposal collection services providers.

18.5 Residual Impacts

18.5.1 An increased workforce on site will increase the volume of domestic waste which is expected to be mostly recyclable and therefore it will be collected and recycled under the waste collection existing scheme.

19 SOCIO ECONOMIC IMPACT

19.1 Introduction

19.1.1 This chapter considers the socio-economic effects of the continuation of mine working at Aberpergwm Mine and the effects of the construction and operation of the proposals.

19.1.2 The Minerals Technical Advice Note (Wales) 2: Coal, Appendix "J" contains advice on best practice to undertake social impact assessment (SIA). The SIA seeks to assess whether a proposed development alters quality of life and sense of well-being, and how well individuals, groups and communities adapt to change caused by development. It is an approach to analyzing, monitoring and managing the social consequences of development.

19.1.3 The SIA helps to:

- Ensure positive outcomes for communities and other stakeholders
- Maximise the benefits of development and minimise its costs, especially those borne by the community
- Ensure that development is generally acceptable to the local community and will improve the wellbeing of the wider community
- Improve awareness of the differential distribution of impacts on different groups in society
- Identify the impacts experienced by venerable groups in the community.

19.1.4 The key socio-economic issues considered in this assessment are the need for coal, employment, the regeneration potential, the local economy and demography.

19.1.5 The description of the development is provided in section 2.

19.2 Scope of the assessment

19.2.1 The potential effects of the proposed development are assessed together with the type, duration and spatial extent of any impacts.

19.2.2 The proposal is to consolidate the ongoing operation at Aberpergwm Mine, to extend the underground coal workings and to use the former Forest Quarry 2 Extension opencast works to dispose of the arising mine waste.

19.2.3 A limited amount of new structures will be required but no major structures will be constructed at this stage and therefore the operations at Aberpergwm Mine will only have a direct effect on the local employment. This will have indirect effects on local services, through the generation of available income.

19.2.4 Energybuild is providing community fund in support to local community projects. Funds are administrated by a Community Fund Committee which includes representatives from Energybuild and the local community. Information provided by the applicant demonstrates that in the 5 years more than £60,000 were deposited in an account.

19.2.5 Energybuild has been working in partnership with Gower College Swansea since September 2004. Since collaboration started 36 full apprentices have either passed out or are in training.

19.2.6 Table 19.1 summarises the direct and indirect effects considered in this section. These are divided into the construction phase and once the development is completed.

Table 19.1 – Direct and Indirect Effects

	Construction phase	**Completed development**
Direct effects	Increased employment Community Funds College Training	Changes in the local employment Increase funds available for local projects Change in local skills
Indirect effects	Increased expenditure on local services	Local employment and commuters Increased demand for local services

19.3 Methodology

19.3.1 The impacts of the current activities on human beings are examined in other separate reports. This application is accompanied by a separate Health Impact Statement (HIS), a Noise Assessment and Air Quality Assessment.

19.3.2 The method of assessment adopted in this chapter comprises the following components:

- A review of existing planning policy, focusing on socio-economic issues;
- An assessment of population profile and employment conditions within the area of study;
- The definition of the direct and indirect effects of the proposal;
- The assessment of the impacts on the socio-economic characteristics of the study area.

19.3.3 Socio-economic information (Population, employment, unemployment, skills and poverty/multiple deprivation) has been collated from a number of sources which include:

- 2011 Census
- 2011 Welsh Index of multiple Deprivation (WIMD)
- Information on current employment provided by Energybuild.

19.3.4 Energybuild employed approximately 270 employees at Aberpergwm Mine up to September 2012. Recent fall in demand in the coal industry has forced the company to undergo a redundancy process.

19.3.5 The company resumed operations in July 2013, and it is forecast that manpower will be resumed to 166 people by 2014.

19.3.6 This socio-economic impact assessment considers the direct employment effects of the development using the forecast from 2014 onward till the end of the proposed life of mine (25 years).

19.3.7 This section considers the baseline conditions in terms of:

- Employment & Age Structure;
- Qualification;
- Index of deprivation;
- Census data on 2011 employment and qualification were collected comparing the seven wards with Neath Port Talbot Unitary Area and the South Wales Area.

19.3.8 The following published sources were used:

- The 2011 Census accessed from the Office for the National Statistic (ONS) website –Neighbourhood Statistics (http://neighbourhood.statistics.gov.uk/dissemination/LeadHome.do;jessionid=ac1f930d30d529e8310a37fe46e3963382f3fe8d5717?m=0&s=1297356377171&enc=1&nsjs=true&nsck=true&nssvg=false&nswid=1020) accessed on October 2013;
- the Welsh Index of Multiple Deprivation (WIMD) 2011 from the StatsWales website (https://statswales.wales.gov.uk/Catalogue/Community-Safety-and-Social-Inclusion/Welsh-Index-of-Multiple-Deprivation/WIMD-2011) accessed on October 2013;

19.3.9 For the purpose of this assessment the area considered is Neath Port Talbot (NPT), also focusing on Blaengwrach, Crynant, Glyncorrwg, Resolven, Onllwyn, Seven Sisters and Glynneath wards. Employment data has been collected comparing the seven wards with NPT Unitary Authority and South Wales.

19.3.10 The WIMD index is calculated for each of the lower layer super output areas (LSOAs) of Wales. The geographical size of these small areas varies quite widely, and depends on the local population density; the populations are intended to be roughly the same in each LSOA, with an average population of 1500 people.

19.3.11 Data on current employment at Abepergwm Mine, forecast future employment and apprendiship scheme were provided by Energybuild.

19.3.12 The effects of the proposal are indentified against the baseline conditions and the significance of these effects is assessed following the criteria of the Department for

Communities and Local Government, "Environmental Impact Assessment: a guide to good practice and procedures" (2006). These are stated below:

Extreme These effects represent key factors in the decision-making process. They 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.

Major These effects are likely to be important considerations at a regional or sub regional scale but, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process.

Moderate 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.

Minor These effect 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.

Negligible Effect which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

19.4 Policy Review

Planning Policy Wales (PPW) (Edition 5, November 2012)

19.4.1 The PPW states that:

'The Assembly Government is committed to building a 'vibrant Welsh economy delivering strong and sustainable economic growth by providing opportunities for all'. The approach is built around the core strengths of Wales: an increasingly skilled, innovative and entrepreneurial workforce; an advanced technology and knowledge base; strong communities; a stunning natural environment and an exceptional quality of life.'

19.4.2 The Welsh Assembly Government's objectives for economic development are to:

- enhance the economic success of both urban areas and the countryside, helping businesses to maximise their competitiveness;
- support initiative and avoid placing unnecessary burdens on enterprise;
- respect and encourage diversity in the local economy, for example in rural areas encouraging farm diversification and in urban areas promoting mixed use development;
- promote the exploitation of new technologies which can provide new opportunities; and
- ensure that development for enterprise and employment uses is in line with sustainability principles and respects the environment in its location, scale and design, especially so as to address climate change.

Minerals Planning Policy Wales (MPPW) (December 2000)

19.4.3 The MPPW states that:

"Proposals for opencast or deep-mine development or colliery spoil disposal will be expected to meet the following requirements otherwise they should not be approved:

The proposal should be environmentally acceptable or can be made so by planning conditions or obligations, and there must be no lasting environmental damage;

If this cannot be achieved, it should provide local or community benefits which clearly outweigh the disbenefits of likely impacts to justify the grant of planning permission;"

Neath Port Talbot Unitary Development Plan (NPTUDP) (Adopted March 2008)

19.4.4 The NPTUDP aims to strike a balance between the need to allow and encourage economic and social developments to improve quality of life, and any environmental impacts which may result from such developments. Policy GC1 sets out general criteria by which all developments will be assessed.

"Policy GC1 – any proposal involving new buildings, structures, change of use, extensions and alterations will not be permitted if it would create unacceptable impact in failing to:

b) address contamination, instability, impacts on health and amenity and proximity or exposure to noise, lighting, pollution or hazard;

(f) ensure that proposals that could (individually or cumulatively) lead to a significant increase in traffic generation, density of occupation, or which are intended to provide affordable housing, housing for the elderly or for people with disabilities, are well located in terms of access on foot to facilities and public transport."

19.5 Baseline conditions

19.5.1 This section compares some key statistics for South Wales, NPT and Blaengwrach, Crynant, Glyncorrwg, Resolven, Onllwyn, Seven Sisters and Glynneath wards. The site is located within the northern part of Glynneath Ward.

Population

19.5.2 The population profile have been summarised from the 2011 Census in tables 19.2 and 19.3 below.

Table 19.2: Resident population								
Glynneath	Onllwyn	Blaengwrach	Crynant	Glyncorrwg	Seven Sisters	Resolven	Neath Port Talbot	Wales
3,430	**1,194**	**1,989**	**1,910**	**1,096**	**2,123**	**3,135**	**139,812**	**3,063,456**

Source: 2011 Census

Table19.3: Population within the economically active age (16-74)								
Glynneath	Onllwyn	Blaengwrach	Crynant	Glyncorrwg	Seven Sisters	Resolven	Neath Port Talbot	Wales

2,462	885	1,487	1,433	804	1,566	2,327	102,986	2,245,166
72%	74%	75%	75%	73%	74%	74%	74%	73%

Source: 2011 Census

19.5.3 The seven wards considered make up 14 percent of the population in NPT. Populations within the economically active age range are all generally comparable around 70% of the total.

Employment

19.5.4 The population of economically active age in employment (including full time students) of NPT, Blaengwrach, Crynant, Glyncorrwg, Resolven, Onllwyn, Seven Sisters and Glynneath and Wales have been summarised from the 2011 Census in table 19.4 below.

Table19.4: Population within economically active age in employment								
Glynneath	Onllwyn	Blaengwrach	Crynant	Glyncorrwg	Seven Sisters	Resolven	Neath Port Talbot	Wales
1,379	466	815	896	378	879	1,310	59,480	1,380,046
56%	53%	55%	63%	47%	56%	56%	58%	61%

Source: 2011 Census

19.5.5 The data shows that percentage of the population within the economically active age range that is in employment in NPT and the seven wards considered is comparatively lower than the national percentage, in particular in Glyncorrwg.

Unemployment

19.5.6 The percentages of population of economically active age in unemployment seeking employment of Blaengwrach, Crynant, Glyncorrwg, Resolven, Onllwyn, Seven Sisters and Glynneath and Wales have been summarised from the 2011 Census in table 19.5 below.

Table19.5: Population within economically active age in unemployment seeking employment								
Glynneath	Onllwyn	Blaengwrach	Crynant	Glyncorrwg	Seven Sisters	Resolven	Neath Port Talbot	Wales
140	35	88	47	64	70	139	4,630	96,689
6%	4%	6%	3%	8%	4%	6%	4%	4%

Source: 2011 Census

Skills

19.5.7 The percentages of population within no qualifications in NPT, Blaengwrach, Crynant, Glyncorrwg, Resolven, Onllwyn, Seven Sisters and Glynneath and Wales have been summarised from the 2011 Census in table 19.6 below.

Table 19.6: Population aged between 16 and 74 with no qualifications or level of qualification unknown								
Glynneath	Onllwyn	Blaengwrach	Crynant	Glyncorrwg	Seven Sisters	Resolven	Neath Port Talbot	Wales
1,009	381	606	450	431	648	864	35,607	650,517
35%	38%	37%	28%	48%	37%	33%	31%	25%

19.5.8 NPT and the 7 wards all have a higher percentage of people with no, or an unknown level of, qualifications. Glyncorrwg is the highest amongst the wards at 48 percent.

Poverty/Multiple Deprivation

19.5.9 The Index of Multiple Deprivation is the Government measure of deprivation and was last updated in 2011. It combines a number of indicators covering a range of economic, social and housing issues into a single deprivation score for each small area in England and Wales. These small areas are called Lower Super Output Areas (LSOAs) and can be combined to create larger, area. There are 91 LSOAs in NPTCB, each of these are ranked and relate to one another according to their level of deprivation. Of the 91 LSOAs in NPTCB, 15 percent of those are within the 10 percent most deprived in Wales.

19.5.10 Glyncorrwg, Onllwyn and Blaengwrach are in the top 40 percent of most deprived wards in Wales. Parts of Glynneath are in the top 20 percent of most deprived wards

in Wales, however other parts of Glynneath, Crynant, Seven Sister and Resolven are in the top 40 percent least deprived areas in Wales.

19.6 Summary of Baseline Conditions

19.6.1 In NPT economic active people in employment are lower than the national percentage. Glyncorrwg, Onllwyn have a particularly low level and Blaengwrach and Glynneath have similar levels to NPT as a whole. The entire area has a higher percentage of unemployment than the rest of Wales.

19.6.2 The population with no, or an unknown level of, qualifications is 31% in NPT, 35% in Glynneath, 38% in Onllwyn and 37% in Blaengwrach. These are all significantly higher than the rest of Wales.

19.6.3 Glyncorrwg, Onllwyn and Blaengwrach are in the top 40 percent of most deprived wards in Wales. Parts of Glynneath are in the top 20 percent of most deprived wards in Wales, however other parts of Glynneath are in the top 40 percent least deprived areas in Wales.

19.7 Potential Impacts

The proposed development

19.7.1 Walter Energybuild propose to invest in excess of £100million to develop Aberpergwm colliery to allow the production of 2.5 million tonnes of run of mine product for a period of 25 years. The onset of production will be phased over the period 2014 to 2020.

19.7.2 As discussed in Section 5, Aberpergwm Colliery mines high quality Anthracite coal, which is used in the nearby Tata steel works at Port Talbot and as a thermal product used at Aberthaw Power Station as well as a superior quality domestic fuel product for nationwide distribution for use in domestic fuel appliances and industrial boilers.

19.7.3 There is limited supply in UK of domestic fuel and Anthracite. The preseservation of Abepergwm Colliery would have a beneficial contribution to the UK balance of payments.

Direct Effect

Benefits to local employment and economy

19.7.4 In Neath Port Talbot economic active people in employment are lower than the national percentage. Glyncorrwg, Onllwyn have a particularly low level and Blaengwrach and Glynneath have similar levels to NPT as a whole. The entire area has a higher percentage of unemployment than the rest of Wales. Parts of Glynneath are in the top 20 percent of most deprived wards in Wales, however other parts of Glynneath are in the top 40 percent least deprived areas in Wales.

19.7.5 It is estimated that the manpower at the mine is expected to increase from 166 in 2014 to 529 in 2020. Over this period and as part of the workforce the mine will employ between 23 and 44 trainees/apprentices per year. Up to September 2012, Energybuild employed 270 workers working at different stages of the coal production, including extraction, processing and disposal of the mine waste. According to Energybuild, approximately 8 percent of this workforce is resident in Glynneath. Approximately 20 percent of the workforce is resident in Neath Port Talbot. 100 percent of the workforce is resident in South Wales.

19.7.6 When the activities at Aberpergwm Mine resume to the previous levels, the beneficial effect of the Mine on local employment will continue.

19.7.7 As demonstrated above, the area is characterized by low employment rates. Following the significance criteria set in the Department for Communities and Local Government, "Environmental Impact Assessment: a guide to good practice and procedures" (2006), the direct employment of up to 529 miners in the next 6 years is considered to have a **major beneficial effect** on a sub-regional level.

19.7.8 An estimation of the wage forecast for the Life of the Mine (LOM) is shown on Appendix 19.1. It is estimated that in the next 25 years Energybuild will pay out salaries in excess of £700,000,000. According to MTAN2 (paragraph 20), *"for every 100 jobs in coal production, between 50 and a hundred jobs are supported elsewhere in Wales".* Therefore the project has the potential to support approximately between 350 and 400 additional jobs in the sub-region. It is therefore considered that, during the lifetime of the project, the effects on the employment will be **major beneficial.**

Training

19.7.9 The mining industry in general has suffered from a lack of training and development of new labour for many years. The current available labour pool is ageing.

19.7.10 The local communities are amongst the most deprived areas in Wales. One of the main thrusts of the Neath Port Talbot Health, Social Care and Well-being Strategy 2008-2011, entitled "Healthy Lives for All" is "Tackling the underlying causes of ill health by providing better housing or helping people into work". The document affirms under the heading "Economic Prosperity" to "reduce the number of people who are economically inactive and/or unemployed; to prevent further job losses and to help local business remain viable".

19.7.11 Energybuild has adopted a specific strategy and policy for the purpose of the development of a workforce to meet the needs of its long term mine business model.

- To provide sufficient technologically skilled and competent personnel to suit the nature of the undertaking.
- To augment and replace the current ageing labour pool as it decays through natural wastage.
- To provide up to date and technologically advanced skill sets to complement the advances in technology and sophistication of mining systems.
- To promote and develop managerial, specialist and ancillary technicians to support the proposed mining plan.
- To promote compliance with the relevant Legislation and associated Regulations in relation to the provision of a suitable management structure and the competence of personnel.

19.7.12 The training and education regime will focus on four key areas which are identified below. All schemes are accredited to the appropriate bodies and are delivered to national standards. Additionally the training provided must in most cases meet the approval of the Health and Safety Executive. All personnel undertaking a training scheme are in addition to the operational manpower level quoted above.

- Mining trainees, underground mining labour.
- Engineering Apprentices, Fitters, Electricians, Welders and Fabricators etc.
- Technical and specialist, Ventilation Engineers, Roof Control Engineers, Surveyors, and underground supervisors. etc.
- Graduate Training Programme, Mining Engineers, Electrical and Mechanical Engineers, Accountancy etc.

19.7.13 Energybuild has been working in partnership with Gower College Swansea since September 2004. Since collaboration started 36 full apprentices have either passed out or are in training, these are made up of Mines Electrical class 1, Mines Mechanical class 1 and Fabrication and Welding. These apprenticeships are normally of 4 years duration.

19.7.14 The apprentices then are awarded a full Level 3 Modern apprenticeship with a Level 3 Mineral product Qualification Council NVQ, Pros kills Level 3 Engineering Framework, Legislation certificate and a full Mining Class 1 certificate.

19.7.15 Examples of the fields in which Energybuild proposes to provide graduate development and subsequent long term careers include Mining Engineers, Mechanical and Electrical Engineers, Geologists and Business Accountants

19.7.16 To date the company has provided career starts to six graduate trainees.

19.7.17 The table below shows the proposed training and apprenticeship up take for the period 2014 to 2024 the numbers may be tailored to meet on-going needs.

Table 19.7 - Training regime 2014 TO 2024

	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
Mechanical Apprentices		4	4	4	4	4	4	4	4	4	4	4
Electrical Apprentices		4	4	4	4	4	4	4	4	4	4	4
Welding and Fabrication		1	1	1	1							

Technical Specialists		2	2	2								
Mining Trainees		30	30	30	30	30	15	15	15	10	10	10
Graduate Scheme			3	2	2							
Total		41	44	43	41	38	23	23	23	18	18	18

19.7.18 The local area is characterized by low level of high qualification. An average of 30 new apprentices will undertake the apprentice programme at Aberpergwm Mine each year.

19.7.19 This is considered a direct effect of the project on future employability of the local population within working age with indirect effects on reduction on expenditure in job seeking allowance. This is considered of sub-regional importance and as such of major beneficial significance.

Community Fund

19.7.20 Energybuild contributes to and participates in the administration of a community social fund. The fund is available to provide financial support for local causes. The list of beneficiaries includes Glynneath Rugby Club, Glynneath+District Historical Society, The Vale of Neath Parish - Restoration Project and Cwmnedd Primary School among others. A list of beneficiaries is provided in Appendix 19.2.

19.7.21 With the resume of activities at Aberpergwm Mine, the Community Funds Committee has expressed the view that the community fund value should be increased. Additionally, it is considered that the catchment of potential beneficiaries of the funds will extend to include the Dulais Valley. According to information provided by Energybuild, it is estimated that over the lifetime of the project, approximately £875,000 will be deposited in the community fund account by Energybuild.

19.7.22 These funds will be directly available to carry out projects of local importance within a deprived area. As such, the Community Fund is considered of local importance, thus generating a direct moderate beneficial impact on the local community.

Indirect Effect

19.7.23 Energybuild provided the list of the external suppliers for Aberpergwm Mine. The majority of Energybuild suppliers are located in South Wales. The continuation of the operations at Abepergwm Mine will secure continuity of business for the local traders. The development of the mine will help to sustain local businesses, with a multiplier effect which is considered of regional importance and would result in a major beneficial effect.

19.7.24 Increased employment will have a positive indirect impact in the overall quality of life. The separate Health Impact Assessment accompanying the current planning application, highlights how income, access to social networks, and a sense of identity and self-worth will have a long term beneficial impact on the local community. Additionally, the quality of work and the type of employment matters. Low paid, insecure and health-damaging work has negative impacts on health. Unemployment has both short- and long-term effects on health. There is evidence of an immediate negative impact of being made redundant on a person's health. There is also evidence of steady negative effects, proportional to the duration of unemployment, which progressively damage health. Therefore adverse effects on health are greatest among those who experience long-term unemployment.

Public support

19.7.25 The beneficial effect of the proposal on local employment and business is perceived and supported by the local community. As discussed in details in the separate Consultation Report, during the public exhibitions, the members of the public who attended the event were recorded to strongly support the project and no objection to the scheme were received.

19.8 Mitigation Measures

19.8.1 No specific mitigation measures are considered necessary, as there are no new negative economic impacts generated by the continuation of activities and expansion of the underground mining.

19.9 Conclusions

19.9.1 The assessment identified that the continuation and expansion of operations at Aberpergwm Mine will have a major beneficial impact on the local employment with a multiplier effect on local business and communities. The direct and indirect effects of the project are assessed as major beneficial in the long term for the local area.

20 CUMULATIVE IMPACT ASSESSMENT – DEVELOPMENT PROPOSALS FOR ABERPERGWM MINE

20.1 Introduction

20.1.1 Cumulative impacts relate to the way in which different impacts can affect a particular environmental resource or location incrementally. In essence, cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable developments, together with the proposed development itself. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

20.1.2 Throughout the Environmental Statement the areas of potential impact that the development could potentially have on the site and the surrounding area has been assessed having regard to the EIA Scoping Opinion. In addition, consideration has been given to cumulative effects when considering each area of potential impact.

20.2 The general approach to cumulative impact assessment

20.2.1 Cumulative impact assessment is carried out on many proposals for minerals development. There is therefore a considerable body of material and examples of how such an assessment is best approached.

20.2.2 Proposals for coal mining development have often resulted in very careful consideration of the potential cumulative effects of development proposals. In particular, surface coal mining proposals have resulted in cumulative impact assessment being the subject of detailed consideration at Public Inquiry into appeals against refusal of mining proposals.

20.2.3 There is therefore helpful guidance and case law that provides a guide as to how best to approach cumulative impact assessment. In this regard it is important to be clear on the categories or areas of potential cumulative impact that need to be considered. Drawing on examples like the granting of Planning Permission by the Secretary of State for UK Coal to surface mine 900,000 tonnes of coal and 250,000 tonnes of fireclay at Huntington Lane, Telford and in the light of the Planning Inspector's report on this case, the main categories can be broadly summarized as follows:

1. Potential simultaneous effects from concurrent developments

2. Potential successive effects having regard to past, present and foreseeable future development

3. A potential combination of effects from the same development

20.2.4 The ES Chapters have each given consideration to the potential cumulative impacts of the proposed mining and related development at Aberpergwm Mine with particular emphasis on both simultaneous effects and foreseeable future development of the mine. Besides considering potential negative impacts consideration has been given to the potential for the proposal to give rise to a series of benefits resulting from the development (which could potentially offset or outweigh any harm).

20.3 Potential simultaneous effects

Introduction

20.3.1 Simultaneous effects comprise the impacts arising from multiple developments, occurring at different locations in the locality. Separately, such individual projects may not create an unacceptable degree of adverse impact but collectively the results may potentially be significant.

Approach

20.3.2 As per the EIA Scoping Opinion the following potential developments have been considered with regard to potential simultaneous cumulative effect:

- P2008/0024 – Hirfynydd Windfarm.
- P2011/1147– Outline application for mixed use development comprising of up to 60 residential units, up to 100 units of holiday accommodation, up to 350sq.m retail and up to 1000sq.m of leisure complex with associated access, footpaths, ecological improvements, landscaping, boundary treatments and services at Rheola House.
- P2013/0366 –Wind Farm at Maesgwyn.
- P2009/0516 – Health Centre, Glynneath (Outline).

- P2012/1126 – Selar Opencast

20.3.3 These are shown on drawing number JNP/CUML/13.

Assessment of the Potential Simultaneous Effects

Hirfynydd Windfarm

20.3.4 The EIA chapters indicate that, for a number of areas of assessment, there would be only limited cumulative effects of the Hirfynydd Windfarm development taking place simultaneously with the mine development. In terms of archaeology/heritage and landscape visual considerations there are either minor adverse or negligible adverse cumulative effects. In terms of hydrology the EIA confirms the two developments drain to different catchments and there is therefore overall no adverse cumulative impact. There is some potential for dust to be generated by both the construction of the windfarm and potential future developments for the mine, but these are relatively short-term temporary and can be mitigated. The subsidence assessment does though indicate the potential adverse subsidence effects that underground coal working could have upon the windfarm and the potential sensitivity of the turbines development to subsidence impact. The windfarm has the potential to have a direct impact on ecology, mainly in relation to the effects on protected bird species. Whereas, the mine development would have negligible adverse impact on ecology.

Rheola House

20.3.5 The EIA chapters indicate that for nearly all aspects of potential cumulative impacts there will be no simultaneous cumulative impacts between the mine development and the Rheola House development. Only the potential for dust to be generated by temporary construction works on the two developments is raised and it is acknowledged that in both cases this is capable of being mitigated.

Maesgwyn Windfarm

20.3.6 The EIA chapters do not indicate a significant simultaneous cumulative impact of the mine development taking place simultaneously with the Maesgwyn Windfarm. In terms of archaeology/cultural heritage and landscape/visual considerations the simultaneous effects are minor adverse and negligible adverse. Temporary construction works on both the mine and windfarm developments would be short

term and could be mitigated. The windfarm has the potential to have a direct impact on ecology, mainly in relation to the effects on protected bird species. Whereas, the mine development would have negligible adverse impact on ecology.

Health Centre, Glynneath

20.3.7 Short term construction work if the Health Centre development were to proceed would generate dust. This could occur simultaneously with potential mine developments, but these temporary simultaneous effects can be mitigated. Both the mine and the potential Health Centre developments will result in run-off but in both cases are capable of being mitigated through sustainable drainage systems and the cumulative impact will be negligible. The Transport Assessment for the mine development has considered the potential worst case for traffic generation for the mine and has concluded, having regard to other existing and permitted developments, including the potential Health Centre, that the highway network has sufficient capacity. The noise effects from the potential increased coal exports from the mine have the potential to have a moderate negative effect on the Health Centre development. This though represents the potential worst case impact at the highest planned outputs from the mine.

Selar Opencast

20.3.8 The EIA chapters indicate minimal simultaneous impacts of the Aberpergwm Mine development taking place simultaneously with the Selar opencast mining scheme. Both developments are temporary mineral developments. Both have the potential to result in dust emissions that are experienced simultaneously, but these are capable of mitigation and in both cases the air quality assessments have indicated they will not result in unacceptable levels of impact. In landscape and visual terms the assessment has concluded that the potential simultaneous effects of the two developments are negligible adverse.

20.4 Potential successive effects

Introduction

20.4.1 Successive effects comprise the potential impacts of the proposed development when combined with the effects of past development, as well as the effects of present development and development that is foreseeable in the future.

Approach

20.4.2 This section considers the cumulative effect of the proposals for Aberpergwm Mine taking account of past mining activities in this location as well as foreseeable further development of the mine, referred to in the individual ES chapters.

20.4.3 This section seeks to address the need for the EIA to consider the potential effects of the entire mining project at Aberpergwm Mine – as far as this is reasonably possible. Clearly the potential impacts of the current proposal, as set out in the "Potential Combined Effects" section, are easier to measure and judge than those that might result from potential future development at the mine.

20.4.4 Potential future development at the mine can though be considered in terms of the options that are available for developing the mine into the future and it is possible then to adopt a broad desk based approach to considering the potential positive and negative impacts of these options. Clearly where potential future development requires planning permission, and is of a scale and nature that requires EIA, specific assessment will then be undertaken on the proposals, their detailed design and any mitigation measures. Until the necessary level of detail has been assembled and a firm proposal brought forward it is not possible to carry out a robust EIA of such proposals.

The Assessment of Potential Successive Effects

Combining the Effects of the Proposal with the Impact of Past Mining Operations

20.4.5 As with many parts of South Wales the Vale of Neath has been subject to a considerable amount of coal mining industry activity over a long period.

20.4.6 Coal mining at Aberpergwm Mine dates back over 200 years. There are, in modern times, 3 distinct phases of mine operation at Aberpergwm Mine:

- Pre 1947 – pre nationalisation of the mining industry
- Post 1947 – following nationalisation of the mining industry
- Post 1994 – following privatisation of the mining industry

20.4.7 The levels of activity at Aberpergwm Mine during these phases can be summarised as follows.

Pre- Nationalisation

20.4.8 The initial Aberpergwm Colliery, the predecessor of its current form, was opened in 1906 and was worked by the Aberpergwm Colliery Company. It became a subsidiary of Amalgamated Anthracite Collieries Limited, who by 1928 controlled 80% of output from the anthracite section of the Coalfield, and by 1934 produced 4,300,000 tons of coal from 26 pits, employing 13,779 men.

Post-Nationalisation

20.4.9 Following Nationalization in 1947, Aberpergwm was placed in the NCB's South Western Division's, Area No.9 (Neath), Group No.1. 690 men were employed at the colliery at this time. The NCB used Aberpergwm as a base for central workshops and road transport. In the late 1950's the NCB re-organized the mines in the Glynneath area and opened new mines at Cwmgwrach and Pentreclwydau, and constructed a new and extensive central coal washery at Aberpergwm. During the late 1970's the NCB initiated a substantial development programme which entailed the underground connection of Treforgan and Aberpergwm Collieries to exploit the vast coal reserves by longwall mining methods in an area situated between the two mines. Initial longwall working undertaken at Aberpergwm Colliery had proved to be very successful and the link between the two mines was planned to open up the reserve area and provided the necessary access and ventilation to boost production by longwalling mining. Following the yearlong (1984/1985) miners strike the colliery made a poor recovery and British Coal abandoned plans to link Treforgan Colliery by underground roadway to Aberpergwm Colliery and closed the east side of the mine. Total closure of Treforgan Colliery followed not long after in 1985.

Post-Privatisation

20.4.10 Aberpergwm Colliery was re-opened in 1993 under private ownership. Substantial underground pumping and repair works were undertaken between 1993 and 1999 to recover the mine. In 2000 the Government provided grants to support the mining development totalling £1 million. In March of 2003 it again qualified for £903,600 in the final part of the Coal Operating Aid Scheme, which had operated since 2000. The primary intention of these grants was to ensure the security of access to the Treforgan coal resource area and the expansion of the mining area. An extensive development programme was initiated at the mine in 2010 which incorporated

substantial underground tunnelling works, development of a new drift, installation of new production mining machinery and also a redevelopment of the mine surface which included the construction of a new coal processing plant and supporting facilities.

Conclusions

20.4.11 In terms of past levels of impact it is apparent that the Vale of Neath has experienced periods of time where there have been substantial cumulative impacts resulting from the presence and operation of a series of collieries, surface mine sites and associated infrastructure to handle both coal products and mine discard. Whilst at times the combined effects of all these operations, concentrated in a relatively small area, would have had an adverse effect on local amenity the communities located in the Vale of Neath would themselves have been developed on the basis of providing employment and manpower for the mining industry and the mining industry was a major provider of employment in this and other areas in South Wales.

20.4.12 In the last 30 years though the level of coal mining activity in the UK, and specifically South Wales and the Vale of Neath, has reduced substantially. In this period 3 collieries have closed in the Vale of Neath and a large amount of infrastructure – e.g. coal washeries, rail loading and rail sidings – has been removed. The effect of this has been a significant reduction in the overall level of mining and mining related operations and a resultant reduction in related effects, like traffic/transportation, emissions to air and general effects, including visual impact. A clear negative effect has been the dramatic reduction in employment in the mining industry and the Neath valley has consequently experienced high levels of unemployment and deprivation.

20.4.13 In this context the environmental effects of the current proposals to extend the underground operations at Aberpergwm Mine, along with new mine waste repository and an extended period of operation of the mine surface development, can be set against a background of generally reduced environmental effects from overall mining activity. The current proposals have the potential though to make a substantial contribution to increased employment in the mining industry over a 25+ year period, with resultant potential opportunities for the younger generation of the Vale of Neath.

20.4.14 The EIA/ES on the current proposals has demonstrated an overall level of environmental acceptability, which takes into account the use of mitigation measures and control over the various operations. In this regard, there has been a general improvement and increase in environmental operating standards and the level of mitigation and control now employed by an operation such as Aberpergwm Mine is greater and more effective than the standards of operation that took place prior to the large reduction in mining activity in the last 30 years.

20.4.15 It is therefore considered that the effects of the current proposals, when combined with the effects of reduced levels of mining activity over the last 30 years do not result in an unacceptable level of environmental impact. Additionally, the potential economic and employment benefits of the current proposals have the potential to result in a significant benefit which would offset the significant adverse effects of mine closure and high levels of unemployment that have been experienced in the last 30 years.

Combining the Effects of the Proposal with Potential Future Development of the Mine

20.4.16 The future for Aberpergwm Mine involves planned growth in the mine's annual "run of mine" output from 233,000 tonnes in 2014 to 1 million tonnes in 2019 and maximum output, at 2.5 million tonnes, from 2020 onwards.

20.4.17 To achieve this planned growth there is a requirement for staged investment across a 5+ years period. This is needed to:

- Ensure maximum exploitation of the coal reserves through a mixture of underground mining methods and with higher levels of output requiring the carrying out of long wall mining methods in association with multi-entry gate-road developments.
- Provide additional ventilation of the underground workings and improve emergency access and egress to the extended workings.
- Enable phased increases in the mine's workforce with associated training and apprenticeships.

- Potentially deliver additional transport infrastructure to support the processing and disposal of increasing volumes of mine waste and the handling and export of greater volumes of coal.

20.4.18 A priority for the development of the mine underground will be the additional ventilation and emergency access and egress routes to serve the extended underground workings. Energybuild's preferred option is to achieve this using a new access via the former Treforgan Colliery drift. The Company currently plan's to bring forward a Planning Application for this in 2014, and plans for delivery of production up to 2020.

20.4.19 The phased increased mine output is also linked to increases in the workforce. Energybuild plans to make provision for this through the provision of additional accommodation off the existing mine site. This would have the benefit of providing both increased and improved accommodation/facilities as well as proving more space and capacity for surface infrastructure in the existing mine site. Included in the options is a new office and welfare complex to be located on the land to the south of the mine site.

20.4.20 In terms of future potential investment in infrastructure for transporting both mine waste and coal Energybuild has identified a number of potential options that might be employed for operational, commercial and environmental reasons at the higher levels of proposed production. These can be briefly summarized as follows:

- Additional infrastructure for the movement/transportation of increased volumes of mine waste (discard) to the proposed mine waste repository (MWR). Options include: potential overland conveyor; potential pipeline; potential to utilize a mix of waste transportation methods, including the current proposed use of an upgraded haul road to the MWR.
- Infrastructure for the export of increased volumes of coal product, based upon the potential to increase the use of rail transport of coal through increased usage of the Unity Mine rail head. Options include: increasing the capacity of the rail head; developing additional means of access to the rail head - besides the existing road haulage route - which might include an overland conveyor route, a pipeline, an overland haul route or a mix of methods/routes.

Development to provide mine ventilation and emergency access

20.4.21 The proposed underground working will reach a stage where, for the purposes of underground logistics, ventilation and safety of access, consideration must be given to the provision of a second surface connection to the expanding Aberpergwm mine workings. Based on the forecast tonnages delivery of this connection is scheduled for the period 2016-2018.

20.4.22 A logical solution is the re-opening of the existing Treforgan Colliery Main Intake and Main return and to use the drifts as emergency egress of the Aberpergwm Mine underground workings since these two tunnels extend toward the proposed Aberpergwm Mine underground workings.

20.4.23 Although quite close to the residential areas of Treforgan and Crynant, the Treforgan Mine is physically well separated and benefits from mature regenerative vegetation around the site providing an effective screen. The proposals to re-open the Treforgan Mine are to purely provide access and ventilation, coal would still be taken out at the Aberpergwm colliery.

20.4.24 The Treforgan site is a disused colliery, and the site has not undergone any formal restoration since its total closure in 1985.The EIA chapters have indicated that there would be limited cumulative impacts in relation to transport/traffic and air quality in terms of the potential additional development at Treforgan Mine. The site has no ecological designations but it has naturally regenerated and this has created new habitats. There is though good potential for mitigation of any ecological impacts and the potential ecological effects, in overall terms are not considered significant. Given the nature of the site, with the previous levels of surface development there is the likelihood of minimal impacts on soils. There is the potential for some amenity effects of redeveloping the site but the level of impacts in terms of visual effect and noise will depend on the detail of what is proposed, its design and any mitigation measures put forward. However, the site is well screened from surrounding sensitive receptors. As the land is previously developed there would be minimal impact upon buried archaeology. There may be some interest with regard to the industrial heritage of the site but overall the potential impacts to archaeology/cultural heritage are not considered to be significant.

20.4.25 The only realistic alternative to providing underground logistics, ventilation and safety of access would be to open a new drift mine. Such a development may have the potential for greater environmental and amenity impacts than the re-opening of the Treforgan Mine.

Development to facilitate increased in mine manpower

20.4.26 With the proposed increases in coal production there will be an increase in employees to operate the mine. To accommodate the increases in staff and to provide the area required to accommodate the increase in coal production there is the potential to locate a new car park and administrative/office buildings to the south of the B4242. The car park could have in the order of 340 spaces, to accommodate the personnel during 24 hours shift working.

20.4.27 This option would require new utility connections, drainage, landscaping and lighting. The potential car park area is identified on land at risk of flooding and therefore the proposals would require flood compensation measures.

20.4.28 The potential administration, accommodation and car park development would be located well away from residential areas. Any potential impact to noise and air quality amenity would be fully assessed as part of any planning application for such a development. However, given the distance to sensitive receptors any impacts would be capable of mitigation and therefore negligible. Construction of the proposed administration offices/welfare buildings has the potential to generate deposition dust during construction. However with appropriate dust mitigation measures employed during the construction operations the effects will be minimised and temporary.

20.4.29 The construction of the administration/welfare facilities along with the increase in workforce has the potential for an increase in the number of vehicles on the local highway. A Transport Assessment for this future development of the mine would be undertaken and appropriate mitigation measures would be put in place, such as a Travel Plan, to ensure that any impacts upon the local highway are kept to a minimum.

20.4.30 The site identified is previously developed land and therefore has minimal ecological interest and little impact. There are no known designations of ecological interest within the site.

20.4.31 As the site is previously developed land there is unlikely to be impact upon archaeological interests. There are no buildings or structures of cultural heritage interest within the potential site. There are two listed buildings within close proximity to the potential site, the Aberpergwm Aqueduct over the Neath Canal and a bridge at a lock on the Neath Canal. Although these listed buildings lie in the vicinity of the proposed development area they are sufficiently remote that the impact of the proposals is unlikely to be significant.

20.4.32 The construction of the office building and car park is likely to include the construction of a pedestrian bridge over the B4242 to allow personnel to safely cross the road. The details of the design of the bridge are not known at this stage but the pedestrian bridge will be visible from the B4242. However, in the context of the overall proposed development, the visual impact is likely to be negligible.

20.4.33 There are alternatives to developing new facilities. There is an opportunity to develop the Treforgan site but the environmental and amenity impacts of this option are considered to be greater due to the closer proximity of residential areas at Treforgan and a longer distance/time for miners to get to the coal face. There is also the potential to use facilities at Unity Mine. However, this would result in a longer time period for miners to travel to the coal face and therefore has some economic constraints.

Options for the transport of coal

20.4.34 As the quantity of coal production increases it may be operationally, economically and environmentally beneficial to provide some alternative or additional transport options to coal movements by road. In general the only feasible alternative is for the greater use of rail to haul the coal. The nearest access to a rail head is at Unity Mine. Therefore options for transporting coal from Aberpergwm Mine to the rail head have been considered in the EIA chapters. The possible options available include:

- Overland conveyor;
- Pipeline;
- HGV haul route;
- A combination of the above.

20.4.35 Any of the above options are likely to be developed along the same broad corridor. The likely corridor for the transport of coal from Aberpergwm Colliery surface to the rail head at Unity Mine is shown on Drawing No JNP/TRNS/CPRR/13Rev1 and follows a route south west from Aberpergwm Colliery surface along the river valley between the Neath Canal and the River Neath, crossing beneath the A465 at the same point that the River Neath crosses the A465 near Cwmgrach.

20.4.36 The potential corridor is reasonably remote from main residential areas. However, there is likely to be an impact upon users of the river valley including informal footpaths. There would be impact from dust during the construction of either a conveyor or pipeline, although this would be for a temporary period and could be mitigated.

20.4.37 There is potential for sensitive habitats and species within the river valley corridor, including loss of trees and shrubs. Of the available options the haul route would have the most impact upon habitats and species due to its invasive nature. A conveyor or pipeline would have impacts upon habitats during construction but once operational the impacts will be minor. Whichever option is pursued a detailed ecological assessment would be required with appropriate mitigation/compensation incorporated within the planning application.

20.4.38 The potential use of alternative means of coal transport (including conveyor and pipeline options), could facilitate increased use of the rail loading facility at Unity Mine, which would reduce emissions associated with transportation of coal by road but emissions via train would increase. Overall though there would be a beneficial effect on air quality in increasing the volumes of coal transported by rail and limiting the volumes of coal transported by road.

20.4.39 The development of a conveyor/pipeline/haul route in the vicinity of the River Neath and Neath Canal may have an impact upon the setting of archaeological and cultural interests and any structure associated with them. The design and route of either conveyor/pipeline/haul route would be assessed to ensure that any potential impacts upon areas of cultural heritage are kept to a minimum.

20.4.40 The corridor identified for potential alternative transport options, including product conveyor or pipeline/haul road connecting Aberpergwm to Unity Mine will be visible within the Neath Valley. The visibility depends on the amount of vegetation

clearance undertaken during any construction but it is likely to result in a minor adverse visual impact up to decommissioning.

Options that could assist in the transport of larger volumes of discard to the mine waste repository

20.4.41 As the quantity of coal production increases there will be a corresponding increase in the levels of discard requiring disposal to the Mine Waste Repository. For operational, economic and environmental benefits there may be benefits in considering alternative or additional methods of transporting the colliery discard to the Mine Waste Repository. The options available include:

- Overland conveyor;
- Pipeline;
- Haul route;
- A combination of the above.

20.4.42 The haul route will continue along the existing route but will incorporate a series of improvements as set out in this planning application. If required the overland conveyor or pipeline could be developed broadly within the same corridor. The potential corridor is shown on drawing no JNP/TRANS CORR/13 and runs from Aberpergwm Colliery surface in a north westerly direction up the hillside to the Mine Waste Repository through Aberpergwm Wood.

20.4.43 The conveyor/pipeline corridor and the continued use of the haul route are remote from the main residential areas with only one or two isolated properties.

20.4.44 Forestry access roads cross the line of both the pipeline/conveyor corridor and the existing haul route. However, no public rights of way lie within the line of the potential pipeline/conveyor corridor or the existing haul route.

20.4.45 Any potential impact would likely to be during the construction of either a conveyor or pipeline, and this will be for only a temporary period.

20.4.46 There may be the potential for sensitive habitats and species to be impacted. Of the available options the haul route is likely to have the least impact upon habitats and species as it is already constructed and operational.

20.4.47 The conveyor/pipeline corridor runs through Aberpergwm Wood, it is accepted that the development along this corridor would have an impact upon trees and therefore potential impacts on habitats/species including Honey Buzzard. However, with careful siting and design at the relevant time any impacts could be managed. A detailed ecological assessment would accompany any planning application with appropriate mitigation/compensation incorporated.

20.4.48 The continuation of use of the haul route has the potential for disturbance upon habitats/species throughout operations but given that the haul route is already in use these are assessed within the EIA/ES as minor. The development of a pipeline/conveyor would only have impacts of an adverse nature during construction reducing once operational.

20.4.49 There is potential for deposition dust to be generated during the construction of the overland conveyor or pipeline but with the implementation of best practice dust mitigation measures emissions during the construction operations, deposition dust emissions can be minimised. The use of a covered conveyor/pipeline will reduce the potential for deposition dust to be emitted during the transportation of the discard material.

20.4.50 There are no known assets of cultural heritage interest along either the haul road or potential corridor for the conveyor/pipeline. The design and route of either conveyor/pipeline would be assessed to ensure that any potential impacts upon areas of cultural heritage are kept to a minimum.

20.4.51 The corridor for a potential mine waste conveyor or pipeline connecting Aberpergwm to the MWR will potentially be visible from long distances from the southern Neath Valley slopes. The visibility depends on amount of vegetation clearance undertaken during construction but it is likely to result in a minor adverse visual impact up to decommissioning. In landscape terms there would be a negative impact upon the landscape. However, given that the corridor route is largely through commercial forest then the impacts are likely to be low.

13.1 Potential combined effects

Introduction

20.4.52 In order to assess the combined effects of the environmental impacts of the proposed development of Aberpergwm Mine, it is necessary to consider whether some or all of the individually acceptable effects are so close to being unacceptable, that when combined together, the totality is unacceptable.

Approach

20.4.53 It is important when carrying out an assessment of how potential effects of a development may be combined to establish the methodology to ensure that a "proper assessment" has been carried out.

20.4.54 What constitutes a proper or robust assessment of cumulative effects has been considered by the High Court in the case of The Queen (on the application of Leicestershire County Council) v. the Secretary of State for Communities and Local Government and UK Coal Mining Ltd (2007) EWHC Admin 1427. The case, known as the 'Long Moor judgement' was heard before Mr Justice Burton and was focused around the Secretary of State's granting of planning permission on appeal for surface coal mining at UK Coal's Long Moor site in Leicestershire.

20.4.55 The background to the case was that Leicestershire County Council (the Mineral Planning Authority or MPA) had originally refused planning permission on the grounds of cumulative impact. At appeal however, the Inspector and the Secretary of State accepted that none of the individual effects was of sufficient dis-benefit to justify the refusal of permission and accepted that in the absence of a further 'proper assessment', there was nothing to suggest that the cumulative impact was such as to warrant the refusal of permission.

20.4.56 When the decision was challenged in the High Court, Mr Justice Burton criticised the MPA's evidence as being based on conclusions which were simple value judgements, with no supporting reasons. Importantly, he concluded that reasons underpinning any conclusions on cumulative effects must be provided by the MPA for it to be considered a 'proper assessment'. In paragraph 41 of his judgement he gives examples of such reasoning as including:

i. Even though each individual area of potential impact was not objectionable yet each such feature was close to objectionability that, although none could be said to be individually objectionable, yet because

each was nearly objectionable, the totality was cumulatively objectionable; or

ii. One, two, three or four of the particular features were close to being objectionable and that would be an important matter to take into account when looking at the totality; or

iii. One particular combination of two or three otherwise unobjectionable features could cause objectionability in their totality; or

iv. As was specifically addressed by the Interested Party and by the Inspector here, and found not to be the case, there could be some unusual feature or some unusual combination of features such as to render the combination objectionable when the individual feature was not.

20.4.57 The judgement of Mr Justice Burton therefore provides guidance as to how levels of objectionability should be assessed and, how, then they might be considered in combination. In effect it has identified a series of tests that could be applied when carrying out an assessment that involves the potential combined effects of the development.

Assessment of the Potential Combined Effects

Subsidence

20.4.58 The subsidence assessment reports that with the use of appropriate mitigation and the employment of appropriate mining methods, where surface development could be significantly impacted upon by subsidence, the potential impact of subsidence can be kept to acceptable levels.

20.4.59 Given the lack of surface constraints across a number of mining zones and the potential to mitigate against impacts of subsidence in other zones it is concluded that the potential effects of subsidence would not come close to the threshold of objectionability.

Water Resources

20.4.60 The hydrogeological and flood risk assessment have found that there will be no significant adverse impacts in terms of flood risk, surface water flow or quality in the

surrounding water environment during the operation. The inclusion of surface water management systems, to include both attenuation and water quality treatment prior to discharge, will provide mitigation against any potential effects. There will be some residual risk of the car park access being subject to flooding at the peak of extremely high return rainfall events, but this risk is only remote. The potential effects do not come close to the thresholds of unacceptability.

Land Use and Soils including Restoration

20.4.61 The Mine Waste Repository is purposely located on an extensive area of brownfield land, which means the potential impacts are largely confined to previously undisturbed areas to the east and south of the former Forest Quarry 2 Extension OCCS which will be overtipped in the course of the development.

20.4.62 The works have resulted in significant environmental improvement, not least in the management of surface water drainage. This, combined with the fact that the Mine Waste Repository will be developed in managed phases that ensure the progressive restoration of areas where filling is complete and the preservation of previously undisturbed and restored areas for as long as possible during the development, avoids any significant cumulative impact. The potential effects do not come close to the thresholds of objectionability in respect of soils and land quality.

Ecology and Wildlife

20.4.63 In terms of potential ecological and nature conservation impacts, it is not considered that the loss of the site for development would be ecologically significant in the wider context, or that there would be cumulative impacts associated with the proposed activities when considered within the context of the wider environment.

20.4.64 None of the woodland areas mapped will be directly affected by the proposed development, although potential risks from pollution and additional noise increase the possibility of indirect impacts.

20.4.65 No statutory or non-statutory protected sites (including nature reserves) occur within the application site.

20.4.66 No protected plant species were recorded within the application site.

20.4.67 The potential effects do not come close to the thresholds of objectionability in respect of ecology, protected species and their habitats. The final restoration of the MWR will have positive ecological benefits.

Landscape and Visual Impact Assessment

20.4.68 As set out in the landscape and visual impact assessment the site's visual envelope is defined by high ground and extensive forest cover to the north, south and west, while its relatively low lying elevation protects it from views from the east.

20.4.69 The site is not located in an area of landscape designation. The baseline landscape value on the working area western part of the site is very poor and it is currently a detractor within the wider landscape. The site's quality and overall sensitivity to development is low.

20.4.70 The landscape impact significance of the proposals will be slight adverse during the lifetime of the development and nil on completion of restoration. That of the current working site will be nil during the lifetime of the development and slight beneficial impact on completion of restoration.

20.4.71 Visual impacts vary depending on the proximity of the viewpoint. The scale of the proposals will remain local because topography and screening vegetation allow a limited number of clear viewpoints. Overall, the operational proposals will result in a temporary (20 year) slight adverse visual impact (although some individual views will tend towards moderate adverse). When works are complete, the visual impact of effectively removing a detractor from the wider landscape will be beneficial, resulting in an overall permanent visual impact of nil. Therefore, whatever combined 'objectionability' may be created in terms of landscape and visual effects, it will be short lived and adequately compensated for in the long term.

Transport and Access

20.4.72 The Transport Assessment investigates the local transport systems serving the proposed development site, including the highway network, public transport infrastructure, and pedestrian/cycle facilities. The TA also identifies the impact of the proposed development on the surrounding highway network.

20.4.73 It is anticipated that, as a 'worst-case' scenario, the proposed development could generate up to 237 HGVs per working day, which is less than the volumes of traffic currently consented on the site (i.e. up to 290 HGVs per working day).

20.4.74 It is considered that, with mitigation measures, no major adverse impacts will remain and it is therefore considered that the proposed development will not represent a significant effect on the environment from a traffic, transport and movement standpoint.

20.4.75 The potential effects do not come close to the thresholds of objectionability in respect of traffic and transport.

Amenity (i.e. noise and dust)

20.4.76 The potential impacts of the development proposal upon residential amenity (i.e. in relation to noise and dust) are not considered to be significant. Mitigation measures are proposed in each case to minimise potential negative effects and ensure that any impacts are controlled to an acceptable level. Whether considered individually or in their totality, the potential effects on amenity do not come close to the thresholds of unacceptability.

Archaeology and Cultural Heritage

20.4.77 The potential impact upon archaeology would be very little impact and none of significance or approaching significance.

20.4.78 The potential effects do not come close to the thresholds of objectionability in respect of archaeology and cultural heritage.

Assessment of the Combination of Potential Impacts

Test 1

20.4.79 The first test referred to by Mr Justice Burton considers "even though each individual area of potential impact was not objectionable yet each such feature was close to objectionability that, although none could be said to be individually objectionable, yet because each was nearly objectionable, the totality was cumulatively objectionable". The first test is assessed as follows:

It has been considered that each individual area of potential impact is not, on balance, objectionable. None of the impacts of the scheme would come close to the thresholds of acceptability and are not considered to come close to being objectionable on an individual basis.

20.4.80 Therefore, because none of the impacts come close to being objectionable or conflict with Development Plan Policy, the totality would not be objectionable.

Test 2

20.4.81 In relation to the second test referred to by Mr Justice Burton it is appropriate to consider whether "One, two, three or four of the particular features were close to being objectionable and that would be an important matter to take into account when looking at the totality".

20.4.82 In this case it is considered that none of the potential impacts arising from the development are close to being objectionable.

20.4.83 The main potential negative impacts are short term. There is not therefore any combination of particular features that are considered to be important matters that could give rise to objections in regard to test two.

Test 3

20.4.84 Test three referred to by Mr Justice Burton considers whether one particular combination of two or three unobjectionable features could cause objectionability in their totality. In consideration of this matter there are individual features (impacts) which are related in terms of subject matter or in regard to the receptors in which they have the potential to impact upon and could therefore be considered in combination, namely:

i. Landscape/Visual Impact and Ecological Impact;

ii. Local Amenity impacts such as Noise, Dust and Traffic

20.4.85 In relation to point one, as discussed above, neither ecology or landscape and visual effects are considered to be close to being objectionable. Therefore, in combination their totality would not amount to being objectionable.

20.4.86 In relation to the second suggested combination (local amenity impacts), none of the individual features are likely to give rise to direct conflict with development plan policy or exceed nationally recognised thresholds of potential nuisance related impacts. The development is being operated in accordance with planning conditions that control the development to levels that are acceptable in the locality. The development forming this planning application would be undertaken in accordance with these accepted planning controls. It is considered that because the potential impacts of noise, dust and traffic on local communities and individual properties (i.e. the nearest sensitive receptors) individually would each be well within the thresholds of objectionability their combined totality would not be objectionable.

20.4.87 In the light of the above it is concluded that there are no particular combination of two or three otherwise unobjectionable features that could cause objectionability in their totality.

Test 4

20.4.88 The fourth area to consider is whether there could be an unusual feature or unusual combination of features that could, when combined, result in objection when the individual features were not. For the most part, the site and surroundings are typical in relation to the potential sensitive receptors, the issues and the potential impacts that tend to arise from mineral development of this nature.

20.4.89 There are no features/impacts associated with these proposals that could when combined result in an objectionable impact.

Conclusions

20.4.90 It is considered that the approach and methodology to assessing the combined negative effects is thorough and robust. Following an assessment of each of the four tests it has been concluded that no objectionable combined negative effects would be brought about by the Aberpergwm proposal.

20.5 Beneficial Effects of the Proposal

20.5.1 The proposed scheme would result in a number of benefits (positive effects) which are summarised as follows:

- *Meeting a national need for coal supply.* Section 10 of this ES deals with the

need for coal and sets out that there is a national need for coal to support the Country's energy mix and ensure security of supply.

- *A range of socio economic benefits.* A socio-economic assessment has concluded that 529 jobs would be directly provided as a result of the proposals. In addition there would be additional expenditure on supplies and service which would also benefit the local economy.
- *Environmental benefits.* As part of the restoration proposals the site will benefit from a variety of environmental improvements and enhancements.

Assessment of the Combination of Potential Positive Effects

20.5.2 In order to assess the overall cumulative impact of the proposal in a balanced manner it is logical that the potential positive impacts of the scheme are identified and aggregated to indicate a potential cumulative positive effect. This enables them to be weighed, in combination, into an overall judgement of cumulative acceptability or otherwise. As set out above, the proposal would bring about a number of benefits to the local/regional area, would help to meet a number of the Government's objectives in relation to mineral supply and energy security and would provide various land use enhancements.

20.5.3 The potential benefits of the scheme can be summarised into three main areas:

- Need for mineral supply;
- Economic benefits; and
- Environmental benefits.

Need for mineral supply

20.5.4 There is limited supply in UK of domestic fuel and Anthracite. The preservation of Abepergwm Colliery would have a beneficial contribution to the UK balance of payments.

Economic Benefits

20.5.5 Energybuild operations have a beneficial effect on local employment. When the activities at Aberpergwm Mine resume to the previous levels, the beneficial effect of

the Mine on local employment will continue. Aberpergwm Mine has directly contributed in the past to local employment by 1.5 percent in Glynneath, and 0.09 percent in NPT. As part of the proposals it is estimated that the manpower at the mine will increase from 166 (in 2014) to 529 (in 2020). The project also has the potential to support approximately 350 to 400 additional jobs in the sub-region. It is therefore considered that, during the lifetime of the project, the effects on the employment will be major beneficial.

20.5.6 It is expected that between 2014 and 2020 as part of the workforce the mine will employ between 23 and 44 trainees/apprentices per year Due to the existing low level of high qualification in the local area is considered that the training and graduate programme is of major direct beneficial significance.

20.5.7 The indirect effect of the Mine on local economic activities is beneficial, with a wider beneficial effect in NPT's economy. It is therefore considered that that such effect would be major beneficial.

20.5.8 The beneficial effect of the proposal on local employment and business is perceived and supported by the local community. As discussed in detail in the separate Consultation Report, during the public exhibitions, the members of the public who attended the event were recorded to strongly support the project and no objection to the scheme were received.

Environmental Benefits

20.5.9 In addition to the social and economic benefits of the proposal, a number of environmental enhancements are proposed as part of the restoration scheme for the site.

20.5.10 Furthermore, the development proposal will bring about a number of ecological and biodiversity benefits in the long-term particularly following the restoration of the MWR site, including the creation of wider conservation verges, ecologically sensitive planting schemes and the creation of ponds and other water features.

Conclusions

20.5.11 The benefits of the proposal (which include meeting a national need for coal supply, providing economic growth benefits, and providing a number of environmental

benefits upon restoration) are considered to combine to provide a moderate positive impact.

20.6 Overall conclusions – cumulative impact, combined positive and negative effects

20.6.1 In accordance with the Development Plan and the County Council's Scoping Opinion, a cumulative impact assessment has been carried out as part of the Environmental Statement. The approach to assessing cumulative impact has followed the advice of Mr Justice Burton (in the Long Moor case) by considering the three categories of potential cumulative effects: successive effects; simultaneous effects from concurrent developments; and combined effects from the same development and then sets out reasoning behind the judgements reached.

20.6.2 The assessment of cumulative impact has had regard to positive and negative effects to ensure that an overall balanced judgement is reached. The potential positive impacts are particularly relevant when considering the combined effects from the same development.

20.6.3 The assessment of simultaneous effects has considered a series of existing/proposed developments that were identified through EIA Scoping. The potential effects of these developments in combination with the potential effects of the proposed mine development have been considered having regard to the main areas of potential receptor. In terms of effects on population, soils, flora/fauna, air and climate it is concluded there are no unacceptable combined effects. There would be some combined landscape effects mainly relating to parts of the mine development in combination with wind farm development. The mine development contribution to this is relatively limited and the overall cumulative effect does not reach unacceptable levels. The assessment has highlighted potential issues of conflict between the mine's proposed underground development and the proposed wind turbine development at Hirfynydd due to the potential sensitivity of the turbines to the effects of mining subsidence.

20.6.4 In terms of the combined effects, there are no impacts that are considered to come close to the thresholds of "objectionability" and therefore there are no combined cumulative impacts from the proposals. This conclusion has been reached having regard to the four tests recommended by case law.

20.6.5 The assessment of successive effects has considered specifically the effect of the mine proposals in combination with the impact of past mining operations as well as the effect of the proposals in combination with potential future developments associated with the mine. It is concluded that the potential totality of the proposed mining development does not result in unacceptable levels of impact in the locality and the assessment indicates that the potential effects of the proposal are set against a background of major reductions in mining and mining related activities in the area. The totality of the potential effects of the overall proposed mining development are considered to be less than the past levels of cumulative effects that resulted from intensive coal mining operations and related uses in this part of South Wales.

20.6.6 The proposal would have a number of positive effects which could act as a potential counter weight to some of the potential negative effects of the development. The main points in relation to the benefits are that the proposal would meet the national need for anthracite coal and bring about a number of employment and economic benefits.

20.6.7 It is concluded that the overall cumulative impact of the totality of the mining development on the locality is relatively low and the combination of the positive effects of the development should be weighed positively in the planning balance.