ERI Limited

BEDWAS TIPS RECLAMATION SCHEME

DRAFT Volume 1 - Environmental Statement

JANUARY 2024

PUBLIC

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1 INTRODUCTION

1.1 THE ENVIRONMENTAL STATEMENT

1.1.1. Subject to Regulation 17 of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[1], an Environmental Impact Assessment (EIA) application must be accompanied by an Environmental Statement (ES). This ES is the product of an EIA and has been prepared by WSP acting on behalf of Energy Recovery Investments Limited (ERI).

1.1.2. The draft ES can be viewed on the ERI website at: https://erireclamation.co.uk/bedwas/.

1.1.3. The public can comment on the ES via email / telephone or by post, as specified below:

- Address: Piers Thomas, Energy Recovery Investments Ltd, White Lion House, 17 Newmarket Street, Usk, Monmouthshire, NP15 1AU
- Telephone: +44(0)7833467341
- Email: Piers@erireclamation.co.uk

1.1.4. There will also be a link on the ERI website for the Proposed Scheme.

1.1.5. All draft planning documents will be available via Caerphilly County Borough Council's (CCBC) planning portal.

1.1.6. The purpose of this draft ES is to accompany the draft planning application for Pre-Application Consultation (PAC). PAC is a statutory process in which to consult with stakeholders, with a number of consultation activities to be undertaken prior to planning application. This includes making the draft planning documents available. This draft ES, along with the suite of planning documents, provides sufficient information to allow stakeholders to make an informed response on the Proposed Scheme.

1.1.7. The purpose of the final ES is to provide sufficient information to allow the Local Planning Authority (LPA), when deciding whether to grant planning permission for the Proposed Scheme, to do so in full knowledge of the significant effects the Proposed Scheme is likely to have on the environment during the construction and operational phases of the development.

1.1.8. This ES represents the findings of the EIA process in relation to the Proposed Scheme and includes the following:

- a description of the Proposed Scheme comprising information on the site, design, size and other relevant features of the development;
- a description of the likely significant effects of the Proposed Scheme on the environment;
- a description of any features of the Proposed Scheme, or measures envisaged in order to avoid, prevent, reduce or, if possible, offset likely significant adverse effects on the environment;

[1] Welsh Government (2017) *The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017*. Available online at: https://www.legislation.gov.uk/wsi/2017/567/regulation/17/made.

- a description of the reasonable alternatives studied by the developer, which are relevant to the Proposed Scheme and its specific characteristics along with an indication of the main reasons for the option chosen;
- a Non-Technical Summary (NTS); and
- any additional information relevant to the specific characteristics or type of development and to the environmental features likely to be significantly affected.

1.1.9. This ES has been undertaken in compliance with the relevant legislation, and therefore:

- is based on a scope agreed with the LPA as to what environmental topics are required for inclusion;
- includes the information required for reaching a reasoned conclusion on the significant effects of the development on the environment, taking into account current knowledge and methods of assessment;
- has been prepared, using the results of relevant UK environmental assessment, which were available at the time of preparation, with a view to avoiding duplication of assessment; and
- has been prepared by competent experts.

1.1.10. In their response to the screening report the LPA considered in line with Section 19 of Schedule 1 of the EIA regulations that an EIA and ES would be required for the Proposed Scheme.

1.1.11. The scoping response from the LPA was received 2 December 2021. It agreed with the assessment of the Proposed Scheme and its requirement for an EIA, but also stated additional assessments/reports needed to be added to the ES, or as supporting documents. The following have been completed:

- Badger Survey;
- Bat Roost Survey on any trees with roost potential to be removed or affected by works;
- Dormouse Survey of woodland;
- Invertebrate Survey;
- Transport Statement;
- Evidence to satisfy Welsh Government Coal Policy; and
- Possible alterations to Public Rights of Way impacts (PRoW).

1.1.12. PRoW is discussed within the Planning Statement and will be determined separately to planning permission.

1.1.13. The following were also requested, however following discussions with CCBC have not been completed:

- Winter Bird Survey
- Moss, Bryophyte and Lichen survey;

1.1.14. Following consultation with the CCBC County Ecologist, in place of the Winter Bird Survey, a ground nesting survey and a vantage point survey for raptors have been undertaken.

1.2 STATEMENT OF COMPETENCE

1.2.1. Under regulation 17(4a) of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[1] an ES must "be prepared by persons who in the opinion of the relevant planning authority or the Welsh Ministers, as appropriate, have sufficient expertise to ensure the completeness and quality of the statement".

1.2.2. The EIA has been undertaken and prepared in accordance with Schedule 4 of the EIA Regulations and with Institute of Civil Engineering's (ICE) EIA guidance[2]. Assessments for the environmental topics have been undertaken in accordance with the relevant Government, professional institute, or best practice guidelines. All text has undergone a strict quality assurance process, involving multiple review stages and led by individuals who are recognised as experts in their field through qualification, accreditation and/or chartership.

1.2.3. The overall EIA process has been managed by experienced Environmental Consultants from WSP. The EIA Lead for the scheme is a Full Member of the Institute of Environmental Management and Assessment (MIEMA) and a Chartered Environmentalist (CEnv) and is considered a competent expert with appropriate experience working on EIAs. Additionally, the ES has undergone quality assurance and technical review by a EIA Technical Director who is MIEMA and a CEnv and has experience working on large-scale projects.

1.2.4. The authors of this ES, along with a summary of their experience, are listed in Table 1-1.

Table 1-1 – Summary of Chapter Author Experience

Chapter / Lead Author(s)	Experience
ES Coordination and Review, Non-Technical Chapters, Cumulative Impacts Rachel Drabble, CEnv, MIEMA	Rachel has over 13 years' experience in environmental consultancy. Rachel has worked on many large schemes and experience includes EIA, construction environmental management and Strategic Environmental Assessment. Rachel has worked in a wide variety of sectors, from mining, road and high speed rail infrastructure, flood alleviation and renewables.
Non-Technical Chapters, Cumulative Impacts Bethan McGowan	Bethan has over five years' experience in environmental consultancy. She has experience in coordinating environmental assessments across sectors including rail, road, housing and flood mitigation schemes. She has worked for clients such as Network Rail, HS2, the Environment Agency, the Defence Infrastructure Organisation and Local Councils across England and Wales.
Air Quality Alex Jones	Alex has nine years' professional experience working in the environmental sector, specialising in air quality. He has experience in the management and delivery of complex of air quality assessments in the form of bespoke assessments, planning documents and environmental statement chapters. This includes local plans, road schemes, dust, masterplanning / regeneration, odour and ecological impact assessments. He has worked for a range of clients

[2] Carroll, B, Fothergil, J, Murphy, J & Turpin, T (2019), *Environmental Impact Assessment Handbook: A practical guide for planners, developers and communities*, 3rd edition, ICE Publishing, London.

Chapter / Lead Author(s)	Experience
	including Hammerson, Centrica, SWTRA (on behalf of Welsh Government), major UK house builders, regional government and local authorities across England.
Noise Fauwaz Baig	Fauwaz has over eight years' experience in environmental consultancy. He has experience in creating road scheme models, DMRB assessments, construction phase models and assessments and coordinating environmental assessments across sectors including rail, road, housing and noise mitigation. He has worked for clients such as Network Rail, HS2, the Environment Agency, the Defence Infrastructure Organisation and Local Councils across England and Wales
Cultural Heritage Libby Langlands, Black Mountains Archaeology	Libby has over 15 years' experience in the historic environment sector working on commercial and research excavations and post-excavation projects in Southern England and Wales. Her experience also includes DBAs, EIAs & ASIDOHL2s, excavation, surveying and post-excavation reporting.
Landscape Faith Crompton	Faith is a Chartered Landscape Architect with over 25 years landscape experience working in local government and consultancy. Faith has reviewed and assessed EIA landscape and visual chapters and LVIA reports associated with proposed developments on behalf of local planning authorities for 22 years. Faith was a steering group member on the Natural England led project 'The North West Regional Landscape Framework' (2008-9), a regional landscape character assessment for Northwest England, which informed the current National Character Area Profiles for England.
Visual Effects Masomeh Fayaz	Masomeh has over three years' of experience in environmental consultancy. She has experience in preparing landscape assessments of Environmental Statement in different projects. She has worked for clients such as Highways England, the Environment Agency, and Local Councils across England and Wales.
Ecology and Nature Conservation Emma Carney	Emma has over five years' ecological consultancy experience where she has undertaken a wide range of surveys and reports, including Phase 1 Habitat survey, hedgerow survey, invasive species and protected species (bats, otter, dormouse, great crested newt, badger and reptiles). Additionally, Emma has prepared and / or assisted with a number of Habitats Regulations Assessments, standalone Ecological Impact Assessments and biodiversity chapters for Environmental Statements. She has worked on a variety of project types including roads, active travel, flood alleviation and landslip remediation projects. Emma also holds a master's degree in 'Wildlife and Conservation Management' from the University of South Wales and is an Associate member of the Chartered Institute of Ecology and Environmental Management. She holds a current Natural Resources Wales (NRW) dormice licence and is an accredited agent on two NRW great crested newt licenses.'
Geology and Soils Dr Nicky Robinson, C. Geol, FGS Emma Copley	Nicky is a hydrogeologist with 30 years' experience, specialising in fractured rock hydrogeology and groundwater modelling. Nicky is responsible for the quantitative assessment of hydrogeological information related to understanding ground conditions on projects for major civil engineering projects, developers, local government, Highway and Railway schemes.
Materials and Waste	Emma has over four years' experience in waste consultancy and is a Chartered Waste Manager. She has experience in providing waste advice and producing

Chapter / Lead Author(s)	Experience
Emma Copley	Materials and Waste Environmental Impact Assessment Chapters for rail, road, and built environment schemes across England and Wales.
Water Environment Lisa Smallwood	Lisa is a Principal Environmental Consultant with 10 years' experience in water resources and EIA in both the private and public sectors, aiding delivery of complex environmental assessments for major infrastructure projects, such as highways schemes, electricity transmission and rail. Lisa is experienced in carrying out environmental management, research, and providing technical fluvial geomorphological expertise for the assessment of scheme designs and in developing mitigation within surface water environments. Lisa has been heavily involved in the appraisal, interim design, consenting and construction phases of projects; including supplying technical support information, managing her team in delivery of high-quality reports.

1.2.7. The above statement is considered to meet the requirements of Regulation 17(4b) of the EIA Regulations to "contain a statement by or on behalf of the applicant or appellant describing the expertise of the person who prepared the ES".

1.3 PURPOSE OF THE PROPOSED SCHEME

1.3.1. The purpose of the Proposed Scheme is for the reclamation and remediation of the existing Bedwas Colliery Tips site to a safer and more natural upland moor and grazing habitat. The tips a legacy of the historic mining activities within the region and are currently classified as Risk Rating Category D by the Welsh Government[3]. Category D risk tips are considered to present a risk to public health and safety and in the case of Bedwas the presence of large amounts of coal spoil indicating that the tips present a significant risk to public health and / or the environment. The Bedwas Tips contain large amounts of compacted coal spoils left as a legacy of the historic mining in the area. Not only do these compacted coal spoils present a fire risk, they prevent the natural drainage of the site, are prone to erosion and inhibit the recovery of wildlife.

1.3.2. The Proposed Scheme involves the remediation and restoration of the tip through the removal of economically viable coal from the spoil and the re-engineering and reprofile of the tip areas to ensure the stability and to enable effective water management. The re-engineering, remediation and restoration of the site will enable upland grazing of the land and return it to a more natural landscape, similar to how it would have been prior to mining activities commencing. When completed, it is intended that the Tips will be reclassified as Class A, a fully restored site with negligible risk.

1.3.3. The proposed land reclamation works are an essential step towards cleaning up waste sites created in the past from coal mining for present and future generations as is part of the Future Generations

[3] Welsh Government (2023) *Disused Coal Tip Categories*. Available online at: https://www.gov.wales/find-disused-coal-tips.

Act (Wales) 2015[4]. The Proposed Scheme supports Welsh Coal Policy and provides a viable lower carbon alternative to the imported industrial coal used by the steel and cement sectors. The remediated coal residues arising from this project will be supplied as an industrial feedstock and enable the displacement of imported foreign coals. The use of recovered coal residues in this manner will assist in the reduction in indirect (Scope 3) greenhouse gas emissions associated with transport and fugitive methane emissions or overseas virgin coal. The removal of these coal residues will also prevent the ongoing releases of fugitive CP2e, as air reacts with unrestored carbonaceous material. Once restored, the vegetation will hold carbon within the biomass and create a carbon sink to sequester further carbon from the atmosphere. The need for the scheme is to help further enhance and improve the Bedwas area for the ecological benefit of the local area as well as the economic growth of Wales.

1.4 NATIONAL PLANNING POLICY AND LEGISLATION

PLANNING POLICY WALES 2021

1.4.1. One of the aims of the Planning Policy Wales (PPW) Edition 11 (February 2021)[5] is to "ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales." This is required by the Planning (Wales) Act 2015[6], the Well-being of Future Generations (Wales) Act 2015[7], and other key legislation. PPW underpins the requirement for sustainable development and promotes action at all levels of the planning system to maximise the well-being of Wales and its communities.

CARBON

1.4.2. The Wales Act 2017 gave Welsh Ministers the duty to authorise coal extraction licences, granted by the Coal Authority.

1.4.3. PPW highlights that surface, deep and spoil won coal will not receive planning consent in Wales, unless exceptional circumstances are identified in the context of the climate change emissions reductions or for reasons of national energy security.

1.4.4. In December 2020, the Welsh Government received advice from the Climate Change Committee (CCC) that included a recommendation to set a target for net zero emissions in 2050, replacing the previous statutory target of at least an 80% reduction in 2050.

1.4.5. As of 7 November 2023, during a Senedd meeting of the Welsh Government, details into coal tip safety were raised[8]. During the meeting, the first minister, Mark Drakeford, stated the below:

[4] Welsh Government (2015) *Future Generations (Wales) Act 2015*. Available online at: https://www.gov.wales/well-being-future-generations-act-essentials-html.
[5] Welsh Government (2021), *Planning Policy Wales; Edition 11*. Available online at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf.
[6] Welsh Government (2015), *Planning (Wales) Act 2015*. Available online at: https://www.legislation.gov.uk/anaw/2015/4/contents/enacted.
[7] Welsh Government (2015), *Well-being of Future Generations (Wales) Act 2015*. Available online at: https://www.legislation.gov.uk/anaw/2015/2/contents/enacted.

[8] mySociety (2023) *Coal Tips – Questions to the First Minister*. Available online at: https://www.theyworkforyou.com/senedd/?id=2023-11-07.1.537334&s=mark+drakeford.

"As to the involvement of private sector companies in tip remediation, we don't have any objection, of course, to that. They would have to follow the same processes as any other organisation seeking to carry out remediation work, and that normally involves a planning application to the local authority, to make sure that whatever work is planned will genuinely contribute to the improvement of the area, because tip remediation brings with it economic opportunities as well as environmental opportunities, and the system is in place to make sure that those advantages can be gathered for local communities."

1.4.6. The PPW states in paragraph 5.14.32 "Coal has predominantly been used for energy production, however coal has other specific uses. These include use for industrial purposes in the steel industry, in speciality carbon markets, in the making of concrete and for domestic use. Coking coal, for example, which is largely imported is used in coke manufacture for the steel industry and directly in blast furnaces. Whilst the use of coal for energy generation should not be permitted if, exceptionally, planning applications come forward for industrial uses for coal then each case would need to be considered individually and the policies contained in MTAN 2: Coal applied, including the test outlined in paragraph 45 of MTAN 2."

1.4.7. Furthermore, cement production is necessary for the construction of green infrastructure as well as to provide necessary housing and infrastructure as recognised in the PPW:

1.4.8. "Construction related minerals and mineral products are particularly important in Wales and are essential for housing and infrastructure, such as schools, roads, railways, airports and flood defences and a steady and adequate supply of materials is necessary. (PPW Dec 2018: para 5.14.1)"

1.4.9. The tests listed under paragraph 45 of MTAN2[9] are:

"1) The proposal should be environmentally acceptable or can be made so by planning Conditions or obligations, and there must be no lasting environmental damage.

2) 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."

1.4.10. Under the explanation found within the PPW, the proposed scheme should be considered under these circumstances for industrial uses as outlined above. As explained under the tests in MTAN2, the proposed scheme provides environmental benefits through land reclamation as well as the community benefits through economic, social and recreational being present. To this regard, these two tests have been met.

PLANNING (WALES) ACT 2015

1.4.11. The Planning (Wales) Act 2015 brought in a PAC process for planning applications of major developments in Wales. This includes "development carried out on a site of 1 ha or more", which is applicable to the Proposed Scheme. The PAC process involves developers undertaking consultation

[9] Welsh Government (2009) *Minerals Technical Advice Note 2: Coal*. Available online at: https://www.gov.wales/sites/default/files/publications/2018-11/minerals-technical-advice-note-mtan-wales-2-coal.pdf.

with statutory stakeholders and local communities before applying for planning permission. Anyone can respond to a PAC, including those who have been directly consulted, individuals, community groups and specific interest groups. This early engagement is important because it can:

- improve the quality and relevance of new developments;
- give residents a voice and confidence to influence decisions affecting their local area; and
- build understanding between developers, planning authorities and communities.

1.4.12. The Proposed Scheme is classified as a 'major development' as it exceeds 1ha in area, and therefore is required to follow the PAC process. Consultation will take place prior to the submission of the planning application to determine whether the Proposed Scheme is accepted by the statutory and non-statutory stakeholders.

MINERALS PLANNING POLICY WALES

1.4.13. Minerals PPW states:

- 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.

Minerals Technical Advice Note (MTAN) (Wales) 2: Coal

1.4.14. The MTAN 2 sets out detailed advice on the mechanisms for delivering the policy for coal extraction for both surface and underground workings. The MTAN 2 also contains advice on best practice for developers, operators, mineral planning authorities and others on the approach to sustainable coal working.

1.4.15. Coal is a non-renewable natural resource. The MTAN 2 states that "to help meet society's need for energy while protecting amenity and the environment, coal will follow key principles of sustainable mineral extraction set out in MPPW, to:

- provide mineral resources to meet society's needs and to safeguard resources from sterilisation;
- protect areas of importance to natural or built heritage;
- limit the environmental impact of mineral extraction;
- achieve high standard restoration and beneficial after-use; and
- encourage efficient and appropriate use of minerals and the re-use and recycling of suitable materials."

1.4.16. The Proposed Scheme will need to "respect ecological limits and protect critical natural capital" and, in line with Wales aims to achieve a reduction in greenhouse gas emissions of 80% below 1990 levels by 2050, "should demonstrate that actions to reduce carbon emissions from the extraction and transport of coal are included in the proposals".

FUTURE WALES - THE NATIONAL PLAN 2040[10]

1.4.17. Future Wales – the National Plan 2040 is the national development framework for Wales, setting the direction for development in the country to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of our communities.

1.4.18. As one of a number of documents concerned with infrastructure and development in Wales, Future Wales aims to "ensure the planning system at all levels is consistent with, and supports the delivery of, Welsh Government strategic aims and policies".

1.5 LOCAL PLANNING POLICY

CAERPHILLY COUNTY BOROUGH COUNCIL LOCAL DEVELOPMENT PLAN 2010

1.5.1. The CCBC Local Development Plan[11] was adopted on 23rd November 2010 which set out the council's vision from 2006 to 2021. This document is still currently adopted by the council and sets out the planning policies to be adhered to for the local area. An update to this document is being completed, however no legal weight is given to the document and therefore the Proposed Scheme adheres the 2010 document.

1.5.2. From the policy supplied in the local plan, the following is of relevancy to the Proposed Scheme:

- NH1 – Special Landscape Areas (SLAs);
- NH3 – Sites of Importance for Nature Conservation (SINC);
- NH1.4 – North Caerphilly;
- SP8 – Minerals Safeguarding;
- SP10 – Conservation of Natural Heritage;
- SP11 – Countryside Recreation;
- CW4 – Natural Heritage;
- CW6 – Trees, woodland and hedgerow protection;
- CW15 – General Locational Constraints;
- CW22 – Location constraint – Minerals; and
- CW23 – Locational Constraints – Mineral Site Buffer Zones.

[10] Welsh Government (2021), *Future Wales - The National Plan 2040*. Available online at: https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf.

[11] Caerphilly County Borough Council (2010), *Local Development Plan (2010 (Adopted))*. Available online at: https://www.caerphilly.gov.uk/business/planning-and-building-control-for-business/local-development-plan/local-development-plan-2010-(adopted).

2 THE ENVIRONMENTAL IMPACT ASSESSMENT

2.1 ENVIRONMENTAL IMPACT ASSESSMENT FOR DEVELOPMENT

2.1.1. The term 'Environmental Impact Assessment' (EIA) encompasses a process that must be followed for certain types of projects requiring development consent. It provides a means of drawing together, in a systematic way, an assessment of a project's likely significant effects on the environment. It aims to protect the environment by ensuring that a consenting authority, when deciding whether to grant permission for a project, does so in the full knowledge of likely significant effects, and is able to take this information into account in the decision-making process.

2.1.2. The main objectives of the EIA process are to:

- ensure that consideration and reporting of the likely environmental effects is undertaken by the Overseeing Organisation so that planning and design decisions can be fully informed;
- facilitate good design by being an integral part of design development and the pre-planning stage of development;
- ensure that the relative importance of the likely impacts are properly evaluated;
- aid the identification of measures that could reduce the magnitude of potentially negative impacts and the scope for such mitigation;
- provide opportunities for stakeholders, including the public and statutory environmental bodies, to comment on proposals; and
- reduce the environmental impact of a project.

2.1.3. A key principle of EIA is the iterative way in which it operates with a developing scheme design; each running concurrently and having the ability to directly influence the other. As the environmental effects of the developing design are recognised, the design can be adjusted to mitigate against these effects. Similarly, as the design evolves the scope of assessment may change.

2.2 LEGISLATIVE FRAMEWORK FOR THE ASSESSMENT

EU Directives

2.2.1. In the UK the EIA regime is governed by European Council Directive No 85/337/EEC, as amended by Council Directives 97/11/*EC and 2009/31/EC which have been codified by 2011/92/EU. This has subsequently been amended by 2014/52/EU and has been transposed into UK law.

2.2.2. Under the EU Directive, certain major projects such as the construction of motorways, major chemical installations etc. are listed as Annex I projects where EIA is mandatory. Projects listed in Annex II of the directive may or may not require EIA dependent on their predicted environmental effects. Where a project is Annex II, criteria contained within Annex III should be considered, under the following:

- characteristics of projects;
- location of projects; and
- type and characteristics of the potential impact.

Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017

2.2.3. The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (the EIA Regulations), transpose the requirements of the EIA Directive into UK law and in determining the need for EIA.

2.2.4. The position of the applicant is that the Proposed Scheme is a Schedule 1 development under the EIA Regulations and a scoping report was prepared in April 2020 (see paragraphs 2.2.6 to 2.2.9 for further information on scoping). Section 19 of Schedule 1 requires "Quarries and open-cast mining where the surface exceeds 25 hectares, or peat extraction where the surface of the site exceeds 150 hectares" to undergo EIA. The Proposed Scheme's Red Line Boundary (RLB) area (shown in plan V2-S02-0001) is approximately 122ha, and is therefore considered a Schedule 1 project. As such, the Proposed Scheme did not undergo EIA Screening.

2.2.5. Following the UK leaving the European Union on 31 January 2020 (a process commonly referred to as 'Brexit'), a new statutory instrument, the Environmental Assessment of Plans and Programmes and the Environmental Impact Assessment (Miscellaneous Amendments) (Wales) (EU Exit) Regulations 2018 (SI No.245, W60), came into force. This enables the process of EIA to continue to operate with no substantive changes. The amendments made through the statutory instrument as part of the EU Withdrawal Act 2018 removed, where appropriate, references to obligations to EU law and also removed the need to re-examine any decision made prior to Brexit as a result of the changes.

Scoping (Regulation 14)

2.2.6. An applicant making a planning application that constitutes EIA development may request a 'scoping opinion' from the LPA, setting out the scope and level of detail to be provided in the ES to support an application.

2.2.7. A scoping report was prepared in April 2020 to support the request for an EIA scoping opinion from CCBC for the development of the Proposed Scheme. The scoping report provided:

- a summary of the Proposed Scheme and alternatives considered to date;
- a description of the baseline conditions of the environment, its sensitivities or constraints (as known at the time);
- an outline and initial assessment of potential impacts and effects (including cumulative effects);
- an outline of the scope of work and methodologies to be applied under each environmental discipline in carrying out the EIA; and
- the proposed structure of the ES to be submitted with planning application for the Proposed Scheme.

2.2.8. A scoping opinion[12] from CCBC was received on 2 December 2021 confirming their agreement of the scope of the ES and that the Proposed Scheme constitutes EIA development under section 19

[12] The CCBC provided a scoping opinion for the Proposed Scheme that was received on 2 December 2021 confirming their agreement of the scope of the ES and that the Proposed Scheme constitutes EIA development.

of schedule 1 of the EIA Regulations (open-cast mining where the surface of the site exceeds 25 hectares).

2.2.9. Further details of the topics and elements 'scoped in' and 'scoped out' of the EIA are detailed below in Section 2.5 'General Approach to Assessment'.

2.3 BEST PRACTICE GUIDANCE AND EIA

2.3.1. The EIA handbook produced by the ICE[2] is the principal guiding document used for this EIA. The ICE Handbook is a practical guide for planners, developers and communities, explaining both the EIA process and the legal procedures that run alongside the EIA process. It is written by practitioners for practitioners and therefore is a fundamental guidance document for supporting the writing up of this ES.

2.3.2. Other guidance, such as the Design Manual for Roads and Bridges (DMRB)[13], will be used for those topics where a specific methodology is not provided within the ICE Handbook.

2.4 PRESENTATION OF FINDINGS: CONTENT OF THE ENVIRONMENTAL STATEMENT

REPORT STRUCTURE

2.4.1. The ES is presented in four volumes as outlined below:

2.4.2. **Volume 1 – ES:** containing the introduction, detailed impact assessments for individual environmental topic chapters and a summary of the key findings. The structure of the technical chapters is shown in Table 2-1 below.

2.4.3. **Volume 2 – Plans:** a series of plans illustrating baseline conditions, key constraints, impacts and mitigation proposals.

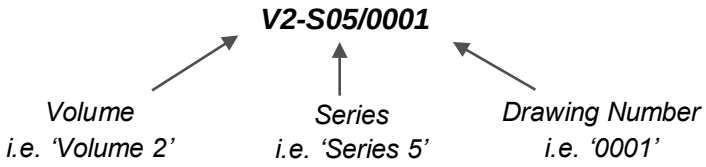
2.4.4. **Volume 3 – Appendices:** comprising all technical appendices which have been referred to in Volume 1 including, but not limited to, calculations, statistical analyses, field notes, site photographs and data records.

2.4.5. **Volume 4 – Non- Technical Summary:** a summary, designed for consumption by the general public, of the Proposed Scheme, the impacts, assessment, proposed mitigation, residual environmental effects and an invitation to respond to consultation.

2.4.6. To assist with navigation of the volumes, the chapter numbers for the specific environmental topic areas covered in Volume 1, Part 2 correspond throughout Volumes 2 and 3.

2.4.7. Items contained in Volume 2 will be referenced as necessary in Volume 1, using the following standard:

[13] Standards for Highways (2020) *Design Manual for Roads and Bridges*. Available online at: https://www.standardsforhighways.co.uk/dmrb.



INDIVIDUAL ASSESSMENT TOPIC REPORTING STRUCTURE

2.4.8. The chapters of the ES technical assessments follow the structure shown in Table 2-1 below.

Table 2-1 – Structure of Technical Chapters

Heading	Description
Introduction	Overview of the purpose of the chapter and description of the study area with a definition of the topic and the topic's scope.
Legislation, Policy and Guidance	Outlines the key national and local legislation, policy and guidance associated with the environmental topic and the Proposed Scheme.
Assessment Methodology	Description of the tools and techniques used, and the significance criteria used with reference to any relevant legislation and/or guidance.
Baseline Conditions	Description of the conditions at the locality of the Proposed Scheme prior to any works being carried out within the environmental topic.
Assessment of Effects	Description of the predicted impacts, before the application of mitigation measures, on the environmental topic associated with the construction and operation of the Proposed Scheme.
Mitigation, Enhancement and Monitoring	Describing proposed measures to avoid, reduce, restore or compensate for effects identified as significant during the assessment.
Residual Impact Assessment	Summarising the potential impacts and effects of the Proposed Scheme, beneficial or adverse, permanent or temporary with a residual assessment of significance with mitigation in place.
Cumulative Effects	Cumulative effects of the Proposed Scheme with the committed developments identified within the vicinity are identified here and any likely significant effects on the environment are discussed.
Summary	Summary of the environmental topic assessment highlighting key findings and significant impacts and their relationship with national and local legislation, policy and guidance.

2.5 GENERAL APPROACH TO ASSESSMENT

ENVIRONMENTAL TOPICS

2.5.1. The ES assesses ten environmental topics as scoped in by the scoping opinion[12]. Table 2-2 shows the order of the environmental topics as they appear within the ES, the corresponding EIA Regulations topic name and what the topics are referred to in this ES and accompanying documents.

Table 2-2 – Chapter Order and Headings According to EIA Regulations

Chapter Number	EIA Regulations Topic	ES Chapter Name
6	Air	Air Quality
7	Cultural Heritage	Cultural Heritage
8	Landscape	Landscape and Visual
	Visual Effects	
9	Biodiversity	Ecology and Nature Conservation
10	Geology and Soils	Geology and Soils
11	Materials and Waste	Materials and Waste
12	Noise	Noise
13	Water	Water Environment
14	Cumulative Effects	Cumulative Effects
15	Summary and Conclusions	Summary and Conclusions

2.5.2. A few topics were 'scoped out' due to the likely effects on the environment identified being considered insignificant. A summary of the justifications for scoping these elements out of the assessment is provided below.

SCOPED OUT CHAPTERS

Land use

2.5.3. The final land use of the Proposed Scheme is intended to be upland grazing and informal amenity grassland, with agricultural land lost to be restored. Therefore, no significant negative impacts are likely and land use has been scoped out of further EIA.

Vibration

2.5.4. The Vibration aspect of the Noise and Vibration topic has been scoped out of further EIA because the likelihood of the Proposed Scheme producing adverse vibrational effects has been assessed as low during the scoping stage. No potential vibration sensitive receptors have been identified within 100m of the Proposed Scheme, which is the typical area where works may give risk to noticeable vibration.

Traffic and Transport

2.5.5. The impact of traffic and transport generated by the Proposed Scheme on the local highway network is likely to be negligible due to the very small increase of traffic flow. An increase in traffic flow of 60 HGVs per day over 10 weeks bringing in plant and equipment during the construction phase is considered negligible with access provided from the A467 which is part of the strategic highway network. During operation, staff will be encouraged to travel to the site sharing vehicles, with 40 vehicles per day being worst case of single occupancy vehicular use. Therefore, traffic and transport has been scoped out of further EIA.

2.5.6. In line with the scoping opinion, a Transport Statement has also been submitted as part of the final planning submission providing further details on access arrangements to the site and additional traffic and transport information.

Population and Human Health

2.5.7. During the scoping stage it was identified that the Proposed Scheme may have positive effects on Population and Human Health in the area, resulting from providing employment. Effects to human health resulting from changes to air quality, soils and geology will be assessed within the respective chapters. Therefore, population and health have been scoped out of further EIA.

Climate Change

2.5.8. In relation to Green House Gas (GHG) emissions, the Proposed Scheme is not anticipated to significantly impact climate change. The tips in their current state are most likely to continue to emit fugitive CO_2e, as ambient air reacts with carbonaceous material in the tips. The current absence of vegetation means that there is no carbon held within the aboveground biomass. There is potential for reclaimed soil to sequestrate carbon at 0.4tC/ha/year, over time this can be compared to a functional natural soil supporting permanent grassland (3.9tC/ha/yr)[14].. Additionally, extraction of coal from spoil tips is significantly less carbon intensive than the extraction of virgin coal as there are no associated releases of coal bed methane, furthermore, transport emissions from the Proposed Scheme will be less than that related to international coal[14].

2.5.9. All construction and excavation will be undertaken in accordance with best practice, such as no vehicle idling, reducing GHG emissions from plant and equipment. Where possible, Hydrotreated Vegetable Oil (HVO) will be used as an alternative to conventional fuels. Therefore, GHG emissions associated with the construction and operation of the Proposed Scheme are unlikely to be significant enough to affect climate change. The topic of Climate has been scoped out of further EIA.

2.5.10. In relation to flooding, the Proposed Scheme does not lie within a flood risk zone; therefore it is unlikely to become significantly affected by climate change. It has also been assessed unlikely that climate conditions will change dramatically within the three to four years of the construction phase to have a significant impact of the resilience of the Proposed Scheme. As such climate change resilience has been scoped out of further EIA.

Major Accidents and / or Disasters

2.5.11. Major accidents are not anticipated to occur on the Proposed Scheme, as it will be operated in accordance with good health and safety practices and law, i.e. Health and Safety at Quarries: The Quarries Regulations 1999. There will also be established pollution management and response. Additionally, the Proposed Scheme will revegetate the land providing natural stability. Therefore, there are no significant effects anticipated and this topic has been scoped out of further EIA.

[14] Wardell Armstrong (2020) *Technical Note – Sustainability Benefits associated with reclamation of coal tips.*

Radiation and Heat

2.5.12. Given the nature of the proposed development, a coal tips reclamation project which will maintain the open space, no significant radiation or heat effects are anticipated, and these effects have been scoped out of further EIA.

STUDY AREAS

2.5.13. Typically, no single study area is applicable to all topics. Instead, the study areas vary according to:

- the geographical scope of the potential effects relevant to each topic;
- the information required to make an appropriate assessment of these effects;
- any topic specific best practice guidance; and
- any feedback received through consultation activities.

2.5.14. A description of the study areas for each of the technical topics along with a justification for its use is provided within each topic chapter. A summary is given in Table 2-3 along with a reference to the relevant plan as provided in Volume 2.

Table 2-3 – Study Areas

Topic	Description	Plan Reference
Air Quality	Baseline air quality: 2km Construction dust risk assessment: 350m	V2-S06/0001 V2-S06/0003
Cultural Heritage	Potential direct and indirect (visual) impacts on all heritage assets 250m from RLB Setting and significance assessment of Value A statutory designated sites within 3km of the RLB	V2-S07/0001 V2-S07/0002
Landscape and Visual	2km from RLB with Zone of Theoretical visibility extended	V2-S08/0001
Biodiversity	Ranges from 50m from the RLB for habitats to 5km from the RLB for bat designated sites	V2-S09/0001
Geology and Soils	250m from the RLB for all sources and 1km for water abstractions	N/A
Materials and Waste	Within the RLB	N/A
Noise	300m from RLB	N/A
Water	2km from the RLB focusing on the Rhymney and Sirhowy River valleys	V2-S13/0001
Cumulative Effects	2km from the RLB	N/A

BASELINE DATA

2.5.15. Establishing the baseline environmental conditions (i.e. the environment without the Proposed Scheme) is a necessary starting point to enable any assessment of potential change resulting from the proposals. The description of the baseline accounts for any changes likely to occur before the Proposed Scheme's construction and operation commences. This includes any independent changes that can be predicted including changes to legislation, regulations and policy, traffic growth

and other community developments with a level of commitment established, such as planning consent gained.

2.5.16. Baseline conditions have been established by a combination of desk-based study, site surveys, and calculated by modelling where appropriate. Reference should be made to individual topic chapters for information in relation to the timing of surveys and any expiry dates if applicable.

2.5.17. The description of the baseline and future baseline conditions will identify receptors that may be affected by the proposals. As some receptors can be more sensitive to certain impacts or can be considered to be more valuable, each identified receptor will be assigned a 'value' (or '*sensitivity*') rating which is defined in general on a five-point scale with descriptors for; *very high, high, medium, low, and negligible values*. Reference should be made to the 'Assessment Methodology' sections within each topic chapter for the relevant 'value' (or '*sensitivity*') ratings and descriptors to be applied, if applicable.

DEFINING ASSESSMENT YEARS

2.5.18. Depending on the environmental topic, the effects will be assessed in the baseline years for construction and opening. Some topics will also make an assessment in a future year which is usually taken at 15 years after opening but may be taken in the worst year within 15 years of operation. It should be noted that in some cases the worst year in the first 15 years of operation can be the opening year (see Table 2-4). In such instances, no future year assessment will be made.

2.5.19. The baseline year and future year assumptions will be reported in the methodology sections of the technical chapters.

Table 2-4 - General assumed assessment years to be applied

Assessment Years	Year
Baseline (immediately prior to construction)	2023
Operation begins	2024
Future (+15 years or *worst year in the 15 years following construction)	2039

ASSIGNING VALUE TO RECEPTORS

2.5.20. The value of the receptors are reported within each of the technical chapters. The descriptions for the sensitivity of receptors are shown in Table 2-5, and unless otherwise stated within the technical chapters themselves, this is how value has been applied to the receptors mentioned throughout the ES.

Table 2-5 – Environmental value (sensitivity) and descriptions

Value (sensitivity) of receptor	Typical description
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.

Value (sensitivity) of receptor	Typical description
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

IDENTIFYING IMPACTS

2.5.21. Following a review of the baseline information, likely 'impacts' on the environment (i.e. the changes resulting from an action) and their 'effects' (i.e. the consequences of those impacts) will be identified.

2.5.22. To assess the likelihood and significance of effects from the Proposed Scheme a source-pathway-receptor model will be used in line with the ICE EIA guidance[2].

- Source – Proposed Scheme change;
- Pathway – the method or route by which the 'source' could affect the 'receptor'; and
- Receptor – the population, whose health outcomes may be affected.

2.5.23. The impacts and their associated effects identified will include those that are: direct, indirect or cumulative; permanent or temporary; positive (beneficial) or negative (adverse); and short, medium or long term in nature. They may result from:

- the existence of the development;
- the use of natural resources;
- the emission of pollutants, the creation of nuisances and the elimination of waste; and
- forecasting methods used to assess the effects on the environment.

2.5.24. Where possible each identified impact will then be assigned a value for 'magnitude' (or extent) of change, defined in general on a five-point scale with descriptors for; *major, moderate, minor, negligible* and *no change* as shown in Table 2-6. These descriptions will be used within the technical chapters unless otherwise stated in that chapter.

Table 2-6 – Magnitude of Impact Descriptions

Magnitude of Impact (change)		Typical Description
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.

Magnitude of Impact (change)		Typical Description
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition to one or more characteristics, features or elements.
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

ASSESSING SIGNIFICANCE

2.5.25. The **significance** of an environmental effect is typically a function of the '**value**' (or 'sensitivity') of a receptor and the '**magnitude**' (or 'extent') of impact. Combining the environmental value of the receptor with the magnitude of impact produces a significance of effect category.

2.5.26. The significance of effects will cover the following:

- the natural and human receptors which would be affected and the pathways for such effects;
- the geographic importance, sensitivity and value of the receptors;
- the duration (long or short-term); permanence (permanent or temporary) and changes in significance (increase or decrease);
- reversibility – is the change reversible or irreversible, permanent or temporary;
- environmental and health standards (e.g. local air quality standards) being threatened; and
- feasibility and mechanisms for delivering mitigation measures.

2.5.27. By assigning each effect to one of five significance categories *(very large, large, moderate, slight, or neutral)* different topic issues can be placed on the same scale thus assisting the decision-making process by being comparable at whatever stage the project is at within that process. Typical descriptors for the significance of effect are provided in Table 2-7.

Table 2-7 - Typical descriptors for the significance of effect categories

Significance category	Typical descriptors of effect
Very large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.

Significance category	Typical descriptors of effect
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

2.5.28. In general, those effects assessed as moderate, large, or very large are considered 'significant' and are taken forward to the residual assessment once mitigation measures are applied.

2.5.29. The greater the environmental value (or sensitivity) of the receptor, and the greater the magnitude (or extent) of the impact, then the more significant the effect. This can be aided by use of a matrix, such as that shown in the DMRB guidance (LA104) and replicated in Table 2.8.

Table 2-8 - Typical matrix for determining significance of effect category

		Magnitude of Impact (Degree of Change)				
Environmental Value (Sensitivity)		No change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

2.5.30. Not all the environmental topics will use the matrix-based approach as described in Table 2-8 but will instead use numerical values to identify significance of effects (i.e. Noise). Furthermore, some topics do not have agreed or standard methods of assessment or scales of measurement for either 'value' (or sensitivity) of a receptor or 'magnitude' (or extent) of change to assist with the matrix-based approach. Where alternative bases of assessment apply, details are provided within the 'Assessment Methodology' sections within each topic chapter.

MITIGATION MEASURES, ENHANCEMENTS, AND RESIDUAL EFFECTS

2.5.31. Where potentially significant adverse environmental effects are identified, developing appropriate mitigation will be an iterative part of the Proposed Scheme development following the mitigation hierarchy of avoidance, reduction, remediation, and compensation.

2.5.32. The environmental assessment in each technical topic shall discuss the following types of mitigation:

- embedded mitigation: mitigation adopted within the Proposed Scheme design to avoid or prevent adverse environmental effects; and

- applied mitigation: measures required to reduce and if possible offset likely significant adverse effects, in support of the significant effects highlighted within the environmental assessment.

2.5.33. The term ‘enhancement’ typically refers to providing measures over and above those needed to mitigate the adverse effect, and/or maximising the opportunity for beneficial effects of the Proposed Scheme. Biodiversity net gain is an example of enhancement and is discussed within the Biodiversity technical chapter (Chapter 9).

2.5.34. Effects that remain after mitigation are referred to as ‘residual effects’. Following agreement of the mitigation and enhancement measures to be applied, environmental impact assessments will be repeated for those impacts with a significant effect, this time accounting for all agreed mitigation measures being in place. The significance of any ‘residual effects’ will then be reported.

ASSESSMENT OF CUMULATIVE EFFECT

2.5.35. The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 require that consideration is given to “the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources”.

2.5.36. These cumulative effects are those that are the result of multiple actions on environmental receptors and resources. Temporal and spatial scope are the main considerations for looking for cumulative effects. There are two types of cumulative effect:

- the combined action of a number of different environmental topic-specific effects upon a single / resource receptor within a single project (‘in combination’); and
- the combined action of a number of different projects, cumulatively with the Proposed Scheme being assessed, on a single resource/receptor (‘cumulative’).

2.5.37. When cumulative effects are being assessed they will:

- establish the zone of influence of the project together with other projects;
- establish a list of projects that have the potential to result in cumulative impacts; and
- obtain further information and detail on the list of identified projects to support further assessment.

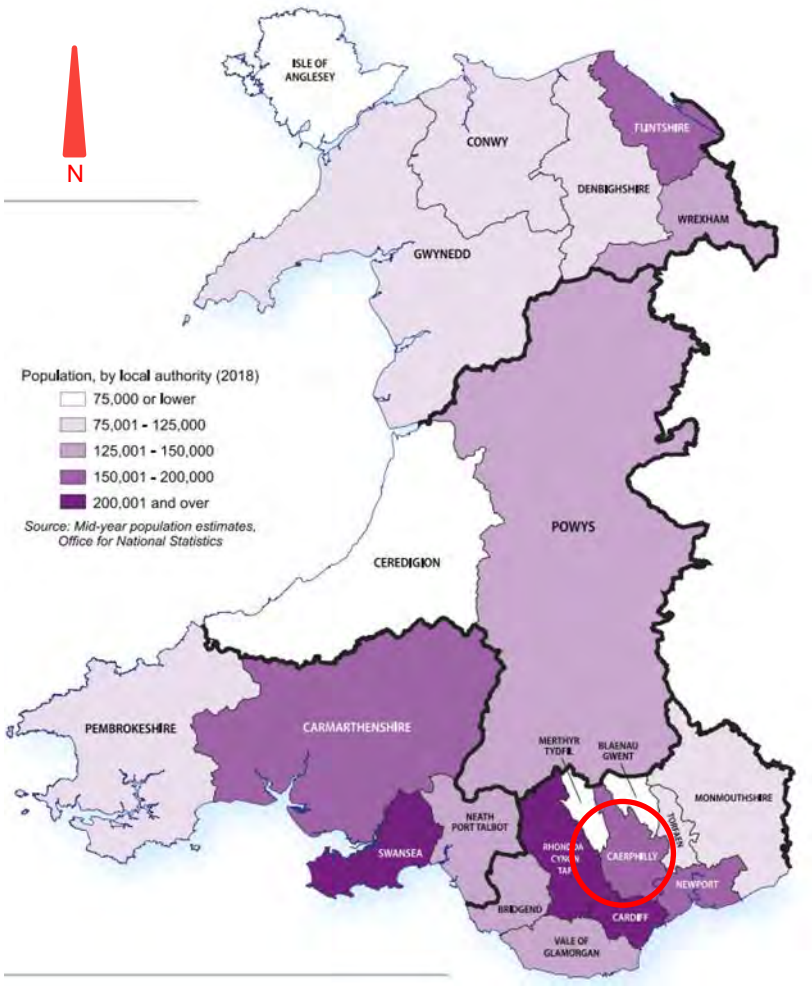
2.5.38. There have been no cumulative developments identified through a desk-based study, through reviews of the Local Development Plans and other related documents for the local area. The assessment of in combination cumulative effects of the Proposed Scheme are assessed in Chapter 14: Cumulative Effects.

3 PROPOSED SCHEME DESCRIPTION

3.1 THE EXISTING CONDITIONS

3.1.1. As stated, the Bedwas Tips are located in CCB being in operation between 1913 and 1985. The site itself is a part of the existing landscape of Bedwas overlooking the town below. CCB borders Torfaen, Cardiff, Newport and Rhondda Cynon Taf being an important county for access to Wales. From reviewing planning history on the site, a previous Scheme by CCBC was designed in 2010 to reclaim the site though, due to funding issues, this could not be undertaken. The Tips remain an underused asset to the community and present a public health and safety liability and cost burden to the county of which the Proposed Scheme, as per this planning application, intends to change. As explained in this planning application, this application proposes the reclamation of the Bedwas Tips for the benefit of Bedwas allowing upland grazing and significantly increasing the biodiversity and enhancing the ecological at the site. Once remediated the financial costs associated with maintenance and monitoring of the existing tips will cease thus enabling the reallocation of public funds for other beneficial uses.

Figure 1 - Map of Welsh counties (Extract from Welsh National Plan 2040) (Red circle to indicate Proposed Scheme to wider Wales)



KEY ENVIRONMENTAL CONSTRAINTS

3.1.2. Key features (constraints) of the area include the following, shown on plan V2-S03/0001:

- Twyn-Yr-Oerfel and Twyn Cae-Hugh Round Barrow Scheduled Monuments;
- Cairn Cemetery on Mynydd Bach Scheduled Monument;
- Common Land;
- Site of Importance for Nature Conservation;
- Graig Goch Local Nature Reserve; and
- Great Crested Newts.

3.2 DESCRIPTION OF THE PROPOSED SCHEME

3.2.1. As stated, the Bedwas Tips are located in CCB being in operation between 1913 and 1985. The site itself is a part of the existing landscape of Bedwas overlooking the town below. CCB borders Torfaen, Cardiff, Newport and Rhondda Cynon Taf being an important county for access to Wales. From reviewing planning history on the site, a previous Scheme by CCBC was designed in 2010 to reclaim the site though, due to funding issues, this could not be undertaken. The Tips remain an underused asset and present material public safety risks to the community of which the proposed Scheme, as per this planning application, intends to change. As explained in this planning application, this application proposes the reclamation of the Bedwas Tips for the benefit of Bedwas allowing upland grazing and ecological enhancement.

3.2.2. As outlined in the Environment Statement Scoping Opinion Request:

"The proposed scheme involves the extraction of coal, from colliery spoil, which will provide the funding for the restoration of Bedwas Colliery Tips. The coal will not be used as a thermal fuel in for instance power stations but will be used in essential industrial processes. The spoil will be processed in an on-site beneficiation plant, and the recovered coal will be sold as a reductant (element in material production to reduce oxygen) in cement plants or steel works and as a colourant in brickmaking. The coal produced from this reclamation scheme will reduce reliance on imported coals currently serving these end-users."

3.2.3. Bedwas Colliery Tips comprises of two colliery spoil tips from the Bedwas Colliery named Tip 1 (Lower and Middle) and Tip 2 (Upper). Tip 2 is located on the ridge at the top of Mynydd y Grug to the north of Bedwas, while Tip 1 (comprised of multiple tiers) is on the hill side just above Bedwas and Trethomas. Based on historical estimates, the total volume of the Tips is approximately 5,000,000m³ which equates to around 8.5 million tonnes of colliery spoil. The Lower Tips have an approximate volume of 2,000,000m³ and the Upper Tip has an approximate volume of 3,000,000m³. The Proposed Scheme is anticipated to cover an area of approximately 80 ha during operations, with the final restored, landscaped and revegetated Tips covering an area of approximately 52ha, and an area of approximately 19ha at the site of the current Lower Tips being returned to its original land contour. The total area within the RLB (see plan V2-S02/0001), including the haul road is 122ha. As of present, there is little topsoil or vegetation to be found at the site with previous drainage projects to prevent erosion and scour proving ineffective.

3.2.4. The Proposed Scheme works to resolve these issues through the reprofiling of the site, stabilizing any remaining tips after the works and through the removal and repurposing of the existing tips. The proposed Scheme works to revegetate the site while improving the overall condition of the site ensuring the area is safe for those on or off the site.

3.2.5. As part of the reclamation works, the soil under the Tips will be excavated and used to form the new topsoil of the site allowing vegetation to grow in keeping with the surrounding landscape being considered a Special Landscape Area (SLA). The soil will be returned 'sealed soils' to a productive, functioning soil profile, in line with the Welsh Government's NRP. This will allow enhanced biodiversity at the site, including a range of habitats. These habitats will support several other ecosystem services such as climate and flood regulation. With the removal of the colliery spoils, water will be able to naturally drain off the site as it would have before mining activities in the area were in operation.

3.2.6. The coal spoil and shale overburden excavated from site will be washed through the use of the beneficiation plant where the spoil is split into usable and waste material. The usable recovered coal product is then dried and loaded onto HGV trailers for export to regional industrial users as a Reduced Carbon Coal (RCC). The specific details of this process and the plant to be installed are detailed as part of the package of work submitted as part of this planning application. Any waste (aggregate and shale) will be used as part of the modified landforms.

3.2.7. An existing Natural Resources Wales (NRW) forestry track is to be expanded to meet the existing B4251 allowing coal loading vehicles to access and exit the site. This haul route will be closed to the public with provisions in place to stop unauthorised access. Electric barriers will be sited at either end of the haul road to ensure only tip related traffic will utilise the road. Once works have been completed, this haul route will be taken over by NRW to access the site and nearby forest.

CONSTRUCTION

3.2.8. The construction activities of the Proposed Scheme will be undertaken during a period of six to nine months and are defined by the preparing the site for extraction and remediation. It includes installing the process plant and ancillary buildings, such a staff welfare and car parking, as well as constructing the haul road It is anticipated that up to 80 staff members will be on site per day during construction. Working hours will be 6am to 10pm Mon-Fri and 7am to 10pm Saturday, with maintenance at other hours.

New Haul Road

3.2.9. The new section of haul road will be a 575m long and 6m wide sloping road cut into the rock. The rock excavated will be spread to the drop side of the road, to make a bund for safety and also to make the road surface (shown in plan V2-S03-0003).

3.2.10. The haul road will consist of three sections, with gradients of between 1 in 5 and 1 in 8.5, with two turning circles with an outer diameter of 17m. Land reprofiling will be undertaken to construct the road and provide flat turning circles.

3.2.11. The new section of the haul road will tie into the Sirhowy Valley Country Park and to the B4251 and A467, to the north, and the existing forestry track, to the south.

3.2.12. Temporary construction area, compound, facilities for the haul road are detailed on Drawing V2-S03/0002.

Improvements to Existing Forestry Track

3.2.13. Sandstone from Tip 2 will be excavated to improve the existing forestry road, where necessary. Several additional passing places with a width of 4-6m for the road and 20m long will be installed every 300m to 400m along the existing forestry track or more frequent if deemed necessary avoiding sensitive receptors where present. The passing places will also be excavated into the

hillside or, ideally, where the land allows it, the passing place will be built without excavation. The work will be supplemental to the existing passing places built by the Forestry Commission (FC).

3.2.14. It is assumed that NRW will want to retain this access after the Proposed Scheme has been completed. The existing access entail forestry traffic passing through residential streets and poor road networks of which these improvements could be beneficial. Discussions are ongoing with NRW to determine elements of the Proposed Scheme.

On-site Haul Road

3.2.15. An additional Haul Road will be constructed on site, to connect Tip 1 to the Process Plant (shown in plan V2-S03/0004). This haul road will be seeded once the reclamation works have been completed to act as improved access for maintenance by stakeholders. Vehicles and equipment will use already cleared areas to avoid the need for compounds.

3.2.16. Sandstone excavated during the construction of ponds and ditches on site will be used as materials to build this haul road. Shale from the excavation of the Tips is found to be unsuitable for the works and so sandstone has been chosen as an alternative.

Drainage Network

3.2.17. The drainage network will be constructed, as depicted in V2-S03/0004, at Tip 1 and Tip 2 before operational activities commence. This will include:

- A clean water pond; 10,000m³
- Site water collection and treatment, including the following:
  - Two settling lagoons, at the base of Tip 1 and southern tip of Tip 2;
  - Main process water lagoon, at the southern tip of Tip 2;
  - Plant process water pond, adjacent to the Process Plant;
  - Total of four storage ponds, two ponds at the northern tip of Tip 2, one pond to the south-east of Tip 2 and one pond at the northern tip of the deposition area (Tip 3); and
  - Discharge pond adjacent to the main process water lagoon.
- The ponds will include an automatic pumping station, flocculent station and associated pipework. All ponds will be safety fenced; and
- Site bunding and water drainage channels – The soils excavated from the pond will be used in the site bunds. These, along with the constructed drainage channels, will collect water from the site and link to water collection and treatment ponds.

3.2.18. The drainage network will collect surface water flows around the site and direct it towards the main process pond. This water will be utilised to feed into the processing during operation.

3.2.19. Additional pumps and pipes will be installed to transport water from the clean water pond to the processing plant and from the legacy quarry to the clean water pond.

Temporary spoil tip processing plant and associated buildings

3.2.20. A temporary spoil tip processing plant will be installed on-site. This will require excavation and laying concrete foundations for the Process Plant, approximately 37m by 35m as shown in V2-S03/0005. Topsoil will be stripped away and the subsoil used in bunds to create a stockyard. Water channels will be created to link into clean water ponds using intermediary ponds to remove suspended solids in water running off the stockyard.

3.2.21. Portable buildings for workers and project administration will also be transported to site and assembled, within close vicinity to the processing plant, as indicated on V2-S03/0002.

CONSTRUCTION PLANT AND EQUIPMENT

OPERATION

3.2.22. Following the construction period, the Proposed Scheme will operate over a five year duration, with suitable tip spoil being processed from a temporary onsite beneficiation plant with RCC transported off site as proposed. Proposed temporary features during operation on the site include:

- Temporary spoil tip processing (beneficiation) plant, which includes:
  - Feed arrangements;
  - Main coal separation equipment;
  - Coal drying and stocking plant; and
  - Water treatment equipment.
- Access and haul route for equipment and vehicles;
- Site water collection and treatment ponds with automatic pumping station; and
- Site bunding and water drainage channels.

3.2.23. The process plant and associated infrastructure for the Proposed Scheme is shown on V2-S03/0002. The process plant covers an area of 0.1225ha and has an approximate height of 8m but this will be built into the tips as shown on V2-S03/0006. The coal drying and stocking yard will cover an area of approximately 50m by 50m.

3.2.24. It is anticipated that approximately 40 staff will be on site per day during operation. The operating hours at the Site will be 6am to 10pm Mon-Fri and 7am to 2pm Saturday. Excavation and tip hauling will cease at 6pm each day (excluding Saturday which is 1pm), with loading of spoil by front loader continuing at the washery until 10pm. Process Plant maintenance activities will be undertaken during other hours (nightshift).

3.2.25. At all non-working times the site will have security in place including 24 hour CCTV, barriers where required and security lighting.

3.2.26. The likely vehicles on site during operation will be as follows:

- 45 tonne excavator excavating the Tip;
- Seven 40 tonne dump trucks;
- A 35-tonne excavator loading the discard back up;
- A 12 tonne excavator for ditching etc
- Two D6 or equivalent Bulldozers;
- A front loading Shovel;
- A heavy vibrating roller;
- A small five tonne excavator for tidying up works around the washery; and
- A JCB 540 telehandler or equivalent for lifting / unloading etc.

Haul Road

3.2.27. The haul road will be in operation during the majority of the operational phase, with an estimated average of 90 hauls per week to occur over the five years operational period. This is equivalent approximately to 18 hauls per day. Haulage trucks will have a maximum speed of 20mph along the

haul road. The trucks will join the public highway at the Wattsville (B4251/A467) roundabout, and continue south along the A467 before joining the M4.

Excavation of the tips

3.2.28. Tip 1 will be excavated first, followed by Tip 2 with the excavated RCC hauled up to the process plant for beneficiation. It will be excavated from the top down and the area gradually restored to a topography closely aligned with its original topography. The excavation will use best practice to shield the excavation activities from the Village of Bedwas and other neighbours, keeping the operations facing east where possible.

3.2.29. Excavation of the Upper Tip will occur thereafter and be undertaken in select sections. Spoil will be deposited in a specified manner to create the final and stabilised restored tip landform.

3.2.30. Excavation and reclamation works will be completed in parallel to each other in phases as work is completed.

3.2.31. Subsoil will be excavated from beneath sections of the spoil tips and stored in piles on the new deposition area to be spread as part of the soil forming material throughout the operations when weather permits.

Spoil processing

3.2.32. The spoil will be transported from the respective Tips to the spoil process plant where the spoil will be processed to recover the RCC.

3.2.33. The RCC is fed into the process plant, into the feed hopper, at which point the rest of the process is entirely automated. The process plant will be partially dug into the Tips to allow an elevated position to deposit material into the feed hopper. This will reduce the temporary impact of the processing plant on the site from a visual perspective.

3.2.34. Water feeding into the process plant will be sourced from the drainage network.

3.2.35. It is anticipated that water required for the coal processing will be sourced from the site drainage network and the clean water pond. The clean water pond will store top up water for the process plant. The washing plant will be separating and screening coal fines and shale overburden and will enable a range of homogenous materials to be either recovered or used as part of the remediation. A settling pond of approximately 500m^3 to 1000m^3 will be required to catch any dirty water emanating from the process plant and can be used as an emergency pond.

Soil deposition

3.2.36. Processed spoil will be deposited in the landform deposition areas, V2-S03/0007 overlapping the Upper Tip and on the northerly deposition area (Tip 3).

3.2.37. Areas of just deposition will occur to the north / northwest of the Tip 2. The topsoil from these areas will be made into an outer 3m high bund, with an inner sub soil bund above and below the land intended for deposition. The subsoil will mostly be used to form the inner part of this bund.

3.2.38. All soils and sub-soils from areas where spoil will be deposited and re-landscaped will be appropriately stored for use in the final restoration. Given that there will be a shortfall of natural soil on the Tip 2 site, subsoil will be used and upgraded to topsoil through management of the seed mixes to be planted. This will ensure successful revegetation and restoration to upland grazing habitats.

3.2.39. All tip areas will be reformed into the appropriate landform in phases which commence during operation and be finalised post-operation. The final landform profile of the reclaimed Bedwas Tips will have boundaries corresponding approximately with V2-S03/0008. Although, details of the landforms will be established on site, depending on the amount of process spoil available. These will be landscaped to follow original contours, as close as practicable, but with some landscaping features to make the land look natural and attractive.

3.2.40. The reformed Tips will be compacted by a vibratory roller to improve stability, apart from the top 2m which will be left uncompacted in order to better support revegetation and drainage. At completion, all areas of the reformed Tips will have a cap of suitable soil forming material.

3.2.41. The areas exposed by the removal of Tip 1 and Tip 2 will also be landscaped into a profile essentially following the contours that existed prior to the deposition of the colliery spoil. The subsoil will be excavated and re-spread with green fertiliser and approved biosolids in order to restore the upland grassland on the Upper Tip. ERI will be able to restore the Lower Tip to farming land or amenity land depending upon the requirements of the local community. There will also be some tree planting where feasible. Drainage of these lower slopes will be maintained by the culverts channelling water to the old quarry where water is culverted to the River Rhymney.

Drainage Network

3.2.42. During the operation of the Proposed Scheme, the drainage network at the bottom of the Upper tip will collect surface water and direct it eastwards, to a setting pond, before it is discharged via the current concrete culvert into an existing quarry at the base of Tip 2. From the existing quarry, the water is pumped up to the main processing pond.

3.2.43. The drainage network around the Upper tip will capture surface water across the area surrounding the Tip and direct it towards the settling pond before it then feeds into the main processing pond. From this pond, the water will either be pumped up to the processing plant or when clean discharged into an existing culvert.

3.2.44. Sustainable Drainage (SuDS) will be required as per the works on site which will be completed according to SuDS statutory standards[15]. These SuDS proposals will be sent to the SuDS Approval Body (SAB), CCBC, to ensure the proposal is suitable for the waterflow predicted.

POST CONSTRUCTION AND AFTER PLAN

Temporary spoil tip processing plant and other buildings

3.2.45. Once processing operations have ceased, the processing plant and other buildings will be dismantled and removed from site by ERI. Final land forming will take place in areas previously occupied by plant and equipment, with final landscaping completed within six months of ceasing operations by ERI (final proposed contours of the Tips are shown in plans V2-S03/0009).

[15] Welsh Government (2018) *Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems*. Available online at: https://www.gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf.

Drainage Network

3.2.46. A five-year aftercare period, for which ERI is responsible, will commence in which any necessary improvement works are completed. The aftercare programme will include any water and drainage maintenance requirements under any relevant planning conditions attached to Proposed Scheme.

Landscaping of the site and vegetation planting

3.2.47. The final profiling and landscaping of the Tips and new deposition area will be completed within several weeks of ceasing operations by ERI. Appropriate landscape features will be incorporated into the reformed Tips, in keeping with the surrounding terrain. This will avoid the reclaimed land looking artificial.

3.2.48. Prior to seeding, the subsoil will be ploughed lightly and de-stoned. Grass will then be seeded along with a quick acting fertiliser. Green fertiliser will then be used to improve the substrate and body of the topsoil.

3.2.49. In order to produce a sustainable grass sward that will resist soil erosion and ensure stability, the seed mix has to contain a quick growing ryegrass typically used on lowland farms. The seed mix will consist of a 10% biodiverse mix with the other 90% quick growing ryegrass. The ryegrass will act as a nurse crop providing quick cover forming thick grassland binding the soil and preventing scour. ERI's previous experience shows that the ryegrass will slowly die out with the slower growing native fescues and bent grasses developing as they are more suited to the local climate. This process takes from five to 10 years to establish. Once established the grassland will return to the various habitats found in upland grasslands. It is considered that as little interference as possible should take place during the period in which the original habitat develops.

3.2.50. Soil covering and seeding of re-landscaped areas will take place in the Spring and Autumn of each year commencing within six months from the start of operations progressing in phases during the reclamation works.

3.2.51. As the maximum elevation of Tip 2 is 330m, there will be tree planting in the landscaping Scheme predominantly below Tip 2 in order to reduce water migration and to slow the water flows to the existing watercourses.

3.2.52. The Proposed Scheme will also include up to two years of additional compost, green waste or approved biosolids to maintain the re-established upland grazing and grassland habitats.

3.2.53. It is possible that there may be some remediation required on the site which would be dealt with accordingly at the time (for example if heavy rains have disturbed establishment of new vegetation). On the basis that the final Tip profiling and landscaping is completed in phases during operations and completed utilising best practice methodologies as intended, the amount of remedial work would be expected to be minimal.

4 CONSULTATION

4.1 TECHNICAL CONSULTATION

4.1.1. The following stakeholders were identified for input into the consultation of the Proposed Scheme at the scoping stage:

- Caerphilly County Borough Council;
- Natural Resources Wales (NRW);
- Cadw;
- Coal Authority;
- Glamorgan-Gwent Archaeological Trust; and
- Dwr Cymru Welsh Water.

4.1.2. In developing the Scheme, the applicant has undertaken consultation with representatives from all levels of Government including:

- Senedd and UK Parliament – Hefin Davis MS
- Local Parliament – Wayne David MP
- Bedwas, Trethomas and Machen Community Council
- Caerphilly County Borough Council

4.1.3. The applicant conducted a visit with CCBC Councillors and other cabinet members to Six Bells land reclamation scheme on the 27*th* of June 2023 to present the applicants previous Scheme.

4.1.4. The applicant has good relations with CCBC Councillors regarding the Proposed Scheme and have given their support to the reclamation Scheme. As part of the Proposed Scheme, the applicant will continue to discuss the proposal with various stakeholders to ensure those opinions incorporated or mitigated as part of the Scheme for the best result.

4.1.5. ERI have also discussed the Proposed Scheme with NRW, however unfortunately due to Government level discussions, NRW is awaiting the Welsh Government's new policy specifically relating to tip restoration before it can give a full response. The new policy is due late 2023, however it has not been published at time of writing.

4.1.6. The landscape officer was consulted on 22 February 2023 to establish and agree viewpoints. A total of 19 viewpoints were agreed to give a thorough view and assessment of the Proposed Scheme.

4.2 PUBLIC CONSULTATION

4.3 In developing the Proposed Scheme, the applicant has undertaken consultation with representatives from all levels of Government including:

- Senedd – Hefin Davis MS
- UK Parliament – Wayne David Local Constituent MP
- Bedwas, Trethomas and Machen Community Council
- Ynysddu Parish Council
- Caerphilly County Borough Council

4.3.1. The applicant conducted a visit with CCBC Councillors and other cabinet members to Six Bells land reclamation scheme on the 27th June 2023 to present the applicant's previous successfully complete scheme.

4.3.2. A meeting was held 18th December 2023 with several councillors to ensure the views of CCBC were considered on the Proposed Scheme. The majority of members present showing support for the Proposed Scheme.

4.3.3. Consultation with the public and Ynysddu Coucnillors was undertaken on the 20th December 2023. Responses during the meeting were mainly positive with the public in acceptance of the Proposed Scheme with any questions dealt with clearly to reduce any concerns raised.

5 ALTERNATIVES CONSIDERED

5.1 PROPOSED SCHEME HISTORY

5.1.1. As required by the EIA Regulations, Regulation 18 (3)(d), reasonable alternatives to the Proposed Scheme considered by the developer must be presented.

5.1.2. Based on ERI's experience of another reclamation scheme, Six Bells in Blaenau Gwent, ERI was approached by CCBC in 2018 to enter its land for the purpose of mineral working and restoration of the tips. Two thirds of the Bedwas tips have been rated as High Risk in the Coal Authority safety assessment and Category D in the Welsh Government Coal Tip Safety Review[16]. Category D is a tip with the potential to impact public safety, to be inspected at least once a year. Therefore this site has been selected due to the need to address safety issues, to improve the landscape and biodiversity, as well as containing sufficient economically viable extractable coal residues to fund the rehabilitation of the site.

5.2 DEVELOPMENT OF THE PROPOSED SCHEME

5.2.1. The Proposed Scheme purpose is primarily for the reclamation of colliery spoil and rehabilitation of the land. Extraction of coal from the colliery spoil provides sufficient economic benefit to fund the reclamation of the site. As the objective of this Proposed Scheme is to restore the area of the Bedwas coal tips, alternatives have been considered in the context of depositional areas, landscaping, transportation of product and end use, as opposed to alternative sites. As such, alternative sites could not be considered. The offsite treatment and deposition of spoil would have a larger environmental impact, and as such has not been considered further. The final proposed depositional areas and landscaping alternatives have been arrived at considering the topography, thus reducing the environmental impact on landscape and visual effects. This will also assist habitat creation, being consistent with the local environment.

5.2.2. Coal extracted from the Proposed Scheme will be used as industrial feedstocks and uses, such as steel and cement manufacturing, and not for energy generation. This would be in keeping with the Welsh Government's coal policy statement[17] which prohibits the extraction of coal for electricity generation. Paragraph 5.14.1 of PPW[5] does allow for mineral products to be used in construction.

5.2.3. 'Doing nothing' and maintaining the Status Quo would mean the Bedwas coal tips remain a Category D risk, require an extensive inspection and maintenance regime and remain a significant cost burden to CCBC. Drainage problems, such as scouring, which contributes to a lack of topsoil, mean the tips would stay without vegetation and therefore would not reach its ecological potential like an existing Welsh upland area.

5.2.4. Alternatives have been considered for different aspects of the Proposed Scheme. These are as follows:

[16] Welsh Government (2023) *Coal Tip Safety*. Available online at: https://www.gov.wales/coal-tip-safety.
[17] Welsh Government (2021) *Coal Policy Statement*. Available online at: https://www.gov.wales/coal-policy-statement.

- the process plant has been sited to consider noise receptors and reduce visual impact;
- existing forestry tracks will be used for the majority of the haul road, rather than impacting on minor public roads, which would require improvement and potential widening;
- the haul road will tie in with a country park road, and then use the existing exit onto the roundabout rather than create a new exit on the roundabout, thus decreasing impacts to traffic;
- Consideration given to best outcome for seed mixes to have the most success at establishment while being ecologically diverse as possible;
- drainage design has considered sensitive areas, for example avoiding the Scheduled Monuments present adjacent to the site; and
- piping water from the Sirhowy River was considered to provide water for the process plant, however, to reduce environmental impact, the Proposed Scheme will now store water that drains off the site, and reuse process water.

HAUL ROUTE DEVELOPMENT

5.2.5. The haul route uses the existing forestry tracks, apart from where it ties into the public road network. Consideration was given to using the existing forestry exit onto the public road network, however it would have meant that HGVs are travelling through Crosskeys and Risca. This would have caused disturbance to residents, as well as disruption by travelling on narrow streets. The haulage could have used the minor road into site, but this would have required a large amount of upgrading, and cause safety issues due to interface with the public and staff travelling to the site.

5.2.6. The option of the haul road exiting on the A467/B4251 roundabout to reduce impact to the Sirhowy Country Park. This would have involved the creation of a new exit onto the roundabout, along with construction to bring the haul road directly to the roundabout. Following discussions with CCBC Highway's department, this was deemed to be unsuitable.

5.2.7. The gradients on the new section of haul road have been agreed with NRW (V2-S03/0003). The land disturbed is being kept to a minimum while still achieving these gradients. The site is also free of tree cover, minimising tree loss.

6 AIR QUALITY

6.1 INTRODUCTION

6.1.1. This Chapter reports the assessment of the likely significant effects of the Proposed Scheme on air quality and describes:

- Relevant, legislation, policy and guidance;
- Consultation undertaken;
- Scope of the assessment;
- Assessment methodology;
- Baseline conditions;
- Assessment of likely impacts and effects; and
- Mitigation measures and residual effects

6.1.2. A qualitative assessment has been undertaken, based on relevant air quality guidance, for dust (both construction dust and mineral dust) including emissions from plant.

6.1.3. It is assumed that during the operational phase, the remediated land will have been converted to a vegetated area. However, extraction of coal from colliery spoil will be carried out and therefore a minerals dust assessment has been undertaken.

6.1.4. This Chapter (and its associated plans and appendices) is intended to be read as part of the wider ES.

6.1.5. **Table 6-13** and **Table 6-14** provide a glossary of terms and abbreviations used in this Chapter respectively.

6.2 LEGISLATION, POLICY FRAMEWORK

LEGISLATIVE FRAMEWORK

Environmental Protection Act 1990

6.2.1. Section 79 of the Environmental Protection Act 1990[18] gives the following definitions of statutory nuisance relevant to dust and particles:

‘Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance’; and

‘Any accumulation or deposit which is prejudicial to health or a nuisance’.

Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

[18]The National Archives (1990) *Environmental Protection Act 1990*. Available online at: https://www.legislation.gov.uk/ukpga/1990/43/contents.

There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept, and its perception is highly dependent upon the existing conditions and the change which has occurred.

Environment Act 1995

6.2.2. Under Part IV of the Environment Act 1995[19], local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality objectives in the future.

Environment Act 2021

6.2.3. The Environment Act 2021[20] was passed into law in November 2021. The Environment Act 2021 does not replace the Environment Act 1995, but it does make amendments in order to strengthen environmental protections. This Act sets a legally binding duty on the Secretary of State to bring forward air quality targets into secondary legislations; with specific regard to the annual mean level of $PM_{2.5}$ in ambient air. In March 2022 and in response to this duty, the UK government proposed a legally binding target to reduce $PM_{2.5}$ concentrations across England and Wales to 10µg/m^3 and achieve a 35% reduction of population exposure by 2040. However, this has not yet been adopted by Wales, however following ongoing discussions there is the potential for more stringent targets or bringing compliance dates forward.

Well-being of Future Generations (Wales) Act 2015

6.2.4. Introduced in 2015[21], the Well-being of Future Generations Act requires public bodies to encourage the improvement of social, economic, environmental and cultural well-being of Wales.

Air Quality (Wales) Regulations 2000

6.2.5. Many of the objectives in the AQS have been made statutory in Wales for the purpose of Local Air Quality Management (LAQM) [22],[23]

Air Quality Standards (Wales) Regulations 2010

6.2.6. The Air Quality Standards Regulations[24] were derived from the European Union Ambient Air Quality Directive and set legally binding thresholds for the concentration of pollutants in air for the protection

[19] The National Archives (1995) *Environment Act 1995*. Available online at: https://www.legislation.gov.uk/ukpga/1995/25/contents.
[20] The National Archives (2021) *Environment Act 2021*. Available online at: https://www.legislation.gov.uk/ukpga/2021/30/contents.
[21] Welsh Government (2015) *Wellbeing of Future Generations (Wales) Act 2015*. Available online at: https://www.gov.wales/well-being-future-generations-act-essentials-html.
[22] Welsh Government (2000) *Air Quality (Wales) Regulations 2000*. Available online at: https://www.legislation.gov.uk/wsi/2000/1940/contents/made.
[23] Welsh Government (2002) *Air Quality (Amendment) (Wales) Regulations 2002*. Available online at: https://www.legislation.gov.uk/wsi/2002/3182/made.
[24] Welsh Government (2010) *The Air Quality Standards (Wales) Regulations 2010 - Statutory Instrument 2010 No. 1443*. Available online at: https://www.legislation.gov.uk/wsi/2010/1433/contents/made.

of health and ecosystems. In the Standards Regulations the thresholds are referred to as 'limit values'. The limit values for NO_2 and PM_{10} are the same concentration levels as the relevant AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 25µg/m^3. The air quality standards in terms of objectives, limit values and targets that are relevant to this assessment are provided in

6.2.7. **Table 6-1**.

Table 6-1 – Relevant air quality standards

Pollutant	Concentration (µg/m^3)	Measured as	Objective
Nitrogen Dioxide (NO_2)	40	Annual Mean	Limit value not to be exceeded
	200	1-hour (hourly) mean	Not to be exceeded more than 18 times a year
Particulate matter less than 10 micrometres in diameter (PM_{10})	40	Annual Mean	Limit value not to be exceeded
	50	24-hour (daily) mean	Not to be exceeded more than 35 times a year
Particulate matter less than 2.5 micrometres in diameter ($PM_{2.5}$)	25	Annual Mean	Limit value not to be exceeded

National Air Quality Objectives

6.2.8. The National Air Quality Objectives (NAQO) for Wales are aimed at the protection of human health (NO_2, PM_{10} and $PM_{2.5}$) and ecological receptors (NOx). The annual mean NAQOs for human health apply at locations where the public may be regularly exposed, such as façades of residential buildings, schools, hospitals and care homes. The 1-hour and 24-hour mean NAQO apply to locations where it is reasonable to expect that members of the public spend at least these time periods, such as busy shopping streets and school playgrounds for the NO_2 1-hour mean, and hotels or residential gardens for the PM_{10} 24-hour mean. Full details on where NAQO apply are provided in Box 1.1 of the Department for Environment, Food & Rural Affairs' (Defra) LAQM Technical Guidance (22) (LAQM.TG(22))[25].

Clean Air Plan for Wales

In August 2020, the Welsh Government published its Clean Air Plan[26] for Wales, which sets out a 10-year plan to achieve cleaner air. The Clean Air Strategy runs alongside the various statutory Air Quality Plans but considers a broader range of emission sources, including domestic properties, farming, industry, and other forms of transport such as shipping and aviation.

[25] Defra (2021). *Part IV of the Environment Act 1995 as amended by the Environment Act 2021 - Environment (Northern Ireland) Order 2002 Part III Local Air Quality Management Technical Guidance LAQM.TG(22).* Available online at: https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf [Accessed November 2023].
[26] Welsh Government (2020) *Clean Air Plan for Wales: Healthy Air, Healthy Wales*. Available online at: https://www.gov.wales/clean-air-plan-wales-healthy-air-healthy-wales.

POLICY

National

UK Air Quality Strategy 2007

6.2.9. The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales, and Northern Ireland[27,28]. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the air quality standards.

Planning Policy Wales (PPW), 2021

6.2.10. PPW[29] sets out land use policy for Wales and is supported by Technical Advice Notes (TANs). At the time of writing, there is no TAN for air quality.

6.2.11. Section 5.14 of PPW deals with minerals. Issues that must be addressed include the control of air pollution, namely dust, smoke and fumes.

6.2.12. Section 6.7 of PPW deals with air quality and soundscape. It defines the framework for addressing air quality. Development must not create areas of poor air quality. Proposed Scheme should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In relation to managing potential environmental risk arising through construction phases, planning authorities must consider the potential for temporary environmental risks, including airborne pollution, arising during the construction phases of development. Where appropriate, planning authorities should require a Construction Environmental Management Plan (CEMP), covering among others, pollution prevention, hours of operation, dust mitigation and details for keeping residents informed about temporary risks.

Planning Policy Wales Technical Advice Note 18: Transport

6.2.13. PPW Technical Advice Note 18: Transport[30] acknowledges the links between road traffic and local air pollution and states that well designed and implemented traffic management measures can help to reduce pollution levels.

Future Wales the National Plan 2040

6.2.14. Future Wales is the national development framework for Wales[31], setting out the spatial plan and strategy for addressing national priorities including decarbonisation and improving health and the environment. Whilst the plan states that the planning policy framework for addressing air quality is

[27] Defra and the Devolved Administrations (2007) *The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland Volume 1.* Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69336/pb12654-air-quality-strategy-vol1-070712.pdf.
[28] Defra and the Devolved Administrations (2007) *The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland Volume 2.* Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69337/pb12670-air-quality-strategy-vol2-070712.pdf.
[29] Welsh Government (2021) *Planning Policy Wales*. Available online at: https://www.gov.wales/planning-policy-wales.
[30] Welsh Assembly Government (2007) Technical Advice Note 18: TRANSPORT. Available online at: https://www.gov.wales/technical-advice-note-tan-18-transport.
[31] Welsh Government (2020). *Future Wales National Plan*. Available online at: https://www.gov.wales/future-wales-national-plan-2040.

set out in Planning Policy Wales (described below), it includes an overarching requirement to minimise exposure to air pollution.

Local

Caerphilly Local Development Plan (LDP) 2010 (Adopted)

6.2.15. Strategic Policy 6 Place Making of the Caerphilly LDP32 outlines that:

'Development proposals should contribute to creating sustainable places by having full regard to the context of the local, natural, historic and built environment and its special features through:

The incorporation and enhancement of existing natural heritage features.'

6.2.16. At the time of writing this is the latest LDP, however Caerphilly County Borough Council (CCBC) are currently preparing a new replacement for the years 2021-2035.

GUIDANCE

Local Air Quality Management Review and Assessment Technical Guidance (LAQM.TG(22))

6.2.17. Defra has published technical guidance for use by local authorities in their review and assessment work. This guidance, referred to in this document as LAQM.TG(22), has been used where appropriate in the assessment presented herein.

Local Air Quality Management in Wales, 2017

6.2.18. The local air quality management in Wales, June 2017, named PG(W)(17)[33], intends to provide stability in terms of Welsh Government policy expectations and for it to always be read by Local Authorities in conjunction with the latest expert advice on what works in practice.

Land-Use Planning & Development Control: Planning for Air Quality

6.2.19. The Land-Use Planning & Development Control: Planning for Air Quality[34], published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM), advises when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and the possible mitigation measures that may be implemented to minimise these impacts.

Guidance on the Assessment of Dust from Demolition and Construction

6.2.20. The Guidance on the assessment of dust from demolition and construction[35], published by IAQM, provides guidance to developers, consultants and local authorities with a means of qualitatively assessing the impact of the construction dust on dust soiling, human health, and designated

[32] Caerphilly County Borough Council (2010) *Local Development Plan (2010 (Adopted))*. Available online at: https://www.caerphilly.gov.uk/business/planning-and-building-control-for-business/local-development-plan/local-development-plan-2010-(adopted).
[33]Welsh Government (2017) Local air quality management in Wales. Policy guidance. PG(W)(17). Available online at: https://www.gov.wales/sites/default/files/publications/2019-04/local-air-quality-management-in-wales.pdf.
[34] EPUK and IAQM (2017) *Land-Use Planning & Development Control: Planning for Air Quality*. Available online at: https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf.
[35]IAQM (2016) *Guidance on the assessment of dust from demolition and construction Version 1.1*. Available online at: http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

ecological sites. The aim is to assign a risk rating to each activity and impact, based on the scale of construction activities and proximity to receptors. Once determined, the relevant level of mitigation (also provided) is recommended.

6.2.21. It should be noted that an updated version was published in 2023, however version 2.1 has been withdrawn due to errors. An updated will be issued, however this Chapter used the established version 1.1 document.

Guidance on the Assessment of Mineral Dust Impacts for Planning

6.2.22. The IAQM produced guidance[36] to provide developers, consultants and local authorities with a means of qualitatively assessing the impact of dust from mineral sites, particularly as part of the planning process. The guidance uses a simple distance-based screening process to identify those minerals sites where the dust impacts are unlikely to lead to significant effects and therefore do not require assessment. Where a more detailed assessment is required, a basic assessment framework based on the source-pathway-receptor approach is used to evaluate the risk of dust impacts and effects. Where effects are predicted to be 'significant', further mitigation (also provided) is recommended.

6.3 RESPONSE TO THE SCOPING OPINION

6.3.1. An EIA Scoping Opinion response was received by the Applicant from the Local Planning Authority (LPA) CCBC on 2 December 2021. The response included air quality, with the Local Authority agreeing with the approach in the Scoping Opinion.

6.4 SCOPE OF THE ASSESSMENT

ELEMENTS SCOPED OUT OF THE ASSESSMENT

6.4.1. The elements shown in Table 6-2 are not considered to give rise to likely significant effects as a result of the Proposed Scheme and have therefore not been considered within the ES. This is unchanged from the Scoping Report referenced above.

Table 6-2 – Elements Scoped out of the Assessment

Element Scoped Out	Justification
Quantitative assessment of construction traffic	As per transport statement section 6.1, the construction phase traffic is expected to be 60 HGVs per day. The EPUK/IAQM[34] scoping criteria of change of flow of 100 AADT HDVs is not expected to be exceeded. Therefore, construction phase traffic assessment is scoped out.

[36] Institute of Air Quality Management (2016) *Guidance on the Assessment of Mineral Dust Impacts for Planning*. Available online at: https://iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf.

Element Scoped Out	Justification
Quantitative assessment of operational traffic	As per the transport statement section 6.1, the operational phase of the Proposed Scheme is predicted to introduce approximately 16 AADT HGV movements per day. Since it does not exceed the EPUK/IAQM[34] scoping criteria of change of flow of 100 AADT HDVs, operational phase traffic assessment is scoped out.

ELEMENTS SCOPED INTO THE ASSESSMENT

6.4.2. The elements shown in **Table 6-3** are considered to have the potential to give rise to likely significant effects during construction and/or during operation of the Proposed Scheme and have therefore been considered within the ES.

Table 6-3 – Elements Scoped Into the Assessment

Element Scoped In	Justification
Qualitative construction dust risk assessment	Human receptors are present within 350m of the site boundary and ecological receptors are present within 50m of the site boundary as well as within 50m of the routes used by construction vehicles. Hence, as per the IAQM guidance[35], construction phase dust risk assessment is scoped in.
Qualitative operational phase mineral dust assessment	The rock type at the Proposed Scheme is soft rock and relevant human and ecological receptors are present within 250m of the site boundary. Hence, as per the IAQM guidance[36], operational phase mineral dust assessment is scoped in.

6.5 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

STUDY AREA

6.5.1. The Proposed Scheme is located in a predominantly rural area of Caerphilly County Borough Council (CCBC) in south Wales and less than 1km north-east of the town of Bedwas.

6.5.2. The Proposed Scheme is anticipated to cover an area of approximately 80 ha during operations, with the final restored, landscaped, and revegetated Tips covering an area of approximately 52ha, and an area of approximately 19ha at the site of the current Lower Tips being returned to its original land contour. The total area within the red line boundary, including the haul road is 122ha. Plan V2-S06/0001 shows the red line boundary for the Proposed Scheme.

The characterise the baseline air quality in the vicinity of the Proposed Scheme, a study area of 2km has been utilised (also shown in plan V2-S06/0001).

Construction Stage

6.5.3. The study area for fugitive dust emissions associated with the demolition and construction stages has been defined, based on the methodology provided within the Institute of Air Quality Management (IAQM) guidance[35]. The Study Area (plan V2-S06/0001 and plan V2-S06/0002) has been defined as 350m from the Site and within 50m of the route(s) used by construction vehicles on the public highway up to 500m from the Site entrance(s).

6.5.4. The guidance states that air quality effects as a result of the construction activities will not be significant outside of these areas.

METHOD OF BASELINE DATA COLLECTION

Desk Study

6.5.5. A baseline desk study has been undertaken, utilising available data from CCBC's latest air quality progress report[37]. Furthermore, information on the location of nearby Air Quality Management Areas (AQMAs), designated ecological habitats, aerial mapping and satellite imagery, have been used to establish locations of human and ecological receptors sensitive to the potential impacts on air quality arising from the Proposed Scheme.

Site Visit and Surveys

6.5.6. No air quality surveys were undertaken or necessary as there was sufficient baseline information available from local authorities.

IMPACT ASSESSMENT METHODOLOGY

Construction Phase Dust Assessment

6.5.7. Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be close to the source of emission. Dust is therefore unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

6.5.8. The smaller particles of dust (less than 10µm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released; this includes a finer fraction, known as $PM_{2.5}$ (with an aerodynamic diameter less than 2.5µm). As these particles are at the smaller end of the size range of dust particles, they remain suspended in the atmosphere for a longer period of time than the larger dust particles and can therefore be transported by wind over a wider area. PM_{10} and $PM_{2.5}$ are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health.

[37] Caerphilly County Borough Council (2021) *Caerphilly 2021 Air Quality Progress Report, February 2022*. Available online at: https://www.caerphilly.gov.uk/caerphillydocs/pollution/progress-report-2021-eng.aspx.

6.5.9. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken with reference to:

- The methodology published within the IAQM Construction Dust Guidance;
- The available information for this phase of the Proposed Scheme provided by the Client and Project Team; and
- Professional judgement.

6.5.10. According to the IAQM Construction Dust Guidance an assessment is undertaken where there are:

- Human receptors within 350m of the site boundary;
- Human receptors within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and / or
- Ecological receptors within 50m of the site boundary;
- Ecological receptors within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

6.5.11. It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air would have the greatest impact on local air quality at sensitive receptors.

6.5.12. The IAQM Construction Dust Guidance methodology assesses the risk of potential dust and PM_{10} impacts from the following four sources: demolition; earthworks; general construction activities and trackout. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM Construction Dust Guidance assessment methodology is provided in V3-S06/0001.

Assessment of Mineral Dust Impacts

6.5.13. The mineral dust assessment uses the Guidance on the Assessment of Mineral Dust Impacts for Planning[36] (a summary to this can be found in V3-S06/0002), which is a simple distance-based source-pathway-receptor approach used to evaluate the risk of dust impacts and effects. Where effects are predicted to be 'significant', further mitigation is recommended. Although the Proposed Scheme is not a mineral site, it however undertakes several activities which are similar to a mineral site and as such this guidance is suitable for undertaking the dust assessment for the Proposed Scheme.

6.5.14. If relevant receptors are located between 400m (for hard rock), or 250m (for soft rock) then a disamenity dust impact assessment is required. This step is deliberately chosen to be conservative.

6.5.15. In addition to the distance of the receptors to relevant dusty site activity, the prevailing wind direction is also considered on the pathway effectiveness since it will affect the number of dusty episodes.

6.5.16. The tables explaining pathway effectiveness, dust impact risk and likely magnitude of dust effect are given in V3-S06/0002.

SIGNIFICANCE CRITERIA

Construction Dust Assessment

6.5.17. The IAQM Construction Dust Guidance methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate

mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

6.5.18. However, the significance of effects pre-mitigation was determined using the overall risk identified for each construction activity. A 'negligible' or 'low risk' as identified in the Construction Dust Assessment methodology would not represent a significant effect. If a 'medium risk' or 'high risk' was identified for a construction activity, this would be assumed as a significant effect.

Mineral Dust Assessment

6.5.19. The magnitude of effects determined within the minerals dust assessment will be used as a basis to recommend suitable mitigation measures to ensure that the impact of the activities during the operation of the Proposed Scheme will not cause significant impacts at receptor locations. Based on the IAQM guidance[36], the assessment of significance is down to the application of professional judgement.

From this, a conclusion must be reached on the likely significance of the air quality effects collectively, with it ether being 'significant' or 'not significant'. The guidance states that *'The above assessment of impacts and their effects will have been carried out based on the residual emissions from the development taking account of the controls that are incorporated into the design of the submitted scheme. If the outcome of the assessment is that the air quality effect is 'not significant' then it is likely that these controls will be sufficient. If, on the other hand, the assessment predicts the impacts and their effects are likely to be 'significant' then it is likely that additional mitigation will be required, to a proportionate degree to sufficiently reduce the impacts.'*

6.6 BASELINE CONDITIONS

EXISTING BASELINE

CCBC Review and Assessment of Air Quality

6.6.1. CCBC has declared two AQMAs within the borough for both exceedances of the annual mean NO_2. NAQO. The closest AQMA is the Caerphilly town centre (approximately 2.7km to the south-west). An Air Quality Action Plan (AQAP)[38] has been implemented with measurements showing a decline in annual mean concentration for NO_2 within the AQMA. Due to its proximity from the Proposed Scheme boundary, it is highly unlikely that activities associated with the construction or operational phases of the Proposed Scheme would have an impact on air quality within the AQMA.

6.6.2. The baseline air quality conditions and constraints are illustrated in plan V2-S06/0003.

Local Emission Sources

[38] Ricardo-AEA on behalf of Caerphilly County Borough Council (2014) *Caerphilly Town Centre Air Quality Action Plan*. Available online at: https://www.caerphilly.gov.uk/caerphillydocs/pollution/airqualityactionplan_caerphilly.aspx.

6.6.3. The Proposed Scheme is in an area where air quality is mainly influenced from road transport emissions from the construction and/or operation vehicles using the A468 Newport Road to the south and the A467 to the north-east.

6.6.4. A review of the Environment Agency's industrial permit public register[39] indicates that there are no Part A1 permitted installations within a 2km of the Proposed Scheme. There is no evidence of industrial pollution sources in the immediate vicinity of the site that will influence the local air quality.

Background Air Quality Data

6.6.5. Defra publishes estimates of background concentrations for specific pollutants for current and projected future years on its website[40]. Background pollutant concentrations are available in 1km x 1km grid squares across the UK and comprise a mixture of measured data and modelled estimates. The most recently published background maps are based on a 2018 reference year and provide annual mean concentration estimates of pollutants up to 2030.

6.6.6. **Table 6-4** summarises the background pollutant concentrations of NO_2, PM_{10} and $PM_{2.5}$ for 2019 and 2023 that were utilised in the assessment. The values from 2019 are used as it was the last pre covid year for monitoring locally by CCBC. The 2023 values are taken to represent the current baseline at the Proposed Scheme. All annual mean background concentrations recorded in 2019 and 2023 are below the relevant annual mean AQS objectives. In comparison to a potential future $PM_{2.5}$ target (assumed to be 10µg/m^3) all background pollutant concentrations are below 10µg/m^3.

Table 6-4 – Defra Background Concentrations

Grid Square (centre on O.S. Grid Reference)	2019 (µg/m^3)			2023 (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
317500, 191500	7.4	11.3	7.4	6.3	10.7	6.9
317500, 190500	7.9	12.1	7.7	6.7	11.6	7.2
317500, 189500	8.8	11.7	7.7	7.5	11.1	7.3
318500, 191500	7.7	11.4	7.6	6.6	10.8	7.1
318500, 190500	7.8	11.6	7.5	6.7	11.0	7.1
318500, 189500	8.1	11.3	7.5	6.9	10.8	7.1

Local Authority Air Quality Monitoring Data

Continuous Monitoring Data

6.6.7. CCBC currently operates six continuous monitoring stations (CMS) within its administrative area for the purpose of monitoring ambient NO_2, PM_{10} and $PM_{2.5}$ concentrations. The roadside CMS IRW

[39] Environment Agency (2022) *Environmental Permitting Regulations – Installations*. Available online at: https://environment.data.gov.uk/public-register/view/search-industrial-installations.
[40] Background Mapping data for local authorities - 2018 - Defra, UK.

(Islwyn Road Wattsville) is located approximately 2.7km east of the Proposed Scheme. This site monitors only NO_2.

6.6.8. **Table 6-5** shows that there were no exceedances of the annual mean NO_2 AQS objectives recorded at IRW for the five-year period from 2016 to 2020 inclusive. Monitoring data recorded in 2020 is not considered to be representative of normal conditions nor when making comparisons of long-term trends due to national lockdown restrictions attributed to the outbreak of the COVID-19 pandemic.

Table 6-5 – CMS Annual Mean NO_2 Concentrations (2016 – 2020)

Site ID**	Site Name	X, Y	Site Type	Distance from Proposed Scheme	Annual Mean NO_2 Concentration (µg/m^3)†				
					2016	2017	2018	2019	2020*
IRW	Islwyn Road Wattsville	320663, 191427	Roadside	2.7 km east	-	26.1	22.5	24.6	17.6

*2020 monitoring data is not considered to be representative of normal conditions nor when making comparisons of long-term trends due to national lockdown restrictions attributed to the outbreak of the COVID-19 pandemic.
Data for CCBC was obtained from the Air Quality Progress Report 2022.

Passive Monitoring Data

6.6.9. CCBC undertook non-automatic (passive) monitoring of NO_2 at 73 diffusion tube sites during the five-year period from 2016-2020. Eight diffusion tube monitoring sites were identified as within 2km of the Proposed Scheme and are summarised in **Table 6-6**.

6.6.10. The monitoring data indicates that there have been no exceedances of the annual mean NO_2 AQS objective at any site within 2km of the Proposed boundary over the five-year period from 2016 to 2020 inclusive. The maximum annual mean NO_2 concentration recorded in 2019 was 28µg/m^3. This was recorded at the Urban industrial site CCBC97 (Morrisville) which is located approximately 1.8km to the east of the Proposed Scheme.

Table 6-6 – Annual mean NO_2 Concentrations at Non-Automatic Monitoring Locations Within 2km of the Proposed Scheme

Site ID**	Site Name	Site Type	X,Y	Distance from Proposed Scheme (km)	Annual Mean NO_2 Concentration (µg/m^3)†				
					2016	2017	2018	2019	2020*
CCBC 20	Newport Road, Trethomas	Roadside	318179, 188764	0.6 south	27.0	25.0	25.0	23.0	17.0
CCBC 68	Premier Stores, Cwmfelinfach	Roadside	318467, 191788	1.0 east	28.0	25.0	24.0	23.0	16.9
CCBC 107	19 Rees Terrace	Roadside	314956, 190575	2.0 west	-	-	-		19.2
CCBC 108	13 Glenview Terrace	Roadside	315035, 190630	1.9 west	-	-	-	-	21.9
CCBC 96	4 Chapel View, Cwmfelinfach	Urban Industrial	318751, 191476	1.0 east	-	-	16.0	16.0	12.1

Site ID**	Site Name	Site Type	X,Y	Distance from Proposed Scheme (km)	Annual Mean NO_2 Concentration ($\mu g/m^3$)†				
					2016	2017	2018	2019	2020*
CCBC 97	3 Morrisville, Cwmfelinfach	Urban Industrial	319759, 191243	1.8 east	-	-	24.0	28.0	20.0
CCBC 101	Nine Mile Point Industrial Estate	Urban Industrial	319218, 191389	1.3 east	-	-	-	17.0	18.0
CCBC 8	Blackwood High Street	Kerbside	317419, 192211	0.4 northeast	30.0	27.0	22.0	26.0	16.4

EXISTING RECEPTORS

6.6.11. Settlements in the town of Bedwas (south-east), Trethomas (south), Cwmfelinfach (north-east) and Llanbradach (west) are the receptors present within 2km of the Proposed Scheme. Among these, a few properties are located within 350m of the site boundary. These include the cottages near Navigation Street and settlements in Bedwas and Trethomas at south and south-west respectively.

6.6.12. There are no residential properties within 20m to 150m of the site boundary and from 150m to 250m there are approximately thirty-one residential properties.

6.6.13. The 2km study area includes one Local Nature Reserve (Graig Goch) and approximately 134 parcels of Ancient Woodland.

SUMMARY

6.6.14. The Proposed Scheme is in an area where the main influence on air quality will be emissions from road traffic.

6.6.15. Based on review of the local monitoring data and background maps, and given the Site is not located within or near an AQMA, pollutant concentrations in the vicinity of the Proposed Scheme are expected to be well below the relevant AQS objectives.

6.7 ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

CONSTRUCTION PHASE

Dust and PM^{10} Arising from On-Site Activities

6.7.1. Construction activities that have the potential to generate and/or re-suspend dust and PM_{10} include:

- Site clearance;
- Preparation of temporary access/egress to the Proposed Scheme and haulage routes;
- Earthworks;
- Movement of vehicles and construction traffic within the Proposed Scheme;
- Exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
- Site landscaping after completion.

6.7.2. The majority of the releases are likely to occur during the 'working week'. week', which is understood to be:

- Monday to Friday: 06:00hrs to 22:00hrs;

- Saturday: 07:00hrs to 22:00hrs; and
- Sundays and Bank Holidays: Closed.

6.7.3. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

Assessment of Potential Dust Emission Magnitude

6.7.4. The IAQM Construction Dust Guidance assessment methodology has been used to determine the potential dust emission magnitude for the following four different dust and PM_{10} sources: demolition; earthworks; construction; and trackout. The findings of the assessment are presented below.

Demolition

6.7.5. No demolition activities will occur at the Proposed Scheme as part of the construction phase of the Proposed Scheme. Consideration of the impact of this source on dust soiling and ambient PM_{10} concentrations is not required. It has been screened out of the assessment and will not be considered further.

Earthworks

6.7.6. The area of the Proposed Scheme exceeds 10,000m^2. The soil type is loamy[41] and therefore is potentially dusty. The total amount of material that would be moved is estimated to be 8 million tonnes. It is also estimated that more than 10 heavy earth moving vehicles would be active at any one time. Therefore, the potential dust emission magnitude is **large** for earthwork activities.

Construction

6.7.7. The Proposed Scheme involves erection of temporary prefabricated structures, butthe construction of permanent structures does not form part of the proposals, therefore consideration of impact of dust and PM_{10} from this construction activity can be screened out of the assessment and not considered further.

Trackout

6.7.8. Based on the Transport statement Chapter 6 (section 1) provided by the project team, there will be 18 heavy-duty vehicles HGV (>3,5t) movements in any one day. The haul route is composed of moderately dusty surface material. The site is accessed via unpaved roads with length more than 500m, with the nearest paved road being the intersection of A467 and B4251. Hence, the potential dust emission magnitude is **large** for trackout.

6.7.9. **Table 6-7** provides a summary of the potential dust emission magnitude determined for each construction activity considered.

[41] Cranfield University (2023) *Soilscapes Map.* Available online at: https://www.landis.org.uk/soilscapes/#.

Table 6-7 – Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction	N/A
Trackout	Large

Assessment of Sensitivity of The Study Area

6.7.10. A 2019 wind rose generated using the meteorological data for Cardiff Airport is provided in plan V2-S06/0003. It shows that the prevailing wind direction is from the west (west-south-west to west-north-west). There is also an east-north-east component in the wind rose Therefore, typically receptors located to east of the Site are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

6.7.11. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. The construction dust risk assessment study area for Proposed Scheme and for the haul road is shown in plan V2-S06/0001 and plan V2-S06/0002 respectively.

There are approximately one hundred sixty-five residential properties (i.e. high sensitivity receptors) located within 350m of the site boundary. These include the cottages near Navigation Street and settlements in Bedwas and Trethomas to the south and south-west respectively. There are no residential properties between 20m and 150m of the site boundary, and between 150m and 250m there are approximately thirty-one residential properties. As shown in **Table 6-4**, the annual mean PM_{10} background concentration is below 24µg/m^3 in all grid squares in the vicinity of the Proposed Scheme. As such, the sensitivity of the area to an increase in both dust soling and PM_{10} from earthworks is **low**.

6.7.12. With regards to trackout, only one residential property is located within 50m of the routes likely to be used by construction traffic, up to 500m from the site access point. As such, the sensitivity of the area to an increase in both dust soling and PM_{10} from trackout is **low**.

6.7.13. A review of Defra's Multi-Agency Graphical Information for the Countryside (MAGIC) website has determined that there is however an ancient woodland within 50m of roads used for construction traffic up to 500m from the site entrance. Approximately 500m length of the haul route is passing through the Local Nature Reserve (Graig Goch). Although there are approximately 134 parcels of ancient woodlands within the 2km study are, only one parcel of ancient and semi-natural woodland is located within 20m of the Proposed Scheme. As such, the sensitivity of the ecological features to an increase in both dust soling and PM_{10} from earthworks is **low**.

Table 6-8 – Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low	N/A	Low
Human Health	N/A	Low	N/A	Low

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Ecological	N/A	Low	N/A	Low

Risk of Impacts

6.7.14. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. **Table 6-9** below provides a summary of the risk of dust impacts for the Proposed Scheme. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 6-9 – Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	N/A	Low Risk
Human Health	N/A	Low Risk	N/A	Low Risk
Ecological	N/A	Low Risk	N/A	Low Risk

6.7.15. The construction dust assessment shows that there is a Low Risk of dust soiling and human health impacts relating to earthworks and trackout. All other impacts are not applicable and therefore there are no significant effects from construction dust during construction. However, appropriate measures to mitigate the low risk for potential for impacts will be implemented.

Construction Plant and Non-Road Mobile Machinery

6.7.16. Final details of the exact non-road mobile machinery (NRMM) and equipment likely to be used on-site will be determined by the appointed contractor, it is considered likely to comprise bulldozers, dump trucks, hydraulic excavators, 360 excavators, cranes, forklifts and low loaders. The number of NRMM and their location within the Site are likely to be variable over the construction period.

6.7.17. Based on the good air quality of the Study Area, with no monitored exceedances of the air quality standards in the vicinity of works, the relatively low duration of the works and the nature of the activities to be undertaken, it is unlikely that the emissions from plant during construction will cause a significant effect.

OPERATIONAL PHASE

Mineral Dust Assessment

6.7.18. The Site is currently classified as having a ‘soft’ rock type. There are thirty-one high sensitivity receptors within 250m from the Proposed Scheme (Cottages near Bryn-Dolwen Street and Tynywern Tce Street). The maximum 2023 background concentration for PM_{10} at the Proposed Scheme (given in **Table 6-4**) is 11.6µg/m^3.

6.7.19.

6.7.20.

6.7.21. Table **6-10** shows the activities taking place within 250m of the thirty-one sensitive receptors and their respective maximum residual dust magnitude.

Table 6-10 – Activities and Their Residual Dust Magnitude

Site Activity	Description	Maximum Residual Source Magnitude
Site preparation and restoration	Working area >10ha and volume of material movement >100000m^3	Large
Spoil extraction	Expected to be >100ha, use of hydraulic excavator, coarse material and/or high moisture content, <200,000tp	Large
Materials Handling	<5 loading plant, clean hardstanding, activity within 50-1000m of site boundary	Medium
On-site transportation	Unpaved haul road, <100 HDVs per day, <500m haul road length	Large
Spoil processing	No spoil processing within 250m of the receptor	N/A
Stockpiles and exposed surfaces	No stockpiling within 250m of closest receptor	Small
Off-site transportation	25-200 HDV movements, unconsolidated access road condition, >50 m access road length	Large

6.7.22. On this basis, the potential dust soiling effects on cottages near Bryn-Dolwen Street and Tynywern Tce Street, are shown in **Table 6-11** and **Table 6-12**.

Table 6-11 – Risk of Mineral Dust Impacts

Receptor	Residual source emissions	Pathway effectiveness	Estimation of dust impact risk
Cottages near Bryn-Dolwen Street	Small	Ineffective	Negligible Risk
Cottages near Tynywern Tce Street	Small	Ineffective	Negligible Risk

Table 6-12 – Magnitude of Dust Effect

Receptor	Receptor sensitivity	Estimation of dust impact risk	Magnitude of dust effect
Cottages near Bryn-Dolwen Street	High	Negligible Risk	Negligible Effect
Cottages near Tynywern Tce Street	High	Negligible Risk	Negligible Effect

6.7.23. The mineral dust assessment has estimated that the magnitude of dust effect at cottages near Bryn-Dolwen Street and Tynywern Tce Street will be negligible. Therefore, there are no significant effects from mineral dust during the operational phase. However, good practice design mitigation measures as outlined in the guidance are recommended to be implemented for the Proposed Scheme.

6.8 MITIGATION MEASURES

MITIGATION MEASURES DURING CONSTRUCTION PHASE

6.8.1. The Proposed Scheme is a low-risk site in relation to dust nuisance. The 'Highly Recommended' mitigation measures for a low-risk site in accordance with IAQM guidance[35] and measures that are typical best practice are set out below:

General Communication

- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.

General Dust Management

- A Dust Management Plan (DMP), which may include measures to control other emissions, in addition to the dust and PM_{10} mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the logbook.

Monitoring

- Carry out regular site inspections to monitor compliance with any DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Avoid site runoff of water or mud.

Operating Vehicle/Machinery and Sustainable Travel

- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery.
- powered equipment where practicable.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

Measures Specific to Earthworks

- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Application Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.
- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being in frequent use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

Waste Management

- Avoid bonfires and burning of waste materials.

MITIGATION MEASURES DURING THE OPERATIONAL PHASE

6.8.2. The mineral dust assessment has estimated that there will be no significant impact due to mineral dust. Good practice mitigation measures consisting of dust management plan, site design and planning and operational control measures are recommended to be implemented as per the IAQM guidance[36].

Dust Management Plan

6.8.3. A Dust Management Plan (DMP) should be prepared and agreed with the stakeholders for implementation on-site. The recommended structure and content of the DMP should be in accordance with Appendix 6 of the IAQM guidance of Assessment of Mineral Dust Impacts[36].

Good Practice Mitigation – Design Measures

Phasing of extraction activities

6.8.4. Consideration should be given to the relationship of site activities to sensitive locations outside the site. As far as practicable, dust-generating activities should be located away from high and medium sensitive receptors. It is important that the minimisation of dust through site design is addressed for each phase of the works operation.

Design and location of dust-generating activities

6.8.5. Dust-generating activities should, where possible, be located where maximum protection can be obtained from topography, woodland or other sheltering features. Stockpiles, haul roads, tips and mounds, and exposed areas should be located as far away as possible from sensitive receptors. Where practicable, they should not be located directly upwind of the sensitive receptors.

Provision for dust mitigation measures

6.8.6. For longer periods of activity, perimeter screening bunds (ideally vegetated) or semi-permeable fences, and over shorter periods netting screens may be effective. If adequate protection is not provided by requirements for landscaping works, then consideration should be given to the need for a zone adjacent to the perimeter within which works are not conducted (i.e. create a 'sensitive zone', which might also be known as a standoff distance, separation zone or buffer zone). Planning and design of the scheme should make provision for water supply to meet the site demand for mitigation and damping.

Equipment and vehicles

6.8.7. The site should be designed to minimise haul route distances and to locate haul routes away from receptors. A long paved road after a wheel or vehicle washer before joining the public highway, where feasible, reduces the trick of trackout off-site. A separate paved parking area for off-site vehicles, such as staff cars, with no access to the working areas, can help prevent track-out of mud onto the public highway.

Planting

6.8.8. Existing woodland/hedgerows along site boundaries should be retained where possible. Advance planting of native trees/hedgerows should be considered.

Good Practice Mitigation – Operational Measures

Management

6.8.9. A DMP must be produced and adhered to. Effective site management practices are critical to demonstrate the willingness of the operator to control dust emissions and provides a mechanism for auditing of site operations. Such management procedures should be outlined within the DMP. Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.

Training

6.8.10. Provide training to the site personnel on dust mitigation. Training should also cover 'emergency preparedness plans' to react quickly in case of any failure of the planned dust mitigation.

Monitoring

6.8.11. Undertake daily on-site and offsite inspections, audit the monitoring programme: carry out regular site inspections to monitor compliance with the DMP and adjust the frequency of site inspections according to dust risk (higher frequency in dry and windy conditions).

Communication

6.8.12. Maintain good communication to help alleviate anxieties between the operators and the surrounding communities. Set up regular, accessible liaison arrangements and providing information as freely as possible.

Planning of activities

6.8.13. Some activities should ideally be planned only during favourable weather conditions. Where possible, particularly dusty activities should be avoided during extended periods of dry and windy conditions.

Vehicle movements

6.8.14. Site traffic is often the greatest source of dust on minerals sites. Standard good practices for site haulage include:

- Avoiding abrupt changes in direction;
- Regular clearing, grading and maintenance of haul routes;
- Setting appropriate site speed limits. If practicable, set site-specific and enforceable speed limits (e.g.10 mph. On unmade routes). Where not practicable, the Quarry Manager should set speed limits according to operating conditions at the time;
- Fitting heavy plant with upswept exhausts and radiator fan shields;
- Evenly loading vehicles to avoid spillages;
- Regular application of water, whether by bowser or by fixed sprays, in dry conditions; and
- Use paved roads where practicable, ensure mobile plant has upward directing exhausts and radiator fan shields.

6.8.15. It is also important to avoid trackout from off-site transportation:

- Clean heavy duty vehicles used to transport minerals before they leave the site using an effective wheel- or vehicle-washer.

Soil and overburden handling

6.8.16. Site stripping and reinstatement operations, and overburden handling activities should be avoided during dry and windy conditions. Soils handling is generally a short-lived seasonal activity and there is considerable flexibility as to its timing. Overburden can usually be worked at higher moisture contents than soils which can reduce the risk of unacceptable dust emissions. Use of soil scrapers is effective in minimising soil handling where the sites are flat and permit their use. In case of sites with complex topography, use of bulldozers, loaders and dump trucks may be effective and practical to remove soils. For all mineral handling it is appropriate to minimise handling and reduce drop heights.

Mineral extraction (including drilling and blasting)

6.8.17. Blasting may be avoided if appropriate alternatives can be employed, for example modern hydraulic excavators and breakers. Equipment used for abrasive blasting should be fitted with dust extraction systems.

Materials handling

6.8.18. Enclose transfer points and conveyor discharges where visible dust emissions occur. As a general provision, other potential impacts should be mitigated wherever practicable by:

- Installation on an even alignment with no abrupt changes in grade;
- Return belt cleaners, with arisings collected into a bin or cleaned up;
- Maintenance of the structures and rollers to minimise spillages;
- Shrouding of feed hoppers, transfer points and discharges;
- Fixed sprays where required;
- Clearance of any spillages to minimise accumulations of loose dry material around the structures;
- Minimisation of drop heights at feed hoppers and discharges;
- Control and restrict the duration of the site activities where practicable;
- Storing material under cover, and protecting material from wind;
- Screening material to remove dusty fractions prior to external storage;
- Dampen material using sprays, mists, microfoam or foam;
- Spray exposed surfaces with chemical binders (after consultation with the regulatory agencies) and spray exposed surfaces of mounds regularly to maintain surface moisture (unless mound surface has formed a crust after rainfall or is grassed);
- Design hopper load systems to ensure a good match with truck size, and enclose fully on all sides;
- Vegetate exposed surfaces, e.g. Overburden mounds, with quick growing plants; and
- Filtration equipment may be used to remove silty wastes from waste slurries, and the resulting 'moist cake' can then be disposed while it is wet.

6.9 RESIDUAL EFFECTS

CONSTRUCTION PHASE

6.9.1. The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice would be **direct**, **temporary**, **short-term** and **negligible**. Therefore, the residual effects would be not significant.

OPERATIONAL PHASE

6.9.2. The residual effects of mineral dust related to the operation of the Proposed Scheme on local air quality would be **direct**, **temporary** and **negligible** and therefore are **not significant**.

6.10 SUMMARY

6.10.1. This Chapter presents the outcomes of a qualitative air quality assessment for the Proposed Scheme. It considers the potential impact of the Proposed Scheme on air quality during the construction and operational phases.

6.10.2. A review of baseline air quality information and monitoring data at and near to the Site concluded that there is not expected to be any exceedance of relevant pollutant objectives at the Proposed Scheme. The CCBC monitoring data indicates that concentrations of NO_2 at the Site are likely to be well below the annual mean NO_2 objective. Similarly, the background concentrations are also well-below the air quality standards.

6.10.3. A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for the Proposed Scheme with reference to the IAQM Construction Dust Guidance methodology. This identified that there is a low risk of dust soiling impacts and a low risk to human

health due to increases in particulate matter concentrations owing to construction activities. The assessment also identified a low risk to ecological receptors. However, through good site practice and the implementation of suitable mitigation measures, the residual effects of dust and PM_{10} are insignificant.

6.10.4. The mineral dust assessment has concluded that there will be negligible risk for receptors within the study area. With the implementation of the recommended designed-in mitigation measures the overall dust effects are anticipated to be negligible. The residual effects following the application of the mitigation measures described above and good site practice are insignificant.

GLOSSARY

Table 6-13 – Glossary

Term	Definition
Annual Average Daily Traffic	A daily total traffic flow (24 hrs), expressed as a mean daily flow across all 365 days of the year.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
Conservative	Tending to over-predict the impact rather than under-predict.
Data capture	The percentage of all the possible measurements for a given period that were validly measured.
Dust	Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials
Exceedance	A period of time where the concentration of a pollutant is greater than the appropriate air quality standard.
Trackout	The transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

Term	Definition
µg/m^3 micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m^3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

ABBREVIATIONS

Table 6-14 – Abbreviations Used in this Chapter

Acronym	Term
AADT	Annual Average Daily Traffic
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Standard
CCBC	Caerphilly County Borough Council
CMS	Continuous Monitoring Site
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EIA	Environmental Impact Assessment
ES	Environmental Statement
HDV	Heavy Duty Vehicle
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LNR	Local Nature Reserve
MAGIC	Multi-Agency Geographic Information for the Countryside
NO_x	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NRMM	Non-Road Mobile Machinery

Acronym	Term
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
$\mu g/m^3$	micrograms per cubic metre

7 CULTURAL HERITAGE

7.1 INTRODUCTION

7.1.1. Black Mountains Archaeology were commissioned by WSP to produce a cultural heritage chapter as part of an Environmental Impact Assessment (EIA) for the Bedwas Tips Reclamation Scheme. The cultural heritage chapter assessed the potential impacts of the Proposed Scheme on the historic environment. All available historic environment data was collated and evaluated for its heritage value. Archival research and a walkover survey were undertaken to identify any unknown heritage assets and to evaluate the wider historical and landscape context of the site.

7.1.2. The assessment of potential direct (physical) and indirect (visual) effects was undertaken on all heritage assets within a 250m (radius) study area (centred on the site). In addition, all value A heritage assets within a wider 3km (radius) study area were assessed for potential indirect (visual) effects and potential impacts on their setting and significance (V2-S07/0001 and 0002).

STUDY AREA (V2-S07/0006,0007,0010)

7.1.3. The Proposed Scheme entails the reclamation of the Upper and Lower Bedwas Tips, Bedwas, Caerphilly, with the aim to return the land to upland pasture. It is proposed that this would be achieved by extracting coal from colliery spoil, processing it in an on-site benefication plant, and offering the extracted coal for sale for industrial use. The Proposed Scheme would result in the complete removal of the Lower Tip (Tip 1) from the valley slope and the creation of a substantial new deposition area on the site of common land to the northwest of the Upper Tip (Tip 2), which would raise the height of the land by 10 metres. The Scheme would also reprofile the Upper Tip following completion of the reclamation process, whilst the footprint of the Lower Tip would be reprofiled to its pre-industrial land contours. Topsoil originating from the common land would be stored and used to re-seed the new landforms, allowing vegetation to grow in keeping with the surrounding landscape.

The Proposed Scheme would cover a total area of 80ha during the reclamation operation, whilst the new finished landform is expected to cover a total of 52ha, and the newly profiled Lower Tip site is expected to cover a further 19ha. The processed coal would be exported via a haul road along the line of an existing Natural Resources Wales (NRW) forestry track on the northern slope of the mountain, to meet the existing B4251.

7.2 LEGISLATION AND POLICY

PLANNING POLICY WALES (11TH EDITION)

7.2.1. Planning legislation is set out in the Town and Country Planning Act 1990. Planning Policy Wales (PPW 11th Edition) sets out the land-use planning policies of the Welsh Government. Chapter 6 sets out the Welsh Government's policy towards the historic environment. It states:

7.2.2. 'The planning system must take into account the Welsh Government's objectives to protect, conserve, promote and enhance the historic environment as a resource for the general well-being of present and future generations. The historic environment is a finite, non-renewable and shared resource and a vital and integral part of the historical and cultural identity of Wales. It contributes to economic vitality and culture, civic pride, local distinctiveness and the quality of Welsh life. The historic environment can only be maintained as a resource for future generations if the individual

historic assets are protected and conserved. Cadw's published Conservation Principles highlights the need to base decisions on an understanding of the impact a proposal may have on the significance of an historic asset.' (PPW 2021, 126).

7.2.3. Underpinning PPW are a series of legislative powers and Technical Advice Notes (TANs), including TAN24: Historic Environment, described in Section 7.3 below.

THE PLANNING (WALES) ACT 2015

7.2.4. The Planning (Wales) Act 2015 sets out a series of legislative changes to deliver reform of the planning system in Wales, to ensure that it is fair, resilient and enables development. The 2015 Act also introduces a mandatory requirement to undertake pre-application consultation for certain types of development. The Town and Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2016 defines in Schedule 4(I) the parameters and definitions for the requirement of pre-application consultation by Welsh Ministers, particularly in response to the effect of statutory designated monuments, buildings, and parks and gardens.

THE ANCIENT MONUMENT AND ARCHAEOLOGICAL AREAS ACT 1979 AND THE HISTORIC ENVIRONMENT (WALES) ACT 2016

7.2.5. Any works affecting an ancient monument and its setting are protected through implementation of the Ancient Monument and Archaeological Areas Act 1979. In Wales the 1979 Act has been strengthened by The Historic Environment (Wales) Act 2016, which makes important improvements for the protection and management of the Welsh historic environment. It also stands at the centre of an integrated package of secondary legislation (Annexes 1-6), new and updated planning policy and advice, and best-practice guidance on a wide range of topics (TAN 24 Historic Environment). Taken together, these support and promote the careful management of change in the historic environment in accordance with current conservation philosophy and practice.

7.2.6. The Ancient Monument and Archaeological Areas Act 1979 and The Historic Environment (Wales) Act 2016 sets out a presumption in favour of preservation in-situ concerning sites and monuments of national importance (scheduled / listed), and there exists in the current Planning Policy Wales (Chapter 6) a presumption in favour of preservation in-situ of all types of heritage assets.

THE ENVIRONMENT ACT 1995 (SECTION 95) AND THE HEDGEROW REGULATIONS 1997

7.2.7. Important or historic hedgerows (and boundaries) are protected under The Environment Act 1995 (section 95). The Hedgerow Regulations 1997 (under the 1995 Act) provides protection and guidance for those development/agricultural activities outside of planning. The regulations permit the removal of any hedgerow (including any length of hedgerow) for 'carrying out development for which planning permission has been granted' provided the loss of the hedgerow has been properly assessed against the benefits of the proposed development.

7.2.8. Following review in 1998, a simplified set of assessment criteria was proposed where all substantially complete boundaries (hedgerows) that predate 1845 were to be afforded consideration/protection. The Environment, Transport and Regional Affairs Committee's Report 'The Protection of Field Boundaries' (1999) was acknowledged by the government, but no amendments were made to the 1997 regulations.

7.2.9. Judicial Review of the application in 2002 of the regulations (Flintshire County Council v NAW and

Mr J T Morris) has clarified the interpretation of some of the criteria (see The Hedgerow Regulations 1997, Schedule 1, Part 2 Archaeology and History and Section 7.4.6 below).

7.3 GUIDANCE

DESIGN MANUAL FOR ROADS AND BRIDGES (DMRB): LA106 CULTURAL HERITAGE ASSESSMENT REVISION 1 (2020)

7.3.1. DMRB LA106 Cultural Heritage Assessment Revision 1 (2020) sets out the requirements for assessing and reporting the potential effects on cultural heritage as part of the Environmental Impact Assessment (EIA) process in accordance with EU Directive 2014/52/EU. The cultural heritage assessment is undertaken in line with the wider requirements of DMRB including, for the present assessment, LA104 Environmental Assessment and Monitoring Revision 1 (2020). The assessment methodology is outlined in full in Section 7.4 below.

TECHNICAL ADVICE NOTE (TAN) 24: CULTURAL HERITAGE

7.3.2. TAN24: Cultural Heritage provides guidance on how the planning system considers the historic environment during development plan preparation and decision making on planning and Listed Building (LBC) applications. It is designed to be read in conjunction with Planning Policy Wales (11th Edition).

CONSERVATION PRINCIPLES FOR THE SUSTAINABLE MANAGEMENT OF THE HISTORIC ENVIRONMENT IN WALES (CADW 2011)

7.3.3. Cadw are the Welsh Government body responsible for determining applications for Scheduled Monument Consent (SMC) and is a statutory consultee for certain types of developments affecting Scheduled Monuments, World Heritage Sites and Registered Historic Parks, Gardens and Landscapes, Strategic Environmental Assessments and scoping opinions for Environmental Impact Assessments (PPW 2016).

7.3.4. The Conservation Principles for the Sustainable Management of the Historic Environment in Wales (2011) provides the basis upon which Cadw discharges its statutory duties, makes decisions or offers advice about changes to historic assets. Cadw advise that the Conservation Principles should also be used by others (including owners, developers and other public bodies) to assess the potential impacts of a development proposal on the significance of any historic asset/assets and to assist in decision-making where the historic environment is affected by the planning process (PPW 2021).

MANAGING HERITAGE IMPACT ASSESSMENT IN WALES (CADW 2017A)

7.3.5. Managing Heritage Impact Assessment in Wales is ‘a best practice guide setting out the general principles to consider when planning changes to historic assets and applying for Listed Building, Conservation Area and Scheduled Monument consent’ (Cadw 2017a).

MANAGING SETTING OF HISTORIC ASSETS IN WALES (CADW 2017B)

7.3.6. Managing Setting of Historic Assets in Wales explains what setting is, how it contributes to the significance of a heritage asset and why it is important. It provides ‘a best practice guide outlining the principles used to assess the potential impact of development or land management proposals within the settings of World Heritage Sites, ancient monuments (scheduled or unscheduled), listed buildings, registered historic parks and gardens and conservation areas… but are equally applicable

to all individual historic assets‘ (Cadw 2017b).

STANDARD AND GUIDANCE FOR HISTORIC ENVIRONMENT DESK-BASED ASSESSMENT (CHARTERED INSTITUTE FOR ARCHAEOLOGISTS 2014, REVISED 2020)

7.3.7. The Standard and Guidance for Historic Environment Desk-Based Assessment (2014, revised 2020) defines the industry standard for best practice in the execution and reporting of desk-based assessment in accordance with the regulations of the Chartered Institute for Archaeologists (CIfA).

ENVIRONMENTAL IMPACT ASSESSMENT HANDBOOK (INSTITUTION OF CIVIL ENGINEERS 2020)

7.3.8. The present study has followed the guidance set out in the Environmental Impact Assessment Handbook in line with the client’s recommendations.

7.4 ASSESSMENT METHODOLOGY

OBJECTIVES

7.4.1. The purpose of a desk-based assessment as set out by the Chartered Institute for Archaeologists (2014, revised 2020) is to gain an understanding of the historic environment resource in order to formulate as required:

- an assessment of the potential for heritage assets to survive within the study area;
- an assessment of the significance of the known or predicted heritage assets considering, their archaeological, historic, architectural and artistic interests;
- strategies for further evaluation whether or not intrusive, where the nature, extent or significance of the resource is not sufficiently well defined;
- an assessment of the impact of proposed development or other land use changes on the significance of the heritage assets and their settings;
- strategies to conserve the significance of heritage assets, and their settings;
- design strategies to ensure new development makes a positive contribution to the character and local distinctiveness of the historic environment and local place-shaping; and
- proposals for further archaeological investigation within a programme of research, whether undertaken in response to a threat or not.

7.4.2. In addition to the above, the objectives of a desk-based assessment are:

- an assessment of available information to determine the extent and character of heritage assets, in local, regional and national contexts;
- an assessment of the significance of heritage assets considering all of the cultural heritage values that people associate with it, or which prompt them to respond to it;
- an assessment of impact (physical or visual) on heritage assets and their setting;
- the careful consideration and presentation of mitigation recommendations aimed at reducing the impact of the Development on heritage assets and their setting; and finally,
- the presentation of this information in a written report and the preparation and deposition of an archive of data generated by the assessment in line with professional standards.

IDENTIFYING HERITAGE ASSETS (RECEPTORS)

7.4.3. Cultural heritage is categorised according to the only values that are nationally agreed in the Department of Transport/Welsh Office/Scottish Office Design Manual for Roads and Bridges (DMRB) LA106 Cultural Heritage Assessment Revision 1 (2020), which adopts the UNESCO definition of cultural heritage as outlined in Article 1 of the 1972 UNESCO World Heritage Convention.

7.4.4. Cultural heritage comprises:

- 'Historic Monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features,
- Groups of buildings: groups of separate or connected buildings (recognised for their architecture, homogeneity or their place in the landscape); and/ or,
- Sites: material remains resulting from the works of humans or the combined works of nature and humans, and areas including archaeological sites'.
- (DMRB LA106 Revision 1 2020, p6)

7.4.5. Further, a cultural heritage resource is defined by DMRB as 'a building, monument, site, place, area or landscape (designated or undesignated) identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest...[noting that] roads themselves can be of heritage interest' (ibid).

7.4.6. In order to identify all heritage assets within a study area, a cultural heritage assessment requires the interrogation of a wide range of sources including (but not limited to):

- statutory designated monuments, buildings and landscapes (including conservation Areas, parks, gardens and battlefields);
- Regional Historic Environment Record (HER);
- National Monuments Record (NMR);
- Aerial photographic archives;
- Local and national archives; and
- Cartographic and documentary sources.

7.4.7. Important or historic hedgerows were included in the assessment in accordance with current legislation that details the following criteria:

- the hedgerow marks the boundary, or part of the boundary, of at least one historic parish or township; and for this purpose, 'historic' means existing before 1850;
- the hedgerow incorporates an archaeological feature which is (a) included in the schedule of monuments compiled by the Secretary of State under Section 1 (schedule of monuments) of the Ancient Monuments and Archaeological Areas Act 1979(7); or (b) recorded at the relevant date in a Historic Environment Record;
- the hedgerow (a) is situated wholly or partly within an archaeological site included or recorded as mentioned in paragraph 2 or on land adjacent to and associated with such a site; and (b) is associated with any monument or feature on that site;
- the hedgerow (a) marks the boundary of a pre-1600AD estate or manor recorded at the relevant date in a Historic Environment Record or in a document held at that date at a Record Office; or (b) is visibly related to any building or other feature of such an estate or manor;
- the hedgerow (a) is recorded in a document held at the relevant date at a Record Office as an

integral part of a field system pre-dating the Enclosure Acts; or (b) is part of, or visibly related to, any building or other feature associated with such a system, and that system (i) is substantially complete; or (ii) is of a pattern which is recorded in a document prepared before the relevant date by a local planning authority, within the meaning of the 1990 Act, for the purposes of development control within the authority's Area, as a key landscape characteristic; and

- There are other criteria relating to rights of way and ecology.

7.4.8. The assessment reviewed the available historic environment data for a 250m (radius) study area centred on the red line boundary of the proposed scheme (NGR ST (3)17784 (1)90903). A number of additional Value A sites were identified within a wider 3km study area for assessment of potential impacts to their setting and significance (see V2-S01/0006).

7.4.9. Information on statutory designated sites (World Heritage Sites, Scheduled Ancient Monuments, Listed Buildings, Conservation Areas, Registered Landscapes, Battlefields, Parks and Gardens) was obtained from Cadw and accessed through Cof Cymru - National Historic Assets of Wales (a Welsh Government online mapping resource) on 02/02/23. Known heritage assets were collated from the Regional Historic Environment Record (Ref 6262, Received 02/02/23) and National Monuments Record (Ref RC23-0043, Received 01/02/23). Collections of aerial photographs held by the Central Register of Air Photography for Wales were studied (Received 31/01/23) and cartographic and documentary archives held by The National Library of Wales and the Glamorgan Archives were also consulted in order to identify potential unrecorded heritage assets and to understand the wider historic and landscape context.

7.4.10. A walkover survey was undertaken on 13 December 2023. The weather was dry but overcast and windy. All identified heritage assets within the 250m (radius) study area and additional designated Value A sites within a 3km (radius) study area were visited and key views to and from the proposed site were photographed (Plates 8-92).

ASSESSING VALUE (SENSITIVITY)

7.4.11. Understanding value is subjective beyond any statutory or registered designation and is based on the professional experience and knowledge of the assessor. Other factors do contribute to the overall assessment of value (and significance) of heritage assets and the assessment criteria below contributes to an overall robust assessment framework.

A preliminary assessment of value is based on the criteria in **Table 7-1** below, which combines Table 3.2N of the current DMRB LA104 Revision 1 (2020) and the more comprehensive Table 5.1 within its precursor DMRB HA208/07 (2009)

Table 7-1 – Value of heritage assets

Value			Criteria
A*	Very High	International/National	World Heritage Sites (including nominated sites). Assets of acknowledged international importance. Assets that can contribute significantly to acknowledged international research objectives. Assets of very high importance and rarity, international scale and very limited potential for substitution.

Value			Criteria
A	High	National	Scheduled Monuments (including proposed sites). Undesignated assets of schedulable quality and importance. Assets that can contribute significantly to acknowledged national research objectives. Assets of high importance and rarity, national scale and limited potential for substitution.
B	Medium	Regional	Designated or undesignated assets that contribute to regional research objectives. Assets of medium or high importance and rarity, regional scale, limited potential for substitution.
C	Low	Local	Designated and undesignated assets of local importance. Assets compromised by poor preservation and/or poor survival of contextual associations. Assets of limited value, but with potential to contribute to local research objectives. Assets of low or medium importance and rarity, local scale.
D	Negligible	Local	Assets with very little or no surviving archaeological interest. Assets with very low importance and rarity, local scale.
U	Unknown	Unknown	The importance of the resource has not been ascertained.

7.4.12. The additional assessment criteria below are adapted from notes made in Annex 2 of the DMRB Vol. 11 Section 3 Part 2: HA 208/07 Cultural Heritage (2007, revised 2009). These notes refer to the Scheduling Criteria as set out by the Ancient Monument and Archaeological Areas Act 1979 and The Historic Environment (Wales) Act 2016 and finally 'Stage 4 Evaluating Relative Importance' as set out in ASIDOHL2, Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process (2nd Edition 2007).

7.4.13. While comprehensive, the criteria should not be regarded as definitive, rather they are indicators which contribute to a wider judgement based on the professional experience of the assessor and the circumstance and context of the assessment and heritage asset.

Table 7-2 – Criteria for assessment the value of heritage assets

Value	Description	Criteria
Rarity	There are some monument categories, which in certain periods are so scarce that all surviving examples which still retain some archaeological potential should be preserved. This should be assessed in relation to what survives today, since elements of a once common type may now be rare.	**Very high:** sole survivor of its type **High:** very few sites of this type are known **Medium:** the site is not unusual but cannot be considered common **Low**: the site is quite common.
Documentation and Association	The significance of a heritage asset may be enhanced by the existence of records of previous investigations or, in the case of more recent monuments, by the supporting evidence of contemporary written records. Furthermore, any important historical associations relating to the heritage asset, such as institutions, cultural figures, movements or events, will enhance value. The survival of documentation and/or historic association that increases our understanding of a heritage asset will raise its importance, though this is difficult to quantify owing to the extremely varied nature of documentary and historical material. Therefore, a professional judgment is given based on the actual amount or importance of evidence and its academic value.	**Very High**: a highly significant, authentic and nationally well-known association(s) and/or complete documentary record, or exceptionally important sources available; **High**: a significant, authentic and regionally well-known association(s) and/or considerable quantity of relevant material, or highly important sources available; **Moderate:** an authentic, but less significant, perhaps locally well-known association(s) and/or some relevant material, or moderately important sources available; and **Low**: unauthenticated or a little-known association(s) and/or little relevant material, or only modestly important sources available. **None**: no known associations and/or relevant material available.
Group Value	Relates to the diversity (or similarity) of elements including their structural and functional coherence. The value of a single monument (such as a field system) may be greatly enhanced by its association with related contemporary monuments (such as a settlement and cemetery) or with monuments of different periods.	**Very high:** largely complete interconnected complex of heritage assets or landscapes (e.g UNESCO World Heritage Site). **High**: significant survival of an interconnected complex of heritage assets. **Moderate:** some surviving elements of an interconnected complex of heritage assets; some disintegration has occurred. **Low**: single or unconnected/unrelated groups of heritage assets.
Survival/Condition	The survival of a monument's archaeological potential both above and below ground is a particularly important consideration and should be assessed in relation to its present condition and surviving features. The Historic Environment Records (HERs) of the four Welsh Archaeological Trusts note the condition of sites according to the following criteria. To these criteria, we can add the following assessment:	**Intact**: the site is intact **Near intact**: the site is nearly intact **Damaged**: the site has been moderately damaged **Near destroyed**: the site has nearly been destroyed **Destroyed**: the site has been destroyed **Restored**: the site has been restored **Moved**: the site has been moved (usually finds) **Not known**: the condition of the site is not known **Very Good:** elements surviving in very good condition for their class **Good**: elements surviving in good or above average condition for their class **Moderate**: elements surviving in moderate or average condition for their class **Fair**: elements surviving in fair or below average condition for their class **Poor**: elements surviving in poor condition for their class

ASSESSING DIRECT (PHYSICAL) IMPACTS

7.4.14. Direct Impacts are outcomes resulting from an assessment of the effect of the proposed development on the heritage asset or landscape. The direct impact of a course of action (e.g. development) can only be assessed once the assessment criteria above has been completed and potential outcomes fully understood (as far as any development proposal or construction design is reasonably understood).

7.4.15. The magnitude of direct impact of the proposed development on heritage assets has been assessed using the following criteria derived from Table 3.4N of DMRB LA104 Revision 1 (2020):

Table 7-3 – Magnitude of direct impact assessment criteria

Magnitude of Impact		Description
Major	Adverse	**Total loss of the integrity of the heritage asset(s).** Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse	**Significant loss of integrity to the heritage asset(s), significant reduction of group and rarity values.** Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	**Some loss of integrity to heritage asset(s) and reduction in value.** Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	**Slight loss of integrity to heritage asset(s) and value.** Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements.

Magnitude of Impact	Description
No change	No perceived or identified effect, or loss in value.

7.4.16. The significance of direct effect is assessed using the following matrix derived from Table 3.8.1 of DMRB LA104 Revision 1 (2020):

Table 7-4 – Significance of direct effect to heritage assets (matrix)

Value (sensitivity)	Magnitude of impact (degree of change)				
	No change	Negligible	Minor	Moderate	Major
A*	Neutral	Slight	Moderate or large	Large or very large	Very large
A	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
B	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
C	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
D	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight
U	Unknown	Unknown	Unknown	Unknown	Unknown

7.4.17. How the significance of direct effect on heritage assets may influence the decision making process is set out in the table below, derived from Table 3.7 or DMRB LA104 Revision 1 (2020):

Table 7-5 – Significance categories and descriptions

Significance	Description
Very Large	Effects at this level are material in the decision making process
Large	Effects at this level are likely to be material in the decision making process
Moderate	Effects at this level can be considered to be material decision-making factors
Slight	Effects at this level are not material in the decision making process.

Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within margin of forecasting error.

ASSESSING INDIRECT (VISUAL) EFFECTS

7.4.18. Assessing the Indirect (Visual) Effects of the proposed development to heritage assets is intrinsically linked to setting and significance (see paragraphs 7.6.28 to 7.6.31 below).

7.4.19. The criteria in Table 7-6 below are adapted from standard EIA evaluation criteria and Stage 3 Assessment of Indirect Impacts of Development as set out in ASIDOHL2, Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process (2nd Edition 2007). Assessment of indirect (visual) effect is confined to sites of international, national and in some cases regional value.

Table 7-6 – Indirect (visual) effect assessment criteria

Value	Criteria
Very severe	The key views and/or essential lines of sight to and from the heritage asset are dominated or obscured by the development resulting in severance of cultural heritage links
Severe	The key views and/or essential lines of sight to and from the heritage asset are interrupted by the development resulting in partial severance of cultural heritage links
Considerable	The key views and/or essential lines of sight to and from the heritage asset are significantly visible resulting in limited severance of cultural heritage links
Moderate	The key views and/or essential lines of sight to and from the heritage asset are visible resulting in some severance of cultural heritage links
Slight	The key views and/or essential lines of sight to and from the heritage asset are noticeable resulting in diminished cultural heritage links
Very slight	The key views and/or essential lines of sight to and from the heritage asset are noticeable resulting in little discernible severance of cultural heritage links
None	The key views and/or essential lines of sight to and from the heritage asset are not noticeable resulting in no severance of cultural heritage links

ASSESSING EFFECTS ON SETTING AND SIGNIFICANCE

7.4.20. The Setting of Historic Assets in Wales 2017 (The Historic Environment (Wales) Act 2016, Annex 6) explains what setting is, how it contributes to the significance of a historic asset and why it is important. It also outlines the principles used to assess the potential impact of development or land

management proposals on the settings of World Heritage Sites, Ancient Monuments (scheduled and unscheduled), Listed Buildings, Registered Historic Landscapes, Parks and Gardens, and Conservation Areas. These principles, however, are equally applicable to all individual historic assets, irrespective of their designation.

7.4.21. Certain major developments require pre-application consultation with the local planning authority and, where specialist advice is required, the Welsh Ministers through Cadw. Any development likely to directly or indirectly (visual) effect a statutory designated heritage asset or high value undesignated heritage asset and its setting will likely require 'consultation before grant of permission' under the Town and Country Planning (Development Management Procedure) (Wales) (Amendment) Order 2016, schedule 4 (I)(i) and (ii) if the proposed Development meets any of the following criteria:

- Development likely to affect the site of a registered historic park or garden or its setting;
- Development is within a registered historic landscape that requires an Environmental Impact Assessment and ASIDOHL2;
- Development likely to have an impact on the outstanding universal value of a World Heritage Site;
- Development is within a distance of 0.5 kilometres from any point of the perimeter of a scheduled monument;
- Development is within a distance of 1 kilometre from the perimeter of a scheduled monument and is 15 metres or more in height, or has an Area of 0.2 hectares or more;
- Development is within a distance of 2 kilometres from the perimeter of a scheduled monument and is 50 metres or more in height, or has an Area of 0.5 hectares or more;
- Development is within a distance of 3 kilometres from the perimeter of a scheduled monument and is 75 metres or more in height, or has an Area of 1 hectare or more; and
- Development is within a distance of 5 kilometres from the perimeter of a scheduled monument and is 100 metres or more in height, or has an Area of 1 hectare or more.

7.4.22. An assessment of the impact of the Proposed Scheme on the setting of the statutory designated heritage asset or high value undesignated heritage asset will be required if any of the criteria above are met. The assessment of the setting of heritage assets follows the four-stage approach detailed in the Setting of Historic Assets in Wales 2017 (The Historic Environment (Wales) Act 2016, Annex 6):

Table 7-7 - Four stages of assessment of impact on setting and significance

Stage	Description
Stage 1:	Identify the historic assets that might be affected by a proposed change or development and their significance.
Stage 2:	Define and analyse the settings to understand how they contribute to the ways in which the historic assets are understood, appreciated and experienced.
Stage 3:	Evaluate the potential impact of a proposed change or development on those settings

Stage 4:	Consider options to mitigate the potential impact of a proposed change or Development on those settings. The assessment of significance is intrinsically linked to the setting (see paragraphs above) and value (see criteria above) of a heritage asset/registered landscape, park and garden.

7.4.23. The significance of an historic asset embraces all of the cultural heritage values that people associate with it, or which prompt them to respond to it. These values tend to grow in strength and complexity over time, as understanding deepens and people's perceptions evolve (Conservation Principles for the Sustainable Management of the Historic Environment in Wales 2011, p10).

7.4.24. There are four values that need to be considered when assessing significance and these are set out in Cadw's Conservation Principles for the Sustainable Management of the Historic Environment in Wales:

Table 7-8 - Setting and significance values (after Cadw's Conservation Principles 2011)

Value	Description
Evidential Value:	Relates to those elements of a heritage asset that can provide evidence about past human activity, including its physical remains or historic fabric. These may be visible and relatively easy to assess, or they may be buried below ground, under water or be hidden by later fabric. These remains provide the primary evidence for when and how a heritage asset was made or built, what it was used for and how it has changed over time. The unrecorded loss of historic fabric represents the destruction of the primary evidence. Additional evidential values can be gained from documentary sources, pictorial records and archaeological archives or museum collections. To assess the significance of this aspect of an asset, all this evidence needs to be gathered in a systematic way and any gaps in the evidence identified.
Historical Value:	A heritage asset might illustrate a particular aspect of past life or it might be associated with a notable family, person, event or movement. These illustrative or associative values of a heritage asset may be less tangible than its evidential value but will often connect past people, events and aspects of life with the present. Of course, the functions of a heritage asset are likely to change over time and so the full range of changing historical values might not become clear until all the evidential values have been gathered together. Historical values are not so easily diminished by change as evidential values and are harmed only to the extent that adaptation has obliterated them or concealed them.
Aesthetic Value	Relates to the way in which people draw sensory and intellectual stimulation from a heritage asset. This might include the form of a heritage asset, its external appearance and how it lies within its setting. It can be the result of conscious design or it might be a seemingly fortuitous outcome of the way in which a heritage asset has evolved and been used over time, or it may be a combination of both. The form of an asset normally changes over time. Sometimes earlier pictorial records and written descriptions will be more powerful in many people's minds than what survives today. Some important viewpoints may be lost or screened, or access to them may be temporarily denied.

Value	Description
Communal Value	Relates to the meanings that a heritage asset has for the people who relate to it, or for whom it figures in their collective experience or memory. It is closely linked to historical and aesthetic values but tends to have additional or specific aspects. Communal value might be commemorative or symbolic. For example, people might draw part of their identity or collective memory from a heritage asset, or have emotional links to it. Such values often change over time and they may be important for remembering both positive and uncomfortable events, attitudes or periods in Wales's history. Heritage assets can also have social value, acting as a source of social interaction, distinctiveness or coherence; economic value, providing a valuable source of income or employment; or they may have spiritual value, emanating from religious beliefs or modern perceptions of the spirit of a place.

7.4.25. The first stage of assessing the significance of a heritage asset is by understanding its value by carefully considering its history, fabric and character and then comparing these values with other similarly designated or types of heritage asset locally, regionally or if necessary, nationally. The outcome of this process is a Statement of Significance, which is partly a subjective exercise based on the assessor's experience and knowledge.

7.5 BASELINE CONDITIONS

LOCATION, TOPOGRAPHY AND GEOLOGY

7.5.1. The Proposed Scheme covers an area of land on Mynydd y Grug in Caerphilly County Borough (CCB) (central NGR ST 17668 90526, V2-S01/0006, 0010, 0007 and V2-S07/0001, 0002). The scheme area is dominated by a pair of coal spoil tips that originating from the former Bedwas Colliery. Tip 1, or the 'Lower Tips' is the southernmost of this pair and is positioned on the south facing hill slope overlooking Bedwas to the southwest and Trethomas to the southeast. Tip 2 or the 'Upper Tip' is situated along the crest of Mynydd y Grug. Beyond the pair of coal spoil tips the landcover within the Scheme Area, specifically the location of the new Deposition Area, comprises upland common.

7.5.2. Mynydd y Grug represents the most prominent topographic feature within the vicinity of the Proposed Scheme, which comprises a chain of hills that extends northwards and eastwards from the Scheme area and is characterised by a broad ridge with elevated crests overlooking the Sirhowy valley to the north and steep foothills overlooking the Rhymney Valley to the south. It has a summit of approximately 375mOD, which is occupied by the Bedwas Upper Tip. The Scheme Area is located towards the northern edge of the Lower Rhymney Valley, at a point where it deviates northwards from its E/W course along Trethomas and Bedwas, before extending towards Llanbradach. The colliery settlements of Bedwas and Trethomas are situated are within the valley on the northwest fringes of the town of Caerphilly, and are bounded to the south by the Rhymney River.

7.5.3. The bedrock of the Scheme Area comprise Hughes Member sandstone, which formed between 309.5–308 million years ago during the Carboniferous period (BGS 2023). Borehole records indicate that coal deposits are located from circa 15m below the summit surface (*ibid;* BGS ID381962). The soils comprise freely draining and acidic loams (Landis 2023).

HISTORIC LANDSCAPES

Registered Historic Landscapes

7.5.4. The Proposed Scheme is not situated within a Registered Historic Landscape.

7.5.5. The nearest Registered Historic Landscape is Gelligaer Common (HLW(MGl)4), the southern boundary of which is situated approximately 7.8km to the northeast.

LANDMAP

7.5.6. The Proposed Scheme straddles two LANDMAP Historic Landscape Aspect Areas. These are:

- Mynydd Bach and Mynydd y Grug (CynonHL556) – Outstanding; and
- Rhymney Valley (CynonHL701) – High.

7.5.7. Mynydd Bach and Mynydd y Grug (CynonHL556) has an Outstanding historic landscape value because it 'represents a remarkably diverse, multi-period upland landscape with particularly significant concentrations of pre-historic ritual/ funerary monuments' (LANDMAP).

7.5.8. Rhymney Valley (CynonHL701) has a High historic landscape value because 'although the coherence of the landscape has been significantly impacted by modern housing and industrial development, the Rhymney Valley remains a diverse, historically important communications corridor with evidence of human activity dating back to the Neolithic period' (LANDMAP).

Registered Historic Parks and Gardens

7.5.9. There are no Registered Parks and Gardens within the vicinity of the Proposed Scheme.

7.5.10. The nearest Registered Park and Garden is the Grade II Listed Ruperra Castle (PGW(Gm)17(CAE), the northwest boundary of which situated approximately 5km to the southeast.

Conservation Areas

7.5.11. The Proposed Scheme is not situated within a Conservation Area and there are no Conservation Areas within its vicinity.

7.5.12. The nearest Conservation Area is Llanbradach (CA306), the eastern boundary of which is situated approximately 2.9km to the west.

DESIGNATED HERITAGE ASSETS

Scheduled Monuments

7.5.13. There are no Scheduled Monuments within the boundary of the Proposed Scheme.

7.5.14. However, within the primary (250m radius) study area there are four Scheduled Monuments, all of which are Bronze Age funerary monuments. These include:

- Twyn Cae-Hugh Round Barrow (SMMm033) – immediately adjacent to the NE;
- Twyn-yr-Oerfel Round Barrows (SMMm070) – 11m NE;
- Mynydd Bach Cairn Cemetery (SMMm196) – 228m NW; and
- Pen y Rhiw Barrow (SSMMm149) – 228m NW.

7.5.15. The Twyn Cae-Hugh Round Barrow (SMMm033) is broadly circular in plan, measures 22m in diameter by 3m in height, and is positioned between the northeast outer boundary of the Proposed Scheme and the western terminus of the proposed haul route.

7.5.16. The Twyn-yr-Oerfel Round Barrows (SMMm070) number two in total, with the easternmost

measuring 10m in diameter by 1.3m in height, and the westernmost measuring 15m in diameter by 1.8m in height. Both are positioned marginally beyond the eastern outer boundary of the Proposed Scheme.

7.5.17. The Mynydd Bach Cairn Cemetery (SMMm196) comprises a collection seven or eight small cairns, each measuring approximately 3m in diameter by 0.4m in height. The cemetery is positioned towards the northern edge of the Proposed Scheme and straddles the northern boundary of the primary study area. The Pen y Rhiw Round Barrow (SMMm149) is situated immediately west of the cemetery.

7.5.18. Immediately adjacent to the west of The Mynydd Bach Cairn Cemetery (SMMm196) is a further round barrow, The Pen y Rhiw Round Barrow (SMMm149), which comprises a single cairn measuring 13m in diameter by 1m in height. Towards the centre of the monument is an approximately square shaped hollow, within which are positioned the remains of a stone-built cist (or burial chamber).

7.5.19. Within a Secondary 3km study area there are a further eight Scheduled Monuments:

- Twyn Tudor (SMMm035) – located 2.59km NE;
- Machen Forge and Tinplate Works (SMGm516) – located 1.9km E;
- Rudry Ironworks (SMGm357) – located 1.54km SE;
- Gwern-y-Domen Castle Mound (SMGm218) – located 1.27km S;
- Bedwas Churchyard Cross (SMMm143) – located 0.28km S;
- Caerphilly Castle (SMGm002) – located 2.64km SW;
- Cornish Type Engine, Bryngwyn Colliery (SMGm440) – located 1.12km W; and
- Bryn Owen Farm Cairns, Llanfabon (SMGm051) – 2.18km W.

Listed Buildings

7.5.20. There are no Listed Buildings within either the boundary of the Proposed Scheme, but there are two Grade II Listed Buildings within the primary (250m radius) study area. These are:

- Former Penllwyn Tramroad Viaduct at Nine Mile Point (Grade II LB22314) – located 215m NW; and
- Ty'n-y-ffynnon (Grade II LB22321) – located 100m SE.

7.5.21. The Former Penllwyn Tramroad Viaduct at Nine Mile Point (Grade II LB22314) survives as a high single span stone river arch reinforced with brick, and buttressed at each side, crossing the Sirhowy river. It is listed as ‘an important early tramroad structure with an impressive span to arch’ (Cadw 2023).

7.5.22. Ty'n-y-ffynnon farmhouse (Grade II LB22321) is an early 19th century mountain farmhouse listed as ‘an uncommon survival of a small regional mountain farmstead retaining almost all its original exterior fabric and character’ (Cadw 2023).

7.5.23. A total of 58 Listed Buildings are present within a secondary (3km radius) study area.

NON-DESIGNATED HERITAGE ASSETS

National Monuments Record (NMR)

7.5.24. There are two NMR records locate within the boundary of the Proposed Scheme. These are:

- Twyn Cae Hugh Enclosure (NPRN225518); and
- Mynydd-y-Grug, Field Boundary (NPRN220388).

7.5.25. There are a further fourteen NMR records within (or just outside) the primary (250m radius) study area.

Regional Historic Environment Record (HER)

7.5.26. There are two HER records located within the boundary of the Proposed Scheme. These are:

- Field Enclosure (GGAT00086g); and
- Ditch and bank/ pound (GGAT00683m).

7.5.27. A further 29 HER records are located within the primary (250m radius) study area.

CARTOGRAPHIC AND PHOTOGRAPHIC EVIDENCE

7.5.28. The 1841 Tithe Map of the local area (Plan of the Parish of Bedwas in the County of Monmouth (V3-S07/0002)) demonstrates that, during the mid-19th century, most of the proposed development area was taken up by Land Parcel 656. The tithe apportionment indicates that this land parcel comprised glebe land owned by the Lord Bishop of Llandaff that was a 'common' occupied by Thomas and William Price, who were using it as pasture. The extent of the land parcel is recorded as 226 acres, two roods and seven perches, or the equivalent of approximately 0.9km^2. To the south and southeast, the tithe map demonstrates that the Proposed Scheme area was taken up by a series of significantly smaller land parcels. The overall impression provided by the tithe map is that the development area during the mid-19th century was almost exclusively agricultural and rural in character. Most of the development area comprised open fields, such as pastures and meadows, with some fields dedicated to growing crops, with the occasional wooded area or 'brake' (meaning thicket or overgrown land). The only exception to this pattern was the large common that occupied most of the development area. The tithe apportionment also demonstrates that the fields constituting the development area at this time were owned exclusively by the Lord Bishop of Llandaff and Sir Charles Morgan of the Tredegar Estate near Newport. Finally, the tithe mapping evidence indicates the presence of four farms within the development area during the mid-19th century. Two of these farms were known as Ty yn y Cwm and Ty Cenol, which were run by John Richards and Mary Phillips respectively. The names of the other two farms are unknown and were being run by Lewis Lewis and David Davies.

7.5.29. A 1st Edition Ordnance Survey (OS) OS map of the local area, published in 1887, indicates the presence of both Upper and Lower Bedwas, with the former comprising only a small collection of farms and the latter having already developed a town centre with its own railway station and school. The map also indicates that the Proposed Scheme area comprised a collection of fields and open common penetrated by a series of trackways. The north-facing slopes of Mynydd y Grug are a mixture of irregular fields and mixed woodland including Coed Cae Hugh and Graig-goch, and occasional upland farmsteads (V2-S07/0003).

7.5.30. A 2nd Edition OS map of the local area, published in 1901, indicates little change to the development area. However, the map indicates that, by at least 1901, the community of Lower Bedwas was

known simply as ‘Bedwas’, and it appears that the former settlement of Upper Bedwas had ceased to exist. To the north of the Proposed Scheme area, the Wentloog Colliery is recorded at Graig-goch featuring three coal levels, and a tramway and winding engine house.

7.5.31. A 3rd Edition OS map, published in 1922, demonstrates the position of Bedwas Navigation Colliery. The 1922 map also indicates that, by at least this time, the settlement of Trethomas was established, which is known on the map by the Anglicised name ‘Thomastown’. The establishment of Trethomas appears to have coincided with the sinking of Bedwas Navigation Colliery, indicating that the settlement was established to house the miners of the colliery. Within the development area itself, the maps indicates that a quarry had been established just north of the Bedwas Navigation Colliery, which, in considering the local geology, was likely for extracting sandstone. The quarry was connected via a N/S aligned tramway and appears to be functioning as a tip site by this date (V2-S07/0004).

7.5.32. Finally, a 1951 Edition OS map demonstrates that by this time the Proposed Scheme area was dominated by spoil tips derived from mining operations associated with the Bedwas Navigation Colliery. These tips correspond with the Lower Tips and Upper Tip, as observed within the development area today (V2-S07/0005).

7.5.33. A series of aerial photographs dating in 1958 indicate the continued presence of large spoil tips across the area’s southern side (the Lower Tips). The spoil tips are shown as comprising elongated, ‘fingertip’ style mounds, accessed via a series of tramways (Plates 1 and 2 in V3-S07/0001).

7.5.34. A 1962 aerial photograph of the Proposed Scheme area reveals that the Upper Tip became established at around this time. It also reveals an aerial ropeway conveyor between the summit of Mynydd y Grug and Nine Mile Point Colliery, suggesting that colliery spoil was originating from more than one source (Plates 3 and 4 in V3-S07/0001).

7.5.35. Aerial photographs dating to 1984 reveal that both coal tips had largely been reprofiled by this date, whilst photographs dating to 1989 show that the colliery had been swiftly demolished following its closure in 1985 (Plate 5 in V3-S07/0001).

PREVIOUS STUDIES

7.5.36. In 2000, the Glamorgan-Gwent Archaeological Trust (GGAT) performed an evaluation at Penllwyn Tramroad Bridge due to a previous watching brief revealing the remains of track formation. Two parallel lines of sleeper blocks were discovered intact, as well as two types of chair. They concluded that that a watching brief be carried out during any further groundworks (GGATE006211).

7.5.37. In 2003, GGAT produced the LANDMAP Historic Area Aspect Landscape Characterisation survey for Rhondda Cynon Taf and Caerphilly (Lewis and Dunning 2003).

7.5.38. In 2014, Museum of London Archaeology (MOLA) was commissioned to carry out a watching brief on a wind farm turbine development at Bryn-ysgawen Farm, Ynysddu, Caerphilly. There were no finds or features of significance encountered (GGATE006526).

7.5.39. In 2013, a field visit was undertaken by Clwyd-Powys Archaeological Trust (CPAT) as part of an archaeological desk-based assessment (GGATE007091,GGATE007090).

7.5.40. In 2018, Archaeology Wales were commissioned by Constantine Wind Energy to carry out a watching brief on groundworks for a wind turbine and associated track, electric cabinet and crane pad at land at Tyle Crwth, southwest of Ynysddu, Newport, due to the proximity of known prehistoric

burial monuments. Three linear features interpreted as drainage and/or boundaries were discovered but not dated. No other features or finds of significance were encountered (GGATE006340).

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Prehistoric

7.5.41. Within the region of southern Caerphilly, to which the Proposed Scheme belongs, archaeological evidence relating to the earliest prehistoric periods (Palaeolithic and Mesolithic) is extremely sparse and little is known of these periods in general. The nearest known sites to the study area are findspots including a palaeolithic hand axe found in Rhiwbina, Cardiff (GGAT02751s) and a Mesolithic perforated sandstone hammer found in Graig, Newport (GGAT00031g). Towards the close of the Mesolithic period, but particularly by the beginning of the Neolithic, mass deforestation occurred across much of Wales in response to burgeoning agricultural activity (Brown 1997).

7.5.42. The known Neolithic archaeology across Caerphilly is again poorly understood and, beyond basic generalisations, little can be said of the character of the local landscape at this time. However, it is difficult to imagine that Caerphilly would have avoided deforestation, meaning that the landscape likely comprised rolling open pastures and grassland punctuated by rivers and smaller creeks. The nearest known sites to the study area are a Neolithic polished flint axe head found in Machen, Caerphilly (GGAT01227m) 1.7km to the southeast, and two further axes found in Rudry, Caerphilly (GGAT00722m and GGAT00723m) 5km to the south.

7.5.43. The known archaeological evidence relating to the Bronze Age in southern Caerphilly is much better understood. The period is characterised in the archaeological record by funerary monuments, including barrows and barrow cemeteries, sited on highly visible upland ridge-top locations. The mountain range of Mynydd y Grug, which straddles the Rhymney Valley to the west and Sirhowy Valley to the east, features a particularly dense cluster of Bronze Age funerary monuments, five of which will be impacted by the Proposed Scheme.

7.5.44. Along the crest of Mynydd y Grug at least six barrow sites, including Twyn Cae-Hugh Round Barrow (SAMMm033) and the two Twyn-yr-Oerfel Round Barrows (SAMMm070), as detailed above, along with the Pont Bren Gwyn Ring (GGAT06003m) and the two Maesycymmer Cairns (GGAT00685m; GGAT00686m). Towards the western hillslopes of Mynydd y Grug are a further funerary sites, including the Mynydd Bach Cairn Cemetery (SAMMm196) and Pen y Rhiw Round Barrow (SAMMm149). The present ridgeway forestry track almost certainly represents a prehistoric communication route that can be traced all the way to the head of the valley and forms the parish boundary within the study area. The siting of Bronze Age funerary monuments along ridgetop locations is a very common occurrence in South Wales and the examples just mentioned form part of a far wider cluster across Caerphilly. For example, on Gelligaer Common to the north, situated towards the western slopes of the Rhymney Valley, is another profuse collection of barrows (Evans and Lewis 2003, 25). Other collections of such monuments are also known to partly encircle and overlook Senghenydd to the west and Cwmfelinfach to the east. Most Bronze Age funerary sites in the region are yet to witness intensive investigation, and determining their precise form and character remains difficult.

7.5.45. The Iron Age archaeology within the southern Caerphilly region is again sparse and no sites dating to this period are known within the vicinity of the Proposed Scheme. Across the entirety of Caerphilly, only two prominent Iron Age sites are known, both of which comprise hillforts, including Twm Barlwm near Risca (GGAT00114g) and Craig Ruperra near Rudry (GGAT01672). Prior to the

Roman invasion of Britain in 43 AD, the Silures tribe are understood to have inhabited the area of Caerphilly and Southeast Wales more broadly.

Roman and Early Medieval

7.5.46. There are no known Roman sites within the vicinity of the Proposed Scheme.

7.5.47. In 43 AD, the Roman army invaded Britain under the orders of Emperor Claudius, who sent at least four legions and many auxiliary units to the east coast of the island under the command of Aulus Plautius. Following this, Vespasian led a westward campaign towards the Severn Estuary and Wales, capturing settlements and strongholds along the way. By 49 AD, the Roman military had gained a significant presence across much of South Wales, leading to the establishment of forts at Usk and Cardiff in the 50s AD. During the following decades, further stretches of the Welsh landscape began to fall to Roman control and by 74–8 AD, an auxiliary fort had been established to the north of the Proposed Scheme at Gelligaer (SAMGm016). Initially, the fort was of timber construction. Later, the fort witnessed significant refurbishment (Pearson 2002, 19–22), before being rebuilt in stone in by 103–11 AD during the reign of Trajan. To the south of the Proposed Scheme, another auxiliary fort was established at Caerphilly (GGAT00697m), which was occupied between the first and second centuries AD. To link forts like these together, as well as other smaller military outposts, a network of roads was constructed across South Wales. Both forts at Gelligaer and Caerphilly were connected to the Cardiff–Castell Collen Road (RR621), which also led to the forts at Penydarren and Castell Collen (Margary 1967, 336–8; Burnham and Davies 2010, 325–6). Moreover, the fort at Caerphilly was potentially connected to road that ran between the forts at Cardiff and Caerleon (RR60b), the course of which was propose by Boon (1972, 16). Little is known of the course that this road took, however it has been suggested by Sherman and Evans (2004, 48), that a stretch of trackway discovered south of Bedwas (GGAT02892.0m) may comprise part of the Roman road, suggesting an E/W trajectory through Bassaleg. A Roman lead mine is recorded at Cefn Pwll-Du (GGAT00719m) and a Roman metalworking site was recorded at Lower Machen (00023g), which together represent important evidence of industrial activity in the period.

7.5.48. The year 410 AD marked the end of Roman occupation in Britain, which brought with it a cessation in centralised governance across the country. As a result, occupation patterns became fragmented, and the large urban settlements of the Roman period were abandoned in favour of small rural farmsteads. Little is known of Caerphilly during this Early-Medieval period. However, to the southwest of the study area, beyond the Aber Valley, are the remains of the Senghenydd Dyke (GGAT04736m), which comprises a linear earthwork that extended along Mynydd Eglwysilan and Mynydd Meio. Originally, it is thought that the dyke served as the boundary of the Early Medieval cantref of Senghenydd. However, the dyke was later used to define a Norman deer park. Today, the dyke survives intermittently due to the presence of later field boundaries and tracks (Lewis 2006, 58). In the period immediately following the Roman withdrawal from Wales, the area of Caerphilly fell under the jurisdiction of the Kingdom of Glywysing, founded in the late 5th century. By at least the middle of the 10th century, Glywysing was incorporated into the larger Kingdom of Morgannwg.

Medieval

7.5.49. There are no Medieval sites within the study area of the Proposed Scheme.

7.5.50. During the mid–late 11th century, Wales was invaded by Norman forces. By 1081, the Kingdom of Gwent, which bordered Morgannwg to the east, was conquered and subsequently fell under Norman control and divided into distinct Marcher Lordships. Shortly afterwards, the Kingdom of Morgannwg

was conquered by the forces of Robert Fitzhamon, who served as first Lord Glamorgan. Fitzhamon at this time was likely the most powerful of all the Marcher Lords and his rule was described by some as '*sicut regale*' ('like a king') (Clarke 1883, 3).

7.5.51. Throughout the Medieval period, the region of southern Caerphilly possessed a largely rural character punctuated by ecclesiastical sites and small-scale industry. By the beginning of the 12th century, the area of Bedwas constituted an important centre of Christian worship, as the Church of St Barrwg (LB13542) was established on its northern edge in 1102. The history of the church remains vague, and both the church and churchyard witnessed significant alterations, particularly throughout the 13th and 14th centuries. The saint to which the church is dedicated – St Barrwg, more commonly known as St Baruc – a Christian hermit who is thought to have resided on what is now Barry Island. To the east of the church, a fulling mill (GGAT01678m) was constructed sometime prior to the beginning of the 15th century, which was powered by waters drawn from the Rhymney River. Few medieval sites or features are known in nearby Trethomas. To the north of the Proposed Scheme, at Mynyddislwyn, is the site of a medieval holy well, known as Ffynnon y Gwaed (or 'Well of Blood'). The well was recorded by Jones, who classified it as an E Type well, meaning it belonged to a group of 'miscellaneous wells which possess a name of possible significance, or concerning which legends and traditions have survived' (1954, 196).

7.5.52. Beyond Bedwas and Trethomas to the south, on the southern outskirts of the Rhymney Valley, the most prominent medieval site within the wider area is Caerphilly Castle (SAMGm002; LB13539). The history and architecture of the castle has undergone intensive study throughout the past couple of centuries (see Clarke 1850, 251–304; Rees 1937; Whittle 1992, 134–8; Newman 1995, 166–79 etc.) and the building itself is relatively well understood today. The castle was constructed in the late 13th century by Gilbert de Clare, the Lord of Glamorgan. The purpose for its construction was to protect the Lordship of Glamorgan from local Welsh rebels. Yet the castle was also intended to quell potential rebellions through intimidation, as it represents an imposing presence in the landscape and, behind Windsor Castle, was the second largest defensive structure in the country.

Post-medieval

7.5.53. During the two or three centuries following the close of the Medieval period, the populations of the county of Caerphilly, on the most part, remained tied to a Medieval mode of living. Between the 16th and 18th centuries, and on through to the first half of the 19th century, dispersed farmsteads and open grassland endured as dominant features of the landscape. However, alterations to the landscape during this time included the appearance of coal extraction and ironworking.

7.5.54. Early coal extraction was rather crude in character and small in scale, particularly when compared to later mining methods, and mainly involved picking at surface outcrops or isolated excavations into sub-surface seams, in the form of, for example, bell pits (see Griffin 1971, 1–10). It is recorded that charters enabling the digging of coal pits were issued across Caerphilly as early as the 14th century, particularly in Rudry, which were being let to individual clients (Chapell 1939, 69). Ironworking during this period was, again, relatively diminutive when compared to that of the 18th and 19th centuries, although some significant smelting sites began appearing from the late 17th century. Penyrheol, on the west edge of the town of Caerphilly, was particularly important in this regard, as a sizeable blast furnace was constructed here in 1680 (SAMGm503). Initially, the furnace was charcoal powered and was used to supply forges at Machen and Tredegar Park with pig iron. By 1787, the furnace was rebuilt and incorporated into a larger ironworks. This later furnace was in use until the 1820s and was powered by coke, which was produced on site from local bituminous coal. When compared to

the counties of Merthyr Tydfil to the west, as well as Gwent and Torfaen to the east, the industrial significance of Caerphilly during the late 18th century, both within the context of iron and coal, were relatively limited. Yet the ironworks at Penyrheol served as an industrial centre in Caerphilly and its smelting operations, which drew in ore, coal, and limestone, significantly increased the industrial fortunes of the county.

7.5.55. From the middle of the 19th century onwards, the industrial landscape of Caerphilly slowly began to be dominated by coal extraction. The Gelli-deg Colliery (GGAT09445g) was opened on the northern slopes of Mynydd y Grug in 1855, but was relatively short-lived and closed in 1875. Shortly afterwards, the Bryn Gwyn Colliery (GGAT02046m) was sunk at Pandy Mawr, west of Bedwas, and was producing coal by 1875. During the 19th century, Bryn Gwyn represented the most significant coal extraction site in the local area. The colliery took around a decade to sink as it was plagued by flooding issues, which continued throughout the use of the colliery. In response, a Cornish type engine house was erected in around 1863 (SAMGm440; LB21311) that housed an inverted Cornish engine with a 60-inch beam (Bick 1989, 86). The engine house still stands today and is three storeys in height and has a square shaped footprint. However, by the end of the 19th century, efforts to drain the colliery proved unsuccessful, and on 8th June 1868 the entire workforce downed their tools due to severe ingress at pit bottom. By April 1894, the colliery had re-opened, although at this time only seven workers were employed, who were performing limited coal extractions from the Maesmawr seam. By around 1903, Bryn Gwyn Colliery had been permanently abandoned.

7.5.56. In 1892 the Wentloog Colliery (GGAT07351g) was opened by the Wentlooge Coal Company, which re-opened an 80 year old level known as 'Edward's Level' located on the north facing slope of Mynydd y Grug. It continued to operate until at least 1923 and went up for sale in 1924, but its closure date is unclear. Also known as Yr-Ocher-With/ Ochrwyth Colliery, the Wentloog Colliery consisted of two levels, which were both connected to the Ynysddu Brickworks by a long, shallow incline and tramway that survives as the present forestry track (industrialgwent.co.uk Accessed 11/12/23). Archaeological remains survive within forestry plantation including levels, spoil tips, the course of the tramway and the foundations of the winding engine house. Further 19th century collieries in the Trethomas area include Cwm-y-glo Colliery opened in 1865 and Diamond Llantwit Colliery opened in 1884.

7.5.57. Despite having a major ironworks situated within its confines, the southern region of Caerphilly was bypassed by both the Glamorganshire Canal to the west and the Monmouthshire Canal, the main lines of which were opened in 1794 and 1796 respectively. In this respect, the industrial development of the region was relatively slow, as it was unconnected to, and was therefore unable to exploit, the major haulage routes of the late 18th and early 19th century. Yet this began to change in the mid-1820s, when the Rumney Railway was opened, which at this time was one of the longest horse-drawn lines in Wales. In the absence of canals, the Rumney Railway served as a vital artery for the region, which allowed direct haulage from the Caerphilly area towards the ports in the south. Indeed, unlike most other rail lines in the region, the Rumney Railway bypassed the Monmouthshire Canal, as it ran from Rhymney in the north towards Pye Corner in the south, where it formed a junction with the Monmouthshire Canal Company's rail line. Like the latter rail line, the Rumney Railway was of plateway design. It has been suggested that, by 1836, the line incorporated combined rails of both plateway and edgeway form, although this idea is tentative (van Laun 2001, 26). Construction of the railway was funded largely by public subscription, with shares being floated on the stock exchange at £100 each (Priestley 1831, 551), the equivalent of around £5,743 today.

7.5.58. The Rumney Railway is of significance to the Proposed Scheme, as on its way to Pye Corner it ran along the northern fringes of Bedwas and Trethomas. In the 1840s, steam locomotives began to be introduced wholesale on the Rumney Railway, which were specifically designed to run on plateways. Many of the locomotives pulled passenger trains. In 1858, an additional rail line was opened in the county of Caerphilly, which ran perpendicular to the Rumney Railway. This new rail line ran from Taffs Well in the south to Ystrad in the north via the town centre of Caerphilly in between. Following the Rumney and Brecon and Merthyr Railways Act 1863, the Rumney Railway was incorporated into the Brecon and Merthyr Railway. As a result, the entire line was reconstructed as an edged standard gauge railway. By 1871, the Taffs Well–Ystrad line was also closed and was incorporated into the Rhymney Railway (not to be confused with the Rumney Railway), which opened that same year. In the centre of Caerphilly, a new train station was constructed to serve the Rhymney Railway. Initially, the Caerphilly branch of the railway was intended as a mixed traffic line, although it remained good-only, with passenger services running southward from the Bargoed line (Hodge and Caston 2022, 19). The main line of the later Rhymney Railway re-used much of the older Rumney Railway line, although instead of extending towards Pye Corner at its southern limits, it instead ran to the docks at Cardiff.

7.5.59. Throughout the Post-medieval period, the area of Bedwas was divided into two communities. These communities comprised one to the north of Mynydd y Grug, known as Upper Bedwas, and one to the south of Mynydd y Grug, known as Lower Bedwas. The former community is not to be confused with the present-day village of Maesycwmmer, near Ystrad Mynach, which was also historically known as Upper Bedwas. While both the upper and lower communities were dominated by agricultural activity and possessed highly rural economies, by the mid–late 19th century, this situation began to change. During this time, Lower Bedwas began benefiting from the economic advantages of the collieries south of Mynydd y Grug. As a result, the community witnessed some degrees of expansion. Upper Bedwas, on the other hand, remained mostly rural.

Modern

7.5.60. After the closure of Bryn Gwyn Colliery in around 1903, coal extraction activities continued across the local area in profusion. To the northeast of Mynydd y Grug, in the Sirhowy Valley, Wyllie Colliery was sunk in 1924 by the Tredegar Iron and Coal Company. Sinking operations took around two years to complete and the colliery was opened in 1926. The colliery was notable in Southeast Wales for making use of the most advanced mining technology of the time, including mechanical boring, shearing, and cutting machines and conveyor belts. In this respect, the colliery served as a steppingstone away from the manual style of longwall mining, which was laborious and time consuming, towards the rapid style of longwall extraction that defines much of underground coal mining today. It has been recorded that the colliery was sunk to a depth of 575 yards (526m) and extracted anthracite (Bradley 1927, 16). By 1938, the colliery was employing 830 men and boys, which had decreased to 729 by 1945. By 1968, the colliery had been closed.

7.5.61. The Bedwas Navigation Colliery was established on a site adjacent to Ty'n-y-wern in 1909, strategically placed alongside the Brecon and Merthyr Railway. The colliery was sunk by the Bedwas Colliery Company who had leased 1,475 acres of land for this purpose. The leading partner of the Bedwas Colliery Company was W.J. Thomas, whose served as the main financial contributor towards the lease agreement, after inheriting a small fortune from his family's coal enterprise in the Rhondda Valleys (Griffiths 2010, 245). A pair of shafts were sunk to the 768 yards (702m) and 802 yards (733m) towards the Lower Black Vein seam – the deepest coal measure in the Caerphilly

area. However, the colliery also exploited those measures situated above the Black Vein seam, which include the Black Vein and Mynyddislwyn seams. The cages within the shafts were double-decked, to increase efficiency, which was a unique feature in Welsh coal mining at the time. By 1912, the colliery was producing its first loads of coal. Within only a few weeks of opening, a major incident had already occurred at the colliery, on 27th March 1912, when a spark caused by signalling equipment ignited fire damp, leading to an explosion that injured twelve workers, three of which later died. A further two workers died during a separate incident in 1914, when the roof supports of a heading collapsed at pit bottom. By 1918, it is recorded that 1,263 men and boys were being employed by the colliery, which had increased to 2,578 in 1923, making Bedwas Navigation Colliery the largest coal extraction site in the Mynydd y Grug area. During the early 1920s, the colliery was producing roughly 500,000 tons of steam coal per year derived from the Rock, Black Vein, and Lower Black Vein seams. By the beginning of the Second World War (WWII), annual coal production had increased significantly, to around 675,000 tons, which was extracted by a workforce numbering 1,850 men and boys. Yet towards the close of WWII, in 1945, the total workforce had decreased to 1,823. By 1947, like all other collieries across Britain, Bedwas Navigation Colliery was taken into state ownership and was run by the National Coal Board (NCB). The colliery sustained yet another major incident on 10 October 1952, when an explosion occurred at pit bottom, caused by safety lamp igniting firedamp, killed the colliery deputy and severely injured 19 other workers. During the late 1950s, a refurbishment programme worth £4,000,000 was carried out at the colliery, which was financed and organised by the NCB. The programme involved, amongst other things, the establishment of subterranean locomotive railways, the construction of coal treatment works at the surface, and the electrification of the winding gear.

7.5.62. By the 1970s, the productivity and workforce of the colliery had decreased drastically. By this time, the colliery was producing around 230,000 tons of coal per year and was employing 653 workers. The financial fortunes of the colliery decreased further throughout the remainder of the decade and into the early 1980s. In 1984, the NCB agreed terms with Thatcher's Conservative government that a widespread programme of pit closure was to be enacted. In response, the National Union of Mineworkers (NUM) voted for nationwide industrial action, which primarily took the form of strikes. These strikes lasted a year, and the South Wales Valleys represented a hub for striking miners, whose communities faced existential crises because of pit closures. Across South Wales, support groups were also established by women, where food distributions were organised to those families who had no income due to the strikes (Leeworthy 2012, 835). Indeed, areas such as Bedwas, whose local economies were almost wholly dependent on coal production, were particularly vulnerable. Ultimately, Bedwas Navigation Colliery failed to survive the programme of pit closures, and by the end of the miners' strike in 1985, the colliery had shut its doors for good. The colliery was subject to a vast reorganisation in the late 1950s which included electrification of the winding gear, after which it continued in operation until the 1984/5 miner's strike when it closed permanently (*ibid*). The Bedwas Navigation Colliery site is now demolished and the tips have been reprofiled.

7.5.63. The colliery was to have a significant impact on the landscape with the construction of the planned mining settlement of Thomastown and the significant and rapid tipping of colliery waste on the slope of Mynydd y Grug. The 1915 Ordnance Survey map records the primary established at a quarry site west of Ty Canol, accessed via a north/ south aligned incline tramway from the colliery. Today this location forms the centre of the Lower Tip. By 1948 the tip had vastly expanded and a secondary tip had been established north of the first on former common land, accessed via a second incline tramway.

7.6 PRELIMINARY IMPACT ASSESSMENT

7.6.1. The potential direct (physical) and indirect (visual) impact of the Proposed Scheme on heritage assets has been assessed according to the design information provided by ERI. An assessment has also been made of the potential impact to the setting and significance of Value A statutory designated sites within a 3km radius. The full impact assessment is provided in Appendix IV.

IDENTIFIED HERITAGE ASSETS

Within the Development Area

7.6.2. The assessment has identified that there three known heritage assets and one new heritage asset within the boundary of the Proposed Scheme.

7.6.3. Mynydd y Grug Field Enclosure (HA1) is a parcel of land on a steep north-facing slope that is recorded on the 1841 tithe map (V3-S07/0002), which will be utilised by the Proposed Scheme for the processing plant and coal stack yard. This land has recently (post 1964) been subject to intensive forestry plantation but the field visit revealed that this has now been felled. The southwest boundary of the enclosure is a high drystone wall, severely damaged in places, that bounds the forestry path and is the same form and character as all extant field boundaries on the mountain and is representative of the pre-industrial fieldscape. No features or structures were visible within the land parcel, which would almost certainly have been destroyed by the forestry plantation.

7.6.4. Ditch and Bank/ Pound (HA2) is a square-shaped enclosure located on the common immediately opposite Twyn Cae Hugh Round Barrow (HA6) adjacent to the forestry track. The date of the feature is not known and it is not recorded on historic Ordnance Survey maps, although it is visible on the earliest 1958 aerial photograph and the embankments remain well preserved today. The feature is sited in the location of the proposed deposition area, although the proposed design has been altered to ensure preservation of the site.

7.6.5. The Bedwas Navigation Colliery Tips (HA4), which are the subject of the Proposed Scheme are heritage assets in their own right and are a prominent key element of the industrial landscape. The Lower Tip (Tip 1) will be completely removed by the Scheme and the Upper Tip (Tip 2) will be processed, redeposited and reprofiled.

7.6.6. Mynydd y Grug Common (HA5) is an area of historic common land that is recorded as such on the 1841 tithe map (V3-S07/0002). A large section of the common was lost to the Bedwas Navigation Colliery Upper Tip (Tip 2) in the 1950s, but the surviving common has retained its character and footprint, and is separated from agricultural land by high, well-preserved drystone walls. In consideration of the numerous Bronze Age monuments in the vicinity (described below), it is not unlikely that there are further buried archaeological features on the common. Almost all of the remaining common will be adopted for the Proposed Scheme by the proposed deposition area.

7.6.7. Concrete footing (HA48) is located within the footprint of the proposed haul road adjacent to Twyn Cae Hugh Round Barrow (HA6).

Within the Primary (250m radius) Study Area

7.6.8. There are a total of seven Bronze Age round barrows or cairns and a cairn cemetery located within 250m of the Proposed Scheme, of which five are Scheduled Monuments making Mynydd y Grug a significant Bronze Age funerary landscape. Twyn Cae Hugh Round Barrow (HA6) is located immediately adjacent to the Proposed Scheme and is bordered by the site boundary. Presently the

barrow is tucked between a modern barbed wire fence boundary and a substantial gate/ cattlegrid structure, despite which there is evidence of recent trail bike activity on the monument. The barrow will be immediately adjacent to the proposed haul road turning point to the southeast and deposition site to the southwest. Two of the round barrows Twyn-yr-Oerfel Western Round Barrow (HA7) and Twyn-yr-Oerfel Eastern Round Barrow (HA8) are located to the east of the Proposed Scheme, with the westernmost being in relatively close proximity (140m) to the Upper Tip (Tip 2) and just 33m from the boundary of the Proposed Scheme. The remainder of these sites (HA9-HA13) are concentrated on agricultural land to the northwest of the common and will have some intervisibility with the new Proposed Deposition Area.

7.6.9. There are four Post-medieval farmsteads (HA15-HA18) located within 250m of the haul road, the remains of a stone barn (HA19) located just south of the Upper Tip (Tip 2) and a Drystone Structure (HA3) within forestry beyond the northeastern boundary of the processing plant area. These sites are representative of the pre-industrial agricultural landscape.

7.6.10. There are two sites linked to the Bedwas Navigation Colliery including the site of the colliery itself (HA20) and the Bedwas Coking Ovens (HA21). Both sites are located to the south of the Proposed Scheme, although both are now destroyed. There are ten sites in the vicinity of the Proposed Haul Road that are linked to the Wentloog Colliery (HA22-HA29, HA31-HA33) located at Graig Goch, and a further site, the Penllwyn Tramroad Bridge (HA30), which crosses the Sirhowy River at Nine Mile Point.

Within the Secondary (3km radius) Study Area

7.6.11. Statutory designated Value A sites within 3km include the Grade II* Listed St Barrwg's Church (HA35) and Scheduled Monument St Barrwg's Churchyard Cross (HA34), and Bryn Gwyn Colliery Engine House (HA36) located in Bedwas to the south of the Proposed Scheme, and a further ten peripheral Scheduled Monuments as listed in the table below.

Table 7-9 - Summary of identified heritage assets

HA ID	ID	Name	NGR	Value
Within Development				
1	GGAT00086g; NMR220388	Mynydd y Grug Field Enclosure	ST17839088	C
2	GGAT00683m; NMR225581	Ditch and Bank/Pound	ST17339151	C
4	New 1	Bedwas Navigation Colliery Tips	ST1784589772	C
5	New 2	Mynydd y Grug Common Land	ST1708991488	C
48	New 3	Concrete footing	ST1739491482	C
51	New 6	Pit	ST1734491503	C

HA ID	ID	Name	NGR	Value
Within Primary Study Area (250m)				
6	SMMm033; GGAT00079g; NMR94868	Twyn Cae-Hugh Round Barrow	ST1738991516	A
7	SMMm070; GGAT00084g	Twyn yr Oerfel Western Round Barrow	ST1811090704	A
8	SMMm070; GGAT00085g; NMR94882	Twyn yr Oerfel Eastern Round Barrow	ST1840190602	A
9	GGAT06002m; NMR91995	Pont Bren Gwyn Ring Cairn	ST1708191945	A
10	SMMm149; GGAT00684m	Pen-y-rhiw Round Cairn	ST1678991977	A
11	SMMm196; GGAT00687m; NMR95241	Maesycymmer Cairnfield	ST1679892009	A
12	NMR93467	Mynydd Bach Cairn II	ST1678091960	A
13	NMR91994	Mynydd Bach Round Barrow	ST1678091810	A
14	NMR10925	Glyn Baptist Chapel (erroneous spot data)	ST1797290987	D
15	GGAT07111g	Ty'n-y-waun	ST1796791152	C
16	NPRN424050	Ty'n y Ffynnon	ST2069990892	C
17	NMR424057	Pant y Cyfrwy	ST2004090348	C
18	GGAT07837g-GGAT07844g	Warren House (group)	ST2044990670	C
19	GGAT07074m	Stone Barn	ST1741690484	C
3	GGAT10035g	Drystone Structure	ST1795090831	C
20	NMR400389	Bedwas Navigation Colliery	ST1777089430	D
21	NMR710336	Bedwas Coke Ovens	ST1803189336	D
22	GGAT07351g	Wentloog Colliery	ST1858590873	C
23	GGAT07194g	Ynysddu Coal Level	ST1860190850	C
24	GGAT07196g	Wentloog Colliery Tramway I	ST1861490871	D
25	GGAT07192g	Ynysddu Electricity Pylon	ST1861890893	C
26	GGAT07195g	Wentloog Colliery Engine House	ST1870390850	C
27	GGAT09499g	Wentloog Colliery Coal Level	ST18739098	D

HA ID	ID	Name	NGR	Value
28	GGAT07197g	Ynysddu Flat Platforms	ST1825490916	C
29	GGAT07349g	Ynysddu Quarry	ST1787891028	C
30	NMR34987; GGAT03699g; LB22314	Penllwyn Tramroad: Nine Mile Point Bridge, Wattsville	ST20359108	B
31	GGAT07513	Structure, Ynysddu, Caerphilly	ST1791091251	C
32	GGAT07193g	Possible Collapsed Level, Ynysddu	ST1851890879	C
33	GGAT07352	Water Tank, Ynysddu	ST2012390818	C
49	New 4	Quarry	ST1827990589	D
50	New 5	Aerial ropeway winding house foundation	ST1825090601	C
Within Secondary Study Area (3km) Value A Sites				
34	SMMm143; LB21304; GGAT00705m	St Barrwg's Churchyard Cross	ST1710989190	A
35	LB13542; GGAT01168m; GGAT01937m; NMR13072	St Barrwg's Church (Grade II*)	ST17108920	B
36	SMGM440	Cornish Type Engine House, Bryngwyn Colliery	ST1620589291	A
37	SMGM218	Gwern-y-Domen Castle Mound	ST1750187871	A
38	SMGM516	Machen Forge and Tinplate Works	ST2034688873	A
39	SMGM357	Rudry Ironworks	ST1957688240	A
40	SMGM002	Caerphilly Castle	ST1548387098	A
41	SMMM337	House Platforms to W of Mynydd Machen	ST2219090091	A
42	SMMM071	Begwns Round Barrow, Mynydd Machen	ST2237690010	A
43	SMMM186	Castell Meredydd	ST2254288739	A
44	SMMM044	Twm-Barlwm Mound and Bailey Castle	ST2422292610	A
45	SMMM259	Former Dam of Cwmcarn Canal Reservoir	ST2224393536	A
46	SMGM051	Bryn Owen Farm Cairns, Llanfabon	ST1438290810	A

HA ID	ID	Name	NGR	Value
47	SMMM035	Twyn Tudor	ST1933593814	A

ASSESSMENT OF DIRECT (PHYSICAL) IMPACT

7.6.12. The assessment identified that a total of five sites are subject to potential direct impacts caused by the Proposed Scheme.

7.6.13. Mynydd y Grug Field Enclosure (HA1), which is located on a steep north-facing slope, will be utilised by the Proposed Scheme for the location of the processing plant, coal stock yard, haul road and bund, welfare facilities, weighbridge and weighbridge office. The field survey revealed that the drystone wall of this enclosure, which runs parallel with the present forestry track, survives in a damaged condition. It was noted that any structures or features within the enclosure have been destroyed by forestry plantation and/ or subsequent felling activity. The Proposed Scheme will require demolition of parts of the wall and there is a risk of damage to the wall as a whole during the works. Without mitigation the site will be subject to a major adverse direct impact of slight significance.

7.6.14. Ditch and Bank/ Pound (HA2) is sited in the location of the proposed deposition area, although the proposed design has been altered to ensure the preservation of the site. The assessment has concluded that despite this, without protective mitigation the site may be subject to a major adverse direct impact of moderate significance due to the risk of damage during the Proposed Scheme.

7.6.15. The Bedwas Navigation Colliery Tips (HA4) will be processed, redeposited and reprofiled. The Lower Tip (Tip 1) will be completely removed by the Proposed Scheme. This therefore will cause a major adverse impact of moderate significance for the heritage asset, although it is recognised that the overall impact of the Scheme as a whole will be beneficial and represents an opportunity for reinstatement of the pre-industrial fieldscape in the location of the Lower Tip (Tip 1). The Upper Tip (Tip 2) will be processed and reprofiled, which during the operational phase of the scheme will be a major adverse impact of moderate significance. However, following completion it is considered that the reprofiled tip will retain a similar character to present resulting in an overall minor adverse direct impact of slight significance. The relocation of tip material from the slope to the summit of Mynydd y Grug will change the material form and character of the industrial landscape of Bedwas as a whole, which has been assessed as an overall minor adverse direct impact of moderate significance, although again it is recognised that the overall impact of the Proposed Scheme as a whole will be beneficial.

7.6.16. Mynydd y Grug Common (HA5) will be almost entirely occupied by the proposed deposition area and will therefore be subject to almost total loss resulting in a high adverse direct impact of moderate significance. This assessment includes the direct impact to potential unknown buried archaeology located on the common. Field boundaries in the form of high drystone walls define the boundary of the common and are at risk of direct physical impacts due to the tipping of spoil and the use of heavy plant. An example of this is evident immediately to the south of the Upper Tip (Tip 2) where spoil has banked up behind the pre-existing field boundary wall. Without protective mitigation these dry stone walls are at risk of total loss resulting in a potential major adverse direct impact of slight significance.

7.6.17. Concrete base (HA48) is likely to suffer total or partial loss due to haulage vehicle traffic. This has been assessed as a major adverse impact of slight significance.

7.6.18. Scheduled Monument Twyn Cae Hugh Round Barrow (HA6) falls outside the red line boundary of the Proposed Scheme but remains at risk of potential direct physical impacts. The curtilage of the Scheduled Monument respects the present forestry tracks which will be used as a haulage route during the works meaning that there is no available buffer area. The assessment has concluded that without mitigation there is potential for the Scheduled Monument to suffer a minor adverse direct impact of moderate significance caused by damage to buried deposits within five metres of the curtilage of the monument caused by a high level of haulage vehicle traffic.

Table 7-10 - Summary of Direct (Physical) Impact

Receptor and sensitivity	Impact and resulting Effect	Magnitude	Significance
Mynydd y Grug Field Boundary (HA1) C	Direct (physical) impact from proposed processing plant, coal stock yard, haul road and bund, welfare facilities, weighbridge and weighbridge office causing loss of integrity to drystone wall boundary.	Major Adverse	Slight
Ditch and Bank/ Pound (HA2) C	Direct (physical) impact from proposed deposition area causing loss of integrity to heritage asset.	Major Adverse	Moderate
Bedwas Navigation Colliery Tips (HA4) C	Direct (physical) impact from processing redepositing and reprofiling/ removal causing total loss of integrity to Lower Tip (Tip 1).	Major Adverse	Moderate
	Direct (physical) impact from processing redepositing and reprofiling/ removal causing loss of integrity to Upper Tip (Tip 2).	Major Adverse	Moderate
	Direct (physical) impact from relocation of tip material from the slope to the summit of Mynydd y Grug will change the material form and character of Bedwas Tips industrial landscape as a whole.	Minor Adverse	Moderate
Mynydd y Grug Common including field boundaries (HA5) C	Direct (physical) impact from proposed deposition area causing total loss of integrity to heritage asset.	Major Adverse	Moderate
	Direct (physical) impact from proposed deposition area causing loss of integrity to dry stone wall field boundaries.	Major Adverse	Slight
Concrete base (HA48) C	Direct (physical) impact from proposed haul road causing potential loss of integrity to heritage asset.	Major Adverse	Slight
Twyn Cae Hugh Round Barrow (HA6) A	Direct (physical) impact from proposed deposition area causing loss of integrity to heritage asset.	Minor Adverse	Moderate

ASSESSMENT OF INDIRECT (VISUAL) IMPACT

7.6.19. For the purposes of the assessment of the potential indirect visual impacts of the Proposed Scheme, the assessment considered all heritage assets within a 250m buffer area and all Statutory Designated Value A sites within a 3km study area. The assessment has concluded that the Proposed Scheme has potential to have an indirect visual impact on a total of thirteen heritage assets.

7.6.20. Within the boundary of the Proposed Scheme, there will be a Considerable visual impact on Mynydd y Grug field boundary (HA1) since the scheme will cause material changes to the site that will be significantly visible during the operational phase of the Proposed Scheme. That said, it is acknowledged that the site was until recently under forestry, which has itself caused severance with the surrounding pre-industrial fieldscape, of which this site is a part.

7.6.21. The visual impact upon ditch and bank enclosure/ pound (HA2) will be Severe as the creation of the Proposed Deposition Area will entirely change the setting of the site and will obscure views towards the southwest and west.

7.6.22. The visual impact on Bedwas Navigation Colliery Tips (HA4) is difficult to quantify but has been assessed as Considerable; the Proposed Scheme will significantly alter the heritage asset and will completely remove visual links between the Upper and Lower tips, however new visual links will be created with the proposed new tip resulting in some continuation. That said, with the tips re-profiled and seeded for pasture, their dominance in the landscape will be reduced, representing a significant change in the industrial landscape of Bedwas.

7.6.23. The visual impact on Mynydd y Grug Common (HA5) will be Very Severe since the Proposed Deposition Area will adopt almost the entire common and therefore dominate and obscure all visual links to and from the surrounding landscape.

7.6.24. Within the 250m study area, the visual impact on Scheduled Monument Twyn Cae Hugh Round Barrow (HA6) has been assessed as Very Severe, since the Proposed Deposition Area will dominate and obscure all views to the south and west. That said, it is noted that the setting of the round barrow is already compromised by modern encroachment to the north and east in the form of forestry and fencing. It has been assessed that there is a potential Very Slight visual impact to Twyn yr Oerfel Western Round Barrow (HA7) as the Proposed Scheme is within visibility of the monument, however it is recognised that its upland setting is already compromised by the presence of Upper Tip (Tip 2, HA4). In addition, the Bronze Age monuments located to the northwest of the Proposed Scheme (HA9-HA13) have all been assessed as being subject to a potential Slight visual impact since whilst the Proposed Deposition Area will be visible, the key views from these monuments is towards the southwest and the intervisibility with other Bronze Age monuments is already impacted by the present tip.

7.6.25. The sites of Bedwas Navigation Colliery (HA20) and Bedwas Coke Ovens (HA21) have both been destroyed and therefore there will be no indirect visual impact from the Proposed Scheme. However it is noted as above that the reprofiling and seeding of the tips will have an impact on the industrial landscape of Bedwas as a whole.

7.6.26. It is considered that the Proposed Haul Road will not adversely visually impact any of the heritage assets within its vicinity since it is utilising a pre-existing forestry track and the sites are all obscured by forestry trees.

7.6.27. In the wider area, it is possible that the Proposed Scheme may have a Very Slight visual impact on St Barrwg's Church (HA35) but is largely shielded by trees, however there will be no visual impact on St Barrwg's Churchyard Cross (HA34). Caerphilly Castle (HA40) and the Proposed Scheme site are intervisible, however the distance between them means that any visual impact on the Scheduled Monument will be Very Slight. There is no intervisibility with any other peripheral Value A sites due to topography and/ or tree cover.

Table 7-11 - Summary of Indirect (Visual) Impact

Receptor ID and sensitivity	Impact and resulting Effect	Magnitude
Mynydd y Grug Field Boundary (HA1) C	Visual impact resulting in varying degrees of change and severance of cultural links	Considerable
Ditch and Bank/ Pound (HA2) C	Visual impact resulting in varying degrees of change and severance of cultural links	Severe
Bedwas Navigation Colliery Tips (HA4) C	Visual impact resulting in varying degrees of change and severance of cultural links	Considerable
Mynydd y Grug Common including field boundaries (HA5) C	Visual impact resulting in varying degrees of change and severance of cultural links	Very Severe
Twyn Cae Hugh Round Barrow (HA6) A	Visual impact resulting in varying degrees of change and severance of cultural links	Very Severe
Twyn yr Oerfel Western Round Barrow (HA7) A	Visual impact resulting in varying degrees of change and severance of cultural links	Very Slight
Pont Bren Gwyn Ring Cairn (HA9) A	Visual impact resulting in varying degrees of change and severance of cultural links	Slight
Pen-y-rhiw Round Cairn (HA10) A	Visual impact resulting in varying degrees of change and severance of cultural links	Slight
Maesycymmer Cairnfield (HA11) A	Visual impact resulting in varying degrees of change and severance of cultural links	Slight

Receptor ID and sensitivity	Impact and resulting Effect	Magnitude
Mynydd Bach Round Barrow (HA12) A	Visual impact resulting in varying degrees of change and severance of cultural links	Slight
Mynydd Bach Cairn II (HA13) A	Visual impact resulting in varying degrees of change and severance of cultural links	Slight
St Barrwg's Church (HA35) B	Visual impact resulting in varying degrees of change and severance of cultural links	Very Slight
Caerphilly Castle (HA40) A	Visual impact resulting in varying degrees of change and severance of cultural links	Very Slight

ASSESSMENT OF IMPACT TO SETTING AND SIGNIFICANCE

7.6.28. The assessment of the potential impact of the Proposed Scheme on the setting and significance of heritage assets is confined to statutory designated sites of International and National Value (Value A* and A class). These include Scheduled Monuments, Registered Landscapes, Parks and Gardens and sometimes Grade I and Grade II* Listed Buildings.

7.6.29. The chapter thus far sets out the context and extent of identified heritage assets, which contribute to Stages 1 (identifying heritage assets) and 2 (defining and analysing their setting) of the Setting and Significance impact assessment. The tables below set out an analysis of the monuments and their settings in relation to the four key values set out in Cadw's Conservation Principles (2011): Evidential value, Historical value, Aesthetic value and Communal value and consider the impact of the Proposed Scheme on those values (Stage 2 and Stage 3 Evaluate potential impact on setting).

7.6.30. The final assessment of setting and significance impact results in a Cumulative Effect, which is the culmination of the assessment of value, degree of change and corresponding effects. This is partly a subjective exercise based on the assessor's experience and knowledge.

7.6.31. A total of four Scheduled Monuments have been identified for setting and significance impact assessment. These are Twyn Cae Hugh Round Barrow (HA6), Twyn yr Oerfel Western Round Barrow (HA7), Pen-y-rhiw Round Cairn (HA10) and Maesycymmer Cairnfield (HA11).

TWYN CAE HUGH ROUND BARROW (HA6)

Table 7-12 - Setting and Significance Impact Assessment: Twyn Cae Hugh Round Barrow (HA6)

	Value	Impact
Evidential Value	**High** The monument comprises the remains of an earth and stone round barrow, which is circular in plan and measures 22m in diameter x 3m high. The monument is in good condition for its class and is well protected from erosion by fencing meaning that its evidential value is relatively high. However, a substantial 7m wide x 1m deep cavity in the crown of the monument is suggestive of historic pillaging or antiquarian investigation, and there are signs of modern damage in the form of trail bike tracks.	**Moderate Adverse** The curtilage of the monument is respected by the present forestry track, or vice versa, which will be used as a haul road for the duration of the Proposed Scheme. As a result, there is no opportunity for a buffer zone around the monument and associated buried features and deposits in the footprint of the haul road are likely to be destroyed by compression by haulage traffic.
Historical Value	**Low** The monument has no known historical or documentary associations and no known antiquarian investigation reports. The place name probably derives from the adjacent forest Coed Hugh. However, the monument forms part of an assemblage of Bronze Age funerary monuments on Mynydd y Grug and therefore has potential to contribute to a narrative of Bronze Age Caerphilly.	**None** The Proposed Scheme will have no impact on the historical value of the monument.
Aesthetic Value	**Moderate** The setting of the monument is compromised and interrupted by modern fencing, gates and forestry tracks, as well as the present Bedwas tips in the distant east view that interrupt intervisibility with the Twyn yr Oerfel barrows to the east. However the monument's key views presently look southwest-wards over the historic common that occupies the broad summit of Mynydd y Grug.	**Major Adverse** The Proposed Deposition Area will occupy almost the entire historic common and will artificially raise the summit of the mountain by ten metres. This will completely sever the monument with its southwesterly views and transform the siting of barrow from its intended summit location to that of a north-facing slope.
Communal Value:	**Moderate** The monument is sited on the Rhymney Valley Ridgeway Footpath and can be viewed as a historic ridgeway landmark. There are braded paths across the adjacent common and the monument falls on the edge of the Sirhowy Valley Country Park to the northeast. The presence of a camper van and park benches on the common indicates that the setting of the monument has an amenity value.	**Moderate Adverse** The operational phase of the Proposed Scheme will presumably the close the footpath for the duration of the works which will eliminate community access to the monument. However the footpath should be reinstated following completion. Despite this, the communal value will be significantly impacted by the loss of the historic common and associated footpaths although the reprofiling and reseeding of the Upper Tip (Tip 2 HA4) may go some way to compensate this.

TWYN YR OERFEL WESTERN ROUND BARROW (HA7)

Table 7-13 - Setting and Significance Impact Assessment: Twyn yr Oerfel Western Round Barrow (HA7)

	Value	Impact
Evidential Value	**High** The monument comprises a pair of earthen, grass covered round barrows occupying the ridge of Mynydd y Grug. The western barrow, which is closest to the site of the Proposed Scheme is circular in plan, measuring 15m in diameter and up to 1.8m high with steep sides. The barrows are in fair condition for their class although there is evidence of trail bike trails and fly tipping, together with heaps of coal tip material and an aerial ropeway ?winding house base in between the two barrows. The curtilage of the western barrow is demarcated by a row of large stone boulders.	**None** The Proposed Scheme will have no impact on the evidential value of the monument.
Historical Value	**Low** The monument has no known historical or documentary associations and no known antiquarian investigation reports. However, the monument forms part of an assemblage of	**None** The Proposed Scheme will have no impact on the historical value of the monument.

	Value	Impact
	Bronze Age funerary monuments on Mynydd y Grug and therefore has potential to contribute to a narrative of Bronze Age Caerphilly.	
Aesthetic Value	**Moderate** The setting of the monument comprises views over a post-medieval agricultural landscape towards the south and a steep valley slope to the north overlooking distant views of the Sirhowy Valley. The setting is already compromised by views to the west of the Bedwas Upper Tip (Tip 2 HA4), situated on former historic common, which interrupts views towards the other Bronze Age barrows on the mountain. The setting is also impacted by modern industrial features in the near vicinity and recent fly tipping activity.	**Minor Beneficial** The Proposed Scheme will have a low impact on the aesthetic value of the monument during operation due to the construction of the proposed haul road immediately to the west and the movement of haulage traffic. However, following completion the Proposed Scheme is likely to have a beneficial impact on the aesthetic value of the monument as the Upper Tip will be processed, reduced, re-profiled and seeded for pasture, thereby returning the habitat to one closer to pre-industrial common pasture than present.
Communal Value:	**Moderate** The monument is sited on the Rhymney Valley Ridgeway Footpath and can be viewed as a historic ridgeway landmark.	**Minor Beneficial** The operational phase of the Proposed Scheme will presumably the close the footpath for the duration of the works which will diminish community access to the monument. The loss of the historic common to the west as a result of the Proposed Deposition Area will have a negative impact, however the reprofiling and reseeding of the Upper Tip (Tip 2 HA4) may go some way to compensate this.

PEN-Y-RHIW ROUND CAIRN (HA10)

Table 7-14 - Setting and Significance Impact Assessment: Pen-y-rhiw Round Cairn (HA10)

	Value	Impact
Evidential Value	**Moderate** The monument comprises the remains a turf covered burial cairn, circular in plan and measuring 13m in diameter x 1m high. It features a square hollow in its centre measuring 1.5m2 x 0.7m deep, within which are two upright slabs, the side slabs of a cist. The monument is directly adjacent to the Maesycymmer Cairnfield (HA11)	**None** The Proposed Scheme will have no impact upon the evidential value of the monument
Historical Value	**Low** The monument has no known historical or documentary associations and no known antiquarian investigation reports. However, the monument forms part of an assemblage of Bronze Age funerary monuments on Mynydd y Grug and therefore has potential to contribute to a narrative of Bronze Age Caerphilly.	**None** The Proposed Scheme will have no impact upon the historical value of the monument
Aesthetic Value	**High** The setting of the monument comprises primary south-facing far reaching views over the Rhymney Valley, with west and north facing views over pre-industrial fieldscape and the historic common beyond.	**Moderate Adverse** The Proposed Scheme will significantly alter the west facing view from the monument, and the Proposed Deposition Area will obscure distant views towards Twyn Cae Hugh Round Barrow (HA6). However it is considered that the scheme is distant enough that the impact will not majorly dominate or obscure the monuments setting, as the key view from the monument is to the south. Mitigation in the form of sensitive landscape profiling may assist in reducing this visual impact and seeding the new tip for upland pasture will also be of benefit.
Communal Value:	**Low** The communal value of the monument is minimal as it is sited within private farmland.	**None** The Proposed Scheme will have no impact upon the communal value of the proposed scheme.

Table 7-15 - Setting and Significance Impact Assessment: Maesycymmer Cairnfield (HA11)

	Value	Impact
Evidential Value	**High** The monument comprises the remains of a Bronze Age burial cairn cemetery associated with the adjacent Pen y Rhiw round barrow (HA10). The Scheduled Monument record states that the cemetery consists of seven or eight small cairns, however only one small stoney mound was visible during the field visit suggesting that ploughing has occurred. This is in agreement with numerous field visits recorded on the HER. The features may be clearance cairns rather than funerary monuments.	**None** The Proposed Scheme will have no impact upon the evidential value of the monument.
Historical Value	**Low** The monument has no known historical or documentary associations and no known antiquarian investigation reports. However, the monument forms part of an assemblage of Bronze Age funerary monuments on Mynydd y Grug and therefore has potential to contribute to a narrative of Bronze Age Caerphilly.	**None** The Proposed Scheme will have no impact upon the historical value of the monument.
Aesthetic Value	**Low** There are no visible remains of this monument which sits adjacent to Pen-y-rhiw Round Cairn (HA10), and therefore shares its setting described above.	**Moderate Adverse** The Proposed Scheme will significantly alter the west facing view from the monument, and the Proposed Deposition Area will obscure distant views towards Twyn Cae Hugh Round Barrow (HA6). However it is considered that the scheme is distant enough that the impact will not majorly dominate or obscure the monuments setting, as the key view from the monument is to the south. Mitigation in the form of sensitive landscape profiling may assist in reducing this visual impact and seeding the new tip for upland pasture will also be of benefit.
Communal Value:	**Low** The communal value of the monument is minimal as it is sited within private farmland.	**None** The Proposed Scheme will have no impact upon the communal value of the proposed scheme.

Table 7-16 - Summary of Setting and Significance Impact

Monument	Value	Setting and Significance Values								Type of visual change / effect	Magnitude of effect	Significance of effect	Cumulative effect
		Evidential		Historical		Aesthetic		Communal					
		Value	Impact	Value	Impact	Value	Impact	Value	Impact				
Twyn Cae Hugh Round Barrow (HA6)	A	High	Moderate	Low	None	Moderate	Major	Moderate	Moderate	Change to setting and key view to south by construction of Proposed Deposition Area on historic common	Major Adverse	Large	Major
Twyn yr Oerfel Western Round Barrow (HA7)	A	High	None	Low	None	Moderate	Minor beneficial	Moderate	Minor beneficial	Change to setting and key view to west by reprofiling of Upper Tip	Minor beneficial	Low	Slight
Pen-y-rhiw Round Cairn (HA10)	A	High	None	Low	None	High	Moderate	Low	None	Change to setting and key view to east by construction of Proposed Deposition Area on historic common	Minor Adverse	Low	Slight
Maesycymmer Cairnfield (HA11)	A	High	None	Low	None	Low	Moderate Adverse	Low	None	Change to setting and key view to east by construction of Proposed Deposition Area on historic common	Minor Adverse	Low	Slight

7.7 MITIGATION, ENHANCEMENT AND MONITORING

MITIGATION AND MONITORING

7.7.1. The assessment has identified the potential direct (physical) and indirect (visual) effects of the Proposed Scheme together with an assessment of potential impact on the setting and significance of statutory designated heritage assets. Based on this assessment the following mitigation measured are recommended.

7.7.2. To mitigate the direct impact on a Mynydd y Grug Field Boundary (HA1) it is recommended that a landscape survey be undertaken in advance of the works to record its landscape setting. It is also recommended that the drystone wall is conserved where possible with protective fencing and reconstructed following the completion of works to conserve and enhance this element of the pre-industrial fieldscape.

7.7.3. To mitigate the direct impact on Ditch and Bank/ Pound (HA2) it is recommended that a landscape survey be undertaken in advance of the works to record its historic landscape setting and that targeted excavation be undertaken in advance of the works to understand and record the nature, extent and dating of the feature. If the design of the landform is to respect the site it is also recommended that protective fencing is employed to prevent damage during the works. Whilst the design has been altered to preserve the site in-situ, the loss of the historic common and the proposed deposition area will result in a permanent visual impact that cannot be mitigated.

7.7.4. To mitigate the direct physical impact on Bedwas Navigation Colliery Tips (HA4) it is recommended that a landscape survey including topographic survey is undertaken in advance of the works to record the site in its present landscape setting. It is recommended that the re-profiling of the Upper Tip should be sensitively designed and contoured to blend in to the surrounding pre-industrial landscape. There is an opportunity following the removal of the Lower Tip to re-landscape and re-contour its footprint in a way that is sensitive to the surrounding pre-industrial fieldscape.

7.7.5. To mitigate the direct physical impact on Mynydd y Grug Common (HA5) it is recommended that a level II landscape survey is undertaken in advance of the works to record the common and its drystone field boundaries within their present landscape setting and to identify any unrecorded sites located on the common. The site would benefit from geophysical survey in advance of the works to identify any buried features associated with the Bronze Age funerary landscape, considering its proximity to numerous Bronze Age monuments, with targeted excavation employed if required. It is recommended that the drystone walls surrounding the common are conserved via protective fencing for the duration of the works. It is recommended that if the ecological topsoil strip methodology allows, i.e. the strip is deep enough to reach natural soils, it is recommended that an archaeological watching brief is employed during the topsoil strip to identify and record any unknown archaeological features on the common. If the topsoil strip is more shallow, an archaeological strip map record would be required. The Proposed Deposition Area will result in the loss of almost the entire common and will create a major change of character for the surrounding monuments. The impact can be reduced through sensitive design and contouring to blend the landform into the surrounding landscape and by seeding it for upland pasture using retained topsoil, however the Proposed Scheme will result in a permanent change that cannot be mitigated.

7.7.6. To mitigate the direct physical impact on Concrete Base (HA48) it is recommended that a landscape survey be undertaken in advance of the works to record its industrial landscape setting.

7.7.7. To mitigate the direct physical impact on Twyn Cae Hugh Round Barrow (HA6) it is recommended that geophysical survey and full excavation of an agreed buffer area be undertaken in advance of the works to fully understand and record the nature and extent of the monument. Due to the major and permanent impact the Proposed Scheme will have on the setting of this monument, the only constructive option is to view this as an opportunity for investigation using modern dating techniques, to inform understanding of the remaining Bronze Age funerary landscape of Mynydd y Grug and the wider region. It is also recommended that protective fencing is employed to prevent damage to the monument during the works. The Proposed Scheme will result in the almost total loss of the historic common setting of the monument and the proposed deposition area will result in a major permanent visual impact that cannot be mitigated.

Table 7-17 - Summary of mitigation measures

Mitigation Ref	Receptor	Impact and resulting effect	Magnitude (Pre-mitigation)	Mitigation
CH01	Mynydd y Grug Field Boundary (HA1)	Direct physical impact resulting in loss of integrity	Major Adverse Slight significance	Pre-commencement: Archaeological landscape survey and topographic survey
	Ditch and Bank/ Pound (HA2)		Major Adverse Moderate significance	
	Bedwas Navigation Colliery Tips (HA4)		Major Adverse Moderate Significance	
	Mynydd y Grug Common (HA5)		Major Adverse Moderate Significance	
	Concrete Base (HA48)		Major Adverse Slight Significance	
	Twyn Cae Hugh Round Barrow (HA6)		Minor Adverse Moderate Significance	
CH02	Mynydd y Grug Common (HA5)	Direct physical impact resulting in loss of integrity	Major Adverse Moderate Significance	Pre-commencement: Geophysical survey

Mitigation Ref	Receptor	Impact and resulting effect	Magnitude (Pre-mitigation)	Mitigation
	Twyn Cae Hugh Round Barrow (HA6)		Minor Adverse Moderate Significance	
CH03	Ditch and Bank/ Pound (HA2)	Direct physical impact resulting in loss of integrity	Major Adverse Moderate significance	Pre-commencement: Archaeological excavation in the form of field evaluation and/ or SMR
	Twyn Cae Hugh Round Barrow (HA6)		Minor Adverse Moderate Significance	
CH04	Mynydd y Grug Common (HA5)	Direct physical impact resulting in loss of integrity	Major Adverse Moderate Significance	Pre-commencement/ Construction stage: Archaeological strip map record or archaeological watching brief during ecological topsoil strip
CH05	Mynydd y Grug Field Boundary (HA1)	Direct physical impact resulting in loss of integrity	Major Adverse Slight significance	Construction and operational stage: Protective fencing and/ or reinstatement of drystone walls
	Mynydd y Grug Common (HA5)		Major Adverse Moderate Significance	
CH06	Twyn Cae Hugh Round Barrow (HA6)		Minor Adverse Moderate Significance	Construction and operational stage: Protective fencing and/ or reinstatement of drystone walls
	Ditch and Bank/ Pound (HA2)		Major Adverse Moderate significance	
CH07	Mynydd y Grug Field Boundary (HA1)	Visual impact resulting in varying degrees of change and severance of cultural links	Considerable	Design stage: Sensitive final landform design that is informed by natural contours to blend in to the
	Ditch and Bank/ Pound (HA2)		Severe	

Mitigation Ref	Receptor	Impact and resulting effect	Magnitude (Pre-mitigation)	Mitigation
	Bedwas Navigation Colliery Tips (HA4)		Considerable	surrounding landscape and reduce visual and setting impacts on intervisible sites and monuments.
	Mynydd y Grug Common (HA5)		Very Severe	
	Twyn Cae Hugh Round Barrow (HA6)		Very Severe	
	Twyn yr Oerfel Western Round Barrow (HA7)		Very Slight	
	Pen-y-rhiw Round Cairn (HA10)		Slight	
	Maesycymmer Cairnfield (HA11)		Slight	
	Pont Bren Gwyn Ring Cairn (HA9)		Slight	
	Mynydd Bach Round Barrow (HA12)		Slight	
	Mynydd Bach Cairn II (HA13)		Slight	
	St Barrwg's Church (HA35)		Very Slight	
	Caerphilly Castle (HA40)		Very Slight	
CH08	Mynydd y Grug Field Boundary (HA1)	Visual impact resulting in varying degrees of change and severance of cultural links	Considerable	Design stage: Seeding final landforms with stored topsoil originating from historic common (HA5) to reduce visual and setting impacts on intervisible sites and monuments.
	Ditch and Bank/ Pound (HA2)		Severe	
	Bedwas Navigation Colliery Tips (HA4)		Considerable	
	Mynydd y Grug Common (HA5)		Very Severe	

Mitigation Ref	Receptor	Impact and resulting effect	Magnitude (Pre-mitigation)	Mitigation
	Twyn Cae Hugh Round Barrow (HA6)		Very Severe	
	Twyn yr Oerfel Western Round Barrow (HA7)		Very Slight	
	Pen-y-rhiw Round Cairn (HA10)		Slight	
	Maesycymmer Cairnfield (HA11)		Slight	
	Pont Bren Gwyn Ring Cairn (HA9)		Slight	
	Mynydd Bach Round Barrow (HA12)		Slight	
	Mynydd Bach Cairn II (HA13)		Slight	
	St Barrwg's Church (HA35)		Very Slight	
	Caerphilly Castle (HA40)		Very Slight	

7.8 RESIDUAL IMPACT ASSESSMENT

DIRECT PHYSICAL IMPACTS

7.8.1. Provided that the mitigation measures noted above are followed, the residual direct physical impact of the Proposed Scheme on all known heritage assets will be 'None'.

7.8.2. The combination of pre-commencement landscape and topographic survey, geophysical survey, targeted excavation, strip map record and/or archaeological watching brief (CH01-CH04) will ensure that all known and as yet unknown heritage assets within the boundary of the Proposed Scheme will be mitigated via a 'Preservation by record'. This mitigation is proposed in recognition of the significant distribution of Bronze Age monuments in the vicinity of the Proposed Scheme and the possibility of important associated buried features. The use of protective fencing around the extant dry stone walls that bound the scheme (CH05) and around Twyn Cae Hugh Round Barrow (HA6) and Ditch and Bank/ Pound (HA2) (CH06) will prevent accidental damage to these sites during the works.

INDIRECT VISUAL IMPACTS

7.8.3. The changes to the topography and the character of the landscape as a result of the Proposed Scheme will be permanent. The proposed mitigation in the form of sensitive design of the final landforms to ensure that they reflect the natural contours of the surrounding landscape (CH07), and seeding them with stored topsoil originating from the common (CH08), may assist in reducing visual and setting impacts on some intervisible Scheduled Monuments, but not enough to have a measurable impact on magnitude. There will therefore be a residual visual impact as outlined in the table below.

Table 7-18 – Summary of residual impact

Receptor ID	Impact and resulting Effect	Magnitude Pre-mitigation	Residual impact
Mynydd y Grug Field Boundary (HA1)	Visual impact resulting in varying degrees of change and severance of cultural links	Considerable	Considerable
Ditch and Bank/ Pound (HA2)	Visual impact resulting in varying degrees of change and severance of cultural links	Severe	Severe
Bedwas Navigation Colliery Tips (HA4)	Visual impact resulting in varying degrees of change and severance of cultural links	Considerable	Considerable
Mynydd y Grug Common including field boundaries (HA5)	Visual impact resulting in varying degrees of change and severance of cultural links	Very Severe	Severe
Twyn Cae Hugh Round Barrow (HA6)	Visual impact resulting in varying degrees of change and severance of cultural links	Very Severe	Very Severe
Twyn yr Oerfel Western Round Barrow (HA7)	Visual impact resulting in varying degrees of change and severance of cultural links	Very Slight	Very Slight
Pont Bren Gwyn Ring Cairn (HA9)	Visual impact resulting in varying degrees of change and severance of cultural links	Slight	Slight
Pen-y-rhiw Round Cairn (HA10)	Visual impact resulting in varying degrees of change and severance of cultural links	Slight	Slight
Maesycymmer Cairnfield (HA11)	Visual impact resulting in varying degrees of change and severance of cultural links	Slight	Slight
Mynydd Bach Round Barrow (HA12)	Visual impact resulting in varying degrees of change and severance of cultural links	Slight	Slight
Mynydd Bach Cairn II (HA13)	Visual impact resulting in varying degrees of change and severance of cultural links	Slight	Slight
St Barrwg's Church (HA35)	Visual impact resulting in varying degrees of change and severance of cultural links	Very Slight	Very Slight

Receptor ID	Impact and resulting Effect	Magnitude Pre-mitigation	Residual impact
Caerphilly Castle (HA40)	Visual impact resulting in varying degrees of change and severance of cultural links	Very Slight	Very Slight

7.9 CUMULATIVE EFFECTS

7.9.1. At the time of writing there is one proposed development for consideration for cumulative impact for the Proposed Scheme. The Proposed Twyn Hywel Energy Park Land Northwest of Caerphilly (Ref 23/0427/DNS) covers a large upland area 1.9km to the west of the Proposed Scheme encompassing much of Mynydd Eglwysilan. The proposed wind farm includes the construction and operation of 14 wind turbines and associated infrastructure. Within the boundary of the proposed wind farm there is a 20th century coal tip associated with Llanbradach Colliery, which is located on the east facing slope above Llanbradach and is significantly visible from the present Proposed Scheme, however the proposed wind farm will not physically impact upon this tip site. Having reviewed the plan of the proposed layout of the wind turbines it is evident that they are all located over 3km away from the Proposed Scheme, and it is therefore considered unlikely that there would be a significant cumulative impact on the heritage assets assessed in the present study.

7.10 SUMMARY

7.10.1. The cultural heritage impact assessment has identified the potential direct and indirect (visual) impacts of the Proposed Scheme on all heritage assets within a 250m study area, together with an assessment of the potential impact on the setting and significance of Value A statutory designated sites within a wider 3km study area.

SUMMARY OF DIRECT PHYSICAL IMPACTS

7.10.2. The assessment identified that the Proposed Scheme would have a direct physical impact on five heritage assets.

7.10.3. Mynydd y Grug Field Enclosure (HA1) will be subject to a major adverse direct impact of slight significance. Ditch and Bank/ Pound (HA2) will be subject to a major adverse direct impact of moderate significance. The Lower Tip (Tip 1) of Bedwas Navigation Colliery Tips (HA4) will be completely removed resulting in a major adverse impact of moderate significance, whilst the Upper Tip (Tip 2) will be processed and reprofiled resulting in a major adverse impact of moderate significance during the operational phase and an overall minor adverse direct impact of slight significance following completion. It is assessed that the Proposed Scheme will have a minor adverse direct impact of moderate significance on the material form and character of the industrial landscape of Bedwas as a whole. Concrete base (HA48) is likely to suffer a major adverse direct impact of slight significance as a result of its total or partial loss due to haulage vehicle traffic.

7.10.4. Mynydd y Grug Common (HA5) will be almost entirely occupied by the proposed deposition area and will therefore be subject to almost total loss resulting in a high adverse direct impact of moderate significance. This assessment includes the direct impact to potential unknown buried archaeology located on the common. Drystone wall field boundaries are at risk of potential major

adverse direct impact of slight significance due to the tipping of spoil and the use of heavy plant.

7.10.5. Scheduled Monument Twyn Cae Hugh Round Barrow (HA6) falls outside the red line boundary of the Proposed Scheme but remains at risk of a minor adverse direct impact of moderate significance. The assessment has concluded that without mitigation there is potential for the Scheduled Monument to suffer a caused by damage to buried deposits within five metres of the curtilage of the monument caused by a high level of haulage vehicle traffic.

7.10.6. A series of mitigation measures are proposed to reduce the potential direct effect on heritage assets on the archaeological resource. Provided that these are implemented, then the residual direct impact of the Proposed Scheme will be reduced to 'None'.

SUMMARY OF INDIRECT VISUAL IMPACTS

7.10.7. The assessment has concluded that the Proposed Scheme has potential to have an indirect visual impact on a total of thirteen heritage assets.

7.10.8. Within the boundary of the Proposed Scheme, there will be a Considerable visual impact on Mynydd y Grug field boundary (HA1), whilst the visual impact upon ditch and bank enclosure/ pound (HA2) will be Severe. The visual impact on Bedwas Navigation Colliery Tips (HA4) is difficult to quantify but has been assessed as Considerable. The visual impact on Mynydd y Grug Common (HA5) will be Very Severe since the Proposed Deposition Area will adopt almost the entire common and therefore dominate and obscure all visual links to and from the surrounding landscape.

7.10.9. Within the 250m study area, the visual impact on Scheduled Monument Twyn Cae Hugh Round Barrow (HA6) has been assessed as Very Severe, since the Proposed Deposition Area will dominate and obscure all views to the south and west. There is a potential Very Slight visual impact to Twyn yr Oerfel Western Round Barrow (HA7) and the Bronze Age monuments located to the northwest of the Proposed Scheme (HA9-HA13) will all be subject to a potential Slight visual impact. The sites of Bedwas Navigation Colliery (HA20) and Bedwas Coke Ovens (HA21) have both been destroyed and therefore there will be no indirect visual impact from the Proposed Scheme. It is considered that the Proposed Haul Road will not adversely visually impact any of the heritage assets within its vicinity since it is utilising a pre-existing forestry track and the sites are all obscured by forestry trees.

7.10.10. In the wider area, it is possible that the Proposed Scheme may have a Very Slight visual impact on St Barrwg's Church (HA35) but is largely shielded by trees, however there will be no visual impact on St Barrwg's Churchyard Cross (HA34). Caerphilly Castle (HA40) and the Proposed Scheme site are intervisible, however the distance between them means that any visual impact on the Scheduled Monument will be Very Slight. There is no intervisibility with any other peripheral Value A sites due to topography and/ or tree cover.

SUMMARY OF IMPACTS TO SETTING AND SIGNIFICANCE

7.10.11. A total of four Scheduled Monuments have been identified for setting and significance impact assessment. Twyn Cae Hugh Round Barrow (HA6) will be subject to a Major setting impact due the construction of the proposed deposition area on the immediately adjacent common, whilst Twyn yr Oerfel Western Round Barrow (HA7), Pen-y-rhiw Round Cairn (HA10) and Maesycymmer Cairnfield (HA11) will be subject to a Slight setting impact.

7.10.12. The changes to the topography and the character of the landscape as a result of the Proposed Scheme will be permanent. The proposed mitigation in the form of sensitive design of the final landforms and seeding them with stored topsoil originating from the common may assist in reducing visual and setting impacts on some intervisible Scheduled Monuments, but not enough to have a measurable impact on magnitude.

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8 LANDSCAPE AND VISUAL EFFECTS

8.1 INTRODUCTION

8.1.1. This chapter covers landscape and visual effects of the Bedwas Tips Reclamation Project. Within this chapter the landscape and visual effects are considered separately, following national guidance. Plans have been produced to include topography, landscape designations, visual assessment / Zone of Theoretical Visibility (ZTV) and site features. Assessment tables will be produced for both landscape and visual effects. Photomontages or red lines will be produced as required by the local planning authority.

8.1.2. This assessment will establish the landscape baseline and value of the study area. It will then consider how the Proposed Scheme will affect the landscape, its character, sensitivity and value.

8.1.3. The European Landscape Convention (ELC) provides a definition of landscape that is adopted in the national guidance that this section will follow, namely the Guidelines for Landscape and Visual Impact Assessment (LI / IEMA 2013), known as GLVIA 3. This states that: 'Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors'', also that: 'Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experimental aspects of the landscape that make different places distinctive'' and that '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.'

8.1.4. Visual effects are the extent and nature of existing and new views and their effects on receptors. The assessment will compare views during construction and implementation with the baseline. It will also consider changes to the visual composition of the landscape and its character.

8.2 STUDY AREA

8.2.1. Visual impacts have the potential to affect large areas extending from the Proposed Scheme where views in and out of the Proposed Scheme are possible. The visual envelope of the Proposed Scheme has been defined to focus the study area on visual receptors (people) likely to experience significant effects. The study area is located 1km north of Bedwas, atop the town's surrounding hills.

8.2.2. The visual study area is shown in V2-S08/0001 and was refined and agreed through consultation with the Local Planning Authority. The scoping opinion dated 2 December 2021 include the comments of the Caerphilly County Borough Council's (CCBC) Landscape Architect who provided guidance on the scale of the assessment and changes to the sensitivity categorisation of several landscapes and visual sensitivities[42]. CCBC provided a plan of viewpoints to be used and reserved the right to request additional viewpoints and supporting information.

[42] CCBC (2021) *EIASCO-20-0001 Bedwas Tips Reclamation Scheme CLS Response 25 August 2021*.

8.2.3. Due to the location and elevation of the proposed site, CCBC requested that the draft ZTV was extended beyond 2km to include the wider landscape e.g. Caerphilly Mountain, Caerphilly Castle and Rudry Common. CCBC identified and agreed 19 viewpoints representative of a range of visual receptors.

8.2.4. The 1km radius landscape study area was agreed with CCBC and illustrated on drawing V2-S08/0001. It extends towards the urban areas of Bedwas, Trethomas and Caerphilly to the south of the site, Llanbradach to the west, Ynysddu, Cwmfelinfach, Brynawel and Wattsville to the north and Crosskeys to the east. The settlements include residential, commercial, and industrial areas, interspersed with amenity open space and recreational land. Areas of Ancient Woodland, Tree Preservation Orders (TPOs), Public Rights of Way (PRoW), listed buildings and important hedgerows add value to the landscapes, and these are described below.

8.2.5. Approximately 30 hectares of larch forest infected by Phytopthera ramorum on the Sirhowy Valley Country Park side of the valley, plus areas of infected trees on the valley slopes opposite, were felled by contractors on behalf of Natural Resources Wales (NRW) in 2020 as part of biosecurity management measures. Areas of felled trees adjoin the proposed development and are located on the route of the proposed haul road. If further biosecurity or forest management measures are necessary during the construction or operational phases of the proposed development, it is likely that there will be an effect on the landscape and visual assessment.

8.3 LEGISLATION AND POLICY

THE ENVIRONMENT (WALES) ACT 2016

8.3.1. The Environment (Wales) Act 2016 promotes the 'sustainable management of natural resources. Section 2 of the Act states 'natural resources' include (but are not limited to) animals, plants and other organisms; air, water and soil; minerals; geological features and processes; physiographical features; climatic features and processes.

PLANNING POLICY WALES

8.3.2. Planning Policy Wales[43] (PPW) sets out the land use and planning policies of the Welsh Government. The key policies and paragraphs within the PPW which relate to landscape and visual effects are:

Policy 2, People and Places: Achieving Well-being Through Placemaking

8.3.3. Paragraph 2.4 states '… interpretation of what makes a good place will vary. Each place will have its own unique characteristics, history and identity, based on how people have and will interact with the landscape…. This 'sense of place' varies, from the rural countryside which provides an economic and environmental base for agriculture and tourism to thrive, to urban areas…. The intrinsic value of

[43] Welsh Government (2021) Planning Policy Wales Edition 11, February 2021.

a place to people or communities is particularly important, which may be due to aesthetic, cultural, spiritual or historical reasons…'

Policy 3, Strategic and Spatial Choices: Placemaking In Action (Good Design Making Better Places)

8.3.4. Paragraph 3.8 states 'The countryside is a dynamic and multi-purpose resource. In line with sustainable development and the national planning principles and in contributing towards placemaking outcomes, it must be conserved and, where possible, enhanced for the sake of its ecological, geological, physiographic, historical, archaeological, cultural and agricultural value and for its landscape and natural resources. The need to conserve these attributes should be balanced against the economic, social and recreational needs of local communities and visitors….'

8.3.5. Paragraph 3.9 states 'The special characteristics of an area should be central to the design of a development. The layout, form, scale and visual appearance of a proposed development and its relationship to its surroundings are important planning considerations.'

8.3.6. Paragraph 3.10 states 'In areas recognised for their particular landscape, townscape, cultural or historic character and value it can be appropriate to seek to promote or reinforce local distinctiveness. In those areas, the impact of development on the existing character, the scale and siting of new development, and the use of appropriate building materials (including where possible sustainably produced materials from local sources), will be particularly important.'

8.3.7. Paragraph 3.55 states 'Previously developed (also referred to as brownfield) land (see definition overleaf) should, wherever possible, be used in preference to greenfield sites where it is suitable for development. In settlements, such land should generally be considered suitable for appropriate development where its re-use will promote sustainability principles and any constraints can be overcome. It is recognised, however, that not all previously developed land is suitable for development. This may be, for example, because of its unsustainable location, the presence of protected species or valuable habitats or industrial heritage, or because it is highly contaminated. For sites like these it may be appropriate to secure remediation for nature conservation, amenity value or to reduce risks to human health…'

Policy 5: Productive and Enterprising Places

8.3.8. Paragraph 5.3.4 states 'Great care must be taken to minimise the adverse impacts of new or improved transport infrastructure on the natural, historic and built environment and on local communities, including on public health resulting from community severance and airborne pollution. Green infrastructure measures to mitigate negative effects and enhance environmental quality and connectivity should be considered at an early stage. Routes should make the best use of existing landforms and other landscape features to reduce noise and visual effects, subject to safety and other environmental considerations. Where no other alternative routes or options are practicable, transport infrastructure schemes should provide mitigation measures to minimise the negative impacts and enhance the positive ones caused by their construction and operation, including reducing exposure to airborne pollution'.

Policy 6, Distinctive and Natural Places

8.3.9. This policy discusses the themes of the historic environment, green infrastructure and landscape.

8.3.10. The historic environment includes historic landscapes, townscapes, Conservation Areas (CA), Listed Buildings, Scheduled Monuments (SM) and historic Parks and Gardens.

8.3.11. Paragraph 6.0.2 states, 'The special and unique characteristics and intrinsic qualities of the natural and built environment must be protected in their own right, for historic, scenic, aesthetic and nature conservation reasons. These features give places their unique identity and distinctiveness and provide for cultural experiences and healthy lifestyles.'

8.3.12. Paragraph 6.0.3 states, 'As well as those characteristics regarded as special or unique there are other, environmental qualities of places which are ubiquitous. Environmental components of places, such as clean air, access to open spaces and water quality, are linked to the quality of the built and natural environment. The environmental components of places influence and shape health and wellbeing as well as playing a role in sustaining and creating places which are adaptable and resilient to change. Distinctive and Natural places must maintain or incorporate green infrastructure, recognising the wide ranging role it can play, as key components of their natural and built fabric. Doing so will maximise health and well-being of communities and the environment.'

8.3.13. Paragraph 6.1.1 states, 'The historic environment comprises all the surviving physical elements of previous human activity and illustrates how past generations have shaped the world around us. It is central to Wales's culture and its character, whilst contributing to our sense of place and identity. It enhances our quality of life, adds to regional and local distinctiveness and is an important economic and social asset.'

8.3.14. Paragraph 6.2; Green infrastructure states 'Green infrastructure is the network of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect places'.

8.3.15. Paragraph 6.2.1 defines green infrastructure as, 'the network of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect places. Component elements of green infrastructure can function at different scales. At the landscape scale green infrastructure can comprise entire ecosystems such as wetlands, waterways and mountain ranges. At a local scale, it might comprise parks, fields, public rights of way, allotments, cemeteries and gardens…'

8.3.16. Paragraph 6.2.4; Integrating Green Infrastructure and Development states 'Green infrastructure plays a fundamental role in shaping places and our sense of well-being, and are intrinsic to the quality of the spaces we live, work and play in. The planning system should protect and enhance green infrastructure assets and networks because of these multi-functional roles'.

8.3.17. Paragraph 6.3.1 states 'Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors. Landscape policy is guided by the European Landscape Convention'.

8.3.18. Paragraph 6.33 states, 'All the landscapes of Wales are valued for their intrinsic contribution to a sense of place, and local authorities should protect and enhance their special characteristics, whilst paying due regard to the social, economic, environmental and cultural benefits they provide, and to their role in creating valued places. Considering landscape at the outset of formulating strategies and polices in development plans and when proposing development is key to sustaining and enhancing their special qualities and delivering the maximum well-being benefits for present and future generations as well as helping to deliver an effective and integrated approach to natural resource management over the long term'.

LANDMAP

Landscape Information

8.3.19. 'LANDMAP' is published by NRW / Cyfoeth Naturiol Cymru (NRW). It is 'an important information resource, methodology, and monitoring baseline for the landscapes of Wales, which can help inform planning for the sustainable management of natural resources in an area. LANDMAP describes and evaluates the physical, ecological, visual, cultural and historic aspects of the landscapes of Wales, and provides the basis of a consistent, quality assured national approach to landscape assessment' (PPW Paragraph 6.3.20) LANDMAP4 has been used as a resource to aid the assessment.

Characteristics of Local Landscapes

8.3.20. The conservation and, where appropriate, enhancement of local landscapes should be provided. This may include landscape features, characteristics and qualities of local significance, statutory Sites of Special Scientific Interest (SSSI) and Special Landscape Areas (SLA) which are non-statutory designations.

Caerphilly County Borough Council Local Development Plan 2010

8.3.21. CCBC Local Development Plan (LDP) was adopted on 23 November 2010. It provides the basis for determining planning applications, covering up to 2021. Relevant county-wide policies include:

- Policy CW4 – Natural Heritage Protection;
- Policy CW6 – Trees, Woodlands and Hedgerow Protection;
- Policy LE3 – Protection of Country Parks;
- Policy NH1 – Special Landscape Areas (SLA);
- Policy NH2 – Visually Important Local Landscapes (VILLs);
- Policy SI1 – Green Wedges;
- Policy SP6 – Place Making;
- Policy SP10 – Conservation of Natural Heritage; and
- Policy TR1 – Cycle Routes.

8.3.22. The Proposed Scheme lies within an extensive local non-statutory designated Special Landscape Area (SLA) and adjoins two SINCs and a Country Park. Immediately south of Tip 1 is a large area designated as a Community Facility. The Proposed Scheme is near non-statutory designated VILL. Relevant county-wide policies include:

8.3.23. '**CW4** Development proposals that affect locally designated natural heritage features, will only be permitted:

A. Where they conserve and where appropriate enhance the distinctive or characteristic features of the SLA or VILL.

B. Within, or in close proximity to sites designated as Sites of Importance for Nature Conservation (SINC), Local Nature Reserves (LNR), Regionally Important Geological Sites (RIGS), Green Corridors, or Local Priority Habitats and Species, where proposals either:

i. Conserve and where appropriate enhance the ecological or geological importance of the designation, or

ii. Are such that the need for the development outweighs the ecological importance of the site, and where harm is minimised by mitigation measures and offset as far as practicable by compensation measures designed to ensure that there is no reduction in the overall value of the area or feature.'

8.3.24. '**CW6** Development proposals on sites containing trees, woodlands and hedgerows, or which are bordered by one of more such trees or hedgerows, will only be permitted provided that:

C. Development proposals have made all reasonable efforts to retain, protect and integrate trees, woodlands or hedgerows within the Proposed Scheme.

D. Where trees, woodlands or hedgerows are removed, suitable replacements are provided where appropriate.'

8.3.25. Sub-regional policies relating to this area, the Southern Connections Corridor (the valleys surrounding and between Caerphilly and Risca / Pontymister), include:

8.3.26. '**NH1** Special Landscape Areas are identified and will be protected at the following locations:

- NH1.4 North Caerphilly;
- NH1.5 South Caerphilly; and
- NH1.6 Mynyddislwyn.'

8.3.27. '**NH2** VILL are identified and will be protected at the following locations:

- NH2.3 Abercarn; and
- NH2.4 Rudry.'

8.3.28. '**NH3** Sites of Importance for Nature Conservation will be protected in the following locations:

- NH3.11 River Sirhowy;
- NH3.148 Mynydd y Grug, West of Cwmfelinfach;
- NH3.149 Twyn yr Oerfel, South of Cwmfelinfach; and
- NH3.171 Berth Goch Wood, North of Trethomas.'

8.3.29. '**LE3** A Country Park that contributes to the Valleys Regional Park is protected at the following location:

- LE3.6 Sirhowy Valley Country Park, Ynysddu / Crosskeys.

8.3.30. **TR1** Land will be safeguarded to facilitate the following improvements to the cycle route network:

- TR1.13 Rhymney Valley Linear Cycle Route – Heads of the Valleys to Bedwas / Caerphilly, Southern;
- TR1.14 Caerphilly Basin Radial Routes; and
- TR1.15 Link from Crosskeys NCN47 to Newbridge.

8.3.31. The CCBC are currently preparing a new revised LDP up to 2035. This document will replace the current adopted LDP. Consultation was undertaken in early 2020 of which no formal documents have been released as of present.

OTHER PLANS AND SUPPLEMENTARY PLANNING GUIDANCE

8.3.32. The Lower Ebbw Sirhowy Valleys Masterplan (approved October 2022)[44] includes the Sirhowy Valley Country Park which lies to the northeast of the Site. The Vision (Section 4 Paragraph 4.1) states, 'The area…, set in a quality landscape with integrated landscape, parks and the Sirhowy County Park providing …informal recreation and leisure, providing increased quality of life and well-being.' Recognising the significant contribution that tourism brings to the local economy, paragraph 5.26 states, '… The Sirhowy Valley Country Park… also contribute to the overall tourist offer of the area and of the county borough.'

8.3.33. Appendix 2 of the Masterplan outlines projects, including Project C5 Sirhowy Valley Country Park, to provide environmental improvements and additional facilities, which will contribute to delivery of the masterplan and CCBC well-being objectives 2018-2023, in accordance with the Sustainable Development Principle within the Wellbeing of Future Generations (Wales) Act 2015.

C5 Sirhowy Valley Country Park

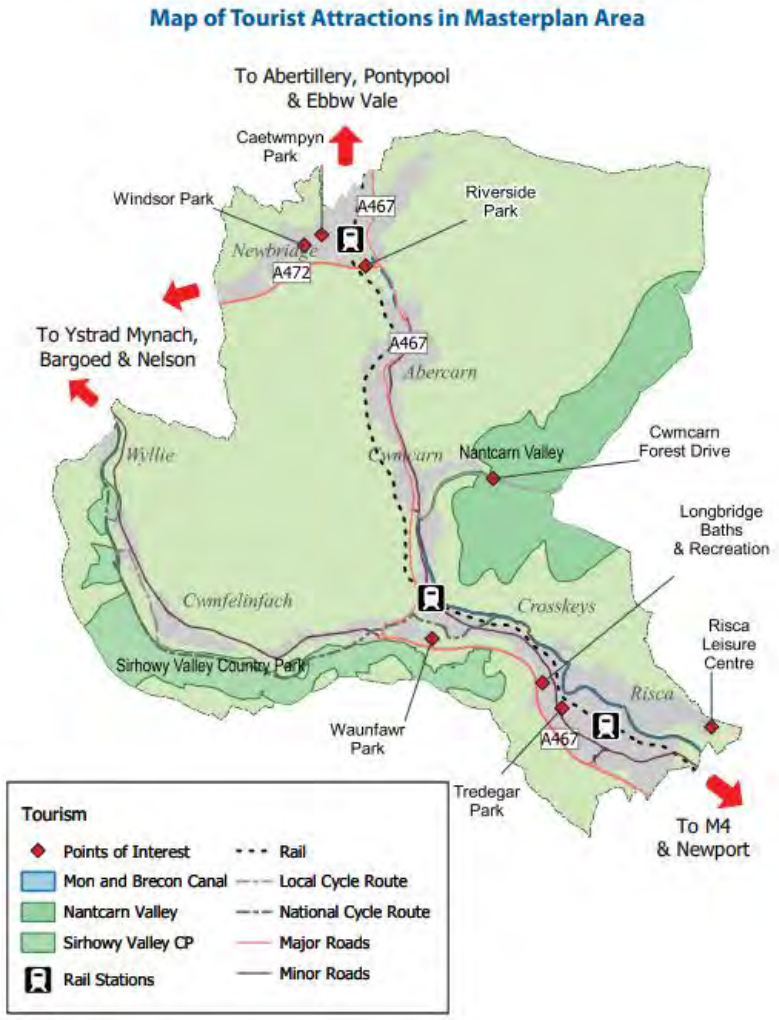
8.3.34. Paragraphs 6.24 – 6.25 state, 'The Sirhowy Country Park is good for walking and cycling, and it has a wide range of wildlife and heritage assets. The former Tredegar to Newport Docks rail line runs through the length of the country park, cycle routes for walkers and cyclists to use link with another country park at Penallta via National Cycle Network Route 47. The park also offers several different environments, such as the managed woodlands on the mountainsides and the water environment of the Sirhowy River. The park is an important part of the Valleys Regional Park and the network of council-managed open spaces. It has potential to attract even more visitors than it does now. Ongoing environmental improvements include the felling of diseased trees, the planting of replacement and new trees, and the carrying out of 'carbon sequestration'.

8.3.35. Related to this, Project C6 Ynys Hywel Activity and Nature Centre, Sirhowy Valley Country Park includes the creation of a café and a bicycle-hire facility and the use of Ynys Hywel farm buildings for education, interpretation and community activities.

8.3.36. PPW 11, the CCBC LDP 2021 policies, Supplementary Planning Guidance and other plans including the Sirhowy Country Park Masterplan outline the importance of the landscape to Wales, the local economy of the historic town of Caerphilly and the cultural identity of South Wales (Figure, 8-1).

[44] CCBC (2022) Lower Ebbw and Sirhowy Valleys Masterplan https://www.caerphilly.gov.uk/caerphillydocs/planning/lower-ebbw-sirhowy-valleys-masterplan.aspx

Figure 8-1 - Map of tourism attractions, extract from Lower Ebbw and Sirhowy Valleys Masterplan Consultation Draft[44] January 2022 page 7



8.3.37. At a local context, the Proposed Scheme lies within a SLA, a designation that recognises the local importance and value given to an area of landscape. In addition, the elevated location of the Proposed Scheme means it has a prominence and visibility from a broad surrounding area that includes other locally designated SLAs and VILL, national trails, access land, dedicated woodland and common land.

8.3.38. National and local policy strongly suggest that the restoration proposals should be landscape led to ensure the most effective integration of the landfill works within the wider environment.

8.4 GUIDANCE

8.4.1. The assessment will be carried out in accordance with guidance and techniques presented in the following documents:

- The Landscape Institute and Institute of Environmental Management & Assessment - Guidelines for Landscape and Visual Impact Assessment (Third Edition) 2013[45] (GLVIA3);
- Design Manual for Roads and Bridges (DMRB), Sustainability and Environmental Appraisal, LA104 - Environmental assessment and monitoring[46];
- DMRB, Sustainability and Environmental Appraisal, LA107 Landscape and visual effects[47];
- LANDMAP[48] Guidance: NRW GN46 Using LANDMAP in Landscape and Visual Impact Assessments (updated 31st December 2021); and
- LI_TGN-06/19 Visual Representation.

8.4.2. In accordance with the guidance above, a detailed assessment has been carried out, due to the potentially significant visual effects on receptors within the study area.

8.5 ASSESSMENT METHODOLOGY

8.5.1. The methodology is defined by the requirements for environmental assessment, as described in the DMRB and GLVIA3. The assessment methodology is presented in V3-S08/0001.

LIMITATIONS AND ASSUMPTIONS

8.5.2. Assumptions have been made as to the 1km buffer study area surrounding the Red Line Boundary of the Site as the Site design has been a dynamic process contiguous with the preparation of this report. The selected study area buffer is associated with an agreed Red Line Boundary dated 9 November 2023.

8.5.3. Access to private property was not possible during the field survey. Field survey information was gathered from areas with public access only.

8.5.4. The LVIA does not include landscape design outputs. It is assumed that this work will be undertaken by others.

8.5.5. The assessment will be iterative with design development, typically considering elements in more detail as the design elements become clearer. This ideally would involve workshops with the design team.

8.5.6. The winter survey took place on 6 – 7 March 2023 to represent a worse-case scenario. CCBC confirmed that a summer survey was not required.

Construction Phase

8.5.7. Information and details of the construction phase have been assessed based on indicative construction information provided. This forms the ‘worst case’ scenario and sets the parameters for the Proposed Scheme.

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[45] The Landscape Institute and Institute of Environmental Management & Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment (Third Edition)*’
[46] Design Manual for Roads and Bridges (DMRB) (2020) *Sustainability and Environmental Appraisal, LA104 Aug 2020.*
[47] Design Manual for Roads and Bridges (DMRB) (2020) *Landscape and Visual Effects LA107 Feb 2020.*
[48] NRW (2023) *LANDMAP Guidance, GN46 – Using LANDMAP in Landscape and Visual Impact Assessments*. Available online at NRW / Using LANDMAP in Landscape and Visual Impact Assessments GN46.

Operational Phase and Progressive Restoration

8.5.8. The operational phase will incorporate sequential progressive restoration and landscape works throughout the seven year period.

8.5.9. It is assumed that insufficient spoil waste will have been processed and laid in its final position to enable restoration to commence during Year 1 of the operational phase. This represents the 'worse case' scenario and sets the parameters for the Proposed Scheme.

8.5.10. It is assumed that proposed tree and shrub planting will take place in the planting season immediately following the Construction phase, i.e. during Year 1.

Decommission Phase

8.5.11. The decommission phase will include final restoration, grading and landscape works to the tips, the restoration of the network of PRoW and seating facilities, the removal of the administrative offices, processing plant, weighing bridge, ponds, and short haul road between Tip 1 and the new tip. It is assumed that the new haul road from the roundabout to the existing forest access road will be accepted by NRW as a permanent facility for forest maintenance access, as will be the new passing places on the existing forest road.

Consultations

8.5.12. Consultation took place during the assessment process with the Local Authority, CCBC, to determine the viewpoints to be assessed.

8.6 BASELINE CONDITIONS: LANDSCAPE

NATIONAL AND INTERNATIONAL DESIGNATED SITES

8.6.1. There are no National Parks or National Landscapes within the 1km study area.

NATIONAL LANDSCAPE CHARACTER AREAS (NLCA)

8.6.2. Wales is subdivided into 48 national landscape character areas[49] (NLCA). The Proposed Scheme and 1km study area lie entirely within NLCA37 Dyffrynnoedd y De / South Wales Valleys. South of Caerphilly, the ridge of hills between Caerphilly and the M4 corridor mark the boundary with the adjacent national landscape character area, NLCA35 Casnewydd, Caerdydd a'r Barri / Newport, Cardiff and Barry. As this lies outside the study area, it is not considered further in this chapter.

8.6.3. NLCA37 Dyffrynnoedd y De / South Wales Valleys occupies a large area (157,555ha) of South Wales north of Cardiff and Swansea, to the south of the Brecon Beacons, and stretches from Ammanford in the west to Pontypool in the east. It comprises 'many deep, urbanised valleys dissecting an extensive upland area. Combined with industrial heritage and the distinct identity of its

[49] NRW (2023) *National Landscape Character Areas*. Available online at: Natural Resources Wales /National Landscape Character Areas (NLCA).

people, the South Wales Valleys provide some of Wales's most widely known and iconic national images' (extract from NLCA37).

8.6.4. The key characteristics of NLCA37 Dyffrynnoedd y De / South Wales Valleys include:

- 'Extensive Upland plateaux – typically wild and windswept, often with unenclosed tracts, running roughly north-south as 'fingers' parallel between intervening deep valleys;
- Numerous steep-sided glaciated valleys - typically aligned in parallel, flowing in southerly directions. Major rivers include the … Rhymney;
- Ribbon urban and industrial areas in valleys – in places extending up valley sides and to valley heads. The uplands by comparison have little or no settlement;
- Extensive remains of heavy industry – a mix of derelict, preserved and largely redeveloped areas, notably for coal mining… typically includes old railway alignments, buildings and former tips;
- Contrast of urban valley activity next to quiet uplands – e.g. busy roads, new developments, traffic noise, night lighting, adjacent wilder, remoter, quieter uplands;
- Large blocks of coniferous plantation and deciduous woodland – covering many steep hillsides and hilltops;
- Heather, rough grassland and steep bracken slopes – dominate many plateaux and are sheep grazed. Much is common land;
- Improved pastures on some lower valley sides - grazed by sheep and dairy cattle;
- Field boundaries - dry stone walls mark common land boundaries, hawthorn hedges bound fields on lower slopes, interspersed with broadleaved woodland;
- Transport routes restricted to valleys – the intervening topography makes valley to valley travel difficult, except at heads and bottoms of valleys. Occasional roads that climb steeply over passes with dramatic views; and
- Iconic cultural identity – many popular images of a tough, rugby-playing, religious, radically-minded society associated with the South Wales Valleys.'

8.6.5. The sensitivity to change of NLCA37 Dyffrynnoedd y De / South Wales Valleys is considered to be **medium**.

REGIONAL LANDSCAPE CHARACTER AREAS (RLCA)

8.6.6. The regional landscape character areas within the study area is the South-East Wales Landscape.

RLCA The South East Wales Landscape

8.6.7. The South-East Wales Landscape is the host regional landscape character area. This includes 'the eastern uplands of the Brecon Beacons National Park, Blaenavon Industrial Landscape World Heritage Site, the Clydach Gorge and South Wales Valleys of the Sirhowy, Ebbw and Rhymney to the north…' It contains almost equal proportions of upland and lowland landscapes, 13% classified as development (national average 5%), 16.5% of the area lies within Designated Landscapes. There are five Registered Historic Landscapes and Blaenavon Industrial Landscape World Heritage Site.

8.6.8. Its key broad characteristics include:

- Tranquil landscapes in eastern hills and valleys;
- Distinctive linear valley settlements and transport corridors influenced by upland landform in the northwest. Major transport corridors link to the Severn crossings and to England; and
- Large areas of woodland.

8.6.9. The landscape of Caerphilly is described as:

- 'the narrow, steep-sided valleys of the Rhymney and lower Sirhowy are extensively wooded;
- The valleys are separated by the open ridge of Cefn y Brithdir and to the west lies the high moorland of Gelligaer Common historic landscape, which includes prehistoric cairns, a Roman fort and practice area;
- Extensive views over upland valleys and industrial areas evoke a strong sense of place as the Common merges with Merthyr Common and the rising slopes on the edge of the Brecon Beacons to the north;
- An undulating plateau of pastoral fields and woods surrounds Aberbargoed, Blackwood and Ystrad Mynach, with a network of footpaths and country parks. The plateau rises to outlying hills and moorland; and
- The historic town of Caerphilly, with its castle, lies on slopes above the Rhymney surrounded by high hills with views over the town. To the south, Caerphilly Common and the wooded slopes of Cefn Onn, with its historic Ruperra Castle, has extensive views over Cardiff and beyond to the Severn Estuary.'[50]

8.6.10. This is the host regional landscape character area. The west and south of the RLCA is predominantly built environment, surrounded by disturbed areas. A small portion of the Proposed Scheme is described as tranquil, with some disturbance e.g. traffic noise. About 10% is evaluated as a nationally outstanding visual and sensory landscape, 49% is evaluated as high, regionally important landscape. Though CCBC area contains very little landscape of high value, within the study area, Mynydd y Lan common is of high value. The majority of Caerphilly is of moderate value due to the low value developed, urban landscape. On balance, the RLCA is of moderate to high value, increasing in value eastwards towards the Wye Valley National Landscape (formerly Area of Outstanding Natural Beauty).

8.6.11. The sensitivity to change of RLCA The South-East Wales Landscape is considered to be **medium**.

LOCAL LANDSCAPE CHARACTER AREAS

8.6.12. The Borough of Caerphilly does not have a Local Landscape Character Assessment, however does have a number of non-statutory designated landscapes, Special Landscape Areas, locally designated VILL and Green Wedges which are defined and protected by Planning policies and guidance, and these locally valued landscapes are described below.

8.6.13. Overlying the landscape of the study area, LandMap Visual Sensory and Cultural aspect areas share many identical boundaries which equate with clearly recognisable boundaries in the field, e.g. valley slopes, edges of common land. These aspect area boundaries have been adopted as local landscape character areas due to the defined boundaries and characteristics which are recognisable in the field, and further consideration is given to geology, landscape habitats and historic landscape aspects within these areas. The study area comprises broad areas of hills, lower plateaus and scarp

[50] NRW (2018) T*he South East Wales landscape.* Available online at: as-south-east-wales-landscape-final-april-2018.pdf (cyfoethnaturiol.cymru).

slopes (HLPSS), built land (BL), exposed upland / plateau (EU / P). Adopting the Visual Sensory aspect area names, the local landscape character areas within the study area, indicated on V2-S08/0006, include:

1. Mynydd Y Grug (EU / P)
2. Sirhowy Valley Slopes (HLP&SS)
3. Valley Slopes Machen – Ystrad Mynach (HLP&SS)
4. Mynydd y Lan (EU / P)
5. NW of Mynydd y Lan (HLP&SS)
6. Wooded Slopes west of Mynydd y Lan (HLP&SS)
7. Wooded Slopes Cwmcarn (HLP&SS)
8. Rhymney Valley South of Caerphilly (HLP&SS)
9. Risca (BL)
10. Caerphilly (BL)

LCA Mynydd Y Grug (CYNONVS129)

8.6.14. Mynydd Y Grug is one of three host LCA. The Proposed Scheme occupies about 80% of this LCA. It is an exposed upland / plateau used for upland grazing and lies entirely within the 1km study area. Its key characteristics include:

- a very remote feeling ridgeline of open grass & conifer woodland;
- Stone walls - some derelict - gives some height;
- Dramatic views all around. Views southwards to Caerphilly;
- Feeling of separation from valley floors below;
- Wind noise ‘is a dominant aesthetic factor which evokes particular experience of exposure and wildness.’;
- A mosaic of habitats including Semi-improved Neutral Grassland. Bracken. Dry Acid Heath. Dry Heath / Acid Grassland Mosaic. Spoil Wet heathland with cross-leaved heath. Dry heaths. Blanket Bog, Purple Moor Grass & Rush Pastures. Upland Heathland. patches of birch woodland / scrub;
- The geology is sedimentary carboniferous sandstone with colliery waste tips. There is no current mineral extraction, there has been in the past; and
- The northeast area is CYNONGL004: mountain and upland valley, glaciated mountain terrain, mountain glacial erosion terrain.

8.6.15. LandMap visual and sensory aspect area is evaluated as of moderate value. Cultural aspect area CYNONCLS011 is not evaluated. LCA Mynydd y Grug is of moderate value due to its openness and attractive views across the valley, but it has no unique features. The coniferous plantations and views down on to the built up areas in the valley base detract from its value.

8.6.16. The historic landscape of Mynydd y Grug has been evaluated as outstanding, except for the part occupied by existing spoil heap Tip 2 which is evaluated as high. Likewise, Landscape Habitats across Mynydd y Grug are evaluated as high as the mosaic of habitats includes a number of priority habitats. The Geological Landscape aspects include CYNONGL010 (west side), and CYNONGL004 (east side, parallel with Sirhowy valley) is evaluated as of outstanding value.

8.6.17. The sensitivity to change of LCA Mynydd Y Grug is considered to be high (except the part occupied by the existing spoil heap, Tip 2).

LCA Sirhowy Valley slopes (CYNONVS668)

8.6.18. LCA Sirhowy Valley slopes are one of three host LCA and is the host site of the haul route to the processing plant from the highway network. Bounded by the developed valley floor and the top of the ridge slope, its key characteristics include:

- An area of hills, lower plateau and scarp slopes to the north and northeast of the Proposed Scheme. A relatively steep sided part of the lower Sirhowy Valley, it has a distinctly more upland feel than the lower Rhymney Valley;
- The slopes are dominated by woodland with planted coniferous forestry being the dominant element with smaller broadleaved areas, including some Ancient woodland;
- Also present, particularly on the lower slopes are some remnant agricultural fields;
- The valley slopes tend to have a northern orientation;
- 'The dominance of coniferous plantations on the slopes to be diluted with some broadleaved tree planting.';
- Undeveloped, with some attractive views from the top of the ridge, including towards the Severn bridges. But, visual detractors include the managed coniferous plantations and the settlements in the valleys; and
- Diverse historic landscape with multi-period remains including industrial, prehistoric ritual / funerary monuments and medieval settlement sites.

8.6.19. It is categorised as being of moderate visual sensory, landscape habitat, geological and cultural value, but outstanding value for its historic landscape (CYNONHL556 which excludes and surrounds the Proposed Scheme.'

8.6.20. The sensitivity of LCA Sirhowy Valley slopes is considered to be **medium**.

LCA Valley Slopes Machen – Ystrad Mynach (HLP&SS)

8.6.21. LCA Valley slopes Machen – Ystrad Mynach (HLP&SS) spans the northern and eastern slopes of the Rhymney Valley, bounded by settlements in the Rhymney Valley to the north, west and south and the Sirhowy Valley to the east. It is an area of hills and valleys with a mix of landcover. LCA Valley slopes Machen – Ystrad Mynach bisects the Proposed Scheme. Tip 1 and the adjacent Bedwas colliery lie within this LCA. Visual sensory aspect area CYNONVS260 and cultural landscape CYNONCLS028 occupy this LCA. The LCA is divided into two parcels by a ribbon of historic landscape CYNONHL701 which includes the colliery and both tips, Landscape habitat areas CYNONLH145, CYNONLH155 and a small part of LH153 overlay the area.

8.6.22. Its key characteristics include:

- An area of sloping valley side on the northern / eastern side of the Rhymney Valley. The land generally rises from a height of approximately 100m AOD at the urban edge to approximately 300m AOD at the top of the slopes;
- Pastoral farmland in enclosed, regular patterned fields, with blocks of broadleaf woodland and coniferous plantation. Areas of bracken dominated steeper / higher slopes in areas such as Mynydd Di. No or little seasonal interest, muted colours;
- Higher side slopes have an open upland character;
- Hills / valleys with a mixed landcover. A settled landscape with moderate sense of place and distinctiveness;

- Scattered rural settlements with farms;
- Boundaries are mixed, hedgerows with some stone walls on higher slopes;
- Large scale, open landscape, diversity with medium texture. Lines in the landscape are angular;
- Infrequent level of human access;
- Negligible nighttime light pollution;
- Building / construction materials stone, render, slate roofs; and
- Attractive views out of the LCA towards the skyline and valleys. Some detractive views out of and into the LCA. Including pylons.

8.6.23. LandMap recommendations for conserving and enhancing its character include:

- Conserving the open upland feel of the higher side slopes; and
- Reducing the dominance of coniferous plantations over large areas and reintroducing native broadleaved trees on an appropriate scale.

8.6.24. The area is of moderate value due to its openness and attractive views across the Rhymney valley, geology, mosaic of landscape habitats. The lack of unique features, coniferous plantations and views of the built up areas in the valley base detract from the value.

8.6.25. The sensitivity of LCA Valley Slopes Machen – Ystrad Mynach is considered to be **medium**.

LCA Mynydd y Lan (EU / P)

8.6.26. LCA Mynydd y Lan is an area of exposed upland / plateau to the north of the proposed haul route and to the northeast of the main Proposed Scheme. The southern part of the LCA is within the study area. Its key characteristics include:

- Upland grazing;
- Open upland ridge, land cover of rough grazing and bracken, with some old stone walls;
- Panoramic views out over lower lying land to the south (longer views) and coniferous plantation to south and west (shorter views). To north there are views to higher land the built up areas of Blackwood and Pontllanfraith;
- Some visual clutter of pylons slightly detracts from this otherwise wild / exposed typical upland area. Pylons are not in keeping with character of the area. Incongruous vertical elements;
- Not remote as close to valleys and their associated urban areas;
- Exposed, large scale;
- No settlements; and
- Area of exposed upland flanked by coniferous plantation on lower slopes, contour, change from rough to more improved grazing.

8.6.27. It is a high value landscape. The sensitivity to change of LCA Mynydd y Lan is considered to be **high**.

LCA NW of Mynydd y Lan (HLP&SS)

8.6.28. This LCA lies to the north of the Proposed Scheme, and areas to the south of the LCA fall within the study area. The LCA forms a large part of SLA NH1.6 Mynyddislwyn. A representative view from this LCA and SLA is discussed in the Visual section. The key characteristics of this LCA include:

- This is an area of pastoral farmland;

- slopes relatively gently from a height of 200m AOD where it borders the built form lower down the valley side up to 300m AOD as it approaches the plateau of Mynydd y Lan;
- The area is relatively open with views out across the Sirhowy Valley and to the settlements of Pontllanfraith and Blackwood to the north;
- On the lower slopes a number of small linear areas of broadleaved woodland extend up the slopes;
- A network of minor roads criss-cross the area; and
- Scattered rural farms, mosaic field pattern, dry stone walls, hedgerows.

8.6.29. The area has a combination of both attractive and unattractive visual elements which result in the overall evaluation as moderate.

8.6.30. The sensitivity to change of LCA NW of Mynydd y Lan is considered to be **medium**.

LCA Wooded Slopes west of Mynydd y Lan (HLP&SS)

8.6.31. Key characteristics include:

- This area comprises of steep sided valley sides covered with coniferous plantation;
- The slopes generally have a southwest aspect and look down on the settlements of Wattsville and Ynysddu on the valley floor and across the valley to the wooded slopes on the other side. The area has a limited upland feel due to the steep wooded slopes;
- Woodland Managed as a coniferous plantation. Consider planting some broadleaved woodland when the coniferous is felled;
- No settlements. The area is undeveloped;
- Some views out across Mynydd y Lan; and
- In general it is a common landscape type with no noticeable visual and sensory elements.

8.6.32. It is evaluated as moderate value. The justification is: 'The area is undeveloped. Some views out across Mynydd y Lan. In general it is a common landscape type with no noticeable visual and sensory elements'.

8.6.33. The sensitivity to change of LCA Wooded Slopes west of Mynydd y Lan is considered to be **medium**.

LCA Wooded Slopes Cwmcarn (HLP&SS)

8.6.34. This LCA occupies the slopes of the adjoining Ebbw valley, and its aspect is predominantly eastwards. The southern-most part of this LCA extends into the northeast section of the study area. Its key characteristics include:

- This area comprises of steep sided valley sides that are cloaked in coniferous plantation woodland;
- The slopes rise to a height of 370m AOD where they back on to the plateau of Mynydd y Lan;
- There are views down to the valley base on to the settlements of Crosskeys and Abercarn and across the narrow valley to the similarly wooded slopes on the other side;
- The area does not have an upland feel but it is distinct from more lowland areas;
- No settlements;
- Enclosed feel, sheltered, remote;
- Area is managed as Coniferous plantation. Dense, dominant coniferous trees; and
- Management recommendation: planting broadleaved trees when plantation areas are felled.

8.6.35. It is considered to be of moderate value, justification: 'The area is undeveloped but is largely clothed in coniferous plantation which makes views within of a short distance and of low value. Also views out are limited by woodland although there are some attractive views out from the western edge on to Mynydd y Lan. The landscape has no obvious remarkable features and coniferous plantation in itself is not a valuable landscape type although it can have some landscape value clothing valley sides in green all year round.'

8.6.36. The sensitivity to change of LCA Wooded Slopes Cwmcarn is considered to be **medium**.

LCA Rhymney Valley South of Caerphilly

8.6.37. Bounded to the north by the urban edge of Caerphilly and nearby settlements, this LCA lies south of the study area with a small segment within the study area. The SLA south Caerphilly occupies a large proportion of this LCA. Its key characteristics include:

- a wide valley sloping gently upwards to the south, the steepness of the slope increasing as the land rises up to areas such as Caerphilly Common and Rudry Common;
- The land use is a mix of pastoral farmland on the slopes and coniferous plantations and Bracken dominated land associated with the higher areas such as Caerphilly Common and Rudry Common;
- There are views across the valley and down into the Valley with the settlement of Caerphilly being a dominant feature;
- Scattered farms;
- Open, large scale;
- Openness of higher ground; and
- Dominance of coniferous plantations over large areas.

8.6.38. It is given an overall evaluation of moderate value. This is justified by: The area is open and has views down into the valley and has attractive short scale views within the 'Common' areas but the area has no remarkable / valuable / unique features and the coniferous plantations and views down on to the built up area of Caerphilly detract from the value.'

8.6.39. The sensitivity to change of LCA Rhymney Valley South of Caerphilly is considered to be **medium**.

LCA Risca (BL)

8.6.40. LCA Risca lies parallel to and north and east of LCA Sirhowy Valley Slopes. Its key characteristics include:

- Predominantly built up, LCA Risca is an 'urban area of housing with some areas of industry in valley setting;
- some attractive views out to wooded valley sides and open tops lessens the overall sense of enclosure and provides a small measure of relief from the dominant built form;
- noise from traffic on the A467 along the southwestern areas.'; and
- Enclosed by valley sides, the urban development is a sinuous corridor of industrial use and remains, transport and residential properties.

8.6.41. The LCA Risca area is overlaid by historic landscape CYNONHL660 which is described as outstanding due to its integrity as an historically important industrial settlement / transport corridor. Its value is high; and overlaid by landscape habitats CYNONLH148 (with a small urban part of

CYNONLH147), which due to the urban-influenced habitats and small area of nature conservation are of moderate value.

8.6.42. The sensitivity to change of LCA Risca is considered to be **high** due to the high and outstanding value of its historic landscape.

LCA Caerphilly (BL)

8.6.43. This LCA comprises is the urban area of Caerphilly and includes the settlements of Bedwas, Trethomas, Graig -y-Rhacca. The study area includes the eastern section of this LCA. Key characteristics of the LCA include:

- Rolling, undulating land, urban development;
- Town dominated by castle / focal point;
- Central shops contribute to small town character;
- Outer areas fringed by warehouse development;
- Valley sides encircle the town, some views out to valley sides;
- Recent housing e.g. at Penyrheol has extended the urban character into the neighbouring LCA;
- Enclosed, diverse LCA. Noisy, declining.

8.6.44. It is evaluated as being of low value overall. The sensitivity to change of LCA Caerphilly is considered to be **low**.

SPECIAL LANDSCAPE AREAS

8.6.45. Special Landscape Areas are non-statutory designations 'applied by the local planning authority to define areas of high landscape importance within their administrative boundaries' (source NRW)[51] and aim to protect areas that exhibit distinct features and characteristics. These areas will be protected by planning policies and strategies from any development that would harm their distinctive features or characteristics. Several SLA are located throughout the borough. This includes SLA NH1.4 North Caerphilly, which hosts the Proposed Scheme.

8.6.46. Special Landscape Areas within the Caerphilly area include:

- NH1.3 Mynydd Eglwysilian;
- NH1.4 North Caerphilly;
- NH1.5 South Caerphilly; and
- NH1.6 Mynyddislwyn.

8.6.47. Representative views towards the site from the four SLA have been assessed in this chapter, taken from a number of viewpoints on public rights of way through the areas.

8.6.48. NH1.4 North Caerphilly, the host SLA, contains almost all of the Proposed Scheme. The southern part of NH1.6 Mynyddislwyn is within the 1km study area. The south edge of the 1km study area encroaches on the edge of NH1.5 South Caerphilly. The effects of the proposals on these SLA are

[51] NRW (2017) *LANDMAP Guidance Note 1: LANDMAP and Special Landscape Areas*. Available online at: GN1 LANDMAP and Special Landscape Areas (naturalresources.wales).

assessed in this chapter. NH1.3 Mynydd Eglwysilian lies outside the study area and will not be discussed further in this chapter.

NH1.4 North Caerphilly

8.6.49. NH1.4 North Caerphilly, the host SLA, is described as 'a substantial area of the middle Rhymney valley landscape, almost totally surrounded by developed valley floors. It is important for public access and recreation, and links into national recreational routes. It provides a visual context and setting to settlements along the valley floor. The eastern edge along the Rhymney Valley Ridgeway Walk provides the boundary between the Rhymney and Sirhowy Valleys.'[52] The majority of the Proposed Scheme lies within the SLA. The key characteristics include:

- Relatively gentle, rolling valley side, rising to Mynydd y Grug. Much of the area looks down on to Caerphilly and across the Rhymney Valley giving it an open feel;
- Views from the countryside out onto urban areas and coniferous plantations detract from the value of the area. Towards the southeast of the SLA near Machen the slopes are steeper and more wooded resulting in a more enclosed and upland feel which dominate the landscape;
- Lower valley sides characterised by mosaic landscape habitats of rough pasture, semi-improved grassland, hedgerows, hedgerow trees and small spinneys. The landform is a mix of pastoral farmland in small – medium fields, broadleaf woodland, Ancient woodland, coniferous plantation and features typical of the former coalfield valleys;
- Bracken dominates the steeper / higher slopes in some areas e.g. Mynydd Dimlaith;
- Archaeologically rich, diverse multi-period upland landscape with particularly significant concentrations of prehistoric ritual / funerary monuments and medieval settlement sites. The landscape has remained essentially unchanged, although some woodland has been replaced by conifer plantation;
- Agriculture, forestry and rural settlements and practices are the predominant cultural influences on this area. Evidence of historic and contemporary human occupation and exploitation in the form of prehistoric monuments, redundant industrial workings, transport systems, and forestry;
- Landscape habitats include improved grassland, patchy broadleaved woodland of upland Ash, Oak, Birch, ancient woodland with diverse ground flora, semi-improved neutral and acid grasslands, marshy grassland, bracken, conifer plantation. Beech is associated with hedges;
- Geological landscape: Steep-sided U shaped glaciated valley cut into South Wales pennant sandstones with glacial sands, gravels and boulder clay present. Areas of derelict and reclaimed land associated with former mining and quarrying industries.
- Boundary treatments are mixed, generally poorly managed and of varying quality;
- Covered by a network of public rights of way, the Rhymney Valley Ridgeway Walk long distance path along its northern boundary. Important area for public access and recreational use.

[52] Caerphilly County Borough Council.

Key Management Issues

- Potential loss of archaeology, historic environment, geological and geomorphological features due to development. Protect the wealth of multi-period archaeology;
- Woodland and plantation management. Soften effect of coniferous plantations upon landscape characteristics e.g. planting broadleaved trees to edges, improving biodiversity;
- Retain, conserve, maintain and enhance characteristic dry stone walls and hedgerow features.
- Prevent and manage degradation of landscape, habitats and quality through management of public access areas, corridors, removal and prevention of fly tipping, burnt / dumped cars, littering and illegal off roading. Enhance public rights of way network;
- Protect the SLA from inappropriate development, development pressure and encroachment into the countryside;
- Encourage reduction of grazing in sensitive landscape habitat areas. Increase grazing in bracken-dominated areas to reduce its spread.
    - The sensitivity to change of NH1.4 North Caerphilly is **medium** as SLAs are non-designated landscapes of regional importance.

NH1.5 South Caerphilly

8.6.50. The SLA is a buffer between Caerphilly and the M4 corridor, and forms the setting for historic Caerphilly, providing recreational opportunities with a mix of landform, plantations and a network of public rights of way and important habitats. Its key characteristics include:

- Important recreation area including Caerphilly Mountain, common land, key sites and a network of PRoW;
- Range of landscape habitat types including upland heath and moorland, conifer plantation, broadleaved woodlands, lowland mosaics of grassland, hedgerows, spinneys and arable farmland. Habitats include bracken, dry heath, amenity / improved grassland, acid grassland, semi-improved grassland, calcareous grasslands and woodland (oak / ash) supporting European and UK Protected Species;
- Boundaries include hedgerows with mature hedgerow trees predominate throughout the SLA. A few poorly maintained dry stone walls are present, mainly on the common land;
- Geology comprises a sandstone ridge with scarp slope across a dissected plain of Old Devonian Red Sandstone, and carboniferous limestone ridge with evidence of past coal and mineral extraction, derelict coal mine sites, spoil tips and some evidence of ancient landslips;
- A wide valley that gently slopes upwards to the south. The steepness of the slope increases as the land rises up to Caerphilly Common and Rudry Common. Dominant views are across the valley and downwards to Caerphilly and other settlements;
- Mix of pastoral farmland on the lower and gentle slopes with coniferous woodland dominating the higher areas. Scattered rural buildings and farms are the primary settlement pattern;
- The main visual detractor of this SLA is the coniferous plantations in the more lowland areas;
- A complex, multi-period landscape containing evidence of prehistoric, Roman, medieval and post-medieval occupation that has remained relatively unchanged, with little evidence of intrusion by 19th – 20th century industrial or residential development; and
- Predominant landscape pattern is characterised by fields enclosing areas of open moorland interspersed with substantial ancient, semi-natural woodland. Isolated, dispersed farmsteads.

Key Management Issues

- Potential loss of archaeological, historic, geological or geomorphological features due to development;
- Reinstate broadleaved woodland, particularly at the edge of coniferous woodland. Reduce the dominance of coniferous woodland;
- Reduce the impact of recreational activity on habitats and landscape quality;
- Preserve the openness of higher ground.
- Prevent encroachment into the SLA or countryside, resist development pressure at the edge of settlements. All new development to be sited sensitively with softening of the urban edge;
- Introduce stock grazing to reduce and control bracken and scrub, conserve heath habitat;
- Retain, maintain and enhance existing hedgerows, banks and stonewalls;
- Minimise and remove fly tipping, burnt / dumped cars, littering and illegal off roading;'

8.6.51. The sensitivity to change of NH1.5 South Caerphilly is medium as SLAs are non-designated landscapes of regional importance.

NH1.6 Mynyddislwyn

8.6.52. Part of this SLA lies in the northeast study area. Described as, 'a small, but important open upland area surrounded by extensive plantations.' Its key characteristics include:

- Evidence of historic and contemporary human occupation and exploitation in the form of prehistoric monuments, redundant industrial workings, transport systems and forestry;
- Landscape habitats include; coniferous woodland, semi natural broadleaved woodland, acid grassland, neutral grassland, marshy grassland, improved grassland, upland heathland, dry heath and bracken. Ancient woodland on the higher slopes. European and UK Protected Species present;
- Boundaries predominantly hedgerows. Land management includes stock grazing and tree felling;
- Geology - steep sided South Wales pennant sandstone valleys with boulder clay, glacial sands / gravel and alluvium in valley floor. Disused sandstone quarries, closed colliery shafts and spoil tips present. Extensive 20th century quarrying has affected the coherence of the landscape;
- Relatively small, distinct landscape unit formed by the open, upland ridge of Mynydd y Lan to the north of Cwmfelinfach and west of Abercarn. Represents a key open upland area in an intensively developed part of the borough, that has not totally been given over to commercial forestry plantations;
- Open ridge surrounded on two sides by plantations covering the steep valley sides, which form a distinctive backdrop to the settlements on the valley floors. Includes the more enclosed agricultural area of Mynydd Islwyn, a mix of rough pasture and grazing land;
- A large and reasonably well-preserved irregular rural field pattern of post-medieval date, which has survived largely intact in spite of encroachment by 20th Century quarrying activity; and
- An extensive, relatively well-preserved tract of open moorland is also present at Mynydd y Lan, which has remained largely intact.
- Much semi-natural woodland has been superseded by modern forestry plantation.
- Some archaeological remains recorded in this area.

Key Management Issues

- Avoid the loss of historic and cultural environment features or geological or geomorphological features;
- Retain the open character of Mynydd y Lan. Prevent loss and degradation of farmed landscape e.g.: field boundaries, spinneys etc. Retain and enhance hedgerows;
- Felling and management of the coniferous woodland to open up the area and increase the ecological value. Enlarge the areas of ancient woodland and broadleaved woodland in the SLA;
- Regenerate and / or reclaim the disused quarry areas and spoil tips;
- Prevent and reduce habitat fragmentation through protection of landscape habitats and linkages;
- Reduce grazing to increase grassland ecological value;
- Prevent vertical clutter e.g. incongruous vertical elements, including pylons and wind turbines, to protect the open integrity of the area.
- Minimise and remove visual landscape degradation including fly tipping, burnt / dumped cars, littering and illegal off roading;
- Reduce development pressure along the settlement edge. All new development should be sited sensitively, soften the generally well-defined urban edge; and
- Conserve notable habitats, implement management plans.

8.6.53. The sensitivity to change of NH1.6 Mynyddislwyn is **medium** as SLAs are non-designated landscapes of regional importance.

VISUALLY IMPORTANT LOCAL LANDSCAPES

8.6.54. A local designation, VILL are landscapes that score highly in visual and cultural aspect in Landmap yet are of a lower score for geological and landscape aspects than Special Landscape Areas. In the Caerphilly Area, these include:

- NH2.3 Abercarn; and
- NH2.4 Rudry.

8.6.55. Neither VILL lies within the 1km study area. VILL are not discussed further in this chapter. Viewpoints representative of views from NH2.4 Rudry VILL are assessed in the visual chapter.

GREEN WEDGES

8.6.56. Green wedges (GW) are located around the urban-rural interface of settlements and between settlements, their function is to prevent the coalescence between settlements, they also contribute towards green infrastructure and protect the identity of separate settlements. The green wedges within the study area include:

- SI1.19 Cwmfelinfach and Ynysddu; and
- SI1.23 Machen, Graig y Rhacca and Waterloo.

SI1.19 Cwmfelinfach and Ynysddu

8.6.57. SI1.19 Cwmfelinfach and Ynysddu is described as ‘not a dominant feature in the wider landscape setting as it is placed along the valley floor. The immediate setting of the green wedge is however, significant due to the already close proximity of the two settlements.’ The west side of SI1.19 Cwmfelinfach and Ynysddu is a locally designated SINC.

8.6.58. The sensitivity to change of SI1.19 Cwmfelinfach and Ynysddu is considered to be **high** due to its location within LCA Risca and function to prevent the coalescence of settlements.

SI1.23 Machen, Graig y Rhacca and Waterloo

8.6.59. SI1.23 Machen, Graig y Rhacca and Waterloo is described as, 'a valuable visual break in the immediate and wider setting. Further development of the land remaining between Machen, Graig-y-Rhacca and Waterloo would result in the coalescence of three settlements, each of which has their own sense of place and identity.' West of Graig y Rhacca, the green wedge is allocated for leisure land use. Within the south and east areas of SI1.23 are SINCs.

8.6.60. The sensitivity to change of SI1.23 Machen, Graig y Rhacca and Waterloo is considered to be **medium** due to its location within LCA Caerphilly and function to prevent the coalescence of settlements.

COUNTRY PARKS

8.6.61. Sirhowy Valley Country Park occupies land which has been identified for the haulage route. An area of land within the country park has been identified as one of the new national covid memorial woodlands, Ynys Hywel Covid Memorial Woodland. Initial planting works took place in early 2023.

8.6.62. The sensitivity to change of the Sirhowy Valley Country Park is considered to be **High**.

HERITAGE LANDSCAPES

8.6.63. There are no heritage landscapes or conservation areas within the 1km study area, but there are several SMs within the study area landscape including, three round barrows at Twyn Cae-Hugh and Twyn-Yr-Oerfel (two) lying just outside the boundary of the Proposed Scheme, Pen-y-Rhiw Round Cairn and Cairn Cemetery on Mynydd Bach to the northwest of the Proposed Scheme, and Bedwas Churchyard Cross which is the southwest of the Proposed Scheme. These are discussed in the Cultural Heritage chapter. Though the Proposed Scheme contains coal mining spoil heaps, considered to be part of Wales's industrial heritage, these are not designated, however, these features contribute generally to the landscape character of host NLCA, RLCA, LCA and SLA.

8.6.64. **Table 8-1** shows the landscape receptors within the study area which will be assessed.

Table 8-1 - Landscape receptors within the study area

Receptor	Comment	Sensitivity / value
NLCA37 Dyffrynnoedd y De / South Wales Valleys	The host NLCA. The Proposed Scheme lies within this NLCA. Within the study area.	Medium
Regional LCA: South-East Wales Landscape	The host RLCA. The Proposed Scheme lies within this RLCA. Within the study area.	Medium
LCA Mynydd Y Grug	A host LCA. The majority of the Proposed Scheme lies within this LCA. Within the study area.	High
LCA Sirhowy Valley Slopes	A host LCA. The main access haul route lies within this LCA. Within the study area.	Medium

Receptor	Comment	Sensitivity / value
LCA Valley Slopes Machen – Ystrad Mynach	A host LCA. Part of the southeast and whole southern half of the Proposed Scheme lies within this LCA. Within the study area.	Medium
LCA Mynydd y Lan	Within the study area.	High
LCA NW of Mynydd y Lan	Within the study area.	Medium
LCA Wooded Slopes west of Mynydd y Lan	Within the study area.	Medium
LCA Wooded Slopes Cwmcarn	Within the study area.	Medium
LCA Rhymney Valley South of Caerphilly	A small segment lies in the south study area.	Medium
LCA Risca	Part lies within the northeast of the study area.	High
LCA Caerphilly	A small area lies in the south study area.	Low
SLA NH1.4 North Caerphilly	Within the study area.	Medum
SLA NH1.5 South Caerphilly	A very small northwest area lies within the study area.	Medium
SLA NH1.6 Mynyddislwyn	South section lies within the study area.	Medium
GW SI1.19 Cwmfelinfach and Ynysddu	Entirely within the study area.	High
GW SI1.23 Machen, Graig y Rhacca + Waterloo	West part is within the study area.	Low
Sirhowy Country Park and Ynys Hywel Covid Memorial Woodland	The Country Park is host to the access haul route. It is within the study area.	High

WOODLANDS AND HEDGEROWS

8.6.65. There are a number of Ancient Woodlands including areas of Forest Management Areas near the site and within the study area. The Ancient Woodlands include areas of Ancient Semi Natural woodland; Plantation on Ancient Woodland site; Restored Ancient Woodland and Ancient Woodland Site of Unknown category. Swathes of these ancient woodland types are included within Forest Management Areas, (areas managed by NRW).

8.6.66. Under the Hedgerow Regulations 1997, Important Hedgerows are protected. To qualify as Important, the hedgerow must conform with criteria set out in the regulations. There are a number of protected trees in the area. Refer to V2-S09/0002.

8.6.67. These landscape receptors are not assessed further in this chapter. Effects on these features are assessed in Chapter 9: Ecology and Nature Conservation.

8.7 BASELINE CONDITIONS: VISUAL

8.7.1. There are a number of transport routes, PRoWs and recreational open spaces and publicly accessible land within the study area which are available for use by visual receptors.

HIGHWAYS AND RAILWAYS

8.7.2. The A469 lies in the Rhymney Valley to the west of the site, the A468 lies to the south, the B4251 to the north and the A467 to the east, a number of unclassified roads cross the mountains, and railway lines from Cardiff to Merthyr Tydfil and Rhymney run northwards to the west of the tips and at the far east of the study area.

8.7.3. Public rights of way, long distance paths and national routes

8.7.4. There is a network of public footpaths, bridleways, restricted byways and cycleways within the study area which will be taken into consideration as part of the detailed assessment. These include the long distance paths, the Rhymney Valley Ridgeway Walk and the Sirhowy Valley Walk which pass very close to the site and the Cambrian Way and the Raven Walk are within the study area. National Cycleway routes 4 (The Celtic Trail), 47 and 475 are near the site, and there is a dense network of PRoWs to the north, south, west and east approaching the tips.

REGISTERED COMMON LAND AND OTHER PUBLICLY ACCESSIBLE LAND

8.7.5. There are areas of Registered Common Land, other Statutory Access Land and Open Country Countryside and Rights of Way Act 2000 (CRoW Act) access land on hill tops and slopes near the site, including stretches of track, Mynydd Dimlaith, Caerphilly Common, Mynydd Rudry and Mynydd y Grug which adjoins the northern tip.

8.7.6. Similarly, large areas of Dedicated Woodland CRoW Act lie immediately east, west and south of the site, containing a network of permissive paths and trails e.g. Coed Cefn-pwll-du, The Warren, Coed-y-Bont. The PRoWs and publicly accessible areas of land are illustrated on drawing, V2-S08/0004.

8.7.7. There are a number of recreational open spaces in the area, including Sirhowy Valley Country Park which lies to the east of the site. Part of the Country Park, Ynys Hywel, has been identified by the Welsh Government as the third in a series of new national Covid Memorial Woodlands, this will be open to the public, with a network of new footpaths, glades and woodland planting which took place during 2023.

HERITAGE LANDSCAPES

8.7.8. There are a number of ancient monuments and listed buildings or structures in the landscape surrounding Caerphilly and the site. These may affect the sensitivity of the character area. Direct impacts of the development on listed buildings have been considered in the Cultural Heritage chapter.

8.7.9. Tree Preservation Orders (TPO) are made by a Planning Authority under Technical Advice Note (TAN) 10: Tree Preservation Orders. Their purpose is to protect specific trees, groups of trees or woodlands, in the interests of amenity. They are a means of protecting individual trees, groups of trees or woodlands whose removal would have significant impact on the public amenity of an area. There are several individual trees and tree groups with TPO status situated within the study area, namely within Sirhowy Valley Country Park, and southwest of Tip 1. These are indicated on drawing V2-S09/0002. TPOs are assessed in Chapter 9: Ecology and Nature Conservation.

DESIGNATED LANDSCAPES

8.7.10. There are no National Parks or National Landscapes within the 1km study area. There are four non-statutory designated Special Landscape areas within the Caerphilly Council area which host viewpoint locations, three of these areas lie within the 1km study area. Locally designated Visually Important Local Landscapes (VILL) are landscapes that score highly in visual and cultural aspect in Landmap yet are of a lower score for geological and landscape aspects than Special Landscape Areas. There are two in the Caerphilly Area, and although neither lies within the 1km study area, representative views from NH2.4 Rudry VILL are assessed. Locally designated Green Wedges are located around the urban-rural interface of settlements and between settlements, their function is to prevent the coalescence between settlements, they also contribute towards green infrastructure and protect the identity of separate settlements. Two Green Wedges are within the 1km study area.

8.7.11. The habitats of Sites of Importance for Nature Conservation (SINC) and Local Nature Reserves (LNR) are features of and contribute to the landscape character of the area. There are several SINCs and one LNR within the 1km study area, their habitats and interest will inform appropriate ecological and landscape mitigation measures. These include Mynydd u Grug West of Cwmfelinfach, Twyn yr Oerfel South of Cwmfelinfach, River Sirhowy and Sirhowy Country Park Meadows Cwmfelinfach. The baseline data and effects on Nature Conservation are considered and assessed in Chapter 9: Ecology and Nature Conservation.

Study Area

8.7.12. Bedwas Colliery Tips comprises two colliery spoil tips named Tip 1 (lower) and Tip 2 (upper). Tip 2 is located on the ridge at the top of Mynydd y Grug to the north of Bedwas, while Tip 1 (comprised of multiple tiers) is on the hillside just above Bedwas and Trethomas.

8.7.13. The landscape within the study area comprises largely rural-urban fringe, industrial sites, residential houses, and agricultural land.

8.7.14. For this assessment, the base year has been set as 2023 and the completion of the Proposed Scheme will be 2030. Assumptions have therefore been made regarding changes to the views in the period between completing the assessment and the base year at completion.

8.7.15. An initial baseline assessment was carried out during the walk-over surveys on 6 – 7 March 2023.

8.7.16. 19 viewpoints around the site were assessed in terms of their features and sensitivity. These are summarised in **Table 8-2** and shown in V2-S08/0013.

Table 8-2 - Visual Receptor Baseline and Sensitivity

Viewpoint Number	Brief Baseline Description of the Existing View	Sensitivity
1	**Raven Walk Regional Trail** – This viewpoint encompasses users of Public Rights of Way (PRoW) RAN/17/5. The initial view spans across a field, enclosed by hedgerows, extending towards dense scrubby woodland in the distance. The terrain gradually slopes upward, rising slightly towards the northeast. The sensitivity of this viewpoint is considered high, as it offers views to individuals who utilise public open spaces for the purpose of enjoying the countryside.	High
2	**Rhymney Valley Ridgeway Walk (RVRW), Mynydd y Grug Common** – This viewpoint is captured from a PRoW located on the southwestern side of Tip 2. The view from this exposed position encompasses wind turbines, a prominent drystone wall in the foreground, and the residential area of Cwmfelinfach in the background. When looking southeast, the dominating features of the view include birch woodland and the upper section of Tip 2. The sensitivity of this viewpoint is considered high, as it offers vistas to users of public open spaces seeking to enjoy the surrounding countryside.	High
3	**Rhymney Valley Ridgeway Walk looking west (by Twyn yr Oerfel Cairns)** – The southeastern view is predominantly filled by Tip 2, positioned alongside the conifer woodland. Beyond, the vistas encompass the Bristol Channel, with a glimpse of Cornwall visible in the background. The sensitivity of this viewpoint is described as high because it has views by users of public open spaces for the enjoyment of the countryside.	High
4	**PRoW by Senghenydd Dyke, Mynydd Eglwysilan** – Looking northeast the view from the path is occupied by dense conifer woodland. The path gradually descends, while the sight of the Tips is obscured by a drystone wall running parallel to a row of conifers. There are groups and rows of mature evergreen trees covering the view. The sensitivity of this viewpoint is described as high because it has views by users of public open spaces for the enjoyment of the countryside.	High
5	**Clos Maes Mawr, Penyrheol looking northeast** – This viewpoint provides a northeast-facing perspective from a residential area towards the Tips. In the distance, the view expands to reveal the hillside and the partially obscured Tips, partially hidden by nearby dwellings. The sensitivity of this viewpoint is considered high due to its location at the edge of a densely populated residential area, making it exposed to and offering clear views towards the Tip.	High
6	**Entrance to Hynydd Dinlaith Common / Pandy-mawr Road** – This viewpoint is taken from a PRoW at the west side of Tip 1 Looking north. The hillsides and Tips are screened partially by hedgerows alongside the path. Looking at the southeast, the path is divided in two by wooded slopes and hedgerow dips to the valley floor, where the urban fringe of Bedwas is visible. The sensitivity of this viewpoint is described as high because it has views by users of public open spaces for the enjoyment of the CRoW Act.	High
7	**Mynydd y Grug Common gateway** - When observing the view to the northeast, the hillsides and tips in the background are partially obscured by hedgerows, with a Corton gateway entrance to Mynydd y Grug Common	High

Viewpoint Number	Brief Baseline Description of the Existing View	Sensitivity
	occupying the foreground. A drystone wall runs alongside the path, partially encircling the vista towards the south. The sensitivity of this viewpoint is described as high because it has views by users of PRoWs for the enjoyment of the countryside.	
8	**Side of Tip 2 / green lane (PRoW)** – When facing northwest, the tips are concealed by the slope of the hill. However, when looking northeast, Swansea Bay comes into view in the background. The view is dominated by the presence of Caerphilly town and the Cwmfelinfach industrial area in the middle ground. In the distance, Rudry Common and Mynydd Rudry are visible. The sensitivity of this viewpoint is described as high because it has views by users of PRoWs for the enjoyment of the countryside.	High
9	**View from Meadow Croft (House), Mountain Road** – The viewpoint is captured from Meadow Croft House, facing towards the tips. From this location, the upper portion of Tip 1 is visible. In the background, Rudry Common and Mynydd Rudry Common come into view. The sensitivity of this viewpoint is considered high, as it offers views to both residents and road users passing through the area.	High
10	**Rhiw Caer Celyn, Pandy Road** – The view is captured from Pandy Road, situated to the west of the tips, facing northeast. In the foreground, a solitary dwelling occupies the visual space, while the partially visible top of Tip 1 can be observed in the background. The sensitivity of this viewpoint is deemed high, as it offers views to both residents and road users passing through the area.	High
11	**Bedwas park, Church Street** – This view is taken from Bedwas Park, located on the south side of the tips. In the distance, tips and commons are visible and partially covered by dwellings and deciduous trees. The sensitivity of this viewpoint is described as high because it has views by users of Bedwas Park, visitors and dwellers of this area.	High
12	**Junction of Navigation St, Llanfabon Drive and Standard St, Bedwas** – The view is captured from the southern side of Tip 1, at the junction of Standard Street and Navigation Street. The prominent feature dominating the view is the top of Tip 1. The sensitivity of this viewpoint is described as high due to its significant exposure, providing clear views to both residents and road users in the vicinity.	High
13	**Cycleway (Power railway) looking northwest** – The view is captured from the cycle path, a secluded pathway enclosed by trees. The visibility from this vantage point is entirely obscured by the surrounding vegetation. Consequently, the sensitivity of this viewpoint is considered moderate, as there is no direct exposure towards the tips or any significant visual impact from this position.	Moderate
14	**PRoW (RUD/FP4/3) Mynydd Rudry, Rudry Common** – The view is captured from the PRoW. In the background, the summit of one of the tips is discernible, while the industrial area dominates the middle distance. The	High

Viewpoint Number	Brief Baseline Description of the Existing View	Sensitivity
	sensitivity of this viewpoint is described as high because it has views by users of PRoWs for the enjoyment of the countryside.	
15	**Caerphilly Castle, Caerphilly** – The perspective captured in the image is from the southeaster side of the castle, with the castle itself prominently commanding the scene. The northern periphery of the view reveals the tips, while the intermediate space is occupied by the residential area. The sensitivity of this viewpoint is deemed to be of high significance due to the complete visibility of the tips by visitors of the castle. Additionally, it should be emphasized that the castle itself carries considerable historical and architectural importance, as it is officially recognized and listed as a Grade 1 building and designated as a Scheduled Ancient Monument.	High
16	**Van Road, Rudry Common** – The perspective presented is captured from the roadside verge situated on the southern of the site. In the background, the summits of the tips are discernible, while the middle ground encompasses the residential vicinity. The sensitivity of this viewpoint is described as high because it has views by road users.	High
17	**Caerphilly Common (PRoW BOAT)** – The picture is captured from Caerphilly Mountain, situated to the south of the site. From this position, the summits of the tips are clearly visible in the background, while the residential area of Caerphilly dominates the middle ground. The sensitivity of this viewpoint is considered high, as it provides views to users of public open spaces who seek to appreciate the natural beauty and countryside.	High
18	**Parc Bedwas, Northover Drive Industrial Estate, Bedwas** – The photograph was taken from the southern vantage point of the Bedwas House Industrial Estate, facing towards the tips. In the foreground, the industrial estate occupies the visual space, while the residential area predominantly characterizes the middle distance. In the background, the tips and Commons come into view. The sensitivity of this viewpoint is considered high, as it provides views of the road users.	High
19	**Bedwas High School Staff Car Park and PRoW** The photograph was taken from the school staff car park situated on the southern side of the site. From this particular vantage point, both tips are clearly visible, dominating the skyline above the adjacent playing fields. The sensitivity of this viewpoint is deemed to be high, as it offers views not only to road users but also to the school community.	High

8.8 PRELIMINARY IMPACT ASSESSMENT

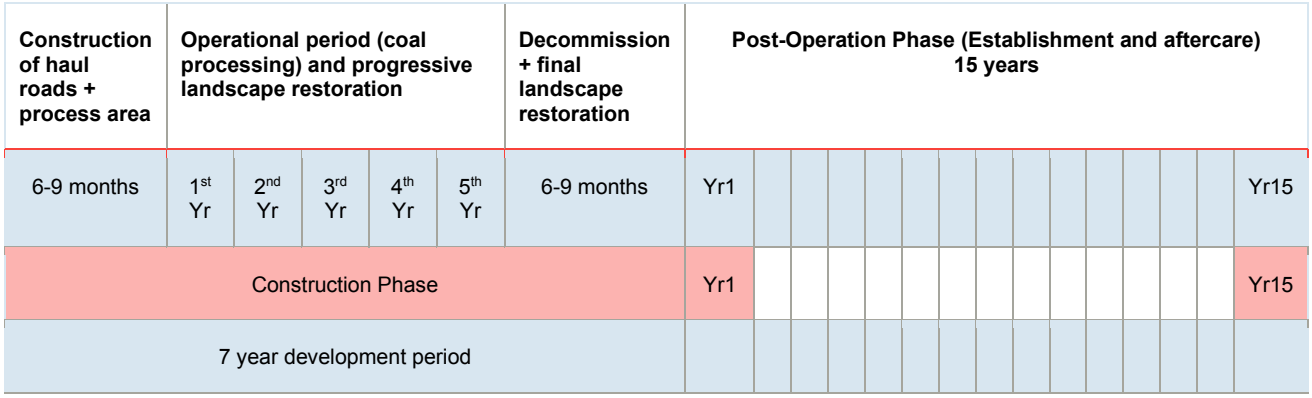
CONSTRUCTION PHASE: LANDSCAPE

8.8.1. An assessment has been undertaken to assess the significance of effects of the Proposed Scheme without mitigation at Construction Phase, Post-operation Phase Year 1 and Post-operation Year 15 without proposed mitigation. The assessment of the effects at night-time has also been taken into consideration. The construction impact assessment on landscape character is set out in **Figure 8-2** below followed by an assessment of visual impacts at each viewpoint in **Table 8-3**.

Construction Operations

8.8.2. These will comprise the construction of the new haul road from the roundabout at Risca, up the valley slopes to the process area, including process area, drainage features, preliminary earthworks, associated infrastructure and initial tree and shrub planting.

Figure 8-2 Illustrative project programme with timing of assessment



Operational Period (Coal processing and progressive restoration)

8.8.3. **Table 8-3** shows the preliminary landscape assessment of the Construction Phase (without mitigation). The existing spoil heaps will be processed and the material removed completely from Tip 1, with the processed spoil redeposited in a new location. It is assumed that when the first 1M tonnes of spoil has been processed and deposited, progressive restoration of the underlying landform beneath Tip 1 and of the Deposition Area will begin. It is assumed that progressive restoration will commence during the first year of the operational period illustrated in Figure 8-2 above.

8.8.4. The Proposed Scheme is programmed to be completed in 7 years, with the remaining earthworks, grading and progressive restoration landscape planting completed in stages throughout the 7 years.

Decommission and Final restoration

8.8.5. Decommission will take place at the end of the operational period, as projected in Figure 8-2. It is assumed that making good operations following decommission of the processing plant, compound area and removal of temporary haul routes and other infrastructure, will comprise landscape restoration operations similar to those of final restoration.

8.8.6. The final restoration planting will have one season growth and establishment in Year 1 of the post-completion establishment period. Planting completed as part of the making good operations will also have achieved up to one season growth and establishment in Year 1.

8.8.7. Planting completed during the stages of progressive restoration will have achieved a sequential, differential increase in establishment, growth and maturity across the development site.

8.8.8. At completion of the coal processing works, the access haul route from the highway network to the processing area will be offered to NRW and is expected to be retained as a permanent access to facilitate woodland management.

Table 8-3 - Preliminary Landscape Assessment of the Construction Phase (without mitigation)

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
NATIONAL NLCA37 Dyffrynnoedd y De / South Wales Valleys (Medium)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, excavation, earthworks, bunding, noise of plant movement around the Proposed Scheme, pile driving, proposed woodland planting, winter lighting. **Coal Processing & Progressive Restoration:** Use of the haulage routes, processing works. Dust and noise of processing, noise and visibility of plant movement, noise and views of haul route traffic. Progressive restoration of landscape commences after deposition of 1M tonnes processed spoil, grading Tip 1 to original contours. Landscape planting of grass seed, in stages. **Decommission and Final Restoration:** Removal of processing plant, temporary ponds, sheet-piling, final earthworks and grading. Final restoration of the common land, new deposition area, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect**: Modification and remodelling of the topography and skyline, altered, vegetated landforms. Sequential and progressive removal of Tip 1 and reduction of Tip 2 with associated creation of a deposition area throughout construction period. During construction period, any planting proposals will not have established. Final restoration: remodelled Tip 2 and newly created deposition tip, removal of Tip 1 completed. Common land grass seeded grassland establishing. **Temporary Effect** There will be a temporary adverse effect from construction and processing activities, including the creation of a more extensive area of colliery spoil while Tip 1 is processed and removed, although there are already colliery waste spoil heaps in the NLCA and there is already construction in and around the character area. There will be a temporary adverse effect from restoration activities.	Minor adverse	Slight adverse
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local	**Permanent Effect:** None	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Temporary Effect** There will be a temporary adverse effect from nighttime lighting in the uplands and increased noise from maintenance activities although there is already construction in and around the character area.		
REGIONAL South-East Wales Landscape (Medium)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, preliminary earthworks, bunding, noise of plant movement around the Proposed Scheme, pile driving, New winter lighting. **Coal Processing & Progressive restoration:** Use of the haulage routes, processing plant, ponds, earthworks, tipping. Dust and noise of processing, noise and visibility of plant movement, noise and views of haul route traffic. Temporary diversion of PROW network and inaccessible common land for Health and Safety reasons. **Decommission and Final Restoration:** Removal of processing plant, temporary ponds, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect:** Modification and remodelling of the topography and skyline, altered, vegetated landforms. Sequential removal of Tip 1 and reduction of Tip 2. The creation of a new deposition area in the landscape. Any planting proposals will not have established. At final restoration, remodelled Tip 2 and completion of new deposition area. Removal of Tip 1 completed and original valley slope contours restored. Common land seeded grassland establishing. **Temporary Effect** There will be a temporary adverse effect from construction, coal processing and restoration activities, including the creation of a third spoil heap in the landscape, although there are already colliery waste spoil heaps in the RLCA and there is already construction in and around the character area.	Minor adverse	Slight adverse
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local	**Permanent Effect**: None	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Temporary Effect** There will be a temporary adverse effect from nighttime lighting in the uplands and increased noise from maintenance activities although there is already construction in and around the character area.		
LOCAL Mynydd Y Grug (EU / P) (High)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, preliminary earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal Processing & Progressive restoration:** Earthworks over majority of the LCA, including regular use of the haulage routes, processing plant, ponds, tipping and grading. Dust and noise of processing, noise and visibility of plant movement, noise and views of haul route traffic. Temporary diversion of PRoW network and inaccessible common land for Health and Safety reasons. **Decommission and Final Restoration:** Removal of processing plant, temporary ponds, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect** Modification and remodelling of the topography and skyline, altered, vegetated landforms. Sequential removal of Tip 1 and reduction of Tip 2, the creation of a deposition area on an area of undisturbed historic landscape and landscape habitat. At final restoration, remodelled Tip 2 and newly created deposition tip complete. Removal of Tip 1 complete and original valley slopes contours restored. Common land seeded grassland establishing. **Temporary Effect** There will be a temporary adverse effect from operational and restoration activities, including the creation of a third spoil heap in the landscape, although there are already colliery waste spoil heaps in the LCA and there is already construction in and around the character area. Temporary disturbance of recreational use of the landscape.	Major adverse	Very large adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect**: None **Temporary Effect** There will be a temporary adverse effect from nighttime lighting in the uplands and increased noise from maintenance activities although there is already construction in and around the character area.	Minor adverse	Slight adverse
Sirhowy Valley Slopes (HLP&SS) (Medium)	**Construction:** The construction of the haulage routes, processing plant, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal Processing & progressive restoration:** Operational use of the haulage route to access the processing plant, increased traffic within character area, Noise of plant movement, users of the haul routes, noise of processing plant. Temporary diversion of PRoW network. **Decommission and Final Restoration:** Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect:** Retained haul route, passing places and remodelled landform on valley slopes. Modification and remodelling of the slopes and skyline above: remodelling Tip 2, creation of deposition area on Mynydd y Grug, vegetated landforms. Retention of the haul road. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities although there is already construction and forestry management in and around the character area.	Major adverse	Moderate adverse
	Nighttime: static lighting of the process area and maintenance wo00rk, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect** None **Temporary Effect**	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
		There will be a temporary adverse effect from nighttime operational/restoration maintenance activities although there is already construction and forestry management in and around the character area.		
Valley Slopes Machen – Ystrad Mynach (HLP&SS) (Medium)	**Construction:** The construction of the haulage route from Tip 1 to processing plant, ponds, earthworks, bunding, initial woodland planting. Noise of plant movement and activity, users of the haul routes, piledriving, construction of processing plant. **Coal processing & progressive restoration:** Operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip, pond use and management, earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Noise and movement of plant and vehicles operating at the tips and haul routes, noise of processing plant. **Decommission and Final Restoration:** Removal of processing plant, temporary ponds, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect**: Modification and remodelling of the skyline, vegetated landforms. Sequential removal of Tip 1, remodelling of Tip 2, creation of deposition area. **Temporary Effect** There will be a temporary adverse effect from construction and processing activities on the elevated skyline, although there is traffic movement in and around the character area and construction at lower elevations to the periphery of the character area. Seeded grassland common land.	Moderate adverse	Moderate adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect**: None **Temporary Effect** There will be a temporary adverse effect from nighttime lighting in the uplands and increased noise from maintenance activities although there is already construction in and around the character area.	Moderate adverse	Moderate adverse
Mynydd y Lan (EU / P) (High)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant. Construction activity on elevated land of similar moorland character, not in lower valley settlements. **Coal Processing & progressive restoration:** Operational use of the haulage route from the highway network to the processing plant. Noise and visual movement of plant and vehicles on the haul road and operating at elevated positions at Tip 2 and the final deposition tip. Noise of processing plant above the valley slope. Loss of enjoyment of Common land, loss of wild, exposed character. **Decommission and Final Restoration:** Removal of processing plant, sheet-piling, final earthworks and grading. Final restoration of the	**Permanent Effect**: Modification and remodelling of the valley slopes, skyline and wild common land opposite, including vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Haul road on valley slopes opposite. Haul road in panoramic views. **Temporary Effect** There will be a temporary adverse effect from construction and processing activities in the uplands with loss of wild, exposed upland character, impact of characteristic panoramic views, although there are already incongruous vertical elements (pylons) and forestry management in and around the character area.	Moderate adverse	Moderate adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	common land, new tip, remodelled Tip 2 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	Permanent Effect: None Temporary Effect There will be a temporary adverse effect from nighttime lighting in the uplands and noise of maintenance activities leading to night-time loss of wild, exposed upland character, impact on panoramic night-time views	Minor adverse	Moderate adverse
NW of Mynydd y Lan (HLP&SS) (Medium)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant. **Coal processing & progressive restoration:** Operational use of the haulage route from the highway network to the processing plant. Noise and visual movement of plant and vehicles on the haul road on the opposite valley slope and operating at elevated positions at Tip 2 and the final deposition tip. Noise of processing plant above the woodland on the valley slope opposite. Loss of enjoyment of PRoW network. **Decommission and Final Restoration:**	**Permanent Effect**: Modification and remodelling of the valley slopes and skyline opposite, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Upgraded and modified existing forest haul road within views from character area. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities although there is already construction in and around the character area.	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Removal of processing plant, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect**: None **Temporary Effect** There will be a temporary adverse effect from nighttime lighting, noise and maintenance activities on the elevated skyline and valley slopes opposite.	Minor adverse	Slight adverse
Wooded Slopes west of Mynydd y Lan (HLP&SS) (Medium)	**Construction:** The construction of the haulage route on the valley slopes opposite, construction of processing plant, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal Processing & progressive restoration:** Operational use of the haulage route from the highway network to the processing plant. Noise and visual movement of plant and vehicles on the haul road on the opposite valley slope, operating at Tip 2 and the final deposition tip. Noise of processing plant above the opposite valley slope. Loss of enjoyment of dedicated forest area and PRoW network. **Decommission and Final Restoration:**	**Permanent Effect**: Modification and remodelling of the valley slopes and skyline opposite, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Haul road within felled forest area. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities although there is already woodland management in and around the character area.	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Removal of processing plant, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect**: None **Temporary Effect** There will be a temporary adverse effect from nighttime lighting, noise and maintenance activities on the elevated skyline and valley slopes opposite.	Minor adverse	Slight adverse
Wooded Slopes Cwmcarn (HLP&SS) (Medium)	**Construction** The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal processing & progressive restoration** Operational use of the haulage route from the highway network to the processing plant. Distant noise and visual movement of plant and vehicles on the haul road, operating at Tip 2 and the final deposition tip. Distant noise of processing plant. Loss of enjoyment of dedicated forest area, PROW and long distance footpath. **Decommission and Final Restoration:**	**Permanent Effect**: Modification and remodelling of the valley slopes and skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Retained haul road within felled forest area and up valley slopes opposite. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities although there is already woodland management in and around the character area.	Moderate adverse (haul road) Minor adverse (Remainder)	Moderate adverse (haul road) Slight adverse (remainder)

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Removal of distant processing plant, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect** None **Temporary Effect** There will be a temporary adverse effect from nighttime lighting, noise and maintenance activities on the elevated skyline and valley slopes.	Minor adverse	Slight adverse
LCA Rhymney Valley South of Caerphilly (Medium)	**Construction** The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal processing & progressive restoration** Distant operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip, pond use and management, earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Distant noise and visual movement of plant and vehicles operating at the tips and haul routes, noise of processing plant.	**Permanent Effect** Modification and remodelling of the skyline north of Caerphilly and vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Sequential removal of Tip 1. **Temporary Effect** There will be a temporary adverse effect from construction and processing activities within characteristic views from the LCA although there is already construction in and around the settlements in the valley.	Moderate adverse (during works) Minor beneficial (removal of Tip 1 and final restoration)	Moderate adverse (during works) Slight beneficial (removal of Tip 1 and final restoration)

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Loss of enjoyment of local recreational landscape and common land. **Decommission and Final Restoration:** Removal works, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect** None **Temporary Effect** There will be a temporary adverse effect from nighttime maintenance activities on the elevated skyline although there is already construction in and around the valley settlements and character area.	Minor adverse	Slight adverse
Risca (BL) (High)	**Construction:** Additional traffic on the highways. Construction of the haul routes, processing plant, ponds, earthworks etc, particularly works in the Sirhowy valley. Noise from construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, noise of construction traffic on the haul routes. Winter lighting. **Coal processing & progressive restoration** Operational use of the haulage routes from the highway network and Tip 1 to the processing	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip on skyline. Haul road retained. **Temporary Effect** There will be a temporary adverse effect from elevated construction and operational activities above the level of the character area although there is already construction and traffic in and around the character area.	Minor adverse	Moderate adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	plant and to the final deposition at the deposition tip above. Elevated earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Noise and visual movement of plant and vehicles operating at the tips and haul routes above. Noise of processing plant above settlement. Potential increased traffic on local highway network. Loss of enjoyment of local gardens, country park, urban recreational and historic landscapes, PRoW network and regional trails. **Decommission and Final Restoration:** Removal of processing plant, temporary ponds, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect** None **Temporary Effect** There will be a temporary adverse effect from nighttime light and noise from maintenance activities on the elevated skyline, although there is already construction and traffic in and around the valley settlements.	Minor adverse	Moderate adverse
Caerphilly (BL) (Low)	**Construction** Potential additional traffic on local road network. The construction of the haulage routes,	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and	Minor adverse	Neutral or Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal processing & progressive restoration** Distant operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip, pond use and management, earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Distant noise and visual movement of plant and vehicles operating at the tips and haul routes, noise of processing plant. Potential increased traffic on local highway network. Loss of enjoyment of local urban recreational and historic landscapes. **Decommission and Final Restoration:** Distant removal activity. Final earthworks and grading on skyline. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	newly created deposition tip. Sequential removal of Tip 1, restoration of original contoured valley slope. **Temporary Effect** There will be a temporary adverse effect from construction, coal processing and restoration activities although there is already construction and traffic in and around the character area.		
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	***Permanent Effect*** *None* ***Temporary Effect*** *There will be a temporary adverse effect from nighttime maintenance activities (noise, lights) on the elevated skyline, although there is already construction and traffic in and around the valley settlements.*	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
SPECIAL LANDSCAPE AREAS North Caerphilly (Medium)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal processing & progressive restoration** Operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip, pond use and management, earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Noise and movement of plant and vehicles operating at the tips and haul routes, noise of processing plant. **Decommission and Final Restoration:** Removal of processing plant, temporary ponds, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition area. Sequential removal of Tip 1. Retained haul routes. Seeded grassland on common land. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities on the elevated skyline, although there is traffic movement in and around the character area and construction at lower elevations to the periphery of the special landscape area and within adjoining valley settlements.	Moderate adverse	Moderate adverse
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect** None **Temporary Effect** There will be a temporary adverse effect from nighttime maintenance activities on the elevated skyline, although there is already construction and traffic in and around the valley settlements below.	Moderate adverse	Moderate adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
Mynyddislwyn (Medium)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal processing & progressive restoration** Distant operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip, earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Distant noise and visual movement of plant and vehicles operating at the tips and haul routes, distant noise of processing plant. Loss of enjoyment of local recreational landscape, PROW network and common land. **Decommission and Final Restoration:** Removal activities on skyline. Final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition area. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities on the elevated skyline, although there is already construction and traffic in and around the valley settlements below.	Minor adverse	Slight adverse
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect** None **Temporary Effect** There will be a temporary adverse effect from nighttime operational maintenance activities (noise and lights) on the elevated skyline, although there is already construction and	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
		traffic in and around the valley settlements below.		
South Caerphilly (Medium)	**Construction:** The construction of the haul route from Tip 1 to the processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant construction Impact on views from the character area **Coal processing & progressive restoration** Distant operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip, pond use and management, earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Distant noise and visual movement of plant and vehicles operating at the tips and haul routes, noise of processing plant. Loss of enjoyment of local recreational landscape and common land. **Decommission and Final Restoration:** Removal of processing plant, temporary ponds, sheet-piling, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.	**Permanent Effect:** Modification and remodelling of the skyline north of Caerphilly and vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Sequential removal of Tip 1. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities within characteristic views from the SLA even though there is already construction activity in and around the valley settlements between the SLA and the site.	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect:** None **Temporary Effect** There will be a temporary adverse effect from nighttime maintenance activities on the elevated skyline, although there is already construction and traffic in and around the valley settlements below.	Minor adverse	Slight adverse
GREEN WEDGES Cwmfellinfach and Ynysddu (High)	**Construction:** The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal processing & progressive restoration** Operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip, pond use and management, earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Noise and movement of plant and vehicles operating at the tips and haul routes, noise of processing plant. Increased traffic on adjacent highway with related noise, loss of recreational enjoyment of open space. **Decommission and Final Restoration:** Removal of processing plant, sheet-piling etc from site and along local highway next to site.	**Permanent Effect**: Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Haul road retained. **Temporary Effect** There will be a temporary adverse effect from elevated construction and operational activities above the level of the green wedge and increased traffic on the nearby road and haul road although there is already construction and traffic in the valley settlements.	Minor adverse	Moderate adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Final restoration of the common land, new tip, remodelled Tip 2 area above GW. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect**: None **Temporary Effect** There will be a temporary adverse effect from nighttime maintenance activities (noise and lighting) on the elevated skyline above the green wedge although there is already construction and traffic in and around the valley settlements.	Minor adverse	Slight adverse
Machen, Graig-y-Rhacca and Waterloo (low)	**Construction** The construction of the haulage route from Tip 1 to processing plant, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant **Coal processing & progressive restoration** Operational use of the haulage route from Tip 1 to the processing plant and to the final deposition at the deposition tip. Earthworks – removing material from Tip 1 and deposition and grading at the deposition tip. Noise and movement of plant and vehicles operating at the tips and haul routes above the GW. Noise of processing plant. Increased traffic on adjacent highway with related noise, loss of enjoyment of recreational open space. **Decommission and Final Restoration:**	**Permanent Effect**: Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Sequential removal of Tip 1 and progressive restoration of original landform. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities elevated above the level of the character area and potentially increased traffic on adjacent roads although there is already construction in the surrounding urban areas and traffic on highways beside the green wedge.	Moderate adverse (During works) Minor beneficial (removal of Tip 1 and final restoration)	Moderate adverse (during works) Slight beneficial (removal of Tip 1 and final restoration)

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Distant removal activities, final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 and former Tip 1 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect:** None **Temporary Effect** There will be a temporary adverse effect from nighttime maintenance activities on the elevated skyline above the GW although there is already construction in and around the valley settlements, character area and traffic on the nearby roads	Minor adverse	Slight adverse
Sirhowy Country Park (High)	**Construction**: The construction of the haulage routes, processing plant, ponds, ground piling, earthworks, bunding, noise of plant movement, users of the haul routes, noise of processing plant Increased traffic within and approaching the country park. Vegetation loss. Earthworks, construction vehicles and noise. Construction of a haul road from roundabout with associated reprofiling of the slopes, cutting, bunding and 17m diameter turning circles. Temporary construction compound and storage area for the haul road construction Improvements to existing forestry road, additional passing places, associated excavation into the hillside to accommodate passing places or earthworks. Increased traffic.	**Permanent Effect**: Modification and remodelling of the slopes and skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition area. Retained haul road and passing places. **Temporary Effect** There will be a temporary adverse effect from construction and operational activities although there is already forest management in and around the Country Park. Loss of enjoyment of PRoW and other footpath and cycleway routes, loss of perceived tranquillity within the Country Park recreational area and woodlands.	Major adverse	Large adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Coal processing & progressive restoration Use of the haulage route to access the processing plant and remove processed material from site. Increased traffic within Country Park. Operational earthworks and processing activity at elevated level with associated noise. Noise of plant movement and operational activity, vehicles on the haul routes, noise of processing plant above. Temporary diversion of PROW network with impact on enjoyment and perceived safety of PROW routes and Country Park. **Decommission and Final Restoration:** Removal of processing plant, sheet-piling using the haul road. Final earthworks and grading. Final restoration of the common land, new tip, remodelled Tip 2 area. Final grass seeding. Noise of restoration activity.			
	Nighttime: static lighting of the process area and maintenance work, occasional moving lights of maintenance vehicles, slight increase in local traffic, Increase in nighttime noise from vehicles, and nighttime maintenance activities.	**Permanent Effect**: None **Temporary Effect** There will be a temporary adverse effect from maintenance activities although there is already forest management works in and around the Country Park.	Minor adverse	Slight adverse

CONSTRUCTION PHASE: VISUAL

8.8.9. The 19 viewpoints represent the views experienced by a number of visual receptors including users of public rights of way, long distance recreational routes and common land, residents of settlements and isolated dwellings, workers, commuters and other highway users, users of schools and community facilities and tourists. Table 8-2 above states the sensitivity of receptors at each of the 19 representative viewpoints for the Scheme ranging from Moderate to High.

8.8.10. Table 8-4 states the potential impacts to the 19 viewpoints without mitigation during the construction phase providing the magnitude and significance of each. Where visual receptors are affected physically by diversions of PRoW and restricted access to Common land (notes in italics below), these effects are assessed in the landscape assessment tables, please refer to Table 8-3, Table 8-5 and Table 8-7.

Table 8-4 – Preliminary Visual Assessment of the Construction Phase

Viewpoint and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
1. Raven Walk Regional Trail (High)	PRoW users Walkers and recreational users of the long distance footpath	Construction works and lighting.	Loss of visual amenity for receptors.	Minor Adverse	Moderate adverse
2. Rhymney Valley Ridgeway Walk (RVRW), Mynydd y Grug Common. (High)	PRoW users Recreational users of RVRW and Mynydd y Grug Common	Construction works, and lighting. The process plant is notably exposed from this viewpoint. The coal stock yard will be visible from this viewpoint.	Loss of visual amenity for receptors. *Diversion of PRoW and RVRW regional trail. Access to Common and viewpoint restricted.*	Major Adverse	Very Large adverse
3. Rhymney Valley Ridgeway Walk looking west (by Twyn yr Oerfel Cairns) (High)	PRoW users Recreational users of RVRW and Mynydd y Grug Common	Construction works, and lighting. The process plant is notably exposed from this viewpoint. Loss of broadleaf trees and conifer plantation on north side of Tip 2 (to be confirmed)	Loss of visual amenity for receptors. *Diversion of PRoW and RVRW regional trail, Access to Common and viewpoint restricted.*	Major Adverse	Very Large adverse
4. PRoW by Senghenydd	PRoW users Recreational users of	Construction works and lighting. Removal	Loss of visual amenity for recreational users	Minor Adverse	Slight adverse

Viewpoint and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
Dyke, Mynydd Eglwysilan (High)	Mynydd Eglwysilan Common land.	of existing vegetation.	of the PRoW and Common land.		
5. Clos Maes Mawr, Penyrheol looking north-east (high)	Residents	Construction works and lighting, heavy plants will be visible from this viewpoint.	Loss of visual amenity for residential receptors.	Major Adverse	Moderate adverse
6. Entrance to Mynydd Dinlaith Common / Pandy-Mawr Road (high)	Recreational users of the PRoW and Mynydd Dinlaith Common Farm workers	Construction works, and lighting.	Loss of visual amenity for recreational receptors and farm workers	Moderate Adverse	Moderate adverse
7. Mynydd y Grug Common gateway (high)	Recreational users of the PRoW and Mynydd y Grug Common. Farm workers	Construction works and lighting will be faintly visible from a distance.	Loss of visual amenity for recreational receptors and farm workers *Potential diversion of PRoW. Access to Common and viewpoint restricted*	Minor Adverse	Slight adverse
8. Side of the Tip 2 / green lane (PRoW) (high)	Recreational users of the PRoW and Mynydd y Grug Common. Farm workers	Construction works, and lighting.	Loss of visual amenity for recreational receptors and farm workers *Potential diversion of PRoW. Access to Common and viewpoint restricted.*	Minor Adverse	Moderate adverse
9. View from Meadow Croft (House), Mountain Road	Residents Recreational users. Vehicle users. Farm workers	Construction works and lighting. The heavy plants will be visible from a distance.	Loss of visual amenity for residential receptors and users of the lane.	Minor Adverse	Slight adverse

Viewpoint and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
(high)					
10. Rhiw Caer Celyn, Pandy Road (high)	Residents Recreational users. Vehicle users. Farm workers	Construction works and lighting are partially visible from a distance.	Loss of visual amenity for residential receptors and users of the lane.	Minor Adverse	Slight adverse
11. Bedwas Park, Church Street (high)	Residents, park users, playground users	Construction works and lighting are partially visible from a distance.	Loss of visual amenity for residents and users of the park and playground	Moderate Adverse	Moderate adverse
12. Junction of Navigation St, Llanfabon Drive and Standard St, Bedwas (high)	Residents, vehicle users. Cyclists and other users of Sustrans Route no 4.	Construction works, lighting and soil bund will be partially visible from this viewpoint.	Loss of visual amenity for receptors.	Major Adverse	Large adverse
13. Cycleway (Power Railway), looking northwest (moderate)	Cyclists, dog walkers, residents and other recreational users of this cycleway.	Mature trees obscure this viewpoint, and the construction site is not exposed from this viewpoint.	Loss of visual amenity for receptors.	Minor Adverse	Slight adverse
14. PRoW, (RUD/FP4/3) Mynydd Rudry, Rudry Common (high)	Recreational users of the PRoW and Mynydd Rudry	Construction works, lighting and soil bund will be partially visible from a distance.	Loss of visual amenity for recreational users of the PRoW and Mynydd Rudry.	Moderate Adverse	Moderate adverse
15. Caerphilly Castle, Caerphilly (high)	tourists, visitors, commuters, recreational users of the castle surroundings	Construction works, lighting and soil bund will be partially visible from a distance.	Loss of visual amenity for tourists, visitors, commuters, and recreational users of the castle surroundings.	Moderate Adverse	Moderate adverse
16. Van Road, Rudry Common	vehicle drivers and passengers, horse riders	Construction works, lighting and soil bund will be partially visible from a distance.	Loss of visual amenity for vehicle drivers and passengers,	Minor Adverse	Slight adverse

Viewpoint and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
(high)	and other recreational users of the highway		horse riders and other recreational users of the highway		
17. Caerphilly Common (PRoW BOAT) (high)	tourists and recreational visitors and users of Caerphilly Common	Construction works, lighting and soil bund will be faintly visible from a distance.	Loss of visual amenity for tourists and recreational visitors and users of Caerphilly Common	Minor Adverse	Slight adverse
18. Parc Bedwas, Northover Drive Industrial Estate, Bedwas (high)	workers and visitors to the businesses	Construction works, lighting and soil bund will be faintly visible from a distance.	Loss of visual amenity for workers and visitors to the businesses	Minor Adverse	Slight adverse
19. Bedwas High School, Staff Car Park and PRoW (high)	school staff, students and users of the PRoW. Users of Bedwas & Trethomas Community Hall	Construction works, lighting and soil bund will be visible.	Loss of visual amenity for school staff, students, users of the PRoW and community hall	Minor Adverse	Slight adverse

POST-OPERATION PHASE (YEAR 1)

Post-operation phase (Year 1): Landscape

8.8.11. Table 8-7 shows the Preliminary Landscape Assessment of the post-operation phase (without mitigation) one year after final restoration. The final restoration planting will have one season growth and establishment in Year 1 of the post-completion establishment period. Planting completed as part of the making good operations will also have achieved up to one season growth and establishment in Year 1. Planting completed during the stages of progressive restoration will have achieved a sequential, differential increase in establishment, growth and maturity across the development site.

Table 8-5 - Preliminary Landscape Assessment of the Post-operational Phase at Year 1 (without mitigation)

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
NATIONAL NLCA37 Dyffrynnoedd y De / South Wales Valleys (Medium)	Tip 1 removed. Tip 2 remodelled. Deposition Area created on Mynydd y Grug. Haul road retained through Sirhowy Country Park. PRoW network and long distance trails restored to their original alignments. Land used for informal recreation. Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.	**Permanent Effect**: Modification and remodelled skyline, vegetated landforms. Common land seeded grassland will be well established with small area seeded during final restoration. Planted shrubs and trees will be of obviously different ages, growth and spread; grass seed mixes will be of varying degrees of establishment and sward densities; all due to progressive restoration. **Temporary Effect** Bare ground may still be visible in places due to lack of plant establishment, some areas of grass seeding will not have fully established. These areas will be vulnerable to scour and erosion due to extreme weather conditions, trampling or off-road vehicles.	Minor beneficial	Slight beneficial
	Nighttime: none.	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
REGIONAL South-East Wales Landscape (medium)	Trees and shrubs planted during making good and Final Restoration phase (end of the coal processing, decommission of processing area, removal of haul route between former Tip 1 and the Process Area and to the Deposition Area) will not have grown sufficiently to provide screening, softening or habitat. Grass seeding will be establishing but not dense cover. All other planting and grass seeding will have up to 6 years establishment and growth, phased geographically across the former Tip 1 site, Deposition Area and remodelled Tip 2. Final restoration grass seeding is establishing, insufficient growth to develop dense sward. Grass seeded during progressive restoration established and developed dense sward. Land used for informal recreation. PRoW diversions ended; paths returned to original alignments.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Removal of Tip 1 completed. Seeded grassland common land. Much established at varying rates due to progressive restoration and seeding. **Temporary Effect** There will be a temporary adverse effect from recent final restoration activities, decommission and making good. Bare ground may still be visible in places due to lack of plant establishment, growth.	Minor beneficial	Slight beneficial
	Nighttime: none	**Permanent Effect** None **Temporary Effect** None	No change	Neutral
LOCAL	Final restoration grass seeding is establishing, insufficient growth to develop dense sward.	**Permanent Effect** Deposition area and remodelled Tip 2 vegetated new contoured landform over	Moderate adverse	Large adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
Mynydd Y Grug (EU / P) (high)	Grass seeded during progressive restoration established and developed dense sward. Land used for informal recreation. PRoW diversions ended; paths returned to original alignments.	whole Common area, close to historic landscape features e.g. enclosure, cairn. Modification and remodelling of the skyline. Enhanced panoramic views down over Rhymney Valley and settlements due to removed Tip 1. Established grass mix on the Common will have a different character, texture and colour to that of the habitat mosaic of the current Common. **Temporary Effect** There will be a temporary adverse effect from soft landscape activities due to presence of bare earth, vulnerable to erosion and scour until grass seeding establishes a dense sward.		
	Nighttime: none.	**Permanent Effect**: None **Temporary Effect** None.	No change	Neutral
Sirhowy Valley Slopes (HLP&SS) (medium)	Haul road and edge bunds retained. Tree planting to edge of former process area retained. Planting and grass seeding during Final restoration of the common land, deposition area and remodelled Tip 2 above is establishing, has not grown sufficient to provide softening or screening or cover for wildlife.	**Permanent Effect:** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Retained haul road and passing places. **Temporary Effect** Temporary adverse effect of final restoration planting having inadequate growth to provide benefit, some bare ground noticeable and	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Works traffic using haul road reduced, limited to grounds maintenance vehicle access. PRoW network and long distance trails restored to their original alignments. Reduced conflict between PRoW users and haul road users	vulnerable to erosion and scour due to weather and off-road vehicle activity.		
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral
Valley Slopes Machen – Ystrad Mynach (HLP&SS) (medium)	Final restoration grass seeding is establishing, insufficient growth to develop dense sward. Grass seeded during progressive restoration established and developed dense sward. Land used for informal recreation. PRoW diversions ended; paths returned to original alignments.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Removal of Tip 1 completed. Seeded grassland common land. **Temporary Effect** There will be a temporary adverse effect from restoration activities.	Minor adverse	Slight adverse
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
Mynydd y Lan (EU / P) (high)	Tip 2 remodelled. Deposition Area created on Mynydd y Grug. Haul road retained through Sirhowy Country Park. PRoW network and long distance trails restored to their original alignments. Land used for informal recreation. Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Haul road in panoramic views. **Temporary Effect** There will be a temporary adverse effect from restoration activities.	Minor adverse	Moderate adverse
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None	No change	Neutral
NW of Mynydd y Lan (HLP&SS) (medium)	Tip 2 remodelled. Deposition Area created on Mynydd y Grug. Haul road retained through Sirhowy Country Park. PRoW network and long distance trails restored to their original alignments. Land used for informal recreation.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip.	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.	**Temporary Effect** There will be a temporary adverse effect from restoration activities.		
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None	No change	Neutral
Wooded Slopes west of Mynydd y Lan (HLP&SS) (medium)	Tip 1 removed. Tip 2 remodelled. Deposition Area created on Mynydd y Grug. Haul road retained through Sirhowy Country Park. PRoW network and long distance trails restored to their original alignments. Land used for informal recreation. Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. **Temporary Effect** There will be a temporary adverse effect from restoration activities.	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.			
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None	No change	Neutral
Wooded Slopes Cwmcarn (HLP&SS) (medium)	Tip 1 removed. Tip 2 remodelled. Deposition Area created on Mynydd y Grug. Haul road retained through Sirhowy Country Park. PRoW network and long distance trails restored to their original alignments. Land used for informal recreation. Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Retained haul road on felled forest slopes opposite. **Temporary Effect** There will be a temporary adverse effect from restoration activities.	Negligible adverse	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.			
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None	No change	Neutral
Rhymney Valley South of Caerphilly (medium)	Final restoration grass seeding is establishing, insufficient growth to develop dense sward. Grass seeded during progressive restoration established and developed dense sward. Land used for informal recreation. PRoW diversions ended; paths returned to original alignments.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip Removal of Tip 1 completed. **Temporary Effect** There will be a temporary adverse effect from restoration activities.	Minor beneficial	Slight beneficial
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None	No change	Neutral
Risca (BL)	Tip 1 removed. Tip 2 remodelled. Deposition Area created on Mynydd y Grug. Haul road retained through Sirhowy Country Park.	**Permanent Effect**	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
(high)	PRoW network and long distance trails restored to their original alignments. Land used for informal recreation. Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.	Modification and remodelling of the valley slopes and skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. **Temporary Effect** There will be a temporary adverse effect from restoration activities.		
	Nighttime: None.	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral
Caerphilly (BL) (Low)	Final restoration grass seeding is establishing, insufficient growth to develop dense sward. Grass seeded during progressive restoration established and developed dense sward. Land used for informal recreation. PRoW	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Removal of Tip 1 completed. **Temporary Effect**	Negligible adverse	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	diversions ended; paths returned to original alignments.	There will be a temporary adverse effect from restoration activities.		
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None	No change	Neutral
SPECIAL LANDSCAPE AREAS North Caerphilly (Medium)	Final restoration grass seeding is establishing, insufficient growth to develop dense sward. Grass seeded during progressive restoration established and developed dense sward. Land used for informal recreation. PRoW diversions ended; paths returned to original alignments.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Removal of Tip 1 completed. Retained haul routes. Seeded grassland on common land. **Temporary Effect** There will be a temporary adverse effect from restoration activities.	Minor adverse	Slight adverse
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral
South Caerphilly (medium)	Final restoration grass seeding is establishing, insufficient growth to develop dense sward. Grass seeded during progressive restoration established and developed dense sward.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Removal of Tip 1 completed.	Negligible adverse	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Land used for informal recreation. PRoW diversions ended; paths returned to original alignments.	**Temporary Effect** There will be a temporary adverse effect from restoration activities.		
	Nighttime: None.	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral
Mynyddislwyn (Medium)	Tip 1 removed. Tip 2 remodelled. Deposition Area created on Mynydd y Grug. Haul road retained through Sirhowy Country Park. PRoW network and long distance trails restored to their original alignments. Land used for informal recreation. Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. **Temporary Effect** There will be a temporary adverse effect from restoration activities.	Negligible adverse	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral
GREEN WEDGES Cwmfellinfach and Ynysddu (high)	Haul road and edge bunds retained. Tree planting to edge of former process area retained. Planting and grass seeding during Final restoration of the common land, deposition area and remodelled Tip 2 above is establishing, has not grown sufficient to provide softening or screening or cover for wildlife. Grass seeded during progressive restoration will have 5 years maximum establishment and growth, older areas will have developed a dense sward. Grass seeding during final restoration will not have grown sufficient to establish a dense sward cover. Some bare patches. Trees and shrubs planted during setting up and progressive restoration will not have grown sufficient (5 years growth maximum) to provide screening, softening or habitat. Tree and shrub planting during final restoration will not have grown sufficiently to provide screening, softening or cover for wildlife. Bare earth is likely to be present.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. **Temporary Effect** There will be a temporary adverse effect from restoration activities and associated traffic in the vicinity and on the haul road.	Minor adverse	Slight adverse

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Works traffic above and on skyline limited to grounds maintenance vehicles. Tip 2 remodelled. Deposition Area created on Mynydd y Grug. PRoW and long distance trails restored to their original paths.			
	Nighttime: None	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral
Machen, Graig-y-Rhacca and Waterloo (Low)	Final restoration grass seeding is establishing, insufficient growth to develop dense sward. Grass seeded during progressive restoration established and developed dense sward. Land used for informal recreation. PRoW diversions ended; paths returned to original alignments.	**Permanent Effect** Removed Tip 1 restored pre-colliery contours and vegetated landforms. Remodelled Tip 2 and newly created deposition area vegetated and remodelled skylines. **Temporary Effect** There will be a temporary adverse effect from soft landscape activities until grass seed is fully established as a dense sward and planted trees and shrubs have grown sufficient to provide dense soil cover.	Minor beneficial	Slight beneficial
	Nighttime: None.	**Permanent Effect** None **Temporary Effect** None.	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
Sirhowy Country Park (high)	Haul road and edge bunds retained. Tree planting to edge of former process area retained. Planting and grass seeding during Final restoration of the common land, deposition area and remodelled Tip 2 above is establishing, has not grown sufficient to provide softening or screening or cover for wildlife. Works traffic using haul road reduced, limited to grounds maintenance vehicle access. PRoW network and long distance trails restored to their original alignments. Reduced conflict between PRoW users and haul road users	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and newly created deposition tip. Retained haul road and passing places. **Temporary Effect** Temporary adverse effect of final restoration planting having inadequate growth to provide benefit, some bare ground noticeable and vulnerable to erosion and scour due to weather and off-road vehicle activity.	Minor adverse	Moderate adverse
	Nighttime: None.	**Permanent Effect**: None **Temporary Effect** None	No change	Neutral

Post-operation Phase (Year 1): Visual

8.8.12. Table 8-2 states the sensitivity of each of the 19 viewpoints for the Proposed Scheme ranging from Moderate to High.

8.8.13. Table 8-6 states the potential impacts to the 19 viewpoints without mitigation during the construction phase providing the magnitude and significance of each.

Table 8-6 – Preliminary Visual Assessment of Post-operational Phase Year 1 (without mitigation)

Receptor and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
1. Raven Walk Regional Trail (High)	PRoW users, walkers and recreational users of the long-distance footpath	The partial intrusion of the new deposition area on the eastern side	Change of landform	Minor Beneficial	Moderate beneficial
2. Rhymney Valley Ridgeway Walk (RVRW), Mynydd y Grug Common. (High)	PRoW users, recreational users of RVRW and Mynydd y Grug Common.	The intrusion of the new deposition area on the north side Substantial change in ground level, the viewpoint is underground at Year 1	Change of landform	Major Adverse	Very Large adverse
3. Rhymney Valley Ridgeway Walk looking west (by Twyn yr Oerfel Cairns) (High)	PRoW users, recreational users of RVRW and Mynydd y Grug Common.	The intrusion of the new deposition area on the north side and the graded remaining tips are visible from this viewpoint. Established grass cover replaces former mixed broadleaf and conifer plantation at north side of Tip 2	Change of landform	Major Adverse	Very Large adverse

Receptor and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
4. PRoW by Senghenydd Dyke, Mynydd Eglwysilan (High)	PRoW users, recreational users of Mynydd Eglwysilan Common land.	The remaining tips and the new deposition area are faintly visible from this viewpoint	Change of landform	Negligible Beneficial	Slight beneficial
5. Clos Maes Mawr, Penyrheol looking north-east (high)	Residents	The intrusion of the new deposition area on the north side and the graded remaining tips are visible from this viewpoint	Change of landform	Minor Beneficial	Moderate Beneficial
6. Entrance to Mynydd Dinlaith Common / Pandy-Mawr Road (high)	Recreational users of the PRoW and Mynydd Dinlaith Common. Farm workers	The remaining tips and the new deposition area are screened from this viewpoint	Change of landform	Minor beneficial	Moderate Beneficial
7. Mynydd y Grug Common gateway (high)	Recreational users of the PRoW and Mynydd y Grug Common. Farm workers	The remaining tips and the new deposition area are screened from this viewpoint	Change of landform	No Change	Neutral
8. Side of the Tip 2 / green lane (PRoW) (high)	Recreational users of the PRoW and Mynydd y Grug Common. Farm workers	The top of the southern tip will be graded	Change of landform	Minor Beneficial	Moderate Beneficial
9. View from Meadow Croft (House), Mountain Road (high)	Residents Recreational users. Vehicle users. Farm workers	The intrusion of the new deposition area on the north side and the graded remaining tips are visible from this viewpoint	Change of landform	Minor Beneficial	Slight Beneficial

Receptor and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
10. Rhiw Caer Celyn, Pandy Road (high)	Residents Recreational users. Vehicle users. Farm workers	The remaining southern tip will be partially visible, but the northern and new deposition area are screened from this viewpoint.	Change of landform	Minor Beneficial	Slight Beneficial
11. Bedwas Park, Church Street (high)	Residents, park users, playground users	The intrusion of the new deposition area on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Moderate Beneficial	Moderate Beneficial
12. Junction of Navigation St, Llanfabon Drive and Standard St, Bedwas (high)	Residents, vehicle users. Cyclists and other users of Sustrans Route no 4	The intrusion of the new deposition area on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Moderate Beneficial	Large Beneficial
13. Cycleway (Power Railway), looking northwest (moderate)	Cyclists, dog walkers, residents and other recreational users of this cycleway	The remaining tips and the new deposition area are screened from this viewpoint	Change of landform	No change	Neutral
14. PRoW, (RUD/FP4/3) Mynydd Rudry, Rudry Common (high)	Recreational users of the PRoW and Mynydd Rudry	The intrusion of the graded remaining tips is visible from this viewpoint	Change of landform	Moderate Beneficial	Moderate Beneficial
15. Caerphilly Castle, Caerphilly (high)	Tourists, visitors, commuters, recreational users of the	The intrusion of the graded remaining southern tip is visible from this viewpoint	Change of landform	Moderate beneficial	Moderate Beneficial

Receptor and sensitivity	Receptors	Impact	Effect	Magnitude	Significance
	castle surroundings				
16. Van Road, Rudry Common (high)	Vehicle drivers and passengers, horse riders and other recreational users of the highway	The remaining tips and the new deposition area are visible from this viewpoint	Change of landform	Minor Beneficial	Slight Beneficial
17. Caerphilly Common (PRoW BOAT) (high)	Tourists and recreational visitors and users of Caerphilly Common	The intrusion of the graded remaining southern tip is visible from this viewpoint	Change of landform	Minor Beneficial	Slight Beneficial
18. Parc Bedwas, Northover Drive Industrial Estate, Bedwas (high)	Workers and visitors to the businesses	The intrusion of the new deposition area on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Minor Beneficial	Slight Beneficial
19. Bedwas High School, Staff Car Park and PRoW (high)	School staff, students and users of the PRoW. Users of Bedwas & Trethomas Community Hall	The intrusion of the new deposition area on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Moderate Beneficial	Moderate Beneficial

POST OPERATION (YEAR 15)

Post-operation (Year 15): Landscape

8.8.14. Table 8-7 shows the Preliminary Assessment of the post-operation landscape at Year 15 (without mitigation) when the land is permanently returned to grassland and used for informal recreation. Trees will have been growing for between 15 and 22 years due to planting taking place at different stages of progressive restoration during the construction phase, including the initial preparatory period prior to the commencement of coal processing.

8.8.15. By Year 15, it is unlikely that temporary effects remain as there will have been a minimum 15 years of establishment and growth. Trees planted to provide woodland and screening will be approaching maturity, and it is expected that patches of bare ground will be fully vegetated and a dense grassland sward has been achieved.

Table 8-7 – Preliminary Landscape Assessment of the post-operation landscape at Year 15 (without mitigation)

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
NATIONAL NLCA37 Dyffrynnoedd y De / South Wales Valleys (Medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Negligible beneficial	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
REGIONAL South-East Wales Landscape (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Negligible beneficial	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
LOCAL Mynydd Y Grug (EU / P) **(high)**	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline and vegetated landforms. Grass seeded common land. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Major adverse	Large adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect**	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
		None		
Sirhowy Valley Slopes (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Haul road retained.	Minor adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Valley Slopes Machen – Ystrad Mynach (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Mynydd y Lan (EU / P) (high)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Negligible beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
NW of Mynydd y Lan (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Negligible beneficial	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Wooded Slopes west of Mynydd y Lan (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Retained haul road.	Negligible adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Wooded Slopes Cwmcarn (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Retained haul road.	Negligible adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Rhymney Valley South of Caerphilly (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and	Minor beneficial	Slight beneficial

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
		deposition tip vegetated. Site of Tip 1 restored and vegetated.		
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Risca (BL) (High)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Negligible beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Caerphilly (BL) (Low)	Restored grassed landscape, remodelled landscape. Removal of domineering benched spoil heap (Tip 1) Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
SPECIAL LANDSCAPE AREAS North Caerphilly	Restored grassed landscape, remodelled landscape. Haulage vehicle access route retained - potential for misuse. Removal of domineering benched spoil heap (Tip 1).	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
(Medium)	Restored public rights of way system and recreational use.			
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Mynyddislwyn (Medium)	Restored grassed landscape, remodelled landscape. Haulage access route retained. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Potentially visible access route.	Negligible adverse	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
South Caerphilly (Medium)	Restored grassed landscape, remodelled landscape. Removal of domineering benched spoil heap (Tip 1) Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
GREEN WEDGES Cwmfellinfach (High)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Minor beneficial	Slight beneficial

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Machen, Graig-y-Rhacca and Waterloo (Low)	Restored grassed landscape, remodelled landscape. Removal of domineering benched spoil heap (Tip 1). Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
COUNTRY PARK Sirhowy Country Park (Medium)	Restored grassed landscape, remodelled landscape. Former haulage route retained. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the landscape, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. New vehicular access route, passing places on existing access route.	Minor adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
NATIONAL NLCA37 Dyffrynnoedd y De / South Wales Valleys (Medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Negligible beneficial	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
REGIONAL South-East Wales Landscape (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Negligible beneficial	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
LOCAL Mynydd Y Grug (EU / P) **(high)**	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline and vegetated landforms. Grass seeded common land. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Major adverse	Large adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
Sirhowy Valley Slopes (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Haul road retained.	Minor adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Valley Slopes Machen – Ystrad Mynach (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Mynydd y Lan (EU / P) (high)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Negligible beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
NW of Mynydd y Lan (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Negligible beneficial	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Wooded Slopes west of Mynydd y Lan (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Retained haul road.	Negligible adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Wooded Slopes Cwmcarn (HLP&SS) (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Retained haul road.	Negligible adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Rhymney Valley South of Caerphilly (medium)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and	Minor beneficial	Slight beneficial

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
		deposition tip vegetated. Site of Tip 1 restored and vegetated.		
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Risca (BL) (High)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Negligible beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Caerphilly (BL) (Low)	Restored grassed landscape, remodelled landscape. Removal of domineering benched spoil heap (Tip 1) Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
SPECIAL LANDSCAPE AREAS North Caerphilly	Restored grassed landscape, remodelled landscape. Haulage vehicle access route retained - potential for misuse. Removal of domineering benched spoil heap (Tip 1).	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
(Medium)	Restored public rights of way system and recreational use.			
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Mynyddislwyn (Medium)	Restored grassed landscape, remodelled landscape. Haulage access route retained. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Potentially visible access route.	Negligible adverse	Neutral
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
South Caerphilly (Medium)	Restored grassed landscape, remodelled landscape. Removal of domineering benched spoil heap (Tip 1) Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
GREEN WEDGES Cwmfellinfach (High)	Restored grassed landscape, remodelled landscape. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated.	Minor beneficial	Slight beneficial

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
Machen, Graig-y-Rhacca and Waterloo (Low)	Restored grassed landscape, remodelled landscape. Removal of domineering benched spoil heap (Tip 1). Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the skyline, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. Site of Tip 1 restored and vegetated.	Minor beneficial	Slight beneficial
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral
COUNTRY PARK Sirhowy Country Park (Medium)	Restored grassed landscape, remodelled landscape. Former haulage route retained. Restored public rights of way system and recreational use.	**Permanent Effect** Modification and remodelling of the landscape, vegetated landforms. Remodelled Tip 2 and deposition tip vegetated. New vehicular access route, passing places on existing access route.	Minor adverse	Slight adverse
	Nighttime: no change from pre-construction works.	**Permanent Effect** None	No change	Neutral

Post-operational Phase (Year 15): Visual

8.8.16. **Table 8-2** states the sensitivity of each of the 19 viewpoints for the Scheme ranging from Moderate to High.

8.8.17. Table 8-8 shows the Preliminary Assessment of the post-operation potential impacts to the visual receptors' experience of 19 viewpoints at Year 15 without mitigation providing the magnitude and significance of each.

8.8.18. During Year 15 (without mitigation), the effects are likely to be similar to those described in Table 8-6 above. Due to there being no mitigation considered for this preliminary assessment, the only difference would be that proposed grass seeding would become more established, therefore there would be no reduction in the significance of adverse effects.

Table 8-8- Preliminary Assessment of Visual Effects without mitigation - Post-operational Phase Year 15

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
1. Raven Walk Regional Trail (High)	The partial intrusion of the new tip on the eastern side. Established grass cover	Change of landform.	Minor Beneficial	Moderate Beneficial
2. Rhymney Valley Ridgeway Walk (RVRW), Mynydd y Grug Common. (High)	The intrusion of the new tip on the north side Established grass cover replaces heathland habitat mosaic. Substantial change in ground level, the viewpoint is underground at Year 15.	Change of landform. Change of vegetation.	Major adverse	Very Large adverse
3. Rhymney Valley Ridgeway Walk looking west (by Twyn yr Oerfel Cairns) (High)	The intrusion of the new deposition area on the north side and the graded remaining Tip 2 are visible from this viewpoint Established grass cover replaces former mixed broadleaf and conifer plantation at north side of Tip 2.	Change of landform. Change of vegetation.	Major adverse	Large adverse
4. PRoW by Senghenydd Dyke, Mynydd Eglwysilan (High)	The remaining Tip 2, new deposition area and restored valley contours are scarcely visible from this viewpoint.	Change of landform	No change	Neutral
5. Clos Maes Mawr, Penyrheol looking north-east (high)	The intrusion of the new deposition area on the north side and the graded remaining tips are visible from this	Change of landform	Minor beneficial	Moderate beneficial

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
	viewpoint Established grass cover			
6. Entrance to Mynydd Dinlaith Common / Pandy-Mawr Road (high)	The remaining tips and the new tip are screened from this viewpoint Established grass cover	Change of landform	Minor beneficial	Slight beneficial
7. Mynydd y Grug Common gateway (high)	The remaining tips and the new deposition area are screened from this viewpoint	Change of landform	No change	Neutral
8. Side of the Tip 2 / green lane (PRoW) (high)	The top of Tip 1 will be graded	Change of landform	Minor beneficial	Moderate beneficial
9. View from Meadow Croft (House), Mountain Road (high)	The intrusion of the new tip on the north side and the graded remaining tips are visible from this viewpoint	Change of landform	Moderate beneficial	Large beneficial
10. Rhiw Caer Celyn, Pandy Road (high)	The remaining southern tip will be partially visible, but the northern and new tips are screened from this viewpoint.	Change of landform	Minor beneficial	Slight beneficial
11. Bedwas Park, Church Street (high)	The intrusion of the new tip on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Moderate beneficial	Large beneficial
12. Junction of Navigation St, Llanfabon Drive and Standard St, Bedwas (high)	The intrusion of the new tip on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Moderate beneficial	Large beneficial
13. Cycleway (Power Railway), looking northwest (moderate)	The remaining tips and the new tip are screened from this viewpoint	Change of landform	No change	Neutral

Receptor and sensitivity	Impact	Effect	Magnitude	Significance
14. PRoW, (RUD/FP4/3) Mynydd Rudry, Rudry Common (high)	The intrusion of the graded remaining tips is visible from this viewpoint	Change of landform	Moderate beneficial	Moderate beneficial
15. Caerphilly Castle, Caerphilly (high)	The intrusion of the graded remaining southern tip is visible from this viewpoint	Change of landform	Moderate beneficial	Moderate beneficial
16. Van Road, Rudry Common (high)	The remaining tips and the new tip are visible from this viewpoint	Change of landform	Moderate beneficial	Large beneficial
17. Caerphilly Common (PRoW BOAT) (high)	The intrusion of the graded remaining southern tip is visible from this viewpoint	Change of landform	Moderate beneficial	Moderate beneficial
18. Parc Bedwas, Northover Drive Industrial Estate (high)	The intrusion of the new tip on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Moderate beneficial	Large beneficial
19. Bedwas High School, Staff Car Park and PRoW (high)	The intrusion of the new tip on the north side and the graded remaining tips are partially visible from this viewpoint	Change of landform	Moderate beneficial	Large beneficial

8.9 MITIGATION, ENHANCEMENT AND MONITORING

MITIGATION AND MONITORING

8.9.1. Mitigation

8.9.2. The following mitigation has been proposed for the construction and operational phases. To avoid, reduce or compensate significant adverse landscape operational effects, various mitigation measures are proposed. Table 8-9 provides details of the mitigation proposals, the receptors to which it applies and the particular impact or effect that it is mitigating.

Table 8-9 – Construction and Operational phase mitigation (Landscape)

Ref	Impact / Effect	Receptor(s)	Mitigation
Access / haul road			
LM01	Creation of new haul road up steep slope, cutting into existing slope. Creation of broad passing places and turning areas. Creation of bunds associated with haul road. Loss of additional trees and other vegetation. excavated soil and rock. Impact on landscape character of host and nearby LCA.	Sirhowy Country Park, Sirhowy Valley Slopes, Risca, Mynydd y Lan	Use of previously felled forest area to site the footprint of a new zigzag 6m wide haul route up the slope to minimise impact on existing woodland and forest area. Use of existing forest road as haul route to/from processing area will avoid and minimise damage, destruction or disturbance of existing woodland and forest landscape and valley slopes. Use of excavated material as bunds alongside haul road to provide safety buffer, physical buffer and screen views of haul traffic and lights.
LM02	Creation of broad passing places on existing forest road. Widening of existing forest road at corners and from 4m to 6m to accommodate haulage traffic. Associated loss of trees, other vegetation, excavated soil and rock. Potential loss of landscape character.	Sirhowy Country Park, Sirhowy Valley Slopes, Risca	Retention of topsoil with seedbank for re-use. Retention of rock for use as road surfacing to minimise loss from site. Use of excavated soil in bunds alongside haul road to provide safety buffer, physical buffer and screen views of haul traffic and headlights during winter work hours.
LM03	Proposals take place along routes of existing PRoW, cycleways, national trails and long distance footpaths. Potential conflicts of interest and safety issues to be addressed. PRoW cross the haulage route and site. Proposed diversions and crossing points.	Sirhowy Country Park, Sirhowy Valley Slopes, Risca	Avoidance: Avoidance of conflicts by PRoW diversions along alternative routes throughout the construction and operational phases. Reduction: Crossing points to be physically marked and visually improved to eliminate obscured views of traffic and pedestrians.

Ref	Impact / Effect	Receptor(s)	Mitigation
			Driver protocols and awareness to be raised to improve public safety.
LM04	Views of vehicles and winter lights	Sirhowy Country Park, Sirhowy Valley Slopes, Risca, LCA north of Risca Mynydd y Lan	Use of excavated soil in bunds alongside haul road to provide safety buffer, physical buffer and screen views of haul traffic and headlights during winter work hours. Tree planting proposals to include suitable evergreen shrubs and trees.
Process plant and offices			
LM05	Process area, offices and infrastructure to be sited between existing forest and Tip 2.	Mynydd y Lan, Sirhowy Country Park, Sirhowy Valley Slopes, Mynydd y Grug, North Caerphilly SLA	Screen bund buffer to north boundary with forest. Tip 2 will be used to screen the process area from the south. Process plant to be built into the side of Tip 2 to facilitate plant access to the hopper. This will partially conceal it in the landscape. Existing rock to be used as hardstanding to integrate process area with its surroundings.
Drainage layout			
LM06	Drainage cuts, pond locations and bund surrounds in functional locations	Mynydd y Grug, North Caerphilly SLA, Valley Slopes Machen – Ystrad Mynach,	Use of existing contours, dry stone walls and temporary soil bunds to screen and locate ponds and drains in ‘natural’ low spots.
LM07	Overflow / emergency drainage facilities	Mynydd y Grug, North Caerphilly SLA, Valley Slopes Machen – Ystrad Mynach,	To be designed within the scheme, to enable avoidance, reduction of potential disturbance / damage to landscape character, historic and ecological and features.

Ref	Impact / Effect	Receptor(s)	Mitigation
Tip 1 and Tip 2			
LM08	Operational activities will be fully visible in the landscape	Mynydd y Grug, North Caerphilly SLA,	Existing tip material to be used to screen activities from view. Tree planting in strategic locations to soften and screen Tips and integrate with surroundings.
LM09	New 6m wide temporary haulage road from Tip 1 to Process Plant	Mynydd y Grug, North Caerphilly SLA,	Existing rock to be used as surfacing to integrate haulage road with its surroundings.
LM10	Total Removal of Tip 1 – potential engineered, uniform slopes.	Mynydd y Grug, North Caerphilly SLA, South Caerphilly SLA, Caerphilly, Rhymney Valley South of Caerphilly, Valley Slopes Machen – Ystrad Mynach, Machen, Graig-y-Rhacca and Waterloo GW.	Return slope to original contours as close as practicably possible, integrated with surrounding contours. Grass seeded to stabilise surface. Path network to be reinstated.
LM11	Tip 2 processed, reprofiled with stable slopes, uniform engineered slopes.	Mynydd y Grug, North Caerphilly SLA, South Caerphilly SLA, Caerphilly, Rhymney Valley South of Caerphilly, Valley Slopes Machen – Ystrad Mynach, Machen, Graig-y-Rhacca and Waterloo GW.	Reprofile and round slopes on skyline, to integrate with surrounding upland Commons. Surface to be grass seeded to stabilise surface. Path network to be reinstated.
LM12	Deposition Area on Mynydd y Grug	Mynydd y Grug, North Caerphilly SLA,	Reprofiled slope will integrate with and existing surrounding contours. Surface to be grass seeded to stabilise surface. PRoW network to be reinstated.

Ref	Impact / Effect	Receptor(s)	Mitigation
LM13	Topsoil and natural subsoil	Mynydd y Grug, North Caerphilly SLA	Retain existing topsoil and natural subsoils in temporary bunds and re-use in final restoration of the Deposition Area, Tip 2. Re-use of topsoil and natural subsoil from beneath Tip 1 to restore landscape.
LM14	Grass seed to stabilise spoil material and establish vegetation cover. Benefit landscape character.	Mynydd y Grug, North Caerphilly SLA, Valley Slopes Machen – Ystrad Mynach	Grass seed mix: 30% rye grass, 70% other grass species to provide habitat value and stabilise slopes.
LM15	Dry stone walls retained around Mynydd y Grug Common.	Mynydd y Grug, North Caerphilly SLA, Valley Slopes Machen – Ystrad Mynach, Machen	Retention of historic landscape features.
LM16	Tree planting to periphery of Tip 2.	Mynydd y Grug, North Caerphilly SLA, Valley Slopes Machen – Ystrad Mynach, Machen	Creation of new woodland.
LM17	Removal and movement of spoil from Tip 1: potential impact on TPO and other existing trees.	Mynydd y Grug, North Caerphilly SLA, Caerphilly, Valley Slopes Machen – Ystrad Mynach	Provision of tree protection to root protection area.
LM18	Species / wildlife displacement from habitats across the site	Mynydd y Grug, North Caerphilly SLA, Valley Slopes Machen – Ystrad Mynach	Creation of bunds of existing topsoil with existing seedbank allowed to germinate and establish vegetative cover will provide temporary habitat for wildlife species. Woodland tree planting early in the project to provide new habitat.

Ref	Impact / Effect	Receptor(s)	Mitigation
LM19	Haulage routes sited by historic landscape features (statutory protected, locally protected, and non-protected features of landscape interest)	Mynydd y Grug, North Caerphilly SLA, Valley Slopes Machen – Ystrad Mynach,	Avoid and minimise potential damage and disturbance, e.g. Use of protective fencing.
LM20	PRoW diversion and temporary closure: potential loss of enjoyment of character areas, loss of landscape key characteristic – public access	Mynydd y Grug, North Caerphilly SLA, Caerphilly, Valley Slopes Machen – Ystrad Mynach,	Identify suitable routes for diverted PRoW. Reinstate PRoW and lost path links and routes as per 19th century OS maps to benefit public access.
Mynydd y grugg			
LM21	Deposition area covered in previously stored subsoil and topsoil. Grass seed for rapid establishment and stabilisation.	Mynydd y Grug, North Caerphilly SLA	Sculpt a more naturalistic landform, to integrate with surrounding skyline.
LM22	Tip 1 and deposition area regraded with engineered slopes.	Mynydd y Grug, North Caerphilly SLA	Contour to resemble contours of existing Commons, rounded on the skyline.
LM23	Fenced temporary lagoons and ponds: effect on open, exposed character of upland Commons.	Mynydd y Grug, North Caerphilly SLA	Safety fencing to be visually permeable to minimise impact on character.
LM24	Dry stone walls	Mynydd y Grug, North Caerphilly SLA	Retain and protect from damage or disturbance.
LM25	PRoW put back in place on completion of operational phase. Repositioned bench seating at new elevated viewpoint on Common.	Mynydd y Grug, North Caerphilly SLA	Avoid lack of use by locating bench seat in similar position to original, on the PRoW route.

ENHANCEMENT

8.9.3. The above listed mitigation measures are taken to reduce or remove identified impacts and may include enhancements, which are changes unrelated to identified impacts but which improve the environment in some way.

8.9.4. The existing public footpath will be located on the new deposition area, with the relocated bench on a new elevated viewpoint at 370m. Improving the overall design for the end user of the development by incorporating features which increase access to, and enjoyment of, the landscape is an important feature of the Proposed Scheme.

8.9.5. There is the opportunity to realign the Rhymnney Valley Ridgeway Walk along the crestline of the newly formed landform to maintain the open panoramic views that would otherwise be obstructed by the restoration proposals (reference Receptors 2 and 3 Table 8-9).

8.9.6. A repurposed haul road could provide potential recreational benefit for bridleway and off road cycle access.

8.9.7. Enhancement measures could be implemented to improve the landscape character of the Proposed Scheme after the coal processing work is complete. Potential landscape enhancement measures could form part of a comprehensive phased landscape master plan and could include:

- Additional tree planting;
- Additional hedge planting and stone wall boundaries;
- Replication of historic field boundaries over Tip One area
- Improvements to grassland species diversity;
- Planting to waterbodies to improve and enhance their health and attractiveness; and
- New equestrian routes, footpaths and cycleways to improve access to and through the landscape.
- Gentle gradient access route from Bedwas to Rhymney Valley Ridgeway Walk
- Community gardens located at the southern end of Tip One for convenient access for the Bedwas community.
- Community orchard at the southern end of Tip One for convenient access for Bedwas community
- Enhancement of the quarry lake at the southern end of Tip One to optimise safety to the public and improve landscape and ecological value.
- Heritage - provision of interpretation of the project and the transformed landscape

MONITORING

8.9.8. It is critical that any proposed mitigation and enhancement measures are monitored and is retained in good condition to maintain full effectiveness. This is particularly crucial with mitigation planting, which needs close monitoring to ensure that it establishes fully to serve its function.

8.9.9. Mitigation will be maintained and monitored continuously to ensure that it is serving the function that was committed through the proposed design. If any damage or failure occurs, is present, this will be replaced as soon as possible. The responsibility will be with the contractor for the duration of their contracted works. Responsibility then will be handed back to CCBC.

8.10 RESIDUAL IMPACT ASSESSMENT

CONSTRUCTION PHASE

8.10.0. The construction phase or development period will last seven years. Suggested mitigation planting for landscape and visual effects planted during the construction phase will not be mature, therefore the residual impacts are likely to remain the same as the impact assessment without mitigation, see **Table 8-10** and **Table 8-11**. This phase is assumed to incorporate the initial construction of the processing infrastructure, coal processing works, progressive restoration and final restoration.

8.10.1. Progressive restoration will commence during the first year of the coal processing works and continue throughout the Construction Phase as sections are complete. An assessment of the residual impacts after mitigation will be applied for the receptors where there are significant adverse effects (moderate, large or very large) in the preliminary assessment. Proposed mitigation will be considered to determine the change in significance of effects. The results of the assessment will be included in **Table 8-10**.

POST-OPERATIONAL PHASE (ESTABLISHMENT): YEAR 15

8.10.2. The post-operational phase commences immediately after decommissioning and removal of the processing plant, associated infrastructure, final restoration and making good. The planting works across the site will have attained between 15 and 22 years of establishment and growth by Year 15. To highlight the effect of the maturing of vegetation over time, an assessment of the residual impacts after Year 15 will be carried out for the same receptors. The results of the assessment are provided in Table 8-12.

8.10.3. The residual impact assessment will consider the significance of the effect of the Proposed Scheme, taking into account the mitigation measures proposed in Table 8.7. The residual magnitude of change and residual significance of effect for the construction phase of the Proposed Scheme will be presented in Table 8-10. In some cases, the introduction of mitigation may reduce the impact of the Proposed Scheme but not to a sufficient degree to change the magnitude and therefore significance of the effect.

Table 8-10 – Landscape residual impact assessment (i.e., with mitigation) – Construction Phase Year 0 and Operational Phase Year 1

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
LCA Mynydd Y Grug (High)	ACCESS: Widen section of existing access road to 6m to accommodate haulage traffic. New haul routes to/from tips to process area and deposition area. Use excavated rock as surfacing to integrate with environment.	Vehicle access on the Common. Wider highway surface. Conflict with PRoW and national trail users. PRoW and national trail diversions required.	Major adverse	Large adverse
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by bund with tree planting to north boundary with forest, and by Tip 2 to south, also built into side of Tip 2 to facilitate plant access. Use of excavated rock as hardstanding to integrate with its surroundings.	Process area to be partially screened from view.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features to upland Common.		
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity largely screened from view		
	LANDFORM: All surface scraped, soil removed and stored in bunds. Deposition commenced in Deposition Area, Tip 1 removal and processing and	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	restoration commenced. Phased regrading, engineered profile and activities on skyline.			
	FINAL VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portions of Tip 1 and Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		
	TREE PLANTING: Tree planting to periphery of Tip 2 to provide screening and softening and cover for wildlife. Tree planting to take place during construction phase to maximise years of growth	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase. Bench seating removed to store.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Retention of historic landscape features		
LCA Sirhowy Valley Slopes (Medium)	ACCESS: Widen section of existing access road to 6m to accommodate haulage traffic. New haul routes to/from tips to process area and deposition	Vehicle access on the Common. Wider highway surface. Potential conflict with PRoW, forest road and national trail users. PRoW and national trail diversions required for safety reasons.	Major adverse	Moderate adverse

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	area. Use excavated rock as surfacing to integrate with environment.			
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by bund with tree planting to north boundary with forest, also partially by landform. Use of excavated rock as hardstanding to integrate with its surroundings.	Process area to be partially screened from view.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features.		
	OPERATIONS: Activities on site will be screened by existing tip material and landform. Tree planting in strategic locations to soften and screen tips and operational activities.	Tree planting growth inadequate to screen operations or provide buffering of operational noise. Bunds, existing forest trees and landform provide partial screening of operational activities. Noise from operations and use of haul road.		
	LANDFORM: Deposition of spoil in deposition area changing profile of the skyline above the slopes.	Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Tree planting inadequate to screen, soften or provide wildlife cover. Species selection contributes to adverse or beneficial effects, e.g., Coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. To be confirmed.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Protection and retention of historic landscape features		
LCA Valley Slopes Machen – Ystrad Mynach (Medium)	ACCESS: Widen section of existing access road to 6m to accommodate haulage traffic. New 6m width haul routes to/from tips to process area and deposition area. Use excavated rock as surfacing to integrate with environment.	Vehicle access and highway surface on the skyline and within open, exposed landscape of the Common and surrounding landscape. Conflict with PRoW and national trail users such that PRoW and national trail diversions are necessary at the edge of the LCA.	Minor adverse	Slight adverse
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by Tip 2 to south, also built into side of Tip 2 to facilitate plant access. Use of excavated rock as hardstanding to integrate with its surroundings.	Process area to be partially screened from view.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features to upland Common.		
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity largely screened from view.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	LANDFORM: Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	FINAL VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portions of Tip 1 and Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Protection and retention of historic landscape features		
LCA Mynydd y Lan (High)	ACCESS: Widen section of existing access road to 6m to accommodate haulage traffic. New haul routes to/from	Vehicle access and highway surface on the skyline and within open, exposed landscape of the Common and surrounding landscape.	Moderate adverse	Moderate adverse

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	tips to process area and deposition area. Use excavated rock as surfacing to integrate with environment.	Conflict with PRoW and national trail users such that PRoW and national trail diversions are necessary at the edge of the LCA.		
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by Tip 2 to south, also built into side of Tip 2 to facilitate plant access. Use of excavated rock as hardstanding to integrate with its surroundings.	Process area partly screened from LCA by existing forest trees.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features to upland Common. Unlikely to be noticeable from LCA		
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity at Tip 1 largely screened from view. Operations at Deposition Area unlikely to be screened. Effect on the Common's undisturbed, open, exposed landscape character.		
	LANDFORM: Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	FINAL VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portions of Tip 1 and Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Retention of historic landscape features		
LCA Wooded Slopes west of Mynydd y Lan (Medium)	ACCESS: Widen section of existing access road to 6m to accommodate haulage traffic. New haul routes to/from tips to process area and deposition area. Use excavated rock as surfacing to integrate with environment.	Vehicle access on the Common. Wider highway surface. Conflict with PRoW and national trail users. PRoW and national trail diversions required.	Minor adverse	Slight adverse
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by Tip 2 to south, also built into side of Tip 2 to facilitate plant access. Use of excavated rock as hardstanding to integrate with its surroundings.	Process area partly screened from LCA by existing forest trees.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry	Introduction of new landscape features to upland Common.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	stone walls, contours and temporary soil bunds to screen ponds.	Unlikely to be noticeable from LCA		
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity at Tip 1 largely screened from LCA by landform. Operations at Deposition Area unlikely to be screened. Effect on the Common's undisturbed, open, exposed landscape character.		
	LANDFORM: Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portions of Tip 1 and Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Protection and retention of historic landscape features		
LCA Wooded Slopes Cwmcarn (Medium)	ACCESS: New haul route near the LCA through felled forest area. Existing access road widened to 6m to accommodate haulage traffic. Use excavated rock as surfacing to integrate with environment.	Noticeable forest haul route, infrastructure and increased traffic. Vehicle access on the Common. Conflict with connecting PRoW routes and users. PRoW diversions.	Moderate adverse	Moderate adverse
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by bund with tree planting to north boundary with forest, also partially by landform. Use of excavated rock as hardstanding to integrate with its surroundings.	Process area partially screened from view. Noise noticeable.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features. Unlikely to be noticeable from LCA		
	OPERATIONS: Activities on site will be screened by existing tip material and landform. Tree planting in strategic locations to soften and screen tips and operational activities.	Tree planting growth inadequate to screen operations or provide buffering of operational noise. Bunds, existing forest trees and landform provide partial screening of operational activities. Noise from operations and use of haul road.		
	LANDFORM: Deposition of spoil in deposition area changing profile of the skyline above the slopes.	Effects on skyline, a key characteristic of LCA and views (see visual assessment).		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portion of Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Protection and retention of historic landscape features		
LCA Rhymney Valley South of Caerphilly (Medium)	ACCESS: New haul routes to/from tips to process area and deposition area. Use excavated rock as surfacing to integrate with environment.	Vehicle access on the Common. Wider highway surface. Conflict with PRoW and national trail users. PRoW and national trail diversions required.	Moderate adverse	Moderate adverse
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by Tip 2 to south, also built into side of Tip 2 to facilitate plant access.	Process area to be partially screened from view.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	Use of excavated rock as hardstanding to integrate with its surroundings.			
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features to upland Common.		
	OPERATIONS: Process activities will be screened by existing tip material. Tip 1 removal will be partly screened by Tip 1 itself but changes in profile will be prominent. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity at Tip 1 partly screened by landform, prominent where visible. Operations at Deposition Area will be prominent, partly screened by surrounding bunds.		
	LANDFORM: Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portions of Tip 1 and Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
		landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Retention of historic landscape features		
LCA Risca (High)	ACCESS: New haul route in felled forest area between Risca and country park. Partial screening by roadside bunds and use of excavated rock as surfacing to integrate with environment. Sections of existing access road widened to 6m to accommodate haulage traffic.	Additional traffic on roads. More vehicle access by the Country Park east entrance. Conflict with PRoW and national trail users. PRoW and national trail diversions.	Minor adverse	Moderate adverse
	PROCESS AREA: Process area, offices and infrastructure sited between existing forest and Tip 2, screened by bund with tree planting to north boundary with forest. Trees planted in construction period will not have grown sufficient to provide screening and softening.	Process area to be partially screened from view.		
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity at Tip 1 largely screened from LCA by landform. Operations at Deposition Area unlikely to be screened. Effect on the Common's undisturbed, open, exposed landscape character.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	LANDFORM: Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portions of Tip 1 and Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Protection and retention of historic landscape features		
SLA North Caerphilly (Medium)	ACCESS: Widen section of existing access road to 6m to accommodate haulage traffic. New haul routes to/from	Vehicle access on the Common. Wider highway surface. Conflict with PRoW and national trail	Major adverse	Large adverse

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	tips to process area and deposition area. Use excavated rock as surfacing to integrate with environment.	users. PRoW and national trail diversions required.		
	PROCESS AREA: Process area, offices and infrastructure to be sited between existing forest and Tip 2, screened by bund with tree planting to north boundary with forest, and by Tip 2 to south, also built into side of Tip 2 to facilitate plant access. Use of excavated rock as hardstanding to integrate with its surroundings.	Process area to be partially screened from view.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features to upland Common.		
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity at Tip 1 largely screened from LCA by landform. Operations at Deposition Area unlikely to be screened. Effect on the Common's undisturbed, open, exposed landscape character.		
	LANDFORM: Levelling and removal of all surface soil from Common, stored in bunds. Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	VEGETATION: Partial respreading of stored existing topsoil and subsoils over	Grass seed establishing on part of site. Dense, mature vegetative cover not achieved in Year 1.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	completed portions of Tip 1 and Deposition Area. Initial restoration phase grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.			
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. In addition, species selection will contribute to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Retention of historic landscape features		
	ACCESS: Section of existing forest access road widened to 6m to accommodate haulage traffic. New haul routes to/from tips to process area and deposition area. Use excavated rock as surfacing to integrate with environment.	Noise of traffic using haul road and operational activity on Common above likely. Movement and activities partly screened by forest and landform. PRoW and national trails diverted.		
GW Cwmfelinfach and Ynysddu (High)	PROCESS AREA: Process area, offices and infrastructure sited between existing forest and Tip 2, partly screened by	Process area to be partially screened from view.	Minor adverse	Slight adverse

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	landform and bund with tree planting to north boundary with forest. Trees planted in construction period will not have grown sufficient to provide screening and softening.			
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften and screen tips and operational activities.	Operational activity at Tip 1 largely screened from LCA by landform. Operations at Deposition Area unlikely to be screened. Effect on the Common's undisturbed, open, exposed landscape character.		
	LANDFORM: Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Gradual change of skyline as Deposition Area developed. Partial restoration of completed part of Deposition Area. Effects on skyline.		
	VEGETATION: Partial respreading of stored existing topsoil and subsoils over completed portion of Deposition Area. Initial area of progressive restoration grass seeded to stabilise surfaces and slopes. Mix: 30% rye grass, 70% other grass species.	Grass seed establishing on part of Deposition Area. Dense, mature vegetative cover not achieved in Year 1.		
	TREE PLANTING: Tree planting to periphery of Tip 2 and processing area during the construction phase will not have achieved sufficient growth in Year 1 to provide screening and softening and cover for wildlife.	Inadequate growth or maturity to provide screening or softening of works or cover for wildlife. Species selection contributes to adverse or beneficial long term effects. E.g., coniferous plantation is detrimental to local landscape character. E.g., broadleaf woodland is beneficial to landscape quality and biodiversity. Species selection to be confirmed.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Retention of historic landscape features		
Sirhowy Country Park and Ynys Hywel Covid Memorial Woodland (High)	ACCESS: New haul route at eastern entrance in felled forest area. Widened sections of existing forest access road to 6m to accommodate haulage traffic. New haul routes to/from tips to process area and deposition area. Use of excavated rock as surfacing and bunds alongside route to integrate with environment.	Increased traffic at country park entrance and on forest road within country park. More vehicle access on the Common above. Wider highway surface. Conflict with PRoW and national trail users at several locations in the country park. PRoW and national trail diversions.	Major adverse	Large adverse
	PROCESS AREA: Process area, offices and infrastructure sited between existing forest and Tip 2, screened by bund with tree planting to north boundary with forest. Trees planted in construction period will not have grown sufficient to provide screening and softening.	Process area to be partially screened from view.		
	DRAINAGE: Drainage cuts and ponds in strategic locations. Use of existing dry stone walls, contours and temporary soil bunds to screen ponds.	Introduction of new landscape features to upland Common.		
	OPERATIONS: Activities will be screened by existing tip material. Tree planting in strategic locations to soften	Operational activity at Tip 1 largely screened from LCA by landform. Operations at Deposition Area unlikely to be screened. Effect on the		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	and screen tips and operational activities.	Common's undisturbed, open, exposed landscape character.		
	LANDFORM: Deposition commenced in Deposition Area, Tip 1 removal and processing and restoration commenced. Phased regrading, engineered profile and activities on skyline.	Three spoil heaps present until removal of Tip 1 completed. Partial restoration in progress. Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	FINAL VEGETATION: Surface to be grass seeded to stabilise surface. Mix: 30% rye grass, 70% other grass species to provide habitat value and stabilise slopes. Retained existing topsoil and subsoils re-spread over Tip 2 and Deposition Area.	Fully vegetated, stable slopes and surfaces. Potential for ground nesting birds.		
	TREE PLANTING: Tree planting to periphery of Tip 2 to provide screening and softening and cover for wildlife. Tree planting to take place during construction phase to maximise years of growth	Adverse or Beneficial effects are determined by species selection. Coniferous plantation has a detrimental effect on local landscape character. Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Diverted during construction and operational phase.	PRoW network diverted until completion with effect on enjoyment and recreational experience.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: to be protected from damage or disturbance and retained.	Retention of historic landscape features e.g., cairns, dry stone walls.		

Table 8-11 - Landscape residual impact assessment (i.e. with mitigation) – Establishment Year 15

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
LCA Mynydd Y Grug (High)	ACCESS: Former haul route retained as permanent forest management access to the Common with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	Broader forest management access suitable for variety of vehicles. Potential opportunities for future public use of the route to broaden accessibility of the Common.	Moderate adverse	Moderate adverse
	PROCESS AREA: Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	DRAINAGE: Selected ponds retained as permanent landscape/habitat features. Mature marginal and aquatic flora.	Established new landscape/habitat features.		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces. Managed as a Common. Potential for ground nesting birds.		
	TREE PLANTING: 15 years of growth, trees are maturing, providing new landscape features, screening and softening and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character. – Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment. Bench	PRoW network sustained. Likely desire line path established to new bench position.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	seating relocated to new viewpoint on Common.			
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features		
LCA Sirhowy Valley Slopes (Medium)	ACCESS: Former haul route retained as permanent forest management access with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	Broader forest management access suitable for plant variety of vehicles. Potential opportunities for future public use of the route to broaden accessibility of the Country Park and Common above.	Minor adverse	Slight adverse
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable, uniform engineered slopes, in profile on skyline.	Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	TREE PLANTING: Peripheral tree planting has attained 15 years of growth, now providing screening and softening of regraded Tip 2 and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character. – Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained. Surface improved on forest road sections of PRoW.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features		
LCA Valley Slopes Machen – Ystrad Mynach	ACCESS: Former haul route retained as permanent forest management access with selected passing bays retained.	Broader forest management access suitable for plant variety of vehicles. Potential opportunities for future public use of the route to broaden	Moderate beneficial	Moderate adverse

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
(Medium)	PRoW network, cycle routes and national trail reinstated on original alignments.	accessibility of the Country Park and Common above.		
	PROCESS AREA: process plant, infrastructure removed. Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	DRAINAGE: Selected ponds retained as permanent landscape/habitat features. Mature marginal and aquatic flora.	Established new landscape/habitat features.		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline. Tip 1 removed with original contours restored.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces. Managed as a Common. Potential for ground nesting birds.		
	TREE PLANTING: 15 years of growth, trees are maturing, providing new landscape features, screening and softening and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character. – Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features		
	LANDUSE: informal recreation	Large area of countryside available for informal recreation with good connectivity to PRoW network		
LCA Mynydd y Lan (High)	ACCESS: Former haul route retained as permanent forest management access with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	Similar access to that on lower slopes by Mynydd y Lan. Broader forest management access suitable for variety of vehicles and users.	Minor beneficial	Slight beneficial
	PROCESS AREA: process plant, infrastructure removed. Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	DRAINAGE: Selected ponds retained as permanent landscape/habitat features. Mature marginal and aquatic flora.	Introduction of new landscape features to upland Common. Unlikely to be noticeable from LCA		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces. Managed as a Common. Potential for ground nesting birds.		
	TREE PLANTING: 15 years of growth, trees are maturing, providing new landscape features, screening and softening and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
		– Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features, characteristic of Commons in the area, indicative of boundaries of Common land.		
LCA Wooded Slopes west of Mynydd y Lan (Medium)	ACCESS: Former haul route retained as permanent forest management access with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	Similar access to that on lower slopes by Mynydd y Lan. Broader forest management access suitable for variety of vehicles and users.	Negligible beneficial	Neutral
	PROCESS AREA: process plant, infrastructure removed. Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	DRAINAGE: Selected ponds retained as permanent landscape/habitat features. Mature marginal and aquatic flora.	Introduction of new landscape features to upland Common. Unlikely to be noticeable from LCA		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces. Managed as a Common. Potential for ground nesting birds.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	TREE PLANTING: 15 years of growth, trees are maturing, providing new landscape features, screening and softening and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character. – Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features, characteristic of Commons in the area, indicative of boundaries of Common land.		
LCA Wooded Slopes Cwmcarn (Medium)	ACCESS: Former haul route retained as permanent forest management access with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	Similar access to that of forests on valley slopes. Broader forest management access suitable for variety of vehicles and users.	Negligible beneficial	Neutral
	PROCESS AREA: Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	DRAINAGE: Selected ponds retained as permanent landscape/habitat features. Mature marginal and aquatic flora.	Introduction of new landscape features to upland Common. Unlikely to be noticeable from LCA		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces. Managed as a Common. Potential for ground nesting birds.		
	TREE PLANTING: 15 years of growth, trees are maturing, providing new landscape features, screening and softening and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character. – Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features, characteristic of Commons in the area, indicative of boundaries of Common land.		
LCA Rhymney Valley South of Caerphilly (Medium)	ACCESS: Former haul route retained as permanent forest management access to the Common with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	Broader forest management access suitable for variety of vehicles. Potential opportunities for future public use of the route to broaden accessibility of the Common.	Moderate Beneficial	Moderate
	PROCESS AREA: Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	DRAINAGE: Selected ponds retained as permanent landscape/habitat features. Mature marginal and aquatic flora.	Introduction of new landscape features to upland Common. Unlikely to be noticeable from LCA		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline. Tip 1 area restored to original valley slope contours.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces. Potential for ground nesting birds.		
	TREE PLANTING: 15 years of growth, trees are maturing, providing new landscape features, screening and softening and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character. – Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features, characteristic of Commons in the area, indicative of boundaries of Common land. .		
	SITE OF FORMER TIP 1: Land use: Potentially agricultural or recreational. To be confirmed. Potential restoration of original field boundary alignments and treatments. To be confirmed.	Integration within the local landscape. Potential contribution to delivery of local planning or recreational strategy. To be confirmed.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
LCA Risca (High)	ACCESS: Haul route retained as permanent forest management access to the Common by Risca roundabout. PRoW network, cycle routes and national trail reinstated on original alignments.	Broader forest management access suitable for variety of vehicles. Potential opportunities for future public use of the route to broaden accessibility of the Common.	Minor beneficial	Slight beneficial
	FINAL LANDFORM: graded and reprofiled Deposition area and Tip 2 fully vegetated, stable slopes and surfaces in profile on skyline, partially screened by existing forest.	Vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces.		
	TREE PLANTING: Planted trees have 15 years of growth, consolidating existing forest areas and landscape features, screening and softening reprofiled Common.	Adverse or Beneficial effects are determined by species selection. – Conifers have a detrimental effect on landscape character. – Broadleafs have a beneficial effect on landscape and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Path links reinstated on original alignment.	PRoW network sustained.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features.		
SLA North Caerphilly (Medium)	ACCESS: Former haul route retained as permanent access with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	Potential opportunities for future public use of the route to broaden accessibility of the Common.	Moderate beneficial	Moderate beneficial

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	PROCESS AREA: Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	DRAINAGE: Selected ponds retained as permanent landscape/habitat features. Mature marginal and aquatic flora.	Established new landscape/habitat features.		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable fully vegetated slopes and surfaces, in profile on skyline. Tip 1 area restored to original valley slope contours.	Open, large scale, regraded, vegetated landform integrated into the surrounding landscape and skyline (see visual assessment). Land used for informal recreation.		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces. Potential for ground nesting birds.		
	TREE PLANTING: 15 years of growth, trees are maturing, providing new landscape and habitat features, screening and softening and cover for wildlife.	Adverse or Beneficial effects are determined by species selection. – Coniferous plantation has a detrimental effect on local landscape character. – Broadleaf woodland has a beneficial effect on landscape quality and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained.		

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features, characteristic of Commons in the area, indicative of boundaries of Common land.		
GW Cwmfelinfach and Ynysddu (High)	ACCESS: Former haul route retained as permanent forest management access to the Common. PRoW network, cycle routes and national trail reinstated on original alignments.	Broader forest management access suitable for variety of vehicles. Potential opportunities for future public use of the route to broaden accessibility of the Common.	Negligible adverse	Slight adverse
	FINAL LANDFORM: graded and reprofiled Deposition area and Tip 2 fully vegetated, stable slopes and surfaces in profile on skyline, partially screened by existing forest.	Vegetated landform integrated into the surrounding landscape and skyline (see visual assessment).		
	FINAL VEGETATION: Mature, dense grass surface.	Fully established grassed surfaces.		
	TREE PLANTING: Planted trees have 15 years of growth, consolidating existing forest areas and landscape features, screening and softening reprofiled Common above.	Adverse or Beneficial effects are determined by species selection. – Conifers have a detrimental effect on landscape character. – Broadleafs have a beneficial effect on landscape and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Path links reinstated on original alignment.	PRoW network sustained.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features.		
Sirhowy Country Park and Ynys Hywel	ACCESS: Former haul route retained as permanent forest management access	Broader forest management access suitable for plant variety of vehicles. Potential opportunities	Minor adverse	Slight adverse

Receptor and sensitivity	Impact / Mitigation	Effect	Magnitude	Significance
Covid Memorial Woodland (High)	with selected passing bays retained. PRoW network, cycle routes and national trail reinstated on original alignments.	for future public use of the route to broaden accessibility to and links between the Country Park and Common above.		
	PROCESS AREA: Area made good, soil and vegetated to match Tip 2. PRoW and national trail restored.	Common reinstated, path network reinstated.		
	FINAL LANDFORM: Deposition area and Tip 2 regraded with stable, uniform engineered slopes, in profile on skyline.	Effects on skyline, a key characteristic of LCA and views (see visual assessment).		
	FINAL VEGETATION: Common vegetated with mature, dense grass surface.	Fully established grassed surfaces. Potential habitat for ground nesting birds.		
	TREE PLANTING: Planted trees have 15 years of growth, consolidating existing forest areas and landscape features, screening and softening reprofiled Common above.	Adverse or Beneficial effects are determined by species selection. – Conifers have a detrimental effect on landscape character. – Broadleafs have a beneficial effect on landscape and biodiversity. To be determined.		
	PRoW NETWORK + NATIONAL TRAIL: Reinstated on original alignment on completion.	PRoW network sustained. Surface improved on forest road sections of PRoW.		
	HISTORIC LANDSCAPE FEATURES + DRY STONE WALLS: retained.	Retention of historic landscape features		

Table 8-12 – Visual Operational Phase Residual Effects

Receptor and sensitivity	Receptors	Impact	Effect	Magnitude (pre-mitigation / enhancement)	Mitigation and Enhancement	Residual magnitude	Residual significance
2. Rhymney Valley Ridgeway Walk (RVRW), Mynydd y Grug Common. (High)	PRoW users, recreational users of RVRW and Mynydd y Grug Common.	Operational works, and lighting. The process plant is notably exposed from this viewpoint. The coal stock yard will be visible from this viewpoint.	Loss of visual amenity for the receptor.	Major Adverse	Following completion, the re-seeding / reinstatement of all exposed earth with grass will be undertaken. The potential area for tree planting on the northern side of tip1 will partially screen the construction area.	Moderate Adverse	Moderate
3. Rhymney Valley Ridgeway Walk looking west (by Twyn yr Oerfel Cairns) (High)	PRoW users, recreational users of RVRW and Mynydd y Grug Common.	Operational works, and lighting. The process plant is notably exposed from this viewpoint.	Loss of visual amenity for the receptor.	Major Adverse	Soil bund screens will be strategically positioned along the construction and process plant to mitigate the impact on the landscape setting. Following completion, the re-seeding / reinstatement of all exposed earth with grass will be undertaken. The potential area for tree planting on the southern side of tip1 will partially screen the construction area.	Moderate Adverse	Moderate

Receptor and sensitivity	Receptors	Impact	Effect	Magnitude (pre-mitigation / enhancement)	Mitigation and Enhancement	Residual magnitude	Residual significance
6. Entrance to Mynydd Dinlaith Common / Pandy-Mawr Road (high)	Recreational users of the PRoW and Mynydd Dinlaith Common, farm workers	Operational works, and lighting.	Loss of visual amenity for the receptor.	Moderate Adverse	Following completion, the re-seeding / reinstatement of all exposed earth with grass will be undertaken.		
14. PRoW, (RUD/FP4/3) Mynydd Rudry, Rudry Common	Recreational users of the PRoW and Mynydd Rudry	Operational works, lighting and soil bund will be partially visible from a distance.	Loss of visual amenity for the receptor.	Moderate Adverse	Following completion, the re-seeding / reinstatement of all exposed earth with grass will be undertaken.		

8.11 CUMULATIVE EFFECTS

8.11.1. There are two current developments (to be decided) in the area that may generate cumulative effects. And a further two granted planning permissions for an existing development.

Table 8-13 - Cumulative developments

Application ref.	Address	Proposal	Distance and direction from RLB	Approved / pending / constructed
23/0427/DNS	Twyn Hywel Energy Park, Land northwest of Caerphilly	Construct & operate up to 14 wind turbines (up to 200m tip height, 122.5m hub height) and associated infrastructure, habitat area and offsite works	2305m westsouthwest of the RLB (new tip) at the nearest point	Current (validated 04/08/2023)
23/0116/DNS	Cwm Ifor Solar Farm, Cwm Ifor Farm, Bowls Lane Caerphilly	Construct and operate a Solar Photovoltaic (PV) Farm (up to 20MW) - Development of National Significance	3390m southwest of the RLB (new tip) at the nearest point	Current (validated 24/03/2023)
22/0353/NCC	Hill Farm Solar Park, Penrhiwarwydd Farm, Islwynslwyn Mountain Road, Mynyddislwyn	Vary condition 02 (timescale of planning consent 14/0512/FULL – solar arrays of circa 8.5MW) to extend operational period up to 40 years and 6 months	922m north of the RLB at nearest point (to haul road RLB)	Granted 17/08/2022
23/0578/NMA	Hill Farm Solar Park, Penrhiwarwydd Farm, Islwynslwyn Mountain Road, Mynyddislwyn	NMA to replace 4no MW substations with 3no field substations. 14/0512/FULL – solar arrays of circa 8.5MW)	922m north of the RLB at nearest point (haul road RLB)	Granted 26/09/2023

8.11.2. The red line boundaries of the two granted planning permissions 22/0353/NCC and 23/0578/NMA for the existing solar farm development lie within the 1km study area boundary. Neither of these will have a cumulative effect.

8.11.3. Planning applications 23/0427/DNS and 23/0116/DNS are both Developments of National Significance and currently have not been determined. These are both outside the 1km radius landscape study area and lie on land which is locally designated a Special Landscape Area. As some of the LCA are characterised by dramatic or extensive views e.g. NCLA 37 South Wales Valleys. However, key characteristics of NCLA 37 do not include the presence of wind turbines. Caerphilly County Borough Council (Caerphilly CBC) guidance53 lists wind turbines of greater than or equal to 109m height or more than 6 turbines as Very Large. Figure 15b of the smaller scale wind turbine development landscape indicates that the landscape of the North Caerphilly, South Caerphilly, Caerphilly, Risca, Mynyddislwyn areas are of high sensitivity to very large wind turbine development and medium to high sensitivity to large wind turbine development.

8.11.4. North Caerphilly landscape unit 4 (contiguous with North Caerphilly SLA) describes the scenic quality and character as “The rural unit is pleasant and attractive with good tree cover. Machen Quarry and Bedwas tips are located at the southeastern end of the unit and are detractors in the rural landscape.” Gillespies & Caerphilly CBC (Nov 2015) (Part 2 page 47).

8.11.5. The dimensions of the proposed 14 turbines, reaching up to a 200m tip height in proximity to the proposed development, have a significant effect on the sensitive visual receptors, including several communities, notably Senghenydd, Abertridwr, Nelson, Gelligaer, Ystrad Mynach, Maesywmmer, and Blackwood. Turbines of this height will be out of scale with the medium-scale landscape, resulting in a visual impact, with the turbines breaking the skyline and not following best practices as set out by NatureScot (2017) in "Siting and Designing Windfarms in the Landscape," Version 3a9.

8.12 SUMMARY

8.12.1. This assessment has considered the operation phase visual impacts of the Proposed Scheme at 19 agreed viewpoints, the significance of effects at each location and how these will be mitigated and enhanced. During the operation phase, visual impacts will be associated with the construction vehicles and process plant, site compounds and associated temporary lighting, and the loss of some existing vegetation. During the construction of the new road and its associated structures, heavy machinery, including lifting equipment, will be brought onto the site and remain there for periods. This will have an adverse visual effect from several viewpoints. None of the operational impacts have resulted in a beneficial effect on the visual amenity from any particular viewpoint.

8.12.2. Table 8-16 shows the Preliminary Assessment of the post-operation landscape at Year 15 (without mitigation) when the land is permanently returned to grassland and used for informal recreation.

[53] Gillespies & Caerphilly County Borough Council (November 2015) Caerphilly County Borough Small Scale Wind Turbine Development: Landscape Sensitivity and Capacity Study Final report November 2015

Trees will have been growing for between 15 and 22 years due to planting taking place at different stages of progressive restoration during the construction phase, including the initial preparatory period prior to the commencement of coal processing. By Year 15, it is unlikely that temporary effects remain as there will have been a minimum 15 years of establishment and growth. Trees planted to provide woodland, and screening will be approaching maturity, and it is expected that patches of bare ground will be fully vegetated and a dense grassland sward has been achieved.

8.12.3. Temporary nighttime effects are likely to occur during the construction period, however, there is no mitigation for nighttime effects. At Year 1 and Year 15 post-operation phase, light and noise levels in the upland site areas will return to the current level.

8.12.4. Table 8-14 summarises the significance of landscape effects during the construction phase, operational phase Year 1 and Year 15 with and without mitigation.

Table 8-14 - Summary of significances – landscape effects

Landscape Receptor	Day / night	Without mitigation						With mitigation			
		Construction Period 7 years		Post-operation Year 1		Post operation Year 15		Construction Period 7 years		Post operation Year 15	
		magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance
NLCA37 Dyffrynnoedd y De / South Wales Valleys (medium)	Day	Minor adverse (during works)	Slight adverse (during works)	Minor beneficial	Slight beneficial	Negligible beneficial	Neutral	-	-	-	-
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
Regional LCA: South-East Wales Landscape (medium)	Day	Minor adverse (during works)	Slight adverse (during works)	Minor beneficial	Slight beneficial	Negligible beneficial	Neutral	-	-	-	-
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Mynydd Y Grug (high)	Day	Major adverse	Very large adverse	Moderate adverse	Large adverse	Major adverse	Major adverse	Major adverse	Large adverse	Moderate adverse	Moderate adverse
	Night	Minor adverse	Minor adverse	No change	Neutral	No change	Neutral	-	-	-	-

Landscape Receptor	Day / night	Without mitigation						With mitigation			
		Construction Period 7 years		Post-operation Year 1		Post operation Year 15		Construction Period 7 years		Post operation Year 15	
		magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance
LCA Sirhowy Valley Slopes (medium)	Day	Major adverse	Moderate adverse	Minor adverse	Slight adverse	Minor adverse	Slight adverse	Major adverse	Moderate adverse	Minor adverse	Slight adverse
	Night	Moderate adverse	Moderate adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Valley Slopes Machen – Ystrad Mynach Not defined previously	Day	Moderate adverse	Moderate adverse	Minor adverse	Slight adverse	Minor beneficial	Slight beneficial	Minor adverse	Slight adverse	Moderate beneficial	Moderate adverse
	Night	Moderate adverse	Moderate adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Mynydd y Lan (high)	Day	Moderate adverse	Moderate adverse	Minor adverse	Moderate adverse	Negligible beneficial	Slight beneficial	Moderate adverse	Moderate adverse	Minor beneficial	Slight beneficial
	Night	Minor adverse	Moderate adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA NW of Mynydd y Lan	Day	Minor adverse	Slight adverse	Minor adverse	Slight adverse	Negligible beneficial	Neutral	Minor adverse	Slight adverse	Negligible beneficial	Neutral

Landscape Receptor	Day / night	Without mitigation						With mitigation			
		Construction Period 7 years		Post-operation Year 1		Post operation Year 15		Construction Period 7 years		Post operation Year 15	
		magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance
(medium)	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Wooded Slopes west of Mynydd y Lan (medium)	Day	Minor adverse	Slight adverse	Minor adverse	Slight adverse	Negligible adverse	Slight adverse	Minor adverse	Slight adverse	Negligible beneficial	Neutral
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Wooded Slopes Cwmcarn (medium)	Day	Moderate adverse	Moderate adverse	Negligible adverse	Neutral	Negligible adverse	Slight adverse	Moderate adverse	Moderate adverse	Negligible beneficial	Neutral
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Rhymney Valley South of Caerphilly (medium)	Day	Moderate adverse	Moderate adverse	Minor beneficial	Slight beneficial	Minor beneficial	Slight beneficial	Moderate adverse	Moderate adverse	Moderate beneficial	Moderate
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Risca	Day	Minor adverse	Moderate adverse	Minor adverse	Slight adverse	Negligible beneficial	Slight beneficial	Minor adverse	Moderate adverse	Minor beneficial	Slight beneficial

Landscape Receptor	Day / night	Without mitigation						With mitigation			
		Construction Period 7 years		Post-operation Year 1		Post operation Year 15		Construction Period 7 years		Post operation Year 15	
		magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance
(high)	Night	Minor adverse	Moderate adverse	No change	Neutral	No change	Neutral	-	-	-	-
LCA Caerphilly (low)	Day	Minor adverse	Neutral or Slight adverse	Negligible adverse	Neutral	Minor beneficial	Slight beneficial	-	-	-	-
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
SLA NH1.4 North Caerphilly (medium)	Day	Moderate adverse	Moderate adverse	Minor adverse	Slight adverse	Minor beneficial	Slight beneficial	Moderate adverse	Moderate adverse	Moderate beneficial	Moderate beneficial
	Night	Moderate adverse	Moderate adverse	No change	Neutral	No change	Neutral	-	-	-	-
SLA NH1.5 South Caerphilly (medium)	Day	Minor adverse	Slight adverse	Negligible adverse	Neutral	Minor beneficial	Slight beneficial	-	-	-	-
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-

Landscape Receptor	Day / night	Without mitigation						With mitigation			
		Construction Period 7 years		Post-operation Year 1		Post operation Year 15		Construction Period 7 years		Post operation Year 15	
		magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance
SLA NH1.6 Mynyddislwyn (medium)	Day	Minor adverse	Slight adverse	Negligible adverse	Neutral	Negligible adverse	Neutral	-	-	-	-
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
GW SI1.19 Cwmfelinfach and Ynysddu (high)	Day	Minor adverse	Moderate adverse	Minor adverse	Slight adverse	Minor beneficial	Slight beneficial	Minor adverse	Slight adverse	Negligible adverse	Slight adverse
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-
GW SI1.23 Machen, Graig y Rhacca + Waterloo (low)	day	Moderate adverse (during works) Minor beneficial (removal of Tip 1 and final restoration)	Moderate adverse (during works) Slight beneficial (removal of Tip 1 and final restoration)	Minor beneficial	Slight beneficial	Minor beneficial	Slight beneficial	-	-	-	-
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-		

Landscape Receptor	Day / night	Without mitigation						With mitigation			
		Construction Period 7 years		Post-operation Year 1		Post operation Year 15		Construction Period 7 years		Post operation Year 15	
		magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance	magnitude	significance
Sirhowy Country Park and Ynys Hywel Covid Memorial Woodland (high)	Day	Major adverse	Large adverse	Minor adverse	Moderate adverse	Minor adverse	Slight adverse	Major adverse	Large adverse	Minor adverse	Slight adverse
	Night	Minor adverse	Slight adverse	No change	Neutral	No change	Neutral	-	-	-	-

8.12.5. Enhancement measures could be implemented to improve the landscape character of the Proposed Scheme after the coal processing work development is complete. Potential landscape and enhancement measures could form part of a comprehensive phased landscape master plan, for example, there is an opportunity to realign the Rhymney Valley Ridgeway Walk along the crestline of the newly formed landform to maintain the open panoramic views that would otherwise be obstructed by the restoration proposals (reference Receptor 2 and 3 **Table 8-1** and **Table 8-2**), and a retained, repurposed haul road could provide potential recreational benefit for bridleway and off road cycleway access.

8.12.6. There are significant adverse impacts associated with the site operations of Bedwas Tip restoration works. Overall, however the completed works will improve the landscape and visual quality of the wider area, in particular the settlements of Bedwas and Trethomas which are within 300m of the Proposed Development (Tip 1) and also their Rhymney Valley setting. In addition, if landscape mitigation and enhancement measures as identified are also carried out as part of the restoration works this will result in an exemplar landscape restoration scheme. This will offer substantial environmental improvements, enhancing the landscape character and value, its visual quality with increased amenity opportunities for the local community.

9 ECOLOGY AND NATURE CONSERVATION

9.1 INTRODUCTION

9.1.1. This chapter of the Environmental Statement (ES) describes the existing environment in relation to Ecology and Nature Conservation and details how the Proposed Scheme would impact ecological resources: designated sites, habitats and species.

9.1.2. This chapter reflects the assessment of likely significant effects as required under the Town and Country Planning (Environmental Impact Assessment (EIA)) (Wales) Regulations 201754.

9.1.3. The assessment is conducted within the framework of best practice guidelines, wildlife legislation and planning policy, to ensure that all potential adverse effects on ecology and nature conservation are identified and mitigated appropriately.

9.1.4. Impacts upon biodiversity resources from infrastructure projects can arise from both direct and indirect sources, of which can be temporary or permanent, and reversible or irreversible. Indirect impacts can be caused through disturbance from noise and vibration or increased human access, alteration of hydrological regimes and pollution of air, land or water.

9.1.5. This chapter is supported by information from the following chapters of the ES:

- Air Quality (Chapter 6) (it should be noted that no Air Quality assessment of non-statutory designated sites was undertaken);
- Landscape (Chapter 8);
- Geology, Soils (Chapter 10)
- Noise (Chapter 12); and
- Water Environment (Chapter 13).

9.1.6. The aim of the biodiversity chapter is therefore to detail the:

- legal and policy context with regard to nature conservation;
- methodology in respect of the information gathering and changes in the assessment methodology or guidance since the environmental scoping exercise;
- current ecological baseline within the zone of influence of the Proposed Scheme;
- evaluation of the ecological resources within the zone of influence of the Proposed Scheme;
- assessment of the likely significant impacts of the Proposed Scheme on important ecological resources in the absence of additional mitigation;
- mitigation measures proposed as part of the Proposed Scheme;
- residual effects predicted as a result of the Proposed Scheme with additional mitigation and conclusions of the assessment; and

[54] The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. Wales Statutory Instruments: 2017 No. 567 (W. 136).

- enhancements for biodiversity.

9.2 STUDY AREA

9.2.1. The study area has been defined in accordance with variable zones of influence for each ecological receptor. As such this ranges between 50m (habitats) up to 5km (bat designated sites) surrounding the Red Line Boundary (RLB) for the Proposed Scheme. Full details of study areas for each ecological receptor are described in Section 9.4 and are shown in V2-S09/0001.

9.2.2. Note: Where reference is made to the Proposed Scheme area this is defined by all areas within the RLB.

9.2.3. Land use within the study area comprises predominantly spoil across two tip sites, with the proposed haul road (along the existing forestry track) passing largely through woodland. Surrounding land use consists agricultural land with pockets of woodland. Bedwas town is situated to the south of the Proposed Scheme area, separated from the Proposed Scheme by a woodland corridor. Cwmfelinfach village is to the north-east of the Haul Road section separated from the Proposed Scheme by the Sirhowy river and a woodland corridor. The Proposed Scheme area lies partially within statutory and non-statutory designated sites.

9.3 LEGISLATION AND POLICY

LEGISLATION

9.3.1. Key legislation that has determined the way in which this assessment was carried out includes, but is not limited to the following:

Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 201955

9.3.2. These regulations identify, designate and protect sites of international/European importance and assist to provide the Natura 2000 ecological network. In addition, numerous habitats and species are strictly protected under the legislation.

9.3.3. Protection afforded to faunal species listed in Schedule 2 of the regulations makes it an offence to:

- deliberately capture or kill any wild animal of a European protected species;
- deliberately disturb any such animal (defined as reduce their ability to survive or reproduce); and
- damage or destroy a breeding site or resting place of such a wild animal.

9.3.4. If development is likely to disturb, destroy or damage a European Protected Species or their place of shelter, then an appropriate licence issued by the relevant governing body i.e. Natural Resources Wales (NRW) is required.

9.3.5. There is an aim to retain listed habitats and species at Favourable Conservation Status and this is taken into account in the evaluation of receptor sensitivity as part of the assessment.

[55] The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

Wildlife and Countryside Act 1981 (as amended)

9.3.6. This Act[56] allows for the designation of Sites of Special Scientific Interest (SSSI) due to features of conservation interest related to flora, fauna, physiography or geology. The Act makes it an offence to kill, injure, take, possess, or trade in many wild animal species and to pick, uproot, possess or trade in a number of wild plant species. Measures are outlined to prevent the establishment of non-native species that could adversely affect native wildlife. The act also implements certain provisions of Council Directive 2009/147/EC (the 'Wild Birds Directive').

Birds Directive (Directive 2009/147/EC)

9.3.7. Annex 1 of the Birds Directive57 lists species and sub-species which are:

- in danger of extinction;
- vulnerable to specific changes in their habitat;
- considered rare because of small populations or restricted local distribution;
- requiring particular attention for reasons of the specific nature of habitat.

9.3.8. For these species Member States must conserve their most suitable territories in number and size as Special Protection Areas (SPAs).

Environment (Wales) Act 2016

9.3.9. Section 7 of the Environment (Wales) Act58 lists living organisms and types of habitat in Wales which are considered to be of key significance to sustain and improve biodiversity in relation to Wales.

9.3.10. The Act states that Welsh Ministers must take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section and encourage others to take such steps.

9.3.11. Priority habitats and species are taken into account as part of this assessment.

EU Water Framework Directive 2000

9.3.12. These Regulations59 set out a series of objectives for fluvial, lacustrine, groundwater, and coastal water bodies. These include improving the water environment to achieve good / high status, maintaining existing good/high status, and implementing mitigation to support the water environment at a catchment and water body scale.

9.3.13. Consideration of the aquatic and water environment is considered under Chapter 13, Water Environment.

[56] Wildlife and Countryside Act 1981 (England and Wales) (Amendment) Regulations 2016.

[57] Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.

[58] Environment (Wales) Act 2016. Acts of the National Assembly for Wales: 2016.

[59] EU Water Framework Directive 2000

Protection of Badgers Act 1992

9.3.14. This legislation60 lists various offences relating to badgers and their places of shelter which could have an impact at both construction and operational stages of the Proposed Scheme.

Wild Mammals (Protection) Act 1996

9.3.15. This Act[61] provides protection for wild mammals against certain acts of deliberate harm. The following offences are specified in relation to any wild mammal: to mutilate, kick, beat, nail or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate.

POLICY

Planning Policy Wales (PPW) 11th Ed. (2021)

9.3.16. The primary objective of PPW62 is to ensure that the planning system contributes towards the delivery of sustainable development. Chapter 6 of the PPW sets out measures in respect of biodiversity and ecological networks and expands upon implementing the Section 6 duty under the Environment (Wales) Act 2016. This chapter has recently been subject to review and the following changes incorporated into the next iteration of Planning Policy Wales (Edition 12) expected to be published in 2024[63]:

9.3.17. Net Benefit for Biodiversity and the Step-wise Approach: further clarity on securing net benefit for biodiversity through application of the step-wise approach, including acknowledgement of off-site compensation measures as a last resort, and need to consider enhancement and long-term management at each step.

9.3.18. Trees and Woodlands: closer alignment with the stepwise approach, along with promoting new planting as part of development based on securing the right tree in the right place.

Technical Advice Note 5 – Nature Conservation and Planning (Welsh Government, 2009)

9.3.19. This advice note64 provides guidance on how the planning system should contribute to the protection and enhancement of biodiversity and geological features.

Caerphilly County Borough Local Development Plan up to 2021 (Adopted November 2010)

9.3.20. The Caerphilly County Borough Local Development Plan (LDP)65 sets out the land use planning policy framework for the period up to 2021 (full review of LDP currently in progress).

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[60] Protection of Badgers Act 1992. UK Public General Acts1992 c. 51

[61] Wild Mammals (Protection) Act 1996. UK Public General Acts1996 c. 3

[62] Planning Policy Wales. Edition 11. February 2021

[63] Welsh Government (2023) Open Letter (Ref: MA/JJ/2512/23) to Local Authorities – Heads of Planning

[64] Planning Policy Wales Technical Advice Note 5: Nature Conservation and Planning 2009

[65] Caerphilly County Borough Local Development Plan up to 2021 (Adopted November 2010)

9.3.21. Key components of the strategy: Reduce the impact of development upon the countryside as detailed in the following policies:

- Strategy Policy SP10: Conservation of Natural Heritage; and
- Countrywide Policy CW6: Trees, woodlands and hedgerow protection.

9.4 ASSESSMENT METHODOLOGY

9.4.1. Desk studies and field surveys undertaken over 2023 have provided extensive knowledge of the biodiversity resource at the site. The assessment covers sites of nature conservation importance, habitats, floral and faunal species.

GUIDANCE

9.4.2. This assessment is based on guidance detailed within the Design Manual for Roads and Bridges (DMRB), LA108 Biodiversity66. This guidance was used as it provides a good foundation for biodiversity assessment easily applied to proposed works associated with this Proposed Scheme.

9.4.3. Where applicable other guidance was consulted such as the Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal (CIEEM, 2018)67, Environmental Impact Assessment Handbook: A practical guide for planners, developers and communities (ICE, 2019)68 and specific species guidance to assess impacts on species such as bats (Wray et al (2010)69: Valuing Bats in Ecological Impact Assessment). These are detailed in the relevant sections of the chapter Methodology.

Sources of Information

9.4.4. The following organisations/persons were consulted for ecological information about the Proposed Scheme and surrounding areas:

- South East Wales Biodiversity Records Centre (SEWBReC)[70];
- Multi-Agency Geographic Information for the Countryside (MAGIC)[71];
- Caerphilly County Borough Council (CCBC) interactive map;
- NRW AW Inventory[72];
- CCBC Local Development Plan;

[66] Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 4 LA 108 Biodiversity.

[67] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

[68] ice (2019) Environmental Impact Assessment Handbook: A practical guide for planners, developers and communities, Third edition, Authors: Barbara Carroll, Josh Fothergill , Jo Murphy and Trevor Turpin

[69] Wray *et al* (2010) Valuing Bats in Ecological Impact Assessment. In Practice. No. 70. Institute of Ecology and Environmental Management.

[70] South East Wales Biodiversity Records Centre (SEWBReC, 2022/23)

71 Multi-Agency Geographic Information System (MAGIC, 201, 2020); https://magic.defra.gov.uk/

[72] Natural Resources Wales (2021) Ancient Woodland Inventory 2021; https://datamap.gov.wales/layers/inspire-nrw:NRW_ANCIENT_WOODLAND_INVENTORY_2021

- Local Environmental Records Centre (LERC)[73] Wales citations- designated sites;
- Bedwas Tips EIA Scoping Report (2019)[74];
- CCBC Environmental Impact Scoping Opinion 2021[75];
- Caerphilly County Ecologist; and
- SureScreen Scientifics (2019) - eDNA Report[76];

Study Areas

9.4.5. Study areas for the ecological assessment were determined through Chartered Institute of Ecology and Environmental Management CIEEM guidance and consultation with the CCBC Ecologist. Study areas vary according to habitat and species, and a sufficient zone of influence was agreed for each applicable survey (see **Table 9-1** for study areas for each ecological receptor).

Table 9-1 – Ecological Receptor Study Areas

Ecological Receptor - Task/Survey	Study/Survey Area	Notes
Designated sites		
Statutory sites	2km surrounding RLB (5km for bat designated sites).	-
Non-statutory sites	1km surrounding RLB	-
Tree Preservation Orders (TPO) and AW	500m surrounding RLB	-
Habitats		
Extended Phase 1 Habitat Survey	Proposed Scheme RLB and 50m buffer surrounding.	This area was considered appropriate to allow for the identification of mitigation for the potential modification of habitat from the Proposed Scheme area.
Species Surveys		

[73] Local Environmental Records Centre Wales citations, Available at: http://citations.lercwales.org.uk/sites
[74] Capita (2019) Bedwas Tip Reclamation Proposed Scheme, Environmental Impact Assessment Scoping Report.
[75] Caerphilly County Borough Council (2021) Environmental Impact Scoping Opinion, Ref: EIASCO/20/0001;
[76] SureScreen Scientifics (2019) Technical Report Analysis of Environmental DNA in Pond Water for the Detection of Great Crested Newts, Folio No. E5816. Report date 10/07/2019.

Ecological Receptor - Task/Survey	Study/Survey Area	Notes
Bats - Ground Level Tree Assessments (GLTAs)	All trees within the Proposed Scheme area	-
Bats - Automated Activity Surveys	Discrete locations across the eastern extent of the proposed haul road route (where the proposed haul road trajectory deviates from the existing track).	-
Dormouse – Presence/ Absence Surveys	Within suitable habitats (woodland / scrub) within the Proposed Scheme area.	-
Otter	No specific survey undertaken as Proposed Scheme not directly impacting the River Sirhowy.	Assumed presence along River Sirhowy.
Great Crested Newt (GCN) – Habitat Suitability Assessments (HSIs)	Ponds within 500m of the main Proposed Scheme area and eastern extent of haul road (main areas of works) and 250m of the remaining sections of Haul Road (minimal works due to existing track).	HSI not obtained for two ponds due to restricted access. Ditches excluded from assessments/surveys due to shallow and ephemeral nature (i.e., likely to dry out) noted during Phase 1 Habitat survey.
GCN – Environmental DNA (eDNA) surveys	Ponds within 500m of the main Proposed Scheme area and eastern extent of Haul Road (main areas of works) and 250m of the remaining sections of Haul Road (minimal works (i.e., passing places) due to existing track).	-
Badger	Main Proposed Scheme area and up to 100m buffer surrounding. Haul Road excluded from surveys due to time restrictions.	Incidental observations made during other ecological surveys for the Proposed Scheme were taken into account for the Haul Road section.
Other small mammals	No specific survey undertaken	Habitat suitable to support the Priority mammal species hare and hedgehog was identified on site during the extended Phase 1 habitat survey. Incidental observations were noted during other ecological surveys.
Birds - Ground nesting bird survey (inclusive of a pre-nesting check for raptor nests along haul road)	Habitats within Proposed Scheme area with potential to support ground nesting species.	A transect route devised to ensure habitat types with potential to support ground nesting birds were incorporated.

Ecological Receptor - Task/Survey	Study/Survey Area	Notes
Birds - Vantage Point (VP) survey - Raptors	VP locations were selected to obtain maximum visual coverage of the Proposed Scheme area and an appropriate buffer zone, using the minimum number of locations to achieve this aim.	-
Winter birds	No specific survey undertaken.	Winter birds were scoped out of surveys and this EIA in consultation with the CCBC Ecologist due to the Proposed Scheme outcome to restore habitat post-works. Further consultation with Richard Poole (WSP, bat and ornithologist) who is familiar with the area determined that it was considered only low numbers of commonly occurring winter migrants such as redwing and common snipe would be present due to the altitude and exposed nature of the site.
Reptiles	No specific survey undertaken	Assumed presence from outset in consultation with the County Ecologist. Habitat suitable to support reptiles was identified on site during the extended Phase 1 habitat survey.
Terrestrial Invertebrates	Within the Proposed Scheme area RLB	Surveys devised to ensure a representative sample of habitats across the site were incorporated.
Lower plants (moss, bryophytes and lichen)	No specific survey undertaken	A broad indication of lower plant presence was recorded during the Phase 1 Habitat survey. This was supplemented by biological data searches for lower plants.

Establishing the Baseline

9.4.6. Ecological baseline information has been collected through the undertaking of a desk study and onsite surveys. Table 9-2 below provides the sources used to collate the baseline for the assessment, as well as the methodologies used.

9.4.7. Surveys have been undertaken with reference to DMRB LD118[77] and current best practice guidelines.

[77] Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) Design Manual for Roads and Bridges, Volume 10 Environmental Design and Management, Section 4 Nature Conservation, Part 1 LD 118 Biodiversity Design

Table 9-2 – Ecological Surveys undertaken across 2023.

Ecological Receptor - Task/Survey	Study/Survey Area	Dates	Methods/Sources
Desk Study			
Statutory Sites Non-statutory Sites Species records	1km radius surrounding the Proposed Scheme boundary. (2km for statutory sites and 5km for bats (records and sites))	January 2023	The following organisations/persons were consulted for ecological information about the site and surrounding areas: ▪ SEWBReC;[78] ▪ MAGIC; [79] ▪ CCBC interactive map;[80] and ▪ NRW AW Inventory[81]
Habitats			
Extended Phase 1 Habitat Survey	Proposed Scheme area and 50m buffer surrounding	January 2023	Undertaken in accordance with Handbook for Phase 1 habitat survey (Joint Nature Conservation Committee[82]) 2010. Mapping habitats within and directly surrounding the Proposed Scheme area, identifying presence of priority habitats / species and/or habitat suitability to support priority species. Invasive species were also noted during this survey.
Species Surveys			
Bats - Ground Level Tree Assessments (GLTAs)	All trees within the Proposed Scheme area	January 2023	Ground Level Tree Assessments (GLTA's) were undertaken based on criteria set out in the Bat Surveys for Professional Ecologists, Good Practice Guidelines[83].

[78] South East Wales Biodiversity Records Centre (SEWBReC, 2022/23)

[79] Multi-Agency Geographic Information System (MAGIC, 201, 2020); https://magic.defra.gov.uk/

[80] Caerphilly County Borough Council (CCBC) (2023) Tree Preservation Orders in CCBC interactive map; https://www.arcgis.com/apps/webappviewer/index.html?id=8fbe45e163664775819414bd3b5029c4

[81] Natural Resources Wales (2021) Ancient Woodland Inventory 2021; https://datamap.gov.wales/layers/inspire-nrw:NRW_ANCIENT_WOODLAND_INVENTORY_2021

[82] JNCC (2010). Joint Nature Conservation Committee (2010). Handbook for Phase 1 habitat survey. *A technique for environmental audit.*

[83] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN – 13 978-1-872745-96-.

Ecological Receptor - Task/Survey	Study/Survey Area	Dates	Methods/Sources
Bats - Automated Activity Surveys	Discrete locations across eastern extent of the proposed Haul Road route (i.e., where the haul road deviates from the existing track).	Five deployment dates: April, May, June, July, August 2023	A total of six static detectors were deployed on five occasions for seven consecutive night periods between April and August 2023. Detectors were Anabat Swift models to allow full spectrum sonograms to be captured. Locations were chosen to provide a sample of activity from each habitat present and to identify bat foraging areas, commuting routes, and possible bat crossing points over the proposed haul road. Surveys undertaken in accordance with Bat Surveys for Professional Ecologists, Good Practice Guidelines[84]
Dormouse – Presence / Absence Surveys	Within suitable habitats (woodland / scrub) within the Proposed Scheme area	April-October 2023	A total of 177 nest tubes were deployed in April 2023 and checked monthly from May 2023 and ongoing until October 2023 inclusive. The number of the nest tubes deployed, and the timing of the survey met the requirements for a robust survey in line with The Dormouse Conservation Handbook[85]. The survey of 177 tubes provided a Probability Index of 77.88[86]. Informal nut searches were carried out during all the nest tube check visits.
GCN – Habitat Suitability Assessments (HSIs)	Ponds within 500m of the main Proposed Scheme area and 250m of the Haul Road	April 2023	HSI assessment undertaken in accordance with methodology described in Oldham et al (2000)[87].
GCN – eDNA surveys	Ponds within 500m of main Proposed	May 2023	eDNA samples were taken in accordance with the published technical advice note Defra Science and Research Project WC1067[88].

[84] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London. ISBN – 13 978-1-872745-96.
[85] Bright, P., Morris, P. and Mitchell-Jones, A. (2006). The dormouse conservation handbook 2nd Edition. English Nature, Peterborough.
[86] Chanin, P. and Woods, M. (2003). Surveying dormice using nest tubes: results and experiences from the South West Dormouse Project. English Nature Research Report 524. Peterborough: English Nature.
[87] Oldham,R.S.; Keeble, K.; Swan, M.J.S; and Jeffcote, M (2000) Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). Herpetological Journal 10(4), 143-155.
[88] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). Analytical and methodological development for improved surveillance of the Great crested newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA.Freshwater Habitats Trust, Oxford

Ecological Receptor - Task/Survey	Study/Survey Area	Dates	Methods/Sources
	Scheme areas and 250m of Haul Road areas where minimal works required due to existing track.		
Badger	Suitable habitats (woodland / scrub) within main Proposed Scheme area and up to 100m buffer surrounding. Haul Road excluded.	June and September 2023	The survey followed standard methodology described by Scottish Natural Heritage (SNH, 2003)[89].
Birds - Ground nesting bird survey (inclusive of a pre-nesting check for raptor nests along the haul road)	Habitats within Proposed Scheme area with potential to support ground nesting species	Pre-nesting check: January 2023 Ground nesting survey: April-July 2023	A ground nesting bird survey was undertaken using methodology broadly based on the British Trust for Ornithology's (BTO) Common Bird Census (CBC) (Bibby et. al., 2000[90]; Gilbert et. al., 1998[91] and Marchant, 1983[92]). A transect route devised to ensure habitat types with potential to support ground nesting birds were incorporated. This transect was walked during four separate survey visits.
Birds - (VP) survey – Raptors	VP locations selected to obtain maximum visual coverage of	April-August 2023	Survey methodology was adapted from industry standard guidance (Gilbert et.al., 1998; SNH, 2017[93]), applying guidance relating to raptors for survey duration, information recording and (VP) locations to meet the specific aims of the survey.

[89] Scottish Natural Heritage (SNH) (2003) Best Practice Guidance - Badger Surveys. Inverness Badger Survey 2003. Commissioned Report No. 096.
[90] Bibby, C.J., Burgess, N.D. and Hill; D.A and Mustoe, S. (2000) Bird Census Techniques-Second Edition Academic Press, London
[91] Gilbert, G., Gibbons, D.W., Evans, J. (1998) Bird monitoring methods. RSPB, Sandy, Bedfordshire.
[92] Marchant, J. (1983) Common bird census instructions. BTO, Tring.
[93] Scottish Natural Heritage (SNH) (2017) Guidance Note – Recommended bird survey methods to inform impact assessment of onshore wind farms.

Ecological Receptor - Task/Survey	Study/Survey Area	Dates	Methods/Sources
	Proposed Scheme area and appropriate buffer zone, using minimum number of locations to achieve this aim.		Four evening survey visits at two VP locations (two surveys at each) of 3-hour durations were undertaken. One VP location was also chosen to overlook an area suitable for nightjar.
Reptiles	No specific survey undertaken	N/A	Assumed presence taken in agreement with CCBC Ecologist. Incidental records recorded during other ecological surveys.
Terrestrial Invertebrates	Surveys devised to ensure a representative sample of habitats likely to support priority invertebrates within Proposed Scheme area covered.	June - July 2023	Two survey visits undertaken (two days each survey), and survey area devised to ensure a representative sample of habitats across the site were incorporated.

Determining Biodiversity Resource Importance

9.4.8. The valuation of biodiversity resource is generally based on a geographical context.

9.4.9. The assessment will be undertaken in accordance with criteria outlined in the DMRB, LA108 Biodiversity[94] and the CIEEM Guidance for Ecological Impact Assessment (2018)[95].

9.4.10. The habitats, species and their key functions within the study area are known as 'ecological features'. To determine the likelihood of a significant effect, it is first necessary to identify whether an ecological feature is suitably valuable for a significant effect upon it to be material in decision making. Guidance for Ecological Impact Assessment (EcIA) developed by CIEEM assesses the

[94] Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 4 LA 108 Biodiversity.
[95] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester.

value in terms of biodiversity, social, community or economic value. These values are described in Table 9-3.

9.4.11. The 'Very High' value identified by CIEEM can be disregarded in this instance as there are no internationally important ecological features and it is therefore not applicable. Additionally, two tiers in the CIEEM guidance (Medium and Medium Low) have been combined and classified as Medium for the purpose of this assessment.

9.4.12. Legal protection is considered separately from value. The protection of a particular ecological feature through national or international legislation may not necessarily be taken into account when assessing ecological value. For example, whilst badgers are protected under national legislation, the presence of a single badger sett would not be properly assessed as a constraint of 'national' importance. Legislation is, however, considered in terms of mitigation.

9.4.13. The biodiversity importance of a receptor has been determined using professional judgement and the criteria listed in LA108 Biodiversity[96] as shown in

9.4.14.

9.4.15. Table **9-3** below:

Table 9-3 - Value (or sensitivity) of ecological receptors

Value	Descriptor
Very High *(International)*	▪ A site designated or identified for designation at the international level (e.g. SPA, Special Area of Conservation (SAC), and / or Ramsar site). Proposed or candidate sites are given the same consideration as designated sites. ▪ A sustainable area of any habitat listed in Annex I of the Habitats Directive or smaller areas of such habitat that is essential to maintain the viability of a larger whole. ▪ Any regularly occurring population of an internationally important species (e.g. Red Data Book species), which are listed as occurring in 15 or fewer 10 km squares in the UK, and that is identified as having an unfavourable conservation status in Europe or global conservation concern in the UK Biodiversity Action Plan (BAP). ▪ A regularly occurring, nationally significant population of any internationally important species.
High *(National)*	▪ A site protected by national designations (e.g. SSSI, National Nature Reserve (NNR), or Marine Protected Area or a site considered worthy of this designation). ▪ A sustainable area of any priority habitat identified in the UK BAP, or smaller areas of such habitat that is essential to maintain the viability of a larger whole. ▪ A feature identified as being of critical importance in the UK BAP.

[96] Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 4 LA 108 Biodiversity.

Value	Descriptor
	▪ A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. ▪ Any regularly occurring population of a nationally important species that is threatened or rare in that region of the County.
Medium *(Regional and County)* *(County)*	▪ Sustainable areas of key habitat identified in the Regional BAP or smaller areas of such habitat that is essential to maintain the viability of a larger area. ▪ Sites which exceed the county-level designations but fall short of the SSSI selection criteria. ▪ Some non-statutory designated sites (AW and TPOs). ▪ Any regularly occurring, locally important population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or listed in the Local BAP on account of its regional rarity or localization. ▪ A regularly occurring, locally significant population/number of a regionally important species. ▪ Some designated sites (e.g. Local Nature Reserves). ▪ Some non-statutory designated sites (including Site of Local Nature Conservation Importance (SLNCI) / County Wildlife Site (CWS)). ▪ A viable area of a habitat that is uncommon in the county/district or a degraded example of a habitat identified in the local BAP. ▪ Sustainable population of a species that is rare or scarce within a county or listed in the local BAP on account of its regional rarity or localisation. ▪ Sites or populations that appreciably enrich the county / district.
Low *(Local >5km)*	▪ Area of internationally or nationally important habitats, which are degraded and have little potential for restoration. ▪ Areas within the site or locally, or populations, that appreciably enrich the habitat resource within the locality, (e.g. species-rich hedgerow). ▪ Species or populations within the site or locally, that appreciably enrich the ecological resource within the locality.
Negligible *(Proposed Scheme footprint)*	▪ Areas of heavily managed or modified vegetation of low intrinsic interest and low value to species of nature conservation interest that do not appreciably enrich the site or locality (i.e. improved grassland and arable crops). ▪ Common and widespread species.

Determining Magnitude of Impact

9.4.16. The magnitude of impact has been assigned quantitatively where possible. The assessment has been undertaken using criteria outlined in the DMRB LA108[97] and has taken into account the following factors:

- Whether the effect is positive or negative – i.e., is the impact likely to be **beneficial** or **adverse**;
- The spatial, or geographical area over which the impact may occur. The duration of the impact, either short term (for example only during construction), or long term (throughout the lifetime of

[97] Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 4 LA 108 Biodiversity.

the project); The timing and frequency – consideration of the point at which the impact occurs in relation to critical life stages or seasons; and

- The reversibility of the impact – i.e., is the impact temporary or permanent. A reversible (temporary) impact is one from which recovery is possible.

9.4.17. Professional judgement has been used to assign magnitude based on the descriptors provided in Table 9-4. Cumulative effects will be identified and assessed.

Table 9-4 – Magnitude of impact (or change) descriptors

Magnitude of Impact (change)		Typical Description
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality.
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality.
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements.
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements
	Beneficial	Very minor benefit to or positive addition to one or more characteristics, features or elements
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Impact

9.4.18. The significance of an impact is a product of the biodiversity resource importance and the level of impact. The impact significance is determined through the matrix published in DMRB LA108[98].

[98] Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 4 LA 108 Biodiversity

9.4.19. For the purposes of this EIA, impacts were only assessed for those receptors of sufficient value (i.e. county level and above) unless where specified. Impacts on these resources will be a material consideration at the planning stage. For impacts upon biodiversity resources valued at or below local level, significance is considered to be neutral.

9.4.20. For impacts associated with low probability or low frequency, the above methodology could suggest an artificially high significance of the effect on the receptor. The assessment has therefore used professional judgement and, where considered appropriate, the assessed magnitude has been reduced to reflect the low probability of occurrence. This is in line with the recommendations within DMRB.

9.4.21. The significance of potential impacts on the biodiversity resources has been identified both with and without any proposed mitigation. When assessing the Proposed Scheme without mitigation, embedded mitigation measures were included in the assessment of impact. Additional mitigation was only included in the assessment of impact in the with-mitigation state.

Identification of Cumulative Effects

9.4.22. Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects are particularly important in EcIA as many ecological features are already exposed to background levels of threat or pressure and may be close to critical thresholds where further impact could cause irreversible decline. Effects can also make habitats and species more vulnerable or sensitive to change. An assessment of potential cumulative effects between the Proposed Scheme and other committed developments in the area has been undertaken as part of this chapter to determine any combined effects on ecological receptors. See Chapter 14 for more detail on Cumulative Effects.

Identification of Mitigation and Enhancement Measures

9.4.23. The identification of mitigation and enhancement measures has been undertaken through a combination of professional judgement, consultation with the CCBC Ecologist and collaboration with other disciplines (such as other EIA topics and landscape design).

9.4.24. The following best practice guidelines were also referred to:

- DMRB Volume 11 Section 3 LA 118 Biodiversity Guidance[99];
- UK Bat Mitigation Guidelines: a guide to impact assessment and compensation for developments affecting bats (Reason and Wray, 2023)[100],
- the Herpetofauna Workers Manual (Gent and Gibson, 2003)[101]; and
- the GCN Conservation Handbook (Langton *et al.*, 2001)[102].

9.4.25. For the identification and design of mitigation measures the following hierarchy was used:

[99] Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) Design Manual for Roads and Bridges, Volume 10 Environmental Design and Management, Section 4 Nature Conservation, Part 1 LD 118 Biodiversity Design.

[100] Reason, P.F. and Wray, S. (2023). UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Chartered Institute of Ecology and Environmental Management, Ampfield.

[101] Gent, T. and Gibson, G., (2003). Herpetofauna Workers' Manual. JNCC, Peterborough

[102] Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook

- **avoidance of impact:** design and mitigation measures to avoid the effect (e.g. alternative design options or avoidance of environmentally sensitive sites);
- **reduction:** where avoidance is not possible, then mitigation is used to reduce the magnitude or significance of effects; and
- **remediation/compensation:** where it is not possible to avoid or reduce a significant adverse effect, measures are proposed to offset the effect.

Identification of Residual Effects

9.4.26. Residual effects are identified where a significant effect on a receptor remains after the implementation of mitigation measures.

9.5 LIMITATIONS AND ASSUMPTIONS

9.5.1. Any ecological survey can only identify what was present on site at the time it was conducted, and habitat use by species can change over time. The length of time survey data remains valid will depend on a case-by-case basis, but it is considered that if development does not commence within two years of the date of this report an update may be required.

9.5.2. No specific survey was undertaken for otter due to the River Sirhowy not being directly impacted by the Proposed Scheme. Assumed presence of otter as per relevant Site of Importance for Nature Conservation (SINC) citations was made where indirect impacts from pollution were considered.

9.5.3. Winter birds were scoped out of surveys and this ES assessment in consultation with the CCBC Ecologist due to the outcome of the Proposed Scheme to restore habitat post-works. Further consultation with Richard Poole (WSP, bat and ornithologist) who is familiar with the area determined that it was considered only low numbers of commonly occurring winter migrants such as redwing and common snipe would be present due to the altitude and exposed nature of the site.

9.5.4. Reptile surveys were not carried out on the site. Following discussion with the CCBC Ecologist at the Proposed Scheme outset and based on knowledge of suitable reptile habitat and incidental records recorded during data searches and other ecological surveys, it was agreed that assumed presence would be made and sensitive clearance of reptiles and amphibians prior to works commencing would be an appropriate approach.

9.5.5. Specific limitations relevant to each survey are detailed in the appropriate survey reports (Volume 3: Appendices).

9.5.6. It is not considered that any of the limitations represent a significant gap in data or that the baseline information collected is insufficient or inadequate. The level of baseline information collected is considered sufficient to provide a robust assessment of the impacts of the Proposed Scheme on the biodiversity resources.

9.5.7. Biodiversity mitigation will require that standard construction pollution prevention measures will be in place for the duration of the construction / operational period. Standard best practice pollution prevention measures will control construction/operational activities in respect of construction timings, dust, silt and surface water run-off, water pollution, materials storage, site traffic etc.

9.6 CONSULTATIONS

9.6.1. Consultation was made with the CCBC Ecologist at the project outset and during the design of mitigation measures. Table 9-5 summarises those consultations.

Table 9-5 - Consultations

Date	Meeting	Brief Summary of discussion
09/11/2022	CCBC Ecologist (Erica Dixon)	Discussed relevant ecological receptors and required habitat/species surveys and survey areas. Bats scoped out except for the area to the eastern extent of the Haul Road. Winter birds scoped out due to habitat reinstatement proposed and low presence anticipated. Assumed presence to be made for reptiles.
23/11/2023	Client Steve Williams and CCBC Ecologist Erica Dixon	Discussions regarding seed mixes. CCBC ecologist specified no less than 10% diverse upland grazing mix to be incorporated into overall seed mix.
06/11/2023, 13/12/2023, 02/01/2024	Client representatives and ES chapter leads/representatives	Discussion and confirmation of outstanding ecological mitigation, monitoring and enhancement measures.

9.7 BASELINE CONDITIONS

CURRENT BASELINE

9.7.1. This section presents the baseline ecological conditions and resources on site and within the study area. Full results for all ecological resources are presented in Volume 3: Appendices.

Designated Sites

Statutory Designated Sites

9.7.2. Two statutory sites were identified within a 2km search of the Proposed Scheme both comprising Local Nature Reserves (LNRs). An additional statutory site SSSI designated for bat species was identified within 5km of the Proposed Scheme. These are listed as follows, greater detail about each site is provided in the Preliminary Ecological Appraisal (PEA) report in V3-S09/0001.

- Graig Goch (LNR) - Haul Road passes directly through site;
- Flatwood Meadow (LNR) - 100m north-east of eastern extent of the Haul Road; and
- Ruperra Castle and Woodlands (SSSI) – bat site. Approximately 4km south of Proposed Scheme.

9.7.3. As the Flatwood Meadow LNR lies 100m from the Proposed Scheme and is not hydrologically connected, no impacts to this site from the Proposed Scheme are anticipated. As such it has been scoped out of this EIA chapter.

Non-Statutory Designated Sites

9.7.4. There were 20 non-statutory designated sites within 1km of the Proposed Scheme. These comprised 19 SINCs and one Regionally Important Geodiversity Site (RIGS). The five most relevant of these, due to their close proximity to the proposed works are detailed below.

- Mynydd y Grug, West of Cwmfelinfach SINC – **directly within Proposed Scheme** (Tip 2 and soil deposition area to north-west sits partially within 36.69ha of the SINC);
- Twyn yr Oerfel, South of Cwmfelinfach SINC – **directly within Proposed Scheme** (Tip 2 sits partially within 0.08ha of the SINC);
- Mynydd Bach Slopes, East of Llanbradach SINC - Immediately west of northern area of main site;
- Berth Goch Wood, North of Trethomas SINC - 45m east (main site); and
- River Sirhowy SINC - 45m north (eastern extent of Haul Road).

9.7.5. Designated sites are illustrated on V2-S09/0001.

Tree Preservation Order

9.7.6. Over 40 TPOs are located within 500m of the Proposed Scheme including individual TPO Trees and TPO Groups, TPO Areas and Woodlands. Almost all were located around the haul road section of the Proposed Scheme, with part of the route running immediately along the edge of a W1 TPO Woodland (3/84/IBC). Impacts to TPOs will not be discussed further within this chapter and instead assessed within Chapter 8: Landscape.

Ancient Semi-Natural Woodland (ASNW)

9.7.7. There were 80 AW sites recorded within 500m of the Proposed Scheme, the majority of which were situated in woodland areas surrounding the haul road section (which largely follows the existing forestry track) of the Proposed Scheme. The haul road itself passes directly through at least 15 AW sites, including two ASNW sites, 12 Plantation on Ancient Woodland (PAW) sites and one Ancient Woodland Site of Unknown Category (AWUC).

9.7.8. The RLB for the Proposed Scheme encompasses approximately 0.4ha of ASNW; 2.56ha of PAW and 0.06ha of AWUC. Much of the PAW was in areas that have already been cleared.

9.7.9. AW and TPOs are illustrated on V2-S09/0002.

Habitats

A summary of the terrestrial habitats identified during the Phase 1 Habitat Survey is provided in

9.7.10. Table 9-6 and also in Volume 2: Plan V2-S09/000(3-4). The full results can be found in V3-S09/0001.

9.7.11. Habitat and species surveys were undertaken using a RLB that has since been slightly modified. Where habitat calculations have been made in this chapter this refers to the latest RLB.

Table 9-6 – Summary of Phase 1 Habitats located within the RLB

Habitat	Approximate Area within RLB (ha)	Features of Interest
Woodland and Scrub		
Semi-natural broadleaved woodland	7.96	Semi-natural broadleaved woodland (also considered to qualify as Priority Habitat under: '*Lowland mixed deciduous/ Upland mixed ash/oakwoods woodland*' as listed under the Environment (Wales) Act, 2016, due to the location, distinctiveness and plant assemblage (JNCC, 2008)[103] , was present in parcels throughout the Haul Road section of the survey area, and in areas surrounding the Tip 1 site. Downy birch (*Betula pubescens*) and silver birch (*B. pendula*) were the most frequently occurring species. Other woodland species, all occasionally occurring (in places locally common), included ash (*Fraxinus excelsior*), alder (*Alnus glutinosa*) beech (*Fagus sylvatica*), larch (*Larix* sp.), oak (*Quercus* sp.) and willow (*Salix* sp.). Woodland immediately west of Tip 1 was immature in comparison with those located along the Haul Road. One area of woodland located towards the centre of the Haul Road, consisting mainly of alder and bordering an area of continuous bracken, was identified as potential Priority Habitat '*Wet woodland*' as listed under the Environment (Wales) Act, 2016, due to the location, distinctiveness and plant assemblage (JNCC, 2008). Common ivy (*Hedera helix*) was commonly occurring across woodland parcels. Bracken (*Pteridium aquilinum*) and bramble (*Rubus fruticosus* agg.) were generally frequently occurring, however dominated the more immature woodland parcels. Other scrub understorey species (listed in descending frequency of occurrence) included hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), broom (*Cytisus scoparius),* gorse (*Ulex europaeus*) butterfly-bush (*Buddleja davidii*) and holly (*Ilex aquifolium*). Ground flora included species such as Hart's-tongue fern (*Asplenium scolopendrium*), herb-robert (*Geranium robertianum*), garlic mustard (*Alliaria petiolate*) and wood-sorrel (*Oxalis acetosella*). Some notable veteran trees (beech) were noted to the east of Tip 1 (approximate grid reference: ST1789889937). Wildlife and Countryside Act (WCA) Schedule 9 invasive non-native species rhododendron (*Rhododendron ponticum*) and Himalayan balsam (*Impatiens glandulifera*) were recorded occurring at rare incidence.
Semi-natural coniferous woodland	3.51	Semi-natural coniferous woodland was recorded in small, linear parcels on and around the edges of the Tip 2 site. These parcels did not have the appearance of being planted but are predicted to have originated from seeds released by nearby areas of coniferous

[103] Joint Nature Conservation Committee, (2008). UK Biodiversity Action Plan Priority Habitat Descriptions.

Habitat	Approximate Area within RLB (ha)	Features of Interest
		plantation. Species included birch, Douglas fir (*Pseudotsuga menziesii*), larch, Leyland cypress (*Cupressus macrocarpa x Xanthocyparis nootkatensis = X Cuprocyparis leylandii*) and Scots pine (*Pinus sylvestris*).
Semi-natural mixed woodland	0.98	Semi-natural mixed woodland was recorded in a few small fragments along the Haul Road, in addition to one larger area north of the Tip 2 site and surrounding the western extent of the Haul Road. These were generally fairly immature areas of woodland which are predicted to have self-seeded from nearby areas of semi-natural broadleaved and coniferous plantation woodland. Tree species included birch (commonly occurring), beech, Douglas fir, larch, ash, hawthorn, hazel, holly and oak.
Coniferous plantation woodland	0.55	Coniferous plantation woodland was present along roughly a third of the survey area surrounding the Haul Road, and in one large strip along the northern boundary of the Tip 2 site. The most significant areas of coniferous plantation were located along the western third of the Haul Road and at the eastern extent. Species included Douglas fir, larch, Leyland cypress, Norway spruce (*Picea abies*), Sitka spruce (*Picea sitchensis*), Scots pine and western hemlock-spruce (*Tsuga heterophylla*), with species composition varying between plots. WCA Schedule 9 invasive non-native species rhododendron was also recorded rarely.
Dense / scattered scrub	6.69	Fragmented dense and scattered scrub habitats were present throughout the survey area, with the majority being located on and around the Tip 1 site. Bracken and bramble were the most common scrub species across the survey area, occurring at common incidence overall and abundantly in areas. Gorse was frequently occurring and locally abundant, particularly in association with spoil and heath habitats. Other less frequently occurring species included broom, birch, hawthorn, ash, dog-rose (*Rosa canina*), foxglove (*Digitalis purpurea*) and ferns (*Polypodiophyta* sp.). Scrub often occurred in association with continuous bracken, grassland, woodland, scattered tree and heath habitats. WCA Schedule 9 invasive non-native species wall cotoneaster (*Cotoneaster horizontalis*) was recorded growing on the edge of an area of dense scrub on the Tip 1 site, in addition to an unidentified cotoneaster species further west. There was no evidence of active management of this habitat.
Scattered trees (broadleaved and coniferous)	Not calculated	Broadleaved and coniferous scattered trees were recorded throughout the survey area. The most commonly occurring species were birches, whilst hawthorn, hazel, holly and oak species were all frequently occurring. Ash, cherry (*Prunus* sp.), fir (*Pinophyta* sp.), Scot's pine (*Pinus sylvestris*), beech and European larch (*Larix decidua*) all occurred commonly across the survey area, whilst the latter two species were locally common and locally frequent, respectively.
Felled woodland	4.73	Patches of felled woodland of varying sizes were present along the Haul Road section of the survey area and to the north of the Tip 2

Habitat	Approximate Area within RLB (ha)	Features of Interest
		site. The majority of these patches appeared to have been coniferous plantation, however some smaller areas of potentially broadleaved or mixed felled woodland were also identified.
Grassland and Marsh		
Acid grassland	2.56	Areas of unimproved and semi-improved acid grassland without the presence of heath (potentially classing as Priority Habitat *Lowland dry acid grassland* as listed under the Environment (Wales) Act, 2016, due to the location, distinctiveness and plant assemblage (JNCC, 2008)) were recorded in small fragments surrounding both tip sites, and around the perimeter of Mynydd y Grug common (generally comprising larger areas). On the spoil tips, acid grassland was generally recorded in close proximity with habitats such as dry heath, bryophyte heath and gorse scrub, or as a mosaic with these habitats. One area of semi-improved acid grassland had a particularly unique topography as several marshy depressions were present in close proximity to each other, containing ephemeral waterbodies and abundant rush species. Acid grassland species included grasses such as red fescue (*Festuca rubra*), sheep's fescue (*Festuca ovina*), common bent (*Agrostis capillaris*) and sweet vernal-grass (*Anthoxanthum odoratum*). Other species included mouse-ear-hawkweed (*Pilosella officinarum*), moss (Bryophyta) species, sheep's sorrel (*Rumex acetosella*), heath bedstraw (*Galium saxatile*), pill sedge (*Carex pilulifera*), tormentil (*Potentilla erecta*), creeping buttercup (*Ranunculus repens*) and Yorkshire-fog (*Holcus lanatus*).
Improved grassland	0.12	Several improved grassland fields were recorded throughout the survey area. These were generally located outside of the Proposed Scheme, aside from a large field to the east of the Tip 2 site which was wholly contained within the proposed Proposed Scheme, and the western edges of three fields located to the north of Mynydd y Grug common. Improved grassland fields often showed signs of grazing by sheep and other livestock and were dominated by perennial rye-grass (*Lolium perenne*), and occasionally occurring broad-leaved dock (*Rumex obtusifolius*), common nettle (*Urtica dioica*) and creeping thistle (*Cirsium arvense*). Soft-rush (*Juncus effusus*) was locally frequent in damp areas.
Marshy grassland	27.07	Marshy grassland was recorded in one small patch towards the centre of the Haul Road, in patches across the Tip 2 site and a large field to the north-west of which also encompasses the Mynydd y Grug common and surrounding areas. In some areas marshy grassland was existing in mosaic with acid grassland, bryophyte and dry heath. Commonly occurring species included soft-rush and other *Juncus* not identified to species. Purple moor-grass (*Molinia caerulea*) was recorded occasionally, although was locally abundant in an area at the north-western boundary of Mynydd y Grug Common.
Poor semi-improved grassland	7.06	Poor semi-improved grassland (PSI) was recorded to the northwest and east of the Tip 2 site. Smaller, more isolated fragments were recorded towards the centre of the Haul Road and to the north and

Habitat	Approximate Area within RLB (ha)	Features of Interest
		west of the Tip 1. Commonly occurring species included creeping buttercup and ribwort plantain (*Plantago lanceolata*), with bent species (*Agrostis*), common sorrel (*Rumex acetosa* subsp. *acetosa*), common nettle, creeping thistle, daisy (*Bellis perennis*), dandelion (*Taraxum officinale* agg.), mouse-ear-hawkweed, Yorkshire-fog and soft-rush all occasionally occurring.
Tall Herb and Fern		
Continuous / scattered bracken	21.70	Continuous and scattered bracken was extensive surrounding the two tip sites and across the survey area, including an extensive area at the eastern extent of the Haul Road. Areas of bracken often co-occurred with scrub species such as bramble and gorse, and scattered trees.
Heathland		
Acid dry dwarf shrub heath and dry heath / acid grassland	7.18 (5.70 and1.48)	Acid dry dwarf shrub heath (potentially classing as Priority Habitat *Lowland heath* as listed under the Environment (Wales) Act, 2016, due to the location, distinctiveness and plant assemblage (JNCC, 2008)) was present on the slopes of both the Lower and Tip 2 sites, however there was generally more of this habitat on the Tip 2 site. This habitat was often growing in a diverse mosaic with bryophytes, lichen, acid grassland, scrub and bracken habitats. Heather (*Calluna vulgaris*) and gorse were commonly occurring in these habitats, with broom occurring frequently, and bilberry (*Vaccinum myrtillus*) and mouse-ear hawkweed (*Pilosella officinarum*) occurring occasionally.
Acid lichen / bryophyte heath	1.71	The habitats mentioned above often had strong lichen / bryophyte underlayers, but as vascular plant cover was generally above 30%, these could not be described as lichen/bryophyte heath. There were, however, some small patches of lichen/bryophyte heath recorded on the surface of the spoil on the Tip 1. These areas consisted of *Cladonia* and other lichen species, alongside mosses and occasional mouse-ear-hawkweed.
Open water		
Standing water	0.19	Several ponds (some of which may classify as Priority Habitat '*Ponds'* as listed under the Environment (Wales) Act, 2016, due to the location, distinctiveness and plant assemblage (JNCC, 2008)) were recorded within the survey area, in addition to numerous ephemeral waterbodies. The largest pond (quarry pond) was located at the south-eastern corner of the Proposed Scheme area (ST 18107 89454). This pond was surrounded by steep cliffs with exposed rock and was fed by running water forming a waterfall down the cliffside. The pond also fed immediately via a controlled system into a wide, stepped, man-made channel. The pond was enclosed by a tall security fence, appeared to be heavily silted and contained very little vegetation. Further ponds were recorded at the northern extent of the survey area (ST 17049 91999), towards the centre of the Haul Road (ST 19538 90735) and to the east of Mynydd y Gryg Common (ST

Habitat	Approximate Area within RLB (ha)	Features of Interest
		17401 91332). The latter was a small and likely ephemeral pond, whilst the former ponds were more established and contained larger amounts of inundation vegetation.
Running water	0.03	Numerous small streams were recorded flowing from south to north along the Haul Road most of which were culverted underneath the main track. Some of the smaller streams fed into ditches alongside the track which then joined up to a larger stream to be carried underneath the track. These streams varied in volume and flow rate, ranging from fast flowing and moderate volume to a small trickle. It is likely that most if not all of these streams eventually feed into the River Sirhowy at the bottom of the hillside. Other areas of running water were recorded at the north, east and south-east of the Proposed Scheme area, all comprising small streams. A large system of man-made drainage ditches was also recorded on and around both tips, designed to carry excess water from the tips down to the pond at the south-eastern corner of the Proposed Scheme area. These were mostly dry during the time of the survey.
Rock exposure and waste		
Rock exposure artificial – Spoil	23.72	Exposed soil was prevalent over both tip sites, with sparse vegetation cover occurring in some areas, and this habitat often formed a mosaic with habitats such as acid grassland, dry heath, lichen/bryophytes and scrub. The area of bare unvegetated spoil was noticeably larger on the Tip 2 than on the Tip 1.
Hedgerows		
Intact species-poor hedgerow	0.001	Three intact species-poor hedgerows were recorded within the RLB all of which were located towards the centre of the Haul Road, within 300m of Ynys Hywel Farm. Hedgerow species included beech, ash, bramble, dogwood, hazel and holly. These qualified as Priority Habitat type '*Hedgerow*' as listed under Environment (Wales) Act 2016:
Miscellaneous		
Walls	Not calculated	Numerous dry-stone walls were present throughout the survey area, which existed in varying states of repair and often included areas with piles of stones where collapses had occurred. All were located directly on the RLB and unlikely to be impacted.
Buildings	0.001	A small number of buildings were recorded within the survey area. These were mainly residential/farm buildings aside from one metal hut situated along the haul road at (ST 18480 90950).
Bare ground	7.60	Bare ground and hard standing habitat were present throughout the survey area, generally comprising roads, tracks and footpaths.

9.7.12. During the PEA both notable flora and invasive Schedule 9 flora were also recorded.

9.7.13. Notable flora included bluebell (Schedule 8 species WCA, 1981) recorded within woodland to the eastern boundary of Tip 1.

9.7.14. Schedule 9 invasive flora (WCA, 1981) included rhododendron (*Rhododendron ponticum*), Himalayan balsam (*Impatiens glandulifera*), and wall cotoneaster (*Cotoneaster horizontalis*) recorded at various locations across the survey area.

9.7.15. Lower plants comprising species of both bryophytes and lichen (not identified to species level), latter notably *Cladonia* spp., were recorded particularly within the acid grassland and heath habitats. Data records did not return any priority lower plant species or species of local concern. It is considered likely the Site will support commonly occurring upland associated grassland / heath lower plant species with potential to support small numbers of priority species.

SPECIES

Bats

Desk Study

9.7.16. The Proposed Scheme is located approximately 4km from the Ruperra Castle and Woodlands SSSI which is designated for being the only known nursery site for greater horseshoe bat (*Rhinolophus ferrumequinum*) in Mid/South Glamorgan and only one of five known in Wales. Lesser horseshoe (*Rhinolophus hipposideros*) bats also use this site as a hibernation roost.

9.7.17. The desktop study returned 907 bat records from 5km SEWBReC data searches.

9.7.18. The nearest record was for a common pipistrelle (*Pipistrellus pipistrellus*) located approximately 20m north-east of the northern extent of the haul road. The closest roost record was located approximately 380m north of the eastern end of the haul road in Wattsville, comprising a maternity *Pipistrellus* roost.

Field Survey

Ground Level Tree Assessments

9.7.19. The Ground Level Tree Assessment (GLTA) survey (Table 9-7) identified 46 trees with potential for roosting bats. Of these 46 trees one tree was identified as having high potential, 13 were identified with moderate potential and 32 with low potential. Additionally, a rock face was identified to have low potential to support roosting bats.

Table 9-7 – Ground Level Tree Assessment Results.

Tree No.	Grid Reference	Bat Roost Features	Tree Suitability
1	ST 21358 91342	North facing rot-hole within stem.	Low
2	ST 21195 91252	Multiple rot-holes throughout the tree within the stem.	High
3	ST 21587 91240	South facing hazard-beam.	Low
4	ST 21368 91210	Multiple features throughout the stem.	Low
5	ST 21335 91153	East facing butt-rot with a mouse nest present.	Moderate
6	ST 21335 91144	South facing fired damaged with butt.	Low

Tree No.	Grid Reference	Bat Roost Features	Tree Suitability
7	ST 21352 91153	South-west facing hazard-beam and three west facing knot holes on stem.	Low
8	ST 21315 91143	Three south facing rot-holes on stem.	Low
9	ST 21251 91140	South facing rot-hole on stem.	Low
10	ST 21255 91131	South facing butt-rot.	Moderate
11	ST 21260 91113	Multiple knot-holes throughout limbs.	Low
12	ST 20543 90986	Multiple callus rolls throughout stem.	Low
13	ST 20032 90589	North-east facing rot-hole on limb.	Low
14	ST 19593 90757	Thick stemmed ivy.	Low
15	ST 19574 90758	Several hazard-beam features throughout tree.	Moderate
16	ST 19526 90727	Multiple features including east facing callus roll, multiple rot holes and tear outs.	Low
17	ST 19354 90791	South-east facing rot hole in stem.	Low
18	ST 19321 90809	South facing flute and knot holes.	Low
19	ST 19268 90837	Two trees with south-west facing features.	Low
20	ST 19174 90880	Wounds throughout stem.	Low
21	ST 19133 90887	Wounds throughout stem.	Low
22	ST 18980 90908	Rot-holes throughout stem.	Moderate
23	ST 18961 90913	South facing woodpecker-hole in stem.	Moderate
24	ST 18888 90929	Rot-holes throughout stem.	Moderate
25	ST 18663 90933	Thick-stemmed ivy.	Low
26	ST 17532 91782	Compression-fork in stem.	Low
27	ST 17541 91788	Butt-rot.	Low
28	ST 17476 91328	Multiple features including south facing wound in limb, fluting and stem cavities.	Low
29	ST 17486 91317	South facing butt-rot and cavity at top of rot area.	Moderate
30	ST 17998 90700	Two west facing hazard-beam in limb.	Low
31	ST 18077 90624	North-east facing knot-hole in stem.	Low
32	ST 18075 90585	South-facing rot-hole in limb.	Low
33	ST 18076 90571	Shearing crack in stem.	Low
34	ST 18070 90520	Two north-west facing knot-holes in stem.	Low
35	ST 18058 90517	North facing rot hole in stem and compression fork.	Moderate
36	ST 18030 90505	South-east facing knot-hole in stem.	Low
37	ST 18334 90505	East-facing butt-rot.	Moderate

Tree No.	Grid Reference	Bat Roost Features	Tree Suitability
38	ST 17672 90396	East facing flute in stem.	Low
39	ST 17658 89889	Nine mature beech not accessible, surveyed from distance with binoculars and given precautionary suitability.	Low
40	ST 17678 89755	West facing butt-rot and knot holes.	Moderate
41	ST 18103 89533	South-facing butt-rot.	Low
42	ST 18094 89533	North facing woodpecker-hole in stem.	Moderate
43	ST 17953 89526	South facing rot-hole in stem on pollarded tree.	Low
44	ST 18123 89675	West facing woodpecker-hole in stem.	Moderate
45	ST 17896 89921	East facing knot-hole in limb.	Low
46	ST 17902 89945	North-west facing butt-rot.	Moderate
Rock face	ST 17661 91505	Multiple cavities within rock face.	Low

Automated Activity Surveys

9.7.20. Static detectors recorded 31,351 bat passes during their deployment between April and August 2023. There were six static detectors deployed across the survey area. A total of 10 species were recorded comprising:

- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Daubenton's bat (*Myotis daubentonii*);
- Whiskered/Brandt's bat (*Myotis mystacinus/brandti*);
- Noctule (*Nyctalus noctula*);
- Serotine (*Eptesicus serotinus*);
- Leisler's bat (*Nyctalus leisleri*);
- Brown long-eared (*Plecotus auratus*);
- Greater horseshoe (*Rhinolophus ferrumequinum*); and
- Lesser horseshoe bat (*Rhinolophus hipposideros*).

9.7.21. The Bat Activity Index for each species is summarised in Table 9-8. The static detectors record the number of bat passes and not necessarily the number of bats. This means recordings could be of several bats flying past or a single bat passing the detector repeatedly during foraging for example. The index is calculated as per the following:

- Total number of bat passes per species ÷ Total time of detector deployment (in hours) = Bat passes per hour.

Table 9-8 - Bat Activity Index (BAI) for Statics 1 – 6 showing static locations with the highest BAI for each species recorded highlighted in green. BAI recorded to 2 decimal places.

Location	Ppip	Ppyg	Pip sp	Myotis	Paur	NSL	Rhip	Rfer
1	29.23	4.15	0.01	0.22	0.06	0.83	0	0.01

2	17.31	1.31	0	0.19	0.19	0.18	0.01	0.01
3	6.95	0.36	0	0.06	0.04	0.12	0	0
4	6.68	0.67	0	0.08	0.03	0.22	0	0.01
5	19.78	1.22	0	0.15	0.08	0.13	0	0.02
6	7.63	0.44	0	2.45	0	0.03	0	0

Key: Ppip = Common pipistrelle; Ppyg = Soprano pipistrelle; Pip sp = Pipistrelle species (unidentified); Myotis sp; NSL = Nocture, Serotine or Leisler's; Paur = Brown long-eared bat; Rhip = Greater horseshoe bat; Rfer = Lesser horseshoe bat.

9.7.22. Full reports for both GLTA and Automated Activity bat surveys are provided in V3-S09/0002 and V3-S09/0003.

Hazel Dormouse

Desk Study

9.7.23. No records for hazel dormouse (*Muscardinus avellanarius*) were returned from 1km data searches, although dormouse are known to be present in woodland areas in the wider area to the south and east around Rudry (PTES, 2022).

Field Survey

9.7.24. A total of 177 dormouse nest tubes were deployed in April 2023 and checked monthly between May and October 2023.

9.7.25. No evidence of the presence, or likely presence, of dormouse in the form of either an animal, nest (including possible / probable nests) or nibbled nuts were recorded during the survey checks.

9.7.26. The full report for the dormouse survey is provided in V3-S09/0004

Otter

Desk Study

9.7.27. One record for otter (*Lutra lutra*) was returned from 1km data searches, comprising a single adult recorded approximately 350m north of the proposed Haul Road, near to the Sirhowy River.

Field Survey

9.7.28. No specific survey was undertaken for otter as the river is not anticipated to be directly impacted, and works will be undertaken over 30m from the river. Assumed presence within the River Sirhowy has however been made.

GCN

Desk Study

9.7.29. Two records for GCN (*Triturus cristatus*) were returned from 1km data searches. The closest record was from a bottle trapping survey in a pond located approximately 15m west of the north-western corner of the Proposed Scheme, which identified two male and two female individuals.

9.7.30. Waterbodies within 500m were identified for further survey. Due to the extensive area of the Proposed Scheme, waterbodies progressed for further survey included those within 500m of the main Proposed Scheme area and eastern extent of the haul road (where main works are proposed) and within 250m of the remaining sections of haul road (in which minimal works are proposed due to use of existing track).

Field Survey

HSI and eDNA Survey

9.7.31. Ten waterbodies were identified for HSI assessment. Of these one had 'good' suitability to support GCN, one had 'average' suitability, three had 'below average' suitability and three had 'poor' suitability. Two ponds could not be assessed for HSI due to access restrictions, however, were subsequently scoped out due to distance (over 250m) and poor suitability of intervening terrestrial topography between the ponds and Proposed Scheme area.

9.7.32. Ponds with a HSI of 'below average to good' with a suitable water depth for sampling were progressed to eDNA sampling. Pond 3 was excluded from sampling however due to a downstream overflow connectivity with Pond 2/2b and results of these were applied to Pond 3. A summary of the HSI and eDNA results are detailed in Table 9-9.

Table 9-9 – Summary of HSI and eDNA results

Pond ID	HSI Score	Habitat Suitability Rating	ADAS Reference No.	eDNA Result
1	0.45	Poor	Not sampled	-
2	0.79	Good	1632	Positive
2b	0.58	Below Average	1630	Negative
3	0.58	Below Average	Not sampled	-
4	0.51	Below average	1631	Negative
5	0.29	Poor	Not sampled	-
6	0.60	Average	1629	Negative
7	N/A	N/A	N/A	N/A
8	N/A	N/A	N/A	N/A
9	0.39	Poor	Not sampled	-

9.7.33. A positive result for GCN eDNA was returned from ADAS for Pond 2 and GCN eggs were recorded during the sampling process. Whilst Pond 2b returned a negative result for GCN eDNA, GCN eggs were recorded during the sampling process confirming presence. As such due to the connectivity to these ponds assumed GCN presence has been made for Pond 3.

9.7.34. Negative results for GCN eDNA were returned for Ponds 4 and 6 and no eggs were identified during the sampling process of these ponds. As such GCN absence can be accepted for these ponds. Palmate / smooth newt eggs were however, recorded in Pond 6.

9.7.35. Incidental records for other amphibians included palmate newt (*Lissotriton helveticus*) juveniles near Pond 2 and an adult common toad (*Bufo bufo*) near Pond 3. Common frog (*Rana temporaria*) tadpoles were also noted in several ponds across the Proposed Scheme area.

9.7.36. A portion of the 500m terrestrial zone for Ponds 2 / 2b in which GCN presence was confirmed falls within the Proposed Scheme area (see Figure 9-1).

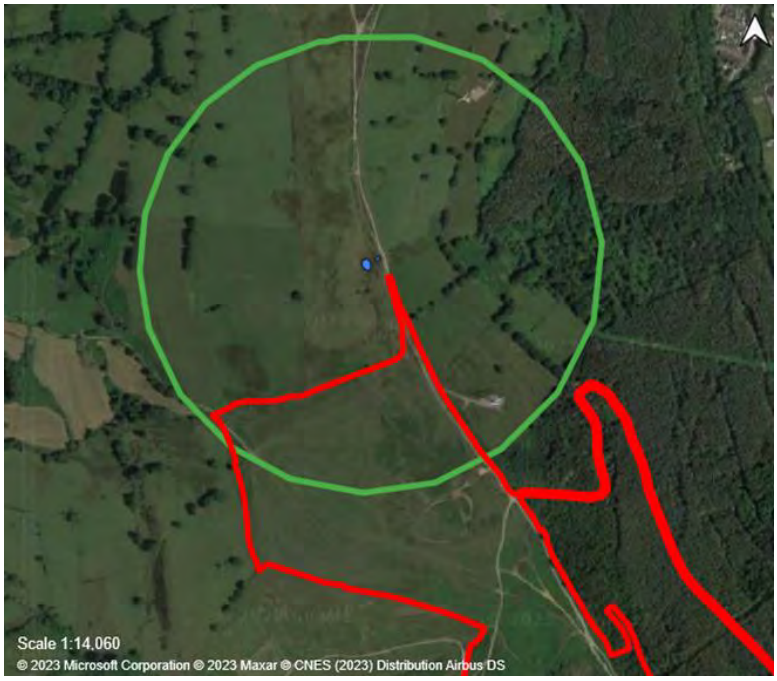

Figure 9-1 - 500m GCN terrestrial zone (green radius) around ponds with GCN presence in relation to the Proposed Scheme RLB.

9.7.37. The full report for the GCN surveys is provided in V3-S09-0005.

Badger

Desk Study

9.7.38. One record for badger (*Meles meles*) was returned from 1km data searches. This was for field signs of a badger seen on the side of the A468 road, approximately 680m south-east of the southernmost point of the Proposed Scheme.

Field Survey

9.7.39. During both badger survey visits (June and September 2023) badger activity was concentrated to the woodland south-east of the Tip 1, with activity levels being higher during visit 1 compared to visit 2. Badger signs included latrines, snuffle marks and hair on a fence. An additional latrine was identified during an associated dormouse survey on the 29 September 2023 located in proximity to the haul road which was not incorporated into the badger survey due to survey area and time restrictions. No badger setts were noted within the survey or Proposed Scheme area.

9.7.40. The full report for the badger survey is provided in V3-S09/0006.

Other Mammals

Desk Study

9.7.41. A total of 14 records for priority mammal species not yet mentioned were returned from 1km data searches, including two records for brown hare (*Lepus europaeus*), one record for polecat (*Mustela*

putorius) and 11 records for West European hedgehog (*Erinaceus europaeus*). The closest of these was for an adult brown hare, observed 5m from the proposed haul road.

Field Survey

9.7.42. Whilst no specific surveys were undertaken for small mammals several species were either observed or evidenced during the PEA survey including rabbits (*Oryctolagus cuniculus*), mole (*Talpa europaea*) hills, fox (*Vulpes vulpes*) scats and short-tailed field vole (*Microtus agrestis*) droppings and a dead individual. Hare has also been seen on several occasions during various surveys within fields to the northwest of Tip 2 associated with the Proposed Scheme.

9.7.43. It is considered that priority species West European hedgehog is also likely to be present or using suitable habitats such as woodland, scrub, grassland, and hedgerows within the Proposed Scheme area for commuting, foraging, sheltering, and breeding.

Birds

Desk Study

9.7.44. A total of 578 records for 27 protected and priority bird species were returned from 1km data searches. These included ten Wildlife and Countryside Act (1981) Schedule 1 (WCA1) bird species and 17 Environment (Wales) Act 2016 Section 7 (S7) species. The closest WCA1 record was for a goshawk (*Accipiter gentilis*), observed directly within the Proposed Scheme area over Tip 1. The closest S7 record was for a flock of starling (*Sturnus vulgaris*) recorded within the Proposed Scheme boundary at Tip 1.

Field Survey

Phase 1 Habitat Survey

9.7.45. A total of 27 different bird species were recorded during the PEA survey including Schedule 1 species red kite *(Milvus milvus).* Winter migrants present also included the Schedule 1 species fieldfare *(Turdus pilaris)* and redwing *(Turdus iliacus).* S7 species noted during the surveys included dunnock *(Prunella modularis),* kestrel *(Falco tinnunculus),* linnet *(Linaria cannabina),* song thrush *(Turdus philomelos),* starling and skylark *(Alauda arvensis).*

Ground Nesting Bird Survey

9.7.46. A total of 65 species were recorded during the survey including 11 breeding ground nesting species (five confirmed breeding, three probably breeding and three possibly breeding).

9.7.47. There were 60 breeding bird territories identified within the survey area. Breeding territories for nine species of high and/or medium conservation concern were recorded. Species comprised skylark, willow warbler (*Phylloscopus trochilus*), meadow pipit (*Anthus pratensis)*, tree pipit (*Anthus trivialis)*, reed bunting (*Emberiza schoeniclus*), cuckoo (*Cuculus canorus)*, and nightjar (*Caprimulgus europaeus*). A peregrine falcon (*Falco peregrinus*) in flight was also recorded during one survey visit. The site overall was considered of local level importance in terms of nature conservation value for ground-nesting breeding birds.

VP Survey – Raptors (inclusive of a pre-breeding raptor nest site survey of the haul road)

9.7.48. A total of 13 possible raptor nest sites were noted during the pre-breeding raptor nest check. VP surveys identified five raptor / owl species using the area including Schedule 1 red kite (*Milvus*

milvus) and hobby (*Falco subbuteo*). No evidence however, of raptor/owl breeding was observed within the Proposed Scheme area.

9.7.49. The full report for the bird surveys is provided in V3-S09/0007.

Reptiles

Desk Study

9.7.50. A total of eight records for three reptile species were returned from 1km data searches. This included three records for common lizard (*Zootoca vivipara*), one for adder (*Vipera berus*) and four for slow worm (*Anguis fragilis*). The closest of these was for a common lizard found during removal of a stone wall, within the Proposed Scheme on the north-eastern boundary of Mynydd y Grug common.

Field Survey (Incidental records)

9.7.51. Due to the habitat types present in the Proposed Scheme area i.e. mosaics of grassland, scrub and woodland alongside local records of reptiles in the area, assumed presence of reptiles was made from the Proposed Scheme outset and as such no specific surveys for reptiles was undertaken. Both slow worm and common lizard have been recorded in and around the area of Tip 2 and connecting Haul Road section during other ecological surveys associated with the Proposed Scheme, inclusive of juvenile slow worm confirming breeding for this species.

Terrestrial Invertebrates

Desk Study

9.7.52. A total of 66 records for 17 protected and priority invertebrate species were returned from 1km data searches. This included records for Red Data Book species dingy skipper (*Erynnis tages*) and small heath (*Coenonympha chenopodiata*). Small heath and dingy skipper were both recorded within the Proposed Scheme area on the southern tip site.

Field Survey

9.7.53. A total of 199 terrestrial invertebrate species were recorded during diurnal surveys within the Proposed Scheme. Of the species identified, at least 10 were considered Priority species i.e., species considered to be rare or scarce, localised, and / or S7 Environment (Wales) Act 2016 listed species. In addition, at least a further six species were considered of Local Concern.

9.7.54. Priority species included but not all, small heath (*Coenonympha pamphilus*), dingy skipper (*Erynnis tages*), cinnabar (T*yria jacobaeae*), and shaded broad-bar (S*cotopteryx chenopodiata*), grayling (*Hipparchia semele*); and the Nationally Scarce, red-tipped clearwing (S*ynanthedon formicaeformis*) and Western bee-fly (*Bombylius canescens*).

9.7.55. The full report for the terrestrial invertebrate survey is provided in V3-S09/0008.

Fish

Desk Study

9.7.56. No priority fish species were returned from 1km data searches however, the River Sirhowy SINC is cited as supporting resident bullhead (*Cottus gobio*) and brown trout (*Salmo trutta*) and migratory anadromous Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta trutta*).

Field survey

9.7.57. No specific survey was undertaken for fish and assumed presence within the River Sirhowy has been made.

9.8 FUTURE BASELINE

CLIMATE CHANGE

9.8.1. In the UK, the effects of climate change are likely to comprise more extreme weather events, a general increase in summer temperatures and warmer, milder winters. Changes in rainfall distribution and a rise in sea levels are also expected. The Climate Change Risk Assessment for Wales[104], suggest that the most significant threats for Wales include:

- changes in soil conditions, biodiversity and landscape as a result of warmer, drier summers;
- reductions in river flows and water availability during the summer;
- increases in flooding; and
- changes in species including a decline in native species, changes in migration patterns and an increase in invasive species.

HABITATS

Grasslands

9.8.2. Whilst some grasslands within the study area are unlikely to be significantly affected by a rise in temperatures, other important grassland areas such as the marshy grassland are likely to be very sensitive to the changes in rainfall patterns, with drier summers leading to a decline in this habitat type. Increased rainfall through the winter, however, could lead to a change in catchment characteristics, providing new waterlogged areas and consequent marshy / wet grassland habitats.

Woodland

9.8.3. Drier summers have the potential to affect the species composition of the small wet woodland areas identified on site, leading to an overall loss of this habitat through drying out of the ground.

SPECIES

Bats

9.8.4. Climate change has the potential to affect bat populations due to changes in their hibernation period. Emerging from hibernation earlier places greater energy demands on the animal and consequent requirement for adequate food resources. This can all lead to poorer body condition and reduced breeding success.

[104] Welsh Government, Department of Environment, DEFRA (2012) The Climate Change Risk Assessment for Wales

9.8.5. Warmer temperatures and higher rainfall can, however, lead to an increase in prey availability. Drier summers and springs, however, would have a negative effect due to a likely reduction in insect numbers.

9.8.6. The general overall warming would, however, allow species such as lesser horseshoe bat to migrate further north increasing its distribution within the UK.

Otter

9.8.7. Increased drought and reduced river flows has the potential to affect otters through a reduction in prey items within the nearby River Sirhowy.

INCREASED FOOTFALL/HUMAN DISTURBANCE

9.8.8. The post-operational phase of the Proposed Scheme could result in an increase in human disturbance to habitats in proximity to any footpaths/tracks associated with the Proposed Scheme. This may over time result in habitat degradation at the edge boundaries of these adjoining habitats from factors such as fly-tipping or ground trampling causing vegetation loss.

9.8.9. The Proposed Scheme area already experiences a degree of human disturbance / habitat degradation from existing tracks / footpaths alongside illegal use by trail motorbikes and quad bikes. The changes to the landscape as part of the Proposed Scheme will be done as such that trail bikes and quad bike usage will be removed, reducing damage from this activity and will aim to provide dedicated walking trails. It is therefore considered that this would contribute to a beneficial change to the future baseline.

9.8.10.

FARMING / GRAZING

9.8.11. The current level of grazing is not considered to change significantly and will not affect the future baseline conditions.

EVALUATION OF BIODIVERSITY RESOURCES

9.8.12. The biodiversity resources identified within the study area are evaluated as summaries in Table 9-10 below.

Table 9-10 – Evaluation of Biodiversity Resources

Ecological Feature	Valuation of Feature	Valuation Justification
Designated Sites		
Ruperra Castle and Woodlands (SSSI)	High (National)	Designated under national legislation, this SSSI supports habitats and ecological features deemed to be of national importance for nature conservation. Only known nursery roost for greater horseshoe bat (*Rhinolophus ferrumequinum*) in Mid/South Glamorgan and one of only 5 known in Wales. Old castle cellar is also used by lesser horseshoe bats (*Rhinolophus hipposideros*) as hibernation roost.

Ecological Feature	Valuation of Feature	Valuation Justification
Graig Goch (LNR)	Medium (Regional / County)	Ancient oak and beech woodland set in Sirhowy Valley Country Park. Contains protected/priority plant species bluebell (*Hyacinthoides non-scripta*) and bird species such as redstart (*Phoenicurus phoenicurus*) and kingfisher (*Alcedo atthis*). Species of bats, butterflies, moths and wildflowers have also been recorded. One of the few remnants of pre-industrial woodland in South Wales Valleys.
Mynydd y Grug, West of Cwmfelinfach (SINC)	Medium (Regional / County)	Qualifying features include extensive open countryside with semi-natural upland features, acid grassland, marshy grassland and ponds. The site supports European protected species GCN and habitat features of the SINC such as ponds are likely to provide important breeding habitat for the species supporting metapopulations within the Region. As such this SINC was assessed as medium ecological value importance at a Regional/County level.
Twyn yr Oerfel, South of Cwmfelinfach (SINC)	Medium (County)	Qualifying features include acid grassland, acid flush/marshy grassland and pond with semi-natural vegetation.
Mynydd Bach Slopes, East of Llanbradach (SINC)	Medium (County)	Qualifying features include acid grassland, marshy grassland and semi-natural woodland with assemblages of indicator species, and grassland with a high density of anthills.
Berth Goch Wood, North of Trethomas (SINC)	Medium (Regional / County)	Qualifying features include ancient semi-natural woodland with indicator species, and acid grassland with anthills.
River Sirhowy (SINC)	Medium (Regional / County)	Qualifying features include watercourse with resident bullhead (*Cottus gobio*) and brown trout (*Salmo trutta*) and migratory anadromous Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta trutta*). Probable breeding of European protected species otter also cited. This is a relatively unpolluted main river with unmodified bed and banks with adjacent semi-natural wetland, grassland and woodland habitats. The river is considered an important ecological corridor for a number of priority species providing connectivity with the wider landscape and as such the SINC was assessed as medium ecological value on a Regional / County level.
AW	High (National)	A number of AW designated parcels and associated ground flora exist within proximity to the Haul Road.
Habitats		

Ecological Feature	Valuation of Feature	Valuation Justification
Semi-natural broadleaved woodland	Medium (Regional / County)	Several parcels of semi-natural broadleaved woodland in the Proposed Scheme area (particularly along Haul Road) were considered to qualify as priority 'Lowland / Upland deciduous woodland' and in localised areas 'Wet woodland' as listed under Section 7 Environment (Wales) Act 2016. These are of Regional importance. Where woodland also formed part of AW designations and/or features of LNR / SINC sites within the Proposed Scheme area, these were also considered to be of Regional importance. All woodland was considered to have moderate value for biodiversity and high potential for breeding birds, amphibians, reptiles, small mammals (mice, voles, rabbits and hedgehogs), and foraging bats. It was also considered likely to act as an important link to other habitats in the wider area. As such the habitat was assessed as medium ecological value importance at a Regional / County level.
Semi-natural Coniferous / Mixed Woodland, Plantation coniferous woodland and Recently felled woodland	Medium (County)	These woodland parcels, where forming part of AW or LNR / SINC designations, were assessed as medium ecological value importance at a County level. These woodlands were considered to have moderate value for biodiversity including breeding birds, small mammals (mice, voles, rabbits and hedgehogs), and foraging bats. Woodland likely to act as an important commuting link for species to other habitats in the wider area. These areas will be assessed under the AW or designated sites they form part of.
Dense and Scattered scrub	Low (Local >5km)	Common and widespread habitat. The habitat was assessed as medium ecological importance at Site / Local level. It is considered that the scrub habitat is likely to act as an important link and buffer zone between other habitats in the wider area.
Scattered trees	Low (Local <5km)	Some of the trees on the site are mature or notable / veteran trees that enrich biodiversity on the site with potential to support nesting birds, roosting bats and a high diversity of invertebrates, but they are common and widespread in the county. As such the habitat was assessed as medium ecological value importance at a Site level.
Felled woodland (outside of AW designations)	Low (Local >5km)	Bare and exposed offering limited ecological value. Standing tree in felled area noted for avian potential i.e., likely usage by raptors. Additionally, bird surveys recorded probable breeding nightjar in an area of clear-fell to the northern boundary of Tip 2 increasing its ecological value. As such the habitat is considered of moderate ecological value on a Local level.
Acid grassland, dry dwarf shrub heath (acid) and lichen / bryophyte heath	Medium (Regional / County)	Likely to qualify under a number of S.7 priority habitats under the Environment (Wales) Act 2016 including: Lowland heath, and lowland acid grassland as well as Open mosaic habitats on previously developed land where smaller patches were in mosaic with spoil habitat.

Ecological Feature	Valuation of Feature	Valuation Justification
		Habitat supports a number of invertebrates alongside ground nesting birds such as skylark.
Improved grassland	Negligible (Proposed Scheme footprint)	Common and widespread habitat. Improved grassland was heavily grazed and of limited ecological value.
Poor semi-improved grassland	Low (Local >5km)	Common and widespread habitat. Poor semi-improved grassland habitat within the survey area was noted as being grazed by sheep and other livestock. Areas where rush / bracken was present has value in conjunction with marshy grassland for ground-nesting birds such as skylark.
Marshy grassland forming part of SINCs	Medium (Regional / County)	Forms part of Mynydd y Grug, West of Cwmfelinfach SINC habitat. Supports GCN and ground nesting birds such as skylark. Evaluation of this habitat will be dealt with under the Mynydd y Grug, West of Cwmfelinfach (SINC).
Marshy grassland (outside of designated sites)	Low (Local >5km)	Species-poor however, forms a mosaic with dry heathland and unimproved acid and semi-improved grassland habitats which increases its ecological values. Provides habitat for ground nesting birds such as skylark.
Continuous / scattered bracken	Low (Local >5km)	Common and widespread habitat but enriches the ecological resources within the locality, providing suitable nesting sites for bird species such as meadow pipit and suitable habitat for common reptiles.
Standing water (Ponds) and associated Marginal / Inundation vegetation (inside designated areas)	Medium (Regional)	Several ponds and associated vegetation to the northern section of Proposed Scheme form part of Mynydd y Grug, West of Cwmfelinfach SINC some of which may qualify as S.7 priority habitat 'Ponds'. Two ponds were confirmed as supporting GCN and were also noted to support a range of invertebrates and other amphibians. These were assessed as offering medium / high ecological value on a Regional level. Evaluation of this habitat will be dealt with under the Mynydd y Grug, West of Cwmfelinfach (SINC) and GCN.
Standing water (Ponds) and associated Marginal / Inundation vegetation (outside designated sites)	Negligible / Low (Proposed Scheme footprint / Local >5km)	Ponds outside of designated sites were of low ecological value. Likely to provided important water resources for wildlife. The quarry pond to the south-eastern end of the site was considered of negligible ecological value for wildlife due to the presence of contaminants from run-off and silt extraction operations.
Running water (River Sirhowy)	Medium (Regional)	There is potential for the streams, when flowing, to confluence into the River Sirhowy. The River Sirhowy is classified as a priority habitat and also designated under the River Sirhowy SINC. This river supports a number of priority species such as brown trout and is also likely to provide an important ecological

Ecological Feature	Valuation of Feature	Valuation Justification
		corridor for other priority species e.g., otter and bats. Valuation of the river is dealt with under the River Sirhowy SINC.
Running water (streams)	Negligible (Proposed Scheme footprint)	Common and widespread habitat. Running water (streams / drainage channels) directly within the Proposed Scheme area were of limited value for wildlife due to shallow and ephemeral water levels. As such running water in the Proposed Scheme area has been assessed as of limited ecological importance at a site level.
Running water outside Proposed Scheme footprint (streams and hydrologically connected River Rhymney)	Medium (Regional)	There are several tributaries outside the Proposed Scheme footprint surrounding the Proposed Scheme (within 200m) particularly around the soil deposition area and connecting with the existing quarry pond to the south-east of Tip 1. These connect with the River Rhymney further to the west / south. Should contaminated water (chemical / silt ladened) escape from the Proposed Scheme area and enter these tributaries there is a risk of polluting the River Rhymney. The river of which is a priority habitat and a designated SINC supporting a number of priority species such as Atlantic salmon, brown trout and common eel. Assessment for the River Rhymney will not be covered specifically in this chapter as impacts have been covered by Chapter 13: Water Environment.
Rock exposure artificial – colliery spoil	Medium (County)	Limited ecological value however increases when considered in mosaic with surrounding acid grassland/heath communities, and can be classified as S.7 priority habitat '*Open mosaic habitats on previously developed land*' (OMH) Habitat mosaic supports a number of invertebrates alongside ground nesting birds such as skylark.
Hedgerows – intact species-poor with trees and intact species-poor	Low (Local >5km)	Species-poor habitat. Hedges may offer some connectivity to the wider landscape and likely to provide good foraging, roosting, and potentially breeding habitat for house sparrow, a bird species of high conservation concern. As such the habitat was assessed as low ecological importance on a Local level.
Buildings, bare ground (footpaths / tracks) and hard standing	Negligible (Proposed Scheme footprint)	Buildings within the survey were farm / residential and were not noted as containing features for use by species such as bats and as such are considered of negligible value to wildlife. Similarly bare ground / hard standing comprised worn and well used roads, tracks and footpaths and as such were also considered of limited value for wildlife.
Wall – dry-stone	Low (Local >5km)	Often considered features of a locality providing character to the landscape area. Likely to offer low ecological value to invertebrates and reptiles on a Local level.
Species		

Ecological Feature	Valuation of Feature	Valuation Justification
Bats – foraging and commuting	Medium (Regional)	CIEEM guidance was used to determine the importance of the site for foraging and commuting bats (Wray *et. al*., 2010). A level of Regional importance for the Proposed Scheme was assigned due to the presence of greater horseshoe bat, whiskered / Brandt's bat, noctule bat and serotine bat alongside a range of other species using the habitats available within and around the Proposed Scheme area for commuting and foraging.
Hazel Dormouse	N/A	No evidence found during surveys. Assumed absent from Proposed Scheme area.
Otter	Medium (County)	Habitats in main Proposed Scheme area are of limited value for otters however the River Sirhowy (located 150m north of the haul road) is cited as supporting probable breeding otter. Woodland between the Haul Road and the river has potential to be used by otter. Otter are a European protected species and a target action plan species within the County. Habitats in the Proposed Scheme have therefore been assessed as low ecological value for otter on a County level.
GCN	Medium (Regional)	GCNs have been recorded in ponds adjacent to the north-west of the Proposed Scheme area both in the last 10 years and during surveys associated with the Proposed Scheme (latter inclusive of eDNA and eggs confirming breeding activity). Habitats suitable for GCN such as the ponds and marshy grassland in this north-western area are therefore likely to support metapopulations within the County / Region, linking with populations recorded in the wider area further north of the Proposed Scheme. Habitats and populations recorded in the Proposed Scheme area are therefore assessed as of medium ecological value on a Regional level.
Badger	Negligible (Proposed Scheme footprint)	No badger setts were identified within the Proposed Scheme area however, evidence of commuting/foraging latrines and snuffle holes were noted particularly in woodland to the eastern boundary of the Tip 1. Grassland and woodland habitats in the Proposed Scheme area are considered suitable for both foraging and commuting badger however, extensive suitable habitats also exist in the wider surrounding area. It is therefore considered habitats within the Proposed Scheme footprint are of ecological value for foraging / commuting badger on a Site level.
Other mammals – Hare, Western European Hedgehog	Low (Local >5km)	Hare, a Species of Principal Importance to Nature Conservation in Wales (as identified in Section 7 of the Environmental (Wales) Act 2016 was recorded within fields adjacent northwest of the Tip 2 of the Proposed Scheme. Habitats on site were suitable for breeding, sheltering and foraging for this species, in addition to Western European hedgehog. These species are considered to enrich the area on a Local level.

Ecological Feature	Valuation of Feature	Valuation Justification
Breeding Birds	Low (Local >5km)	Breeding within the Proposed Scheme boundary was recorded of Amber listed (BoCCUK5) skylark, meadow pipit, and bullfinch. S7 species nightjar was recorded as probable breeding within clear-fell adjacent to the northern boundary of the Tip 2. No evidence of breeding raptor species was recorded within the Proposed Scheme boundary, and whilst habitats in the Scheme area offer suitable foraging habitat, plentiful suitable foraging habitat also exists in the wider area.
Reptiles	Medium (County)	Habitats such as scrub / bracken, grassland, heath, ponds / marginal vegetation and woodland across the Proposed Scheme area are considered highly likely to support all four common reptile species i.e., adder, common lizard, slow worm and grass snake. Whilst specific surveys were not undertaken for reptiles, suitable habitat exists on site for reptiles. Both common lizard and slow worm were recorded in the Proposed Scheme area during other ecological surveys, inclusive of juvenile slow worm indicating breeding. As such the habitat has been assessed of medium ecological value on a County Level.
Terrestrial Invertebrates	Low (Local >5km)	A diverse range of habitats were noted on site and resulted in the recording of several notable species. Of these no legally protected species were recorded however, three red data book listed species (dingy skipper, grayling and small heath) were recorded. Species recorded including those of Priority or Local Concern, were largely generalist species reliant on commonly occurring habitats and plant species, of which were abundant within the Proposed Scheme and the wider landscape. Therefore, invertebrates within the Proposed Scheme area were considered of low, Local value.
Fish	Low (Local >5km)	No priority fish species were noted within the Proposed Scheme area and waterbodies / courses were considered unsuitable to support these. There is some connectivity via shallow streams to the River Sirhowy where presence of priority fish species is likely. Impacts to fish only considered likely from indirect pollution of which will be assessed under 'River Sirhowy SINC'.
Notable Flora and Lower plants	Low (Local >5km)	One notable species of flora was recorded within the Proposed Scheme area comprising bluebell. The Graig Goch LNR also cites presence of bluebell. Bluebell presence however is considered would be of ecological value on a Local level. Lower plants (lichen and bryophytes) formed part of acid grassland and heath habitat and species likely to be present and / or have been recorded in the area are considered predominately commonly occurring or of local concern. As such presence is likely to enhance the area on a Local level.

9.8.13. Ecological features valued at below "County" level will not be considered further in this assessment unless a direct or potential direct impact triggering wildlife legislation has been identified.

9.8.14. Where habitats form part of a designated site such as a SINC, they will be considered within the context of the designated site and the higher value will be used in the assessment.

9.9 PRELIMINARY IMPACT ASSESSMENT

CONSTRUCTION / OPERATIONAL PHASE

9.9.1. Due to the nature of the proposed works and similarity in impacts resulting from the construction and operational activities on ecological receptors, to be undertaken over 3-5 years, these have been assessed in combination. This will then be followed by an impact assessment of the post-construction (decommissioning) phase.

9.9.2. The construction and operational phase have the potential to cause impacts upon biodiversity through habitat loss, disturbance, direct mortality, insensitive timing of works coinciding with specific life cycle phases such as hibernation or breeding, pollution of air, water or land leading to habitat modification or reduction in prey species etc.

9.9.3. Whilst general impacts resulting from air and water pollution on ecological receptors have been assessed in Table 9-11, detailed evaluations of impacts from dust and surface run-off, are considered in the Air quality and Water Environment chapters (Chapters 6 and 13).

9.9.4. The footprint of the Proposed Scheme has been assumed as per the RLB. The most likely locations for construction compounds and haul routes have also been included within the assessment. It is considered therefore that the assessment presents a reasonable worse-case scenario (see Table 9-11).

Table 9-11 – Construction / Operation Impacts Assessment

Receptor Name	Impact	Effect	Magnitude	Significance
Designated Sites				
Ruperra Castle and Woodlands SSSI (Regional)	Potential habitat loss – functionally linked woodland	Whilst no direct habitat loss will occur to this SSSI, potential loss to functionally linked woodland that may be used by greater/lesser horseshoe bats for commuting / foraging has been considered. Due to the intervening topography offering little connectivity, the Proposed Scheme area is unlikely to be used by greater / lesser horseshoe bats from the SSSI. As such no effects are anticipated to designatory bat features associated with the SSSI.	No change	Neutral
Graig Goch LNR (Regional / County)	Habitat Loss	Potential for minor loss (<0.14ha) to AW associated with the LNR if passing point required within LNR footprint.	Moderate adverse	Moderate adverse
	Habitat Degradation	Due to the Haul Road passing through the LNR (via the pre-existing track) there is potential for chemical or dust pollution to occur to adjacent habitats during haul road resurfacing or transport of spoil material.	Minor adverse	Slight adverse
Mynydd y Grug, West of Cwmfelinfach SINC (Regional / County)	Habitat Loss / Modification	The Proposed Scheme encompasses a large proportion of the SINC (36.69ha of 58ha) which is set to be predominately used as a temporary soil deposition area. Much of the impacted area contains marshy grassland with adjacent standing water (ponds) habitats which are sensitive habitats in terms of alterations to the surrounding water environment. The deposition of material within the SINC area may temporarily alter ground water levels and therefore the characteristics of the directly impacted marshy grassland and affect nearby retained standing water (pond) habitats. This could result in detrimental effects to the integrity of the SINC alongside impact species using the site such as GCN and ground nesting skylark.	Moderate adverse	Moderate adverse

Receptor Name	Impact	Effect	Magnitude	Significance
		The habitat adjacent to the boundaries of the Proposed Scheme and haulage and access / egress routes may be temporarily damaged by dust and chemical pollution.		
	Habitat Degradation	The condition of habitats within the SINC may be degraded through potential hydrological changes caused by the deposition of material on the soil storage area. Dust from these works may also cause a temporary degradation of habitat value.	Moderate adverse	Moderate adverse
Twyn yr Oerfel, South of Cwmfelinfach SINC (County)	Habitat Loss	A small portion of the SINC (0.08ha) will be lost to the Proposed Scheme largely comprising an existing access track (0.02ha) and semi-improved acid grassland (0.06ha).	Minor Adverse	Slight Adverse
	Habitat Degradation	There is potential for the habitats outside the Proposed Scheme footprint in this SINC to be affected indirectly from chemical and dust pollution resulting from the excavation works and material deposition as this SINC lies partially within and adjacent to the north-eastern extent of Tip 2.	Negligible Adverse	Slight Adverse
Mynydd Bach Slopes, East of Llanbradach SINC (County)	Habitat Degradation	There will be no loss of habitat as works do not encroach on the site. There is potential for habitats in this SINC to be affected indirectly by dust accumulation resulting from excavation works and material deposition as this SINC lies adjacent to the soil deposition area to the north-western extent of the Proposed Scheme.	Minor Adverse	Slight Adverse
Berth Goch Wood, North of Trethomas SINC (Regional / County)	Habitat Degradation	There will be no loss of habitat as works do not encroach on the site. There is potential for habitats in this SINC to be affected indirectly by dust accumulation resulting from the excavation works and material deposition as this SINC lies 45m east of Tip 1.	Negligible Adverse	Slight Adverse
River Sirhowy SINC (Regional / County)	Habitat Degradation	The SINC lies 45m north of the haul road at the eastern extent. No water abstraction is anticipated, and the Sustainable Drainage (SUDs) design will ensure no contaminated site water will enter the river. There may be potential for contaminated surface water run-off	Minor adverse	Slight adverse

Receptor Name	Impact	Effect	Magnitude	Significance
		and chemical pollution from machinery or dust to enter the river via likely connected shallow streams along the Haul Road, however many of these dry out over the summer months lowering this risk. Indirect impacts through pollution, silt debris and sediment entering the watercourse may impact on designatory features of the SINC such as otter and fish.		
AW (National)	Habitat loss	Various AW parcels are located either side of the existing forestry Haul Road track. Many are associated with or located around the Graig Goch LNR. It is anticipated passing places (4-6m wide and 20m long every 300-400m) will be located predominantly in PAW areas which are already subject to felling activities and / or in places where the existing track is wider. Localised removal and pruning of individual / low numbers of trees and excavation of AW ground flora such as bluebell at the woodland boundaries, may be required to accommodate the passing places.	Minor adverse	Moderate adverse
	Habitat degradation	Roots of adjacent trees may be damaged, and therefore degrade the habitat value should machinery and excavations be required within the root zones of trees. There is potential for adjacent AW along the Haul Road to be affected indirectly from chemical and dust pollution during haulage of material.	Minor adverse	Moderate adverse
Habitats (outside of designated sites)				
Semi-natural broadleaved woodland (Regional / County)	Habitat Loss	There would be a potential direct impact on small areas of woodland within the Proposed Scheme. Habitat loss is anticipated to be minimal (less than 1ha) resulting from localised removal of trees to accommodate the tip haul road and access to the existing drainage channels to the east of Tip 1.	Moderate adverse	Moderate adverse

Receptor Name	Impact	Effect	Magnitude	Significance
		The veteran beech trees east of Tip 1 (approximate grid reference: ST1789889937) will be avoided.		
	Habitat Degradation	Roots of adjacent trees may be damaged, and therefore degrade the habitat value should machinery and excavations be required within the root zones of trees. There is potential for adjacent woodland to be affected indirectly from chemical and dust pollution during excavations / soil deposition and phased landscaping activities.	Moderate adverse	Moderate adverse
Semi-natural Coniferous / Mixed Woodland, Plantation coniferous woodland and Recently felled woodland (County)	Habitat Loss and degradation	Assessed as part of AW woodland.	N/A	N/A
Acid grassland, dry dwarf shrub heath (acid) and lichen / bryophyte heath mosaic (Regional / County)	Habitat Loss	An area of 11.45ha of acid grassland/dry shrub heath and lichen/ bryophyte heath mosaic would be temporarily lost in the short to medium term (5-10 years) through excavations on the two Tip sites.	Moderate adverse	Moderate adverse
Rock exposure artificial – colliery spoil (County)	Habitat Loss	This habitat will be permanently lost (23.72ha) due to the nature of the Proposed Scheme being to extract coal for removal from site and reprofiling and seeding of remaining spoil. This is likely to impact the integrity of the habitat mosaic associated with the S.7 priority habitat OMH alongside impact the species using the habitat mosaic. Whilst there will be a permanent loss, the large area of colliery spoil present within the Proposed Scheme area is	Moderate adverse	Slight adverse

Receptor Name	Impact	Effect	Magnitude	Significance
		considered to have a low biodiversity value superseding the value associated with the OMH priority habitat.		
Species				
Bats (Regional)	Disturbance	Works may cause short term disturbance to foraging and commuting bats during the site preparation and construction phases particularly surrounding the construction of the link between the haul road and highway.	Moderate adverse	Moderate adverse
	Roost destruction, loss or modification / isolation of foraging habitat	No long-term impacts are anticipated regarding potential roost features, as no buildings or trees on site suitable for roosting bats are being impacted. The construction of the Haul Road section connecting the current forestry road with the A467 is not expected to cause long-term negative impacts for bats due to the relatively small area of foraging habitat likely to be lost.	Negligible adverse	Neutral
Otter (County)	Direct mortality / injury	Low likelihood of presence within main Proposed Scheme area and haul road due to distance from the river and low suitability of habitats.	No change	Neutral
	Habitat Degradation	Potential pollution to the River Sirhowy could impact the species via reduction in food resources such as fish.	Moderate adverse	Slight adverse
GCN (Regional)	Direct mortality / injury	Much of the impacted habitat areas associated with the Proposed Scheme that falls within the 500m terrestrial zone surrounding the breeding ponds is located in the distant 250-500m zone (11.02ha).	Major adverse	Large adverse

Receptor Name	Impact	Effect	Magnitude	Significance
		This reduces the likelihood of GCN presence, as presence declines with distance from breeding ponds (English Nature, 2001[105]). There is however still potential for individual GCN to be killed, injured, or disturbed whilst in a resting place during clearance activities e.g., vegetation clearance and excavations in these areas, particularly during winter months. This could significantly impact the local population particularly should population density be low. Risk of encounter also increases in those areas within 0-250m (0.85ha) of the breeding ponds notably along the north-western access track to the Proposed Scheme. Additionally, a further 0.11ha of disturbed grassland/scrub habitat within 500m of the ponds linked with the northern access track outside the RBL may be impacted by passing site traffic.		
	Disturbance	Construction noise and vibration as well as the use of construction and security lighting has the potential to disturb GCN in both aquatic and terrestrial phases but most significantly if hibernating nearby. Particularly where the access track runs adjacent to the ponds with GCN presence.	Moderate adverse	Moderate adverse
	Habitat Loss (terrestrial)	There will be a temporary short to medium term loss (five years) during the construction/operational phase of approximately 11.87ha of suitable terrestrial habitat (predominantly marshy grassland) for GCN within 500m of confirmed breeding ponds. This area of land is located within the distant 250m – 500m zone. There are however extensive areas of suitable terrestrial habitat within the surrounding landscape.	Moderate adverse	Moderate adverse

[105] English Nature (2001). Great Crested Newt Mitigation Guidelines. English Nature, Peterborough

Receptor Name	Impact	Effect	Magnitude	Significance
		There is potential for damage to the boundary of a pond with confirmed GCN presence where this lies adjacent to the access track to the north-west of the Proposed Scheme. The track will be used by heavy plant and minor re-stoning of the track will be required.		
	Habitat Degradation	There is potential for pollution to occur from site activities i.e., oil spills, excavation dust, particularly where construction traffic is set to pass adjacent to GCN ponds and where works occur adjacent to retained marshy grassland areas outside the Proposed Scheme footprint.	Moderate adverse	Moderate adverse
Small mammals (hare, hedgehog) (Local)	Direct mortality/injury	Site clearance activities have potential to cause killing, injury, crushing or asphyxiation of small mammals triggering legislation under the Wild Mammals (Protection) Act 1996.	Major adverse	Slight adverse
Birds (ground nesters - skylark) (Local)	Direct mortality	The pre-construction phase such as vegetation clearance, topsoil and turf stripping can cause direct morality to eggs and chicks of ground nesting birds such as skylark and / or tree dwelling species if undertaken during sensitive breeding periods. This triggers legislation under the WCA, 1981.	Major adverse	Slight adverse
	Roosting and / or nesting habitat loss	The ground nesting bird survey identified breeding skylark and meadow pipit. Approximately 36.69ha of the Mynydd-y-Grug SINC (area with highest concentration of ground nesting birds) will be temporarily lost / disturbed within the Proposed Scheme footprint. Additional breeding grounds for breeding birds will also be temporarily lost in suitable habitats within the Proposed Scheme area outside the SINC.	Major adverse	Slight adverse
Reptiles (County)	Direct mortality / injury	In the absence of a survey but based on knowledge of the site and presence of suitable habitats to support reptiles, the precautionary principle will be followed, and reptiles will be assumed present. Site	Major adverse	Moderate adverse

Receptor Name	Impact	Effect	Magnitude	Significance
		clearance works such as vegetation clearance and earth-moving works can cause direct mortality to the reptile population on site.		
	Terrestrial habitat loss and degradation	There will be up to 60ha of temporary habitat loss that may be used by reptiles for foraging and sheltering purposes inclusive of scrub, grassland, heath and bracken. Areas of colliery spoil and bare ground will also be permanently lost which may be used by basking reptiles.	Major adverse	Moderate adverse

POST-OPERATIONAL (DE-COMMISSIONING) PHASE

9.9.5. De-commissioning activities are due to be undertaken following completion of the construction and operational activities. Activities such as site remediation (final landscaping and removal of the processing plant and other buildings) have the potential to cause impacts upon biodiversity through habitat disturbance and pollution of air, water or land leading to habitat modification or reduction in prey species etc. Following site remediation activities, the Proposed Scheme area will be returned to nature and upland grazing pasture.

9.9.6. It is assumed that all relevant decommissioning activities will follow best practice pollution prevention guidance as per the construction/operational phases.

9.9.7. The footprint of the Proposed Scheme has been assumed as per the RLB.

Table 9-12 – Post-operational (de-commissioning) Phase Impact Assessment

Receptor Name	Impact	Effect	Magnitude	Significance
Designated Sites				
Ruperra Castle and Woodlands SSSI (National)	N/A	No effects anticipated.	No change	Neutral
Graig Goch LNR (Regional / County)	Habitat Degradation	Following the cessation of the construction / operational activities the haul road will return to normal use by NRW for forestry cropping.	No change	Neutral
Mynydd y Grug, West of Cwmfelinfach SINC (Regional / County)	Habitat Modification	The Proposed Scheme encompasses a large proportion of the SINC (approximately 36.69ha) predominately to be used as a soil deposition area during the construction/operational phase. During the decommissioning phase it is anticipated that there will be modification to the impacted areas in terms of landscaping and habitat remediation which may change the hydrology of the site and habitat compositions.	Moderate adverse	Moderate adverse
	Habitat Degradation	There is potential for the habitats in this SINC to be affected indirectly post-construction by dust accumulation during final landscaping activities and dismantlement of the processing plant and other buildings however, this would be temporary (within six months of cessation of construction / operational activities). Embedded mitigation in the form of good construction pollution prevention practice will negate this effect. The condition of habitats inclusive of ponds supporting GCN within the SINC may be degraded through potential hydrological changes caused by alterations to the landform within the SINC. It is anticipated that the final landform in this area will as far as practically possible, follow the original contours and tie in with adjoining topography minimising this impact.	Minor adverse	Slight adverse

Receptor Name	Impact	Effect	Magnitude	Significance
Twyn yr Oerfel, South of Cwmfelinfach SINC (County)	Habitat Degradation	There is potential for the habitats in this SINC to be affected indirectly post-construction by dust accumulation during final landscaping activities and dismantlement of the processing plant and other buildings however, this would be temporary (within six months of cessation of construction / operational activities). Embedded mitigation in the form of good construction pollution prevention practice will negate this effect.	Minor Adverse	Slight Adverse
Mynydd Bach Slopes, East of Llanbradach SINC (County)	Habitat Degradation	There is potential for the habitats in this SINC to be affected indirectly post-operation by dust accumulation during final landscaping activities and dismantlement of the processing plant and other buildings however, this would be temporary (within six months of cessation of construction / operational activities). Embedded mitigation in the form of implementation of best practice pollution prevention measures will negate this effect.	Minor Adverse	Slight Adverse
Berth Goch Wood, North of Trethomas SINC (Regional / County)	Habitat Degradation	There is potential for the habitats in this SINC to be affected indirectly post-operation by dust accumulation during final landscaping activities and dismantlement of the processing plant and other buildings however, this would be temporary (within six months of cessation of construction / operational activities). Embedded mitigation in the form of implementation of best practice pollution prevention measures will negate this effect.	Minor Adverse	Slight Adverse
River Sirhowy SINC (Regional / County)	Habitat Degradation	There is potential for the habitats in this SINC to be affected indirectly post-operation by effects of contaminated surface run-off, potential changes of alkalinity and salinity and siltation of habitat resulting from landscaping activities and dismantlement of the processing plant and other buildings. This would, however, be temporary (within six months of cessation of construction / operational activities) and embedded mitigation in the form of implementation of best practice pollution prevention measures and the enhanced drainage design will however negate this effect.	Minor adverse	Slight adverse
AW (National)	Habitat degradation	No effects anticipated. It is expected that the created passing places along the existing forestry haul road track in which AWs are located adjacent to will be retained post-construction for use by NRW forestry operations. As such no	No change	Neutral

Receptor Name	Impact	Effect	Magnitude	Significance
		further excavations / remediation works will be required along the haul road as part of the post-operation phase.		
Habitats (outside designated sites)				
Semi-natural broadleaved woodland (Regional)	Habitat Degradation	There is potential for woodland outside of the Proposed Scheme footprint but within the RLB to be affected indirectly post-operation by dust accumulation during final landscaping activities and dismantlement of the processing plant and other buildings however, this would be temporary (within six months of cessation of construction / operational activities). Embedded mitigation in the form of implementation of best practice pollution prevention measures will negate this effect.	Minor adverse	Slight adverse
Acid grassland, dry dwarf shrub heath (acid) and lichen/bryophyte heath mosaic (Regional/County)	Habitat degradation	There is potential for acid grassland, heath and lichen / bryophyte habitats to be temporarily lost or be of lower quality over the short to medium term (5-10 years) whilst habitats develop following reinstatement measures and natural re-establishment. There is also potential for reinstated habitats to be affected indirectly post-operation by dust accumulation during adjacent landscaping activities and dismantlement of the processing plant and other buildings however, this would be temporary (within six months of cessation of construction / operational activities). Embedded mitigation in the form of implementation of best practice pollution prevention measures will negate this effect.	Moderate adverse	Moderate adverse
Rock exposure artificial – colliery spoil (County)	Habitat modification	Due to landscape seeding activities this habitat will be modified in the long-term. Bare colliery spoil of low biodiversity value will be reseeded with a commercial reclamation upland grassland mix which will improve the available green infrastructure and biodiversity value within the Proposed Scheme area. This will result in a beneficial biodiversity impact.	Moderate beneficial	Moderate beneficial
Species				

Receptor Name	Impact	Effect	Magnitude	Significance
Bats (Regional)	Disturbance	Following cessation of construction / operational activities no works are anticipated along the Haul Road of which supports habitat suitable for foraging / commuting bats. As such no effects are anticipated to bats.	No change	Neutral
Otter (County)	Habitat Degradation	Potential pollution of the River Sirhowy during de-commissioning activities (landscaping and processing plant removal) could impact the species via reduction in food resources. Embedded pollution prevention measures for de-commissioning activities should negate this effect.	Minor adverse	Neutral
GCN (Regional)	Disturbance	Noise and vibration as well as the use lighting during de-commissioning activities (landscaping and processing plant removal) has the potential to temporarily (up to six months) disturb GCN in both aquatic and terrestrial phases. The main noise/vibration associated activity would be associated with removal of the processing plant. Due to the modular nature of the processing plant this can be easily and quickly dismantled. Additionally, these activities are anticipated will be undertaken during the day removing the requirement for lighting. As such it is not considered there will be significant noise, vibration or lighting disturbance during this phase.	Minor adverse	Slight adverse
	Habitat Degradation / modification	There is potential for pollution to occur from de-commissioning activities i.e., oil spills, excavation dust. This will be temporary (up to six months) and embedded pollution prevention measures should negate this effect. Where site traffic is set to pass adjacent to ponds supporting GCN there is potential to cause damage/degradation to the pond boundary. There is potential for a delay or failure in successful re-instatement/natural re-establishment of suitable terrestrial habitats i.e., marshy grassland within 500m of the GCN pondsThere is a degree of suitable habitat in the wider area to support individuals whilst vegetation re-establishes.	Minor - Moderate adverse	Slight - Moderate adverse
Small mammals (hare, hedgehog) (Local)	Disturbance / habitat loss	No significant effects anticipated as plentiful habitat exists in the wider area to support displaced individuals until vegetation re-establishes	Minor adverse	Slight adverse

Receptor Name	Impact	Effect	Magnitude	Significance
Breeding birds (ground nesters – Skylark) (Local)	Disturbance and habitat loss / modification	Following site clearance activities during the construction / operational phases no breeding skylark are anticipated will be present within the Proposed Scheme area during decommissioning activities. Following landscaping to return the area back to upland grazing, skylark may be temporarily displaced into the wider surrounding area whilst vegetation regenerates. It is considered once habitat establishes that the species would return to the Proposed Scheme area in the long-term.	Minor adverse	Slight adverse
Reptiles (County)	Habitat loss / modification	Following site clearance activities during the construction / operational phases no reptiles are anticipated will be present within the Proposed Scheme area during decommissioning activities. There may be a delay in suitability of habitat present to support reptiles whilst vegetation regenerates. It is considered there is plentiful habitat in the wider area to support displaced individuals until vegetation establishes.	Minor adverse	Slight adverse

9.10 MITIGATION, ENHANCEMENT AND MONITORING

EMBEDDED MITIGATION

9.10.1. There are a number of construction / operational phase effects that are reduced or eliminated through embedded mitigation. There are also opportunities for multiple habitat and species enhancement delivery during the post-construction phase.

9.10.2. Dependent on long term management and enhancements, biodiversity improvements may be realised.

Construction/Operational Stage

9.10.3. The following is assumed:

- Habitats within the RLB but outside the Tip areas will be retained throughout the Proposed Scheme;
- Standard construction measures for pollution prevention in accordance with Construction Industry Research and Information Association (CIRIA) 2015 guidance[106] and Guidance for Pollution Prevention (GPP) documents[107] will be applied to the construction and operational phases. This will minimise air quality impacts from dust/emissions, noise and vibration impacts from site activities and pollution to water and soils from polluted run-off/chemical spills and dust;
- Site clearance activities i.e., vegetation clearance will be undertaken at appropriate times of year; and/or under ecological supervision, if appropriate;
- European Protected Species Licence (EPSL) from NRW will be in place for GCN prior to the works. This will include a method statement for site clearance works and detail required mitigation and monitoring measures;
- Excavated soil will be stored appropriately on site for use in landscaping;
- SuDs will be incorporated into the Proposed Scheme design which will be completed according to SuDS statutory standards[108];
- Site compounds or storage areas will not be set up in habitat areas set to be retained;
- Landforms will be landscaped to follow original contours (as existed prior to the deposition of the colliery spoil), as close as practicable, but with some landscaping features to make the land look natural and attractive; and
- Landscaping will occur in stages as the works progress, occurring in tandem with operational activities. This will ensure landscape remediation (for example if heavy rains have disturbed establishment of new vegetation) can be undertaken where required as works progress.

[106] CIRIA (2015) Environmental good practice on site (fourth edition) (C741) Charles, P., Edwards, P (eds). CIRIA, London;

[107] NRW (2018). Guidance for Pollution Prevention. Available online: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/;

[108] statutory-national-standards-for-sustainable-drainage-systems.pdf (gov.wales)

9.10.4. There will be a commitment to follow best practice in respect of environmental protection during both construction and operational phases. A detailed Ecological Method Statement (EMS) and Mitigation Strategy (MS) will be produced for the Proposed Scheme to ensure working practices adhere to this commitment.

Post-operational (decommissioning) Phase

9.10.5. Due to the nature of the Proposed Scheme and the after use, adverse effects were considered predominantly limited to the decommissioning activities (i.e., final landscaping and removal of processing plant and other buildings).

9.10.6. The following measures to mitigate long-term impacts on biodiversity receptors:

- Standard construction measures for pollution prevention in line with CIRIA guidance and GPP documents, as implemented for construction / operation activities to minimise dust / air quality impacts, noise and vibration and pollution controls to water and soils from decommissioning activities i.e., final landscaping and building removal;
- Landforms will be landscaped to follow original contours (as existed prior to the deposition of the colliery spoil), as close as practicable, but with some landscaping features to make the land look natural and attractive;
- Excavated soil will be stored appropriately on site for use in landscaping; and
- Aftercare Plan covering five years post-operation to be implemented inclusive of water / drainage maintenance. Plan to include monitoring of landscaped areas to allow remediation actions where necessary. Two years of additional compost or fertiliser to be spread to maintain re-established upland grazing and grassland habitats.

9.10.7. Impacts which are controlled or reduced to a significance of Slight Adverse or below through the above embedded mitigation are not included in Table 9-13 and Table 9-14, with exception of habitat degradation impacts to designated sites from dust and pollution which are detailed to show control through standard construction measures.

9.10.8. Applied mitigation measures therefore have only been proposed where significant adverse impacts (moderate or above) remain inclusive of embedded mitigation or where a direct impact triggering wildlife legislation has been identified.

CONSTRUCTION/OPERATIONAL PHASE MITIGATION

9.10.9. The following mitigation (beyond embedded mitigation) outlined in Table 9-13 will be required to minimise / negate biodiversity impacts at the construction/operational phase.

Table 9-13 – Construction/Operational Phase Mitigation

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
Designated Sites			
Graig Goch LNR (Regional / County)	Habitat loss / degradation	Moderate adverse	Avoidance of locating any passing places within the Graig Goch LNR will be made, to negate loss of established AW. Site traffic will adhere to the designated Haul Road track and passing places (located outside the LNR) to prevent damage to adjacent habitats within the LNR.
Mynydd y Grug, West of Cwmfelinfach SINC (Regional / County)	Habitat loss	Moderate adverse	Mitigation for the loss of SINC habitat will accord with the following hierarchy: ▪ Minimisation of land-take; ▪ Minimisation of damage to areas outside of the RLB through use of appropriate fencing/bunding; ▪ All semi-natural habitats topsoil/turves will be stripped and stored in low bunds according to the habitat type for use during landscaping activities; ▪ Incorporation of existing habitats into the landscape design; and ▪ The finalised landform of the impacted SINC will include slight depressions/dew ponds and marshy grassland topsoil will be re-instated within the SINC area. It is assumed the soil conditions as a result of these measures will remain marshy and marshy grassland species will naturally re-colonise from adjacent areas.
	Habitat degradation	Moderate adverse	Habitats outside the RLB forming part of the SINC will be separated from the site by earth bunds and protected from accidental damage. Standard construction measures for dust and pollution prevention will be applied to works.
Twyn yr Oerfel, South of Cwmfelinfach SINC (County)	Habitat loss	Slight adverse	Mitigation will be as per the hierarchy set out for Mynydd y Grug, West of Cwmfelinfach SINC.

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
All designated sites – LNR / SINCs (County/Regional)	Habitat degradation	Slight adverse	Standard construction measures for dust and pollution prevention will be applied to works.
AW (National)	Habitat loss	Moderate adverse	Siting of passing places will be within the footprint of the existing track where possible. Avoidance of the ancient semi-natural woodland associated with the Graig Goch LNR will be made.
	Habitat degradation	Moderate adverse	Standard construction measures for dust and pollution prevention will be applied to works. Tree Root Protection Zones will be implemented in accordance with BSI (BS 5837) guidance (2012)[109]. Heavy plant will be restricted to the designated Haul Road route and passing places only, to negate damage to adjacent woodland/tree habitats.
Habitats (outside designated sites)			
Semi-natural woodland (Regional / County)	Habitat Loss	Moderate adverse	Semi-natural broadleaved woodland within the RLB but outside of the tip areas will be retained and protected throughout works. Loss of woodland is anticipated will be minimal (<1ha) and measures to avoid or minimise loss will be implemented during site clearance activities.

[109] BSI (2012) BS 5837:2012, BSI Standards Publication, Trees in relation to design, demolition and construction – Recommendations.

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
			Haul road route to the east of Tip 1 will be sited to ensure avoidance of mature beech trees (approximate grid reference: ST1789889937).
Acid grassland, dry dwarf shrub heath (acid) and lichen/bryophyte heath mosaic (Regional / County)	Habitat loss	Moderate adverse	Topsoil will be stripped and stored appropriately in low bunds for reinstatement during landscaping activities. Areas of heath comprising heather, bilberry will have the turf stripped. These will be stored appropriately on site for reinstatement post-works in the approximate locations they were removed from. Landscape seeding will comprise a commercial reclamation upland seed mix. The seed mix has been selected due to its suitability for establishing grassland on reclamation sites inclusive of the upland Welsh Valley hillsides and will be structurally composed of the following: 30% rye grass (*Lolium perenne*), 35% red fescue (*Festuca rubra*), 9% smooth stalked meadow grass (*Poa Pratensis*), 8.5% crested dog's-tail (*Cynosurus cristatus*), 10% sheep's fescue (*Festuca ovina*), 5% bent species (*Agrostis* sp.), 2.5% white clover (*Trifolium repens*). Many of these species correspond with species that are naturally present in the area. This will then supplement and encourage natural regeneration of the acid grassland. Construction/operational works will be undertaken in phases commencing at Tip 1. Landscaping and seeding will take place as phases are completed. This will allow grassland/heath re-instatement/re-establishment to commence on a phased basis. The phasing of extraction and landscaping will thus reduce the length of time during which habitats are lost.
Species			
Bats – foraging / commuting (Regional)	Disturbance	Moderate adverse	Standard measures to reduce construction/ operational noise will be applied to works. Noise screen will be installed around processing plant. Night-working within the active season will be minimised and adhere to construction/operation timings (5am – 10pm).

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
			Where temporary construction/ operational lighting is required, this will be shielded and directional and developed in consultation with a suitably qualified bat ecologist.
GCN (Regional)	Direct mortality/ injury	Large adverse	An EPSL from NRW will be obtained for vegetation removal and excavations in relation to GCNs. This will include a Method Statement that details exclusion of GCN from areas within the Proposed Scheme that fall within 500m of confirmed GCN ponds via sensitive clearance and appropriate newt fencing. Translocation of individuals found to existing suitable habitat outside the Proposed Scheme footprint.
	Disturbance (noise, vibration and lighting)	Moderate adverse	A GCN Method Statement (as part of the EPSL) will detail clearance measures to minimise disturbance. Any lighting required for health and safety, or security will be designed to avoid light spill into surrounding habitat to minimise the impact on GCN.
	Habitat loss (terrestrial)	Moderate adverse	Grassland and woodland outside the immediate footprint will be retained and protected. Direct damage to pond adjacent northern-western access track to be avoided and appropriate fencing installed (amphibian and Heras fencing) to stop site vehicles and operatives straying into the pond area. Access track re-surfacing will be minimised where this passes in proximity to the ponds. Marshy grassland topsoil will be stripped and stored appropriately in a low bund for reinstatement within the impacted terrestrial zone post-works. The landform created post-works within the 500m terrestrial zone will be modified to include depressions and a cluster of dew ponds to encourage marshy soil conditions and natural re-establishment of marshy grassland species.
	Habitat degradation	Moderate adverse	Standard construction measures for dust and pollution prevention will be applied to works. The drainage design will prevent surface water run-off from polluting the waterbodies/marshy grassland.

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
			Appropriate fencing i.e., newt fencing will be installed along the north-western access track to prevent site traffic/loose track surface material entering the pond area.
Small mammals (hare and hedgehog) (Local)	Direct mortality or injury	Slight adverse	Site clearance will be undertaken sensitively following an appropriate method statement and under ecological supervision. This will ensure works progress in compliance with legislation regarding small mammals. The method statement will be detailed in an overall EMS and MS for the Proposed Scheme.
Birds (Local)	Direct mortality / injury and disturbance	Slight adverse	All vegetation clearance will be undertaken outside of breeding bird season where possible (i.e., undertaken between September to February inclusive), and/or under ecological supervision inclusive of visual checks prior to clearance and appropriate exclusion zones implemented where a nest is discovered. This will ensure works progress in compliance with legislation regarding breeding birds and their nests. The method of working will be detailed in an overall EMS and MS for the Proposed Scheme.
	Habitat loss	Slight adverse	Grassland and woodland outside the immediate footprint will be retained and protected. On completion of works, grassland/heath/scrub habitat will be reinstated or left to re-vegetate naturally.
Reptiles (County)	Direct mortality / injury	Moderate adverse	Site clearance will be undertaken sensitively in respect of reptiles following an appropriate method statement during the construction/operational phases. Method statement will comprise measures to exclude reptiles from the works footprint by encouraging individuals to move into retained habitat through phased vegetation clearance. All vegetation clearance will be undertaken under supervision of an Ecological Clerk of Works (ECoW). Clearance measures to adhere to GCN EPSL methodology in relevant areas and take into consideration measures for breeding birds. This will ensure compliance with legislation regarding reptiles and will be detailed in an overall EMS and MS for the Proposed Scheme.

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
	Habitat loss	Moderate adverse	Grassland, hedgerows, and woodland outside of the immediate footprint will be retained and protected. Whilst a large area of suitable habitat will be temporarily lost / modified to accommodate the Proposed Scheme, grassland habitat will be reinstated / re-seeded both throughout and on completion of the works and left to re-vegetate in the long-term naturally. Turf reinstatement of heath habitats will also be undertaken. It is considered there is extensive suitable habitat in the wider area to support displaced individuals whilst vegetation re-vegetates.

Post-Operational (Decommissioning) Phase

9.10.10. Due to the nature of the Proposed Scheme and the after use, adverse effects were considered predominantly limited to the decommissioning activities (i.e., final landscaping and removal of processing plant and other buildings). Post-operational mitigation where appropriate is detailed in Table 9-14.

Table 9-14 – Post-operational (de-commissioning) Phase Mitigation

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
Designated Sites			
Mynydd y Grug, West of Cwmfelinfach SINC (Regional / County)	Habitat Loss/modification	Moderate adverse	Topsoil reinstatement of marshy grassland will be undertaken using stored soils. Landform in the area will be modified to provide depressions and dew ponds to encourage natural re-establishment of the marshy grassland in this area. Landscape seeding will comprise a commercial reclamation upland grassland mix (see Acid grassland for composition). It is however considered the soil conditions as a result of the topsoil reinstatement and created depressions in the landform will remain marshy and marshy grassland species will naturally re-colonise from the existing seedbank and adjacent areas. Aftercare habitat monitoring (over five years) will determine the success of grassland re-establishment within the SINC. Where required remedial measures such as supplementary seeding will be undertaken. Areas of bracken and scrub will be left to naturally re-vegetated rather than reinstated using excavated soil / turves to allow grassland areas to prevail.
All other designated sites (County / Regional)	Habitat degradation	Slight adverse	Standard construction pollution preventions measures to be implemented to relevant decommissioning activities (i.e., final landscaping and removal of buildings).
Habitats (outside designated sites)			
Acid grassland, dry dwarf shrub heath (acid) and lichen / bryophyte heath mosaic	Habitat loss/degradation	Moderate adverse	Topsoil reinstatement of acid grassland will be undertaken using stored soils. Landscape seeding will comprise a commercial reclamation upland grassland mix. The seed mix has been selected due to its suitability for establishing grassland on

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
(Regional / County)			reclamation sites inclusive of the upland Welsh Valley hillsides and will be structurally composed of the following: 30% rye grass (*Lolium perenne*), 35% red fescue (*Festuca rubra*), 9% smooth stalked meadow grass (*Poa Pratensis*), 8.5% crested dog's-tail (*Cynosurus cristatus*), 10% sheep's fescue (*Festuca ovina*), 5% bent species (*Agrostis* sp.), 2.5% white clover (*Trifolium repens*). Many of these species correspond with species that are naturally present in the area. This will then supplement and encourage natural regeneration of the acid grassland. Turf stripping of areas of heath (bilberry, heather) will be made. These will be stored appropriately on site and reinstated in approximately the same locations as removed from during landscaping activities. To ensure minimal loss of this habitat. Aftercare habitat monitoring (over five years) will determine the success of grassland re-establishment. Where required remedial measures such as supplementary seeding will be undertaken.
Rock exposure artificial – colliery spoil	Habitat modification	Moderate beneficial	Bare colliery spoil will be reseeded with a commercial reclamation upland grassland seed mix which will improve the available green infrastructure and biodiversity value within the Proposed Scheme area. This will result in a beneficial biodiversity impact.
Species			
GCN (Regional)			
	Habitat degradation / modification	Slight - Moderate adverse	Pollution prevention measures as per construction/operational activities will be applied to relevant decommissioning activities (i.e., landscaping and removal of buildings). Fencing along the northern access track shall remain in place to stop plant and operatives straying into the adjacent ponds during relevant decommissioning activities (i.e., landscaping and removal of buildings). On completion of the works, temporarily lost GCN terrestrial habitat will be reinstated using stripped marshy grassland topsoil. The new landform in the 500m terrestrial zone will be modified to include depressions and a cluster of dew ponds. It is likely the marshy grassland

Receptor(s)	Impact and resulting effect	Significance (pre-mitigation)	Mitigation
			topsoil will be supplementary seeded with a commercial reclamation upland grass species mix. It is considered that the re-use of the marshy grassland topsoil and created depressions in the landform will retain the marshy characteristics and marshy grassland species will naturally re-colonise from the existing seed bank and adjacent marshy grassland areas. GCN habitat monitoring as part of the EPSL will determine the success of GCN habitat re-establishment within relevant areas surrounding the GCN ponds. Monitoring will ensure any required remedial measures such a supplementary seeding/ bracken management are identified and actioned.

ENHANCEMENT

9.10.11. Biodiversity Net Benefit (BNB) or Net Benefits for Biodiversity (NBB) is achieved where a development can demonstrate that it has maintained and enhanced biodiversity and created resilient ecological networks (CIEEM, 2022)[110]. The consideration of biodiversity enhancement and green infrastructure is now a mandatory requirement under the Environment (Wales) Act 2016 and Planning Policy Wales (2021).

9.10.12. A number of enhancements are considered achievable and appropriate for the Proposed Scheme, these are detailed in Table 9-15.

9.10.13. **CAVEAT –** *Enhancement measure specifications, where yet to be fully determined (TBD) at the time of writing this chapter, have been outlined in italics.*

Table 9-15 – Enhancement Opportunities.

Description of location	Description of enhancement measures
Bats boxes - Sirhowy Country Park	Three 'summer roost' crevice bat boxes and one pole mounted maternity box are recommended to be installed within the Sirhowy Country Park under guidance of an ecologist. These should be erected on trees and each

[110] CIEEM (2022) Welsh Government's Approach to Net Benefits for Biodiversity and the DECCA Framework in the Terrestrial Planning System. CIEEM Briefing Paper

Description of location	Description of enhancement measures
	box positioned facing north, south-east and south-west to give a range of temperatures throughout the season[111].
Multiple species – Pond provision	Creation of several dew ponds (*TBD – number and locations*) across the site to provide enhancement for a range of species including amphibians, reptiles, birds, mammals and invertebrates. Storage ponds and lagoons will be retained on site post-operation and will provide additional water provision for species using the site. These will be infilled to reduce the depth, where possible to a sloping depth of 1-2m to improve value for wildlife. These will be further modified to increase value for wildlife via measures such as marginal planting.
Bird boxes – Country Park / LNR	The following bird boxes will be installed as part of the Proposed Scheme: Installation of kestrel boxes - Kestrel, a rapidly declining species in the UK, was recorded hunting within the Proposed Scheme near Tip 2. Provision of a nest box (1-2 in total) suitable for kestrel will be made within the Proposed Scheme boundary under the guidance of a suitably qualified ecologist. Installation of small bird species nest boxes - A range of bird boxes (approximately 20 in total) will be installed in suitable habitat within the Proposed Scheme under the guidance of an ecologist to enhance nesting potential for small birds. These should include open-fronted boxes and boxes with holes of 25, 30 and 32mm diameter. Schwegler nest boxes, or similar type, are recommended for durability[112].
Reptile / Invertebrate refugia - Across the Proposed Scheme area	At least one 'below ground' reptile hibernaculum and several mini brash/log piles will be created within the Proposed Scheme area. Tree cuttings from felled trees and brash on site will be re-purposed for this creation. The location(s) and specifications of these will be agreed by the supervising ecologist. Where these are sited in proximity to ponds this would also provide enhancement for GCN/amphibians.
Invertebrate planting – across the Proposed Scheme area	Designated strips/patches within the Proposed Scheme area *(TBD – locations and specifications)* will be set aside for planting of native, locally sourced wildflower seeds or plug plants of species representative of the area, to include common bird's-foot-trefoil (*Lotus corniculatus*) to increase habitat potential for dingy skipper, a S7 and RDB1 (UK) – VU species.

MONITORING

9.10.14. **CAVEAT –** *The monitoring period for GCN has not been agreed at the time of writing this chapter. These have been stated as TBD (to be determined).*

[111] Recommended make and model: Treble or Double Crevice; NHBS reference #187784/ #187782; available at: https://www.nhbs.com/improved-crevice-bat-box. Single or double pole mounted maternity box: NHBS reference #232540/ #232542; available at: https://www.nhbs.com/pole-mounted-maternity-bat-box.

[112] An example of suitable boxes can be found at: https://www.nhbs.com.

9.10.15. Monitoring is recommended across the site for habitats and species such as grassland, woodland, GCN and ground nesting birds. Suggested monitoring and time periods for specific habitats/species is detailed in Table 9-16 below:

Table 9-16 – Monitoring required across the site throughout the construction/operational phase and the aftercare post-operational (decommissioning) Phase.

Ecological Receptor	Monitoring Period	Description of monitoring
Habitats	Post-operation (decommissioning) Phase Yearly for five years	A five-year Aftercare Plan will be in place to monitor and ensure the establishment of the reinstated habitats and natural regeneration. This will include monitoring the success of planting, habitat re-establishment and natural regeneration and implementation of remedial measures where required.
GCN – Population monitoring	*TBD - Survey frequency and duration to be agreed with NRW as part of the EPSL and undertaken between March and June prior to, during and post-operation.*	Surveys to comprise torching and egg searches and where feasible (i.e., sufficient water levels) bottle trapping of Ponds 2 and 2b. *Population monitoring anticipated to be a requirement of the GCN EPSL and survey effort and monitoring period will be agreed with NRW.*
GCN – Habitat Monitoring	Post-operation (decommissioning) Phase: TBD: *Survey frequency and duration to be agreed with NRW.*	Habitat monitoring of reinstated GCN terrestrial zone habitat and ponds. *Monitoring period will be agreed with NRW.*
Ground nesting bird survey	Post-operation (decommissioning) Phase: Year 2 and Year 5	Post-operational phase ground-nesting bird surveys in line with baseline surveys. This will establish if ground-nesting bird species such as skylark and meadow pipit are continuing to use the area and inform any additional measures required to increase potential for such species to use the site.

9.11 RESIDUAL IMPACT ASSESSMENT

CONSTRUCTION / OPERATIONAL PHASE

9.11.1. A number of impacts have been identified for the construction/operational phase and mitigation has been proposed to avoid, reduce or compensate for these impacts.

9.11.2. It is expected that all construction / operational activities will be controlled by standard construction measures in accordance with CIRIA 2015 guidance[113] and GPP documents[114], and that significant long-term residual impacts due to the timing of operations and pollution of air, water or soil will be avoided.

9.11.3. A European Protected Species Licence will be obtained to minimise impacts to GCN.

9.11.4. It is considered that the embedded and applied mitigation detailed in Section 10.6 will successfully reduce the potential long-term significant adverse effects from the construction/operation phase of the Proposed Scheme to a level of **Neutral** to **Slight adverse**.

POST-OPERATION (DECOMMISSIONING) PHASE

9.11.5. A number of impacts have been identified for the post-operational phase and mitigation has been proposed to avoid, reduce or compensate for the impacts.

9.11.6. It is expected that all relevant post-operation activities will be controlled by standard construction measures in accordance with CIRIA 2015 guidance and GPP documents as per the construction/operational phases. As such significant long-term residual impacts due to the timing of activities and pollution of air, water or soil will be avoided.

9.11.7. Table 9-17 It is considered that the embedded and applied mitigation detailed in Section 9.10 will successfully reduce the potential long-term significant adverse effects from the post-operational phase of the Proposed Scheme to a level of **Neutral** to **Slight adverse**.

9.11.8. In addition, biodiversity improvements are anticipated resulting from modifications to low biodiversity value habitats and incorporation of enhancement measures into the Proposed Scheme as detailed in Table 9-17. These have potential to result in moderate beneficial residual impacts in the long-term due to increasing the available green infrastructure on site alongside providing additional nesting, roosting and sheltering opportunities for species.

Table 9-17 – Residual Impacts of moderate or higher from the post-operational (decommissioning) phase of the Proposed Scheme with inclusion of embedded and applied mitigation and enhancement.

Receptor	Mitigation / Enhancement	Residual magnitude	Residual significance
Habitats (outside designated sites)			
Rock exposure artificial - Colliery Spoil	Bare colliery spoil will be reseeded with a commercial reclamation upland grassland seed mix which will improve the available green infrastructure and	Moderate beneficial	Moderate beneficial

[113] CIRIA (2015) Environmental good practice on site (fourth edition) (C741) Charles, P., Edwards, P (eds). CIRIA, London;

[114] NRW (2018). Guidance for Pollution Prevention. Available online: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/;

Receptor	Mitigation / Enhancement	Residual magnitude	Residual significance
	biodiversity value within the Proposed Scheme area. This will result in a beneficial biodiversity impact. Due to the topography and altitude within the Proposed Scheme area, it is likely small pockets of bare ground will naturally develop in the long-term, which would re-establish to an extent the bare ground element associated with the OMH priority habitat.		
Species			
Multiple species – bats, birds, reptiles, small mammals and invertebrates	Incorporation of the enhancement measures within the Proposed Scheme: • Provision of bat and bird boxes; • Creation of dew ponds and modification of retained Scheme ponds/lagoons for wildlife; • Creation of brash/log piles; and • Native, wildflower planting for invertebrates.	Moderate beneficial	-Moderate beneficial

9.12 CUMULATIVE EFFECTS

9.12.1. One development was identified during the desk-based study as described in the Introductory chapter. This comprises the proposed development of 14 wind turbines and associated infrastructure at the Twyn Hywel Energy Park Land Noth-West of Caerphilly, located approximately 2km west of the Proposed Scheme.

9.12.2. Following review of the species and habitat assemblages recorded at both the Proposed Scheme and the windfarm development and potential impacts to these, it is considered there is only potential for a minor cumulative effect to occur to breeding birds of local importance for nature conservation, in particular ground nesters such as skylark. Cumulative effects to raptors are unlikely as no considerable impacts are likely to result from the Proposed Scheme.

9.12.3. Impacts are considered would predominantly be during the construction phases of each development (inclusive of the operational phase for this Scheme) if they should occur concurrently. Construction activities such as vegetation clearance and excavations would likely result in temporary habitat loss and displacement of local populations of birds such as skylark. There is, however, plentiful suitable habitat in the wider area surrounding both the Proposed Scheme and windfarm development to support displaced individuals. Reinstatement activities to restore lost habitats incorporated into each development will negate long-term habitat loss and it is anticipated that these populations will return once vegetation has suitably re-established. As such cumulative effects to breeding birds (ground nesters in particular) will be minor and not significant.

9.13 SUMMARY

9.13.1. Desk studies and field surveys have shown the site to be located within and adjacent to valued nature conservation areas in terms of SINC designations and Priority habitats. The site encompasses a large portion of the Mynydd y Grug SINC designated for its mosaic of habitats e.g., marshy grassland and ponds which support GCN.

9.13.2. Embedded mitigation including implementation of standard construction measures regarding pollution prevention and good site practice, will eliminate significant residual impacts due to timings of operations and pollution of air, water or soil during the construction and operational phases. This has reduced impacts on species and habitats, particularly surrounding pollution to designated i.e., SINC, habitats.

9.13.3. Proposed applied mitigation relies heavily on sensitive clearance methods for species such as GCN, reptiles, ground nesting birds and small mammals. An EPSL will be required for the Proposed Scheme's progression covering areas within 500m of two GCN breeding ponds. This would include an appropriate site clearance method statement, details of a suitable translocation area for individuals, appropriate fencing to prevent individuals re-entering the site and habitat reinstatement measures.

9.13.4. Additionally, a site clearance method statement will also be required to protect reptiles, ground nesting birds and small mammals. This will be outlined within the overall EMS and MS for the Proposed Scheme.

9.13.5. Due to the nature of the works and requirements for soil stabilisation, landscape seeding would likely result in a permanent loss of exposed colliery spoil which will have a degree of impact on associated S7 priority habitat OMH.

9.13.6. Turf translocation and topsoil re-instatement within the landscape activities for the remaining habitats such as heath and acid grassland associated with the OMH priority habitat and marshy grassland, will ensure the existing seedbank is retained to an extent on site. Landscape seeding comprising a commercial reclamation upland grassland mix, will encourage and supplement natural regeneration of acid grassland. This would reduce impacts of long-term habitat loss on site.

9.13.7. Modification of the lost colliery spoil due to grassland seeding will also likely result in biodiversity improvements in the long-term by increasing the available green infrastructure within the Proposed Scheme area. It is likely that small pockets of bare ground would naturally develop over time due to the topography and altitude. This would reduce impacts of long-term loss of bare ground associated with OMH priority habitat.

9.13.8. No significant cumulative effects with other developments are expected.

9.13.9. A number of measures to enhance the site for biodiversity will be incorporated into the Proposed Scheme including creation of dew ponds (multiple species benefit) and hibernaculum/brash piles for reptiles/small mammals and installation of bat roost, kestrel and passerine nest boxes.

9.13.10. A five-year Aftercare Plan will be in place to monitor the establishment of reinstated habitats and natural regeneration. Monitoring for species such as GCN, and ground nesting birds will also be incorporated into the Proposed Scheme to ensure the development has not had any lasting negative effects on these species.

9.13.11. The Proposed Scheme has potential in the absence of mitigation to result in slight to moderate, short and medium-term (5-10 years) adverse effects on the existing ecological features of the site. However, with implementation of the proposed mitigation, long-term effects would be reduced to neutral to slight adverse on specific habitats and species. Therefore, no significant adverse impacts are anticipated in respect of biodiversity.

9.13.12. Overall, it is considered there will be moderate beneficial long-term impacts to the Proposed Scheme area on a landscape level. This is largely a result of modification of the extensive low

biodiversity value bare ground (colliery spoil) to upland grassland of improved biodiversity value. Addition of enhancements such as habitat creation (ponds) and shelter provision (nest boxes, brash piles) will provide additional biodiversity benefits. These measures will increase the available green infrastructure and improve habitat diversity and suitability for multiple species across the Proposed Scheme area.

ABBREVIATIONS

Table 9-18 – Abbreviations Used in this Chapter.

Acronym	Term
ES	Environmental Statement
EIA	Environmental Impact Assessment
RLB	Red Line Boundary
NRW	Natural Resources Wales
SSSI	Site of Special Scientific Interest
SPA	Special Protection Area
PPW	Planning Policy Wales
LDP	Local Development Plan
DMRB	Design Manual for Roads and Bridges
CIEEM	Chartered Institute of Ecology and Environmental Management
ICE	Institution of Civil Engineers
CWS	County Wildlife Site
EPSL	European Protected Species License
NBB	Net Benefits for Biodiversity
GLTA	Ground Level Tree Assessment
GCN	Great Crested Newts
VP	Vantage Point
EcIA	Ecological Impact Assessment
SAC	Special Area of Conservation
BAP	Biodiversity Action Plan
NNR	National Nature Reserve
TPO	Tree Preservation Order
SLNCI	Site of Local Nature Conservation Importance

Acronym	Term
SINC	Site of International
LNR	Local Nature Reserve
ECoW	Ecological Clerk of Works
EMS	Ecological Method Statement
MS	Mitigation Strategy
PEA	Preliminary Ecological Assessment
RIGS	Regionally Important Geological Site
AW	Ancient Woodland
ASNW	Ancient Semi-Natural Woodland
AWUC	Ancient Woodland of Unknown Category
PAW	Plantation on Ancient Woodland
JNCC	Joint Nature Conservation Committee
PSI	Poor Semi-Improved grassland
BNB	Biodiversity Net Benefits
WCA	Wildlife and Countryside Act 19
PTES	Peoples Trust for Endangered Species
HSI	Habitat Suitability Assessment
ADAS	Independent environmental & agricultural advice
eDNA	Environmental DNA
BoCC	Birds of Conservation Concern
SUDs	Sustainable Drainage
CIRIA	Construction Industry Research and Information Association
GPP	Guidance for Pollution Prevention
MAGIC	Multi-Agency Geographic Information for the Countryside
SEWBReC	South East Wales Biodiversity Records Centre
LERC	Local Environmental Records Centre
CCBC	Caerphilly County Borough Council
OMH	Open Mosaic Habitats on Previously Developed Land

10 GEOLOGY AND SOILS

10.1 INTRODUCTION

10.1.1. This chapter provides a review of baseline conditions in relation to geology, soils, hydrogeology and potential ground contamination (related to current and past land uses) and assesses how these conditions may be affected by the construction, operation (processing of spoil) and post-operation / aftercare of the Proposed Scheme.

10.1.2. In addition to the baseline conditions, soil related impacts have been assessed (i.e. contamination and the impact on soil condition) during the construction, operation and post-operation phases. Hydrogeological conditions have also been assessed. This includes contamination, perched groundwater and aquifer groundwater.

10.1.3. At the time of preparation of this chapter, a ground investigation factual report[115] has been made available. This assessment utilises the results of this ground investigation and desk study research. Data enquiries were made to the following data suppliers:

- Natural Resources Wales[116] (NRW);
- British Geological Survey (BGS)[117];
- Zetica UXO / UXB Risk Map[118];
- MAGIC website[119];
- Data Map Wales[120];
- Coal Authority Interactive Map[121]; and
- National Rivers Authority Policy and Practice for the Protection of Groundwater[122].

STUDY AREA

10.1.4. The study area for the geology and soils topic is centred around the alignment of the Proposed Scheme, with a buffer width of 250m on either side of the site boundaries for all sources other than water abstractions. Abstractions have been searched for over a 1km buffer, again from the site boundaries.

[115] White Young Green (2002) *Ground Investigation Report for Bedwas Colliery Reclamation Scheme for Caerphilly County Borough Council.*

[116] Natural Resources Wales (2023). Available online at: https://naturalresources.wales/?lang=en.

[117] British Geological Survey (2023). Available online at: https://www.bgs.ac.uk/.

[118] Zetica (2023) *UXB Risk Map*. Available online at: https://zeticauxo.com/downloads-and-resources/risk-maps/.

[119] Department for Environment, Food & Rural Affairs (Defra) (2023) *MAGIC Map*. Available online at: https://magic.defra.gov.uk/.

[120] Welsh Government (2023) *Data Map Wales*. Available online at: https://datamap.gov.wales/maps/new#/.

[121] British Geological Survey (2023). *Coal Authority Interactive Map*. Available online at: http://mapapps2.bgs.ac.uk/coalauthority/home.html.

[122] Environment Agency (1998) *Policy and Practice for the Protection of Groundwater*.

10.2 LEGISLATION AND POLICY

REGULATORY AND POLICY FRAMEWORK

10.2.1. Protection of existing geological features is covered through national designation i.e. Sites of Special Scientific Interest (SSSI) and on a regional basis via Local Geodiversity Sites (formerly Regionally Important Geological and Geomorphological Sites (RIGS)).

10.2.2. A number of policies currently provide some aspects of protection to soils. However, no one legislative or policy tool has been developed specifically with the protection of soils in mind. Where policy or legislation does relate to soil, it is generally limited to the protection of a specific impact or function of that soil.

10.2.3. The foundation of the regulatory framework for the assessment of contaminated land is Part 2A of the Environment Protection Act 1990[123], which was inserted into the Act in 1995. This Act of Parliament provides the definition:

''Contaminated land' is any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- significant harm is being caused or there is a significant possibility of such harm being caused; or
- significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused.'

10.2.4. As outlined in para 11.2.12 the Planning Policy Wales (PPW) document[124] (Welsh Government, 2021) requires that when land has been remediated under the planning regime it should not be capable of being determined as contaminated land under Part 2A.

10.2.5. The Department for Environment Food and Rural Affairs (Defra) Contaminated Land Statutory Guidance on the Environmental Protection Act 1990 Part 2A (2012)[125] states:

'Part 2A takes a risk-based approach to defining contaminated land. 'Risk' means the combination of:

- the likelihood that harm or pollution of water will occur as a result of contaminants in, on or under the land; and
- the scale and seriousness of such harm or pollution if it did occur.'

10.2.6. In 2020, the Environment Agency online document 'Land Contamination Risk Management' (LCRM 2020) replaced previous guidance (CLR11 2004), in how contaminated land should be assessed.

10.2.7. Besides Part 2A the other, and in current practice more frequently used, route for the identification and remediation of contaminated land is through the planning process. This occurs where a

[123] UK Government (1990) *Environmental Protection Act*. Available online at: https://www.legislation.gov.uk/ukpga/1990/43/part/IIA.

[124] Welsh Government (2021) *Planning Policy Wales Edition 11*. Available online at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf.

[125] Department for Environment Food and Rural Affairs (2012) *Contaminated Land Statutory Guidance*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/223705/pb13735cont-land-guidance.pdf

developer intends to develop a site. The method for assessment for triggering land remediation under the Planning regime is more stringent than that for an assessment categorising 'Contaminated land' under Part 2A. Part 2A requires a 'significant possibility of significant harm' to be established. However, planning policy requires that sites need to be shown to be 'safe' and 'suitable for use'. Consequently, the margins of safety required to be proven are much higher under the Planning regime and remediation is a more likely consequence.

10.2.8. The Water Framework Directive (WFD) (Directive 2000/60/EC) (European Union, 2000b) came into force in 2000 and is implemented in Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017[126]. The overarching objective of the WFD is for the water bodies in Europe to attain Good or High Ecological Status. Activities, processes and land-use with the potential to cause pollution are regulated within England and Wales under the Environmental Permitting (England and Wales) Regulations 2016 (as amended). Under the Environmental Permitting Regulations, any activity which may affect controlled water receptors must be authorised by Natural Resources Wales (NRW). This includes, but is not limited to, discharges, disposal to land, abstractions, and impoundments. NRW operate a permitting system to assist in the control of pollution.

NATIONAL, REGIONAL AND LOCAL PLANNING POLICIES

10.2.9. Several regional and local planning policy documents have been referred to for the purposes of the assessment. At regional level the principal document is PPW (December 2018)[127]; with particular reference to sections 'Protecting Special Characteristics and Qualities of Places', 'After Use' and 'Unlocking Potential by Taking a De-risking Approach', which highlight approaches to be considered with regards to soils, agricultural land class and ground risk.

10.2.10. The sections in the PPW document 'Promoting Healthier Places' and 'Recognising the Environmental Qualities of Places' were reviewed in reference to requirements regarding human health aspects of the application scheme. Chapter 13 of the PPW: 'Minimising and Managing Environmental Risks and Pollution' sets out the requirement for protection of the natural environment and natural resources. The following paragraphs are particularly relevant to the consideration of impacts to geology and soils with regards to the Proposed Scheme:

- Section 13.5 – requires that planning authorities consider the potential impacts of pollution or unstable land to ensure that a development is appropriate for its intended location;
- Section 13.6 – requires planning authorities to consider the nature, scale and extent of contamination which may pose risks to health; and
- Section 13.7 – requires that planning decisions should ensure that a site is suitable for use with regards to ground conditions (including land contamination) and land instability and that after remediation, as a minimum, land should not be capable of being determined as Contaminated

[126] UK Government, The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

[127] Welsh Government (2021) *Planning Policy Wales Edition 11*. Available online at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf.

Land as defined in Part 2A, and that adequate specialist investigation and assessment is presented in support of a development.

10.2.11. The Future Wales, National Plan 2040[128] is the first national development framework and provides a national spatial strategy setting out where Wales should focus development over the next 20 years. The document addresses key national priorities, including sustaining and developing a vibrant economy, supporting our town and city centres, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of Welsh communities, which includes measures on the protection of high value agricultural soils.

10.2.12. Caerphilly County Borough Local Development Plan up to 2021[129] has been considered, in particular Policy CW 4 – Natural Heritage Protection as this section makes reference to RIGS. In addition, a check has been made to the constraints map supporting the planning document to ensure all SSSIs recognised by the planning department have been identified for the assessment through other sources.

10.2.13. Policy CW15 – General Locational Constraints has been considered as part of the assessment due to the particular references made in this document to contamination management.

10.2.14. In addition, a check has been made to the constraints map[130] supporting the planning document to ensure all SSSIs recognised by the planning department have been identified for the assessment through other sources.

10.2.15. Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (SI 2017 No. 576 (W.136)[131], in particular Section 17 Paragraph 4 has been considered to ensure compliance with the regulation from a soil's perspective.

10.3 GUIDANCE

10.3.1. This assessment follows the guidance outlined in the Design Manual for Roads and Bridges (DMRB) Sustainability and Environment Appraisal LA109 Geology and Soils[132] (October 2019). This guidance was used as it is deemed to be the most appropriate assessment method for the Geology and Soils topic.

[128] Welsh Government (2021) *Future Wales, National Plan 2040 Edition 1*. Available online at: https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf.

[129] Caerphilly County Borough Council (2010) *Local Development Plan up to 2021*. Available online at: https://www.caerffili.gov.uk/caerphillydocs/ldp/written-statement.aspx.

[130] Caerphilly County Borough Council (2023) *Local Development Plan Constraints Map*. Available online at: http://caerphilly.opus3.co.uk/ldf/maps/ldp-constraints-map#x=317064.7113172&y=189822.34317082&scale=10000&2&43&74&125&258&281&903&902&61&270&173&509&339&114&422&143&322.

[131] https://www.legislation.gov.uk/wsi/2017/567/contents/made

[132] Highways England (2019) *Sustainability and Environment Appraisal LA 109 Geology and Soils*.

10.4 ASSESSMENT METHODOLOGY

10.4.1. The site boundaries have evolved from the consideration of several potential alternatives through a process of design, consultation, mitigation and re-design. The extent of the study area has been determined through desk-based research and is limited to the footprint of the Proposed Scheme.

10.4.2. Baseline conditions have been determined through a review of publicly available information and enquiries with following data suppliers:

- NRW;
- BGS;
- Zetica UXO / UXB Risk Map;
- MAGIC website;
- Data Map Wales;
- Coal Authority Interactive Map; and
- National Rivers Authority Policy and Practice for the Protection of Ground Water.

10.4.3. In addition, reference has been made to the Ground Investigation Report by White Young Green (WYG) in 2002 and the Generic Quantitative Risk Assessment (GQRA) undertaken by Capita Real Estate and Infrastructure in 2020. Following completion of the ground investigations in 2019/2020, contaminant concentrations were analysed using a GQRA based on safe levels for 'Public Open Space' end use. In accordance with Contaminated Land: Applications in Real Environments (CL:AIRE) guidance.

SIGNIFICANCE CRITERIA

10.4.4. The receptor value refers to the sensitivity of the receptor. In terms of the identified receptors, the receptor value has been determined using the descriptors outlined in Table 10-1.

Table 10-1 - Determination of the Receptor Value (Sensitivity)

Receptor value (Sensitivity)	Description
Very High	**Geology:** Very rare and of international importance with no potential for replacement (e.g. United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Sites, UNESCO Global Geoparks, SSSIs and Geological Conservation Review (GCR) sites where citations indicate features of international importance). Geology meeting international designation citation criteria which is not designated as such. **Soils:** 1) soils directly supporting a designated site (e.g. Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites); and / or 2) Agricultural Land Classification (ALC) grade 1&2 or Land Capability for Agriculture (LCA) grade 1&2. **Contamination:** 1) human health: very high sensitivity land use such as residential or allotments; 2) surface water:

Receptor value (Sensitivity)	Description
	- Water course having a WFD classification shown in a River Basin Management Plan (RBMP) and Q95 ≥1.0m^3/s - Site protected / designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water) - Species protected by European Commission (EC) legislation LA108; and 3) groundwater: - Principal aquifer providing a regionally important resource and / or supporting a site protected under EC and UK legislation LA108 - Groundwater locally supports Groundwater Dependent Terrestrial Ecosystems (GWDTE) - Source Protection Zone (SPZ) 1.
High	**Geology:** Rare and of national importance with little potential for replacement (e.g. geological SSSI, Areas of Special Scientific Interest (ASSI), National Nature Reserves (NNR)). Geology meeting national designation citation criteria which is not designated as such. **Soils:** 1) soils directly supporting a UK designated site (e.g. SSSI); and / or 2) ALC grade 3a, or LCA grade 3.1. **Contamination:** 1) human health: high sensitivity land use such as public open space; 2) surface water: - Water course having a WFD classification shown in a RBMP and Q95 <1.0m^3/s - Species protected under EC or UK legislation LA108; and 3) groundwater: - Principal aquifer providing locally important resource or supporting a River ecosystem; - Groundwater supports a GWDTE; - SPZ2.
Medium	**Geology:** Of regional importance with limited potential for replacement (e.g. RIGS). Geology meeting regional designation citation criteria which is not designated as such. **Soils:** 1) soils supporting non-statutory designated sites (e.g. Local Nature Reserves (LNR), Local Geological Sites (LGS), Sites of Nature Conservation Importance (SNCIs)); and/or 2) ALC grade 3b or LCA grade 3.2.

Receptor value (Sensitivity)	Description
	Contamination: 1) human health: medium sensitivity land use such as commercial or industrial; 2) surface water: Water courses not having a WFD classification shown in a RBMP and Q95 >0.001m^3/s; and 3) groundwater: - Aquifer providing water for agricultural or industrial use with limited connection to surface water - SPZ3.
Low	**Geology:** Of local importance / interest with potential for replacement (e.g. non designated geological exposures, former quarries/mining sites). **Soils:** 1) ALC grade 4&5 or LCA grade 4.1 to 7; and / or 2) soils supporting non-designated notable or priority habitats. **Contamination:** 1) human health: low sensitivity land use such as highways and rail; 2) surface water: Water courses not having a WFD classification shown in a RBMP and Q95 ≤0.001m^3/s; and 3) groundwater: Unproductive strata.
Negligible	**Geology:** No geological exposures, little / no local interest. **Soils:** Previously developed land formerly in' hard uses' with little potential to return to agriculture. **Contamination:** 1) human health: undeveloped surplus land/no sensitive land use proposed; 2) surface water: Water courses not having a WFD classification shown in a RBMP and Q95 ≤0.001m^3/s; and 3) groundwater: Unproductive strata.

Determination of Impact and Magnitude

10.4.5. An assessment of information obtained during the desk study phase and ground investigation phase has been used to determine the impact of the Proposed Scheme on the geology, soils and hydrogeology in the area. Environmental impacts have been predicted with reference to the relevant standards and legislations. Where it has not been possible to quantify effects, a qualitative assessment has been carried out based on available knowledge and professional judgement.

10.4.6. The magnitude refers to the ‘size’ or ‘amount’ of an impact. In terms of the identified receptors, magnitude has been determined using the descriptors outlined in Table 10-2.

Table 10-2 - Determination of the Magnitude of Impacts

Magnitude	General Impact
Major	**Geology:** Loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features or elements. **Soil:** Physical removal or permanent sealing of soil resource of >20ha of agricultural land. **Contamination:** 1) human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. Land Quality Management (LQM) / Chartered Institute of Environmental Health (CIEH) Suitable for Use Levels (S4ULs) for Human Health Risk Assessment category 4 screening levels SP1010) with potential for significant harm to human health. Contamination heavily restricts future use of land; 2) surface water: - Failure of both acute-soluble and chronic-sediment related pollutants in the Highways Agency's Water Risk Assessment Tool (HAWRAT) and compliance failure with Environmental Quality Standards (EQS) values - Calculated risk of pollution from a spillage ≥2% annually (spillage assessment). - Loss or extensive change to a fishery. - Loss of regionally important public water supply. - Loss or extensive change to a designated nature conservation site. -Reduction in water body WFD classification; and 3) groundwater: - Loss of, or extensive change to, an aquifer. - Loss of regionally important water supply. - Potential high risk of pollution to ground water from routine run off-risk score >250 (Groundwater quality and runoff assessment). - Calculated risk of pollution from spillages ≥2% annually (Spillage assessment). - Loss of, or extensive change to GWDTE or baseflow contribution to protected surface waterbodies. - Reduction in waterbody WFD classification. - Loss or significant damage to major structures through subsidence or similar effects.
Moderate	**Geology:** Loss of geological feature / designation and/or quality and integrity, severe damage to key characteristics, features or elements. **Soil:** 1) physical removal or permanent sealing of 1-20ha of agricultural land; or

Magnitude	General Impact
	2) permanent loss /reduction of one or more soil function(s)and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource). **Contamination:** 1) human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria (e.g. LQM / CIEH S4ULs) 2) surface water: - Failure of both acute-soluble and chronic-sediment related pollutants in HAWRAT but compliance with EQS values. - Calculated risk of pollution from spillages ≥1% annually and <2% annually. - Partial loss in productivity of a fishery. - Degradation of regionally important public water supply or loss of major commercial / industrial / agricultural supplies. - Contribution to reduction in waterbody WFD classification; and 3) groundwater: - Partial loss or change to an aquifer. - Degradation of regionally important public water supply or loss of significant commercial / industrial / agricultural supplies. - Potential medium risk of pollution to ground water from routine runoff-riskscore150-250. - Calculated risk of pollution from spillages ≥1% annually and<2% annually. - Partial loss of the integrity of GWDTE. - Contribution to reduction in waterbody WFD classification. - Damage to major structures through subsidence or similar effects or loss of minor structures.
Minor	**Geology:** Minor measurable change in geological feature / designation attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements. **Soils:** Temporary loss / reduction of one or more soil function(s)and restriction to current or approved future use (e.g. through degradation, compaction, erosion of soil resource). **Contamination:** 1) human health: contaminant concentrations are below relevant screening criteria (e.g. LQM / CIEH S4ULs). Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health; 2) surface water:

Magnitude	General Impact
	- Failure of either acute soluble or chronic sediment related pollutants in HAWRAT. - Calculated risk of pollution from spillages ≥0.5% annually and <1% annually. - Minor effects on water supplies; and 3) groundwater: - Potential low risk of pollution to ground water from routine runoff-risk score <150 - Calculated risk of pollution from spillages ≥0.5% annually and <1% annually - Minor effects on an aquifer, GWDTEs, abstractions and structures.
Negligible	**Geology:** Very minor loss or detrimental alteration to one or more characteristics, features or elements of geological feature/designation. Overall integrity of resource not affected. **Soils:** No discernible loss / reduction of soil function(s) that restrict current or approved future use. **Contamination:** 1) human health: contaminant concentrations substantially below levels outlined in relevant screening criteria (e.g. LQM / CIEH S4ULs). No requirement for control measures to reduce risks to human health/make land suitable for intended use; 2) surface water: - No risk identified by HAWRAT (pass both acute-soluble and chronic-sediment related pollutants). - Risk of pollution from spillages <0.5%; and 3) groundwater: No measurable impact upon an aquifer and/or groundwater receptors and risk of pollution from spillages <0.5%.

Determination of the Significance of Effects

10.4.7. The significance of identified impacts has been determined through assessment of the value of the environmental receptor and the determined magnitude of the impact. Consideration has also been given to the sensitivity of the receptor to change. An Impact Assessment Matrix (IAM) (Table 3.8.1 of DMRB LA 104[133]) has been used to provide guidance on assessing the significance of impacts, a copy is provided in Table 10-3. The descriptors of various significance ratings are outlined in Table

[133] Sustainability and Environment Appraisal LA 104 Environmental assessment and monitoring, Highways England.

10-4 and this process has been used to assign ratings specific to the works and measures embodied in the Proposed Scheme.

10.4.8. Table 10-1 and Table 10-2 consider adverse effects which negatively affect the receptors. It should be noted that impacts from the Proposed Scheme may be beneficial and positively influence the receptors or provide opportunities for improvement.

Table 10-3 - Impact Assessment Matrix

		Magnitude of Impact (Degree of Change)				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Environmental Value (Sensitivity)	**Very High**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Table 10-4 - Descriptors for significance ratings

Significance	Generic Significance Ratings
Very Large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

10.4.9. Potential impacts from the development may also be beneficial. Therefore, final residual significance ratings may include both beneficial and adverse impacts. The rating of the impact significance may indicate whether mitigation measures are required.

LIMITATIONS AND ASSUMPTIONS

10.4.10. As stated in Paragraph 11.4.3, the nature and extent of contamination at the site has been assessed within the GQRA[134]. Any additional data collected during future ground investigations or monitoring should be reviewed and the conclusions of this report will be reviewed to identify if there are any significant changes.

10.5 BASELINE CONDITIONS

10.5.1. The baseline conditions related to the geology and soils of the study area has been assessed using the information gathered as part of the desktop assessment or publicly available information and information provided by the client.

STATUTORY AND NON-STATUTORY DESIGNATIONS

10.5.2. It has been identified that no RIGS exist within the study area.

10.5.3. According to the DataMapWales, no ancient woodlands fall within the Tip 1 and Tip 2 areas of the Proposed Scheme. A total of four ancient woodlands and one plantation on ancient woodland site fall within 250m of the site, with two further ancient woodlands identified between 250m and 500m of the site boundary.

10.5.4. The haul road intersects two plantations on ancient woodland sites, four semi-natural ancient woodland sites and one restored ancient woodland site.

10.5.5. The only designated sites located within 500m of the route corridor is Graig Goch which is designated as a Local Nature Reserve (LNR). There are no non-designated sites located within 500m of the route corridor.

MADE GROUND

10.5.6. The ground investigation carried out by WYG on behalf of CCBC in 2002 encountered Made Ground (excluding colliery spoil material) within fifty-six exploratory locations ranging from 10.16m to 5.90m thick. The material was generally described as clayey sandy gravel of brick, concrete and various metal and wood fragments.

10.5.7. The ground investigation also identified one-hundred and ten exploratory locations encountered colliery spoil material ranging from 0.30m to 40.00m thick, depending on where on the tip the exploratory hole was located (refer to paragraphs 11.5.7 and 11.5.8 below). The material was variable in composition generally described as black clayey sandy gravel of burnt shale and coal fragments with, in places, a black sandy gravelly clay.

HISTORICAL LAND USE

10.5.8. Land use records and site history were studied and reported in detail in the WYG report in section 2.5.

[134] Capita (2019) *Generic Quantitative Risk Assessment (GQRA).*

10.5.9. In summary, the site was used for farming up to at least 1922, as shown by the early years of mapping with the 1901 plan indicating the presence of a number of springs across the farmland. Bedwas Navigation Colliery first appeared on the 1922 map indicating more intensive mining was developing in this area and was noted to the south of the current Tip 1. Tramways were also present to the north of this colliery site.

10.5.10. The 1952 plan indicated the first presence of the Bedwas colliery tips with later plans showing the increase in area covered by these colliery tips. By 1965 the historical maps indicate the colliery tip outlines being of similar configuration as seen today. The plan also indicated a works site to the north-east of Bedwas Navigation Colliery, possibly the development of a coke works associated with the colliery which is located of site adjacent to the southern boundary.

10.5.11. By 1993 the mapping indicated the Bedwas Colliery was closed and marked on the maps as 'disused' and the tramways as 'dismantled'.

10.5.12. Man-made features have been identified at various points within the site boundaries and within 250m that are mainly associated with the former mineral workings and their associated infrastructure. The features identified include (Table 10-5):

- 10 mine levels (within 500m);
- Historical Tramway;
- Colliery Tips; and
- Areas of unknown infilled ground.

Table 10-5 - Significant sources and associated potential contaminants

Potentially contaminative land-use	Proximity to route	Impact potential score (where a score 3 or more requires passing to 2nd stage QRA)	Potential contaminants (refer Defra/EA CLR8:2002)
Colliery Tip Material	Tip 1 and Tip 2 areas	3	Sulphates, heavy metals. Methane and carbon dioxide ground gas
Mine levels (adits)	Surrounding areas	2/3	Mine gas and mine water, heavy metals near entry
Historical Tramway Line	Surrounding area	3	Heavy metals, oils, sulphates and asbestos
Ubiquitous contamination to Made Ground	Various made ground areas	Less than 1/2	Heavy metals, inorganic and organic contaminants, sulphates and asbestos
Radon – natural occurrence	Low magnitude radon emissions underlie the northern section & Tip 2	2	Radon gas

Potentially contaminative land-use	Proximity to route	Impact potential score (where a score 3 or more requires passing to 2nd stage QRA)	Potential contaminants (refer Defra/EA CLR8:2002)
	Medium magnitude radon emissions underlie the southern section & Tip 1		
Coke Works	To the south of the site/adjacent to the southern boundary.	Less than 1/2	Metals, PAHs, aromatic hydrocarbons, sulfates, sulphides, ammonium, arsenic, thiocyanate, phosphates, asbestos.

TOPSOILS

10.5.13. Ignoring the haul road, only 40% of the study area is located within agricultural land / grazing land as the majority of the site is disturbed land due to historic colliery operations. The majority of the haul road is on forestry land. The soils in the area are classified by the Cranfield Soil and Agriculture institute[135] as freely draining acid loamy soils over rock. These types of soils form in areas of grass moor and upland pastures.

10.5.14. There is some potential for compressed poor quality topsoil to be present beneath colliery stockpiles.

AGRICULTURAL LAND CLASSIFICATION

10.5.15. The land use located along the Proposed Scheme is predominately agricultural, other than where it intersects with water courses or statutory and non-statutory designations (ancient woodlands).

10.5.16. The 'Predictive ALC' as indicated on the DataMapWales is a mix of Grade 3b, 4 and 5 along the Proposed Scheme. As all land is below Grade 3a ACL, there is no requirement for surveys under planning policy.

An ALC Class 3b is described as 'moderate quality agricultural land', Class 4 is described as 'poor quality agriculture land' and ALC Class 5 is described as 'very poor-quality agricultural land'.

GEOLOGY AND GEOMORPHOLOGY

10.5.17. The site is located within an area which was glaciated during the last ice age (Devensian). Glacial, periglacial and fluvial processes have influenced the geomorphology of the site. The study areas are situated within variable superficial geology.

[135] Cranfield Soil and Agriculture Institute (2023) *Soilscapes*. Available online at: https://www.landis.org.uk/soilscapes/.

Glacial Deposits

10.5.18. Glacial deposits were encountered in 73 of the 110 exploratory holes drilled as part of the WYG ground investigation. The thickness of the glacial deposits ranged between 0.3m and 12.0m. The glacial material consisted primarily of clayey sandy gravel with cobbles, sandy gravelly clay and clayey gravelly sand. The WYG report stated that contamination was not visually identified within the glacial till.

10.5.19. The geological map covering the area indicates small pockets of glacial till across the site area and it is evident that glacial till is somewhat more extensive than the geological mapping suggests (quite often deposits of lesser thickness than 2m thickness are not deemed mappable).

Bedrock

Tip 1 and Tip 2

10.5.20. The bedrock located beneath the tips is referred to as being within the Hughes Member, part of the Pennant Sandstone Formation, of Upper Carboniferous age.

10.5.21. The geological memoir for the area indicates that bedrock from the Hughes Member lies between Cefn Glas coal seam and the base of the Mynyddislwyn seam, which marks the overlying Grovesend Formation. In the Caerphilly / Bedwas area the Hughes Member is approximately 200m thick.

10.5.22. The Cefn Glas seam is a small seam approximately 0.3m thick, which has only been worked on a small scale in scattered localities throughout the Rhymney Valley. The geological plan indicates small adits located along the outcrop of the Cefn Glas to the east of Tip 2, in the Sirhowy Valley.

10.5.23. This seam is underlain by massive ‘pennant’ sandstones which continue up some 70m down through the geological sequence to a group of mudstones up to 6m thick containing the Darren Ddu coal seam. The mudstones in the vicinity of the site area are thought to be thin. The presumed outcrop horizon of the Darren Ddu coal seam is located to the eastern boundary of the upper tip. This is stated within the memoir for the area that it is a thin seam, approximately 0.4m thick and unlikely to have been worked. There is no indication on the geological plan or the Coal Authority Interactive Map that mining has occurred in this seam.

10.5.24. The very top of the Hughes Member is noted on the geological maps as being just to the south of the site boundary and is marked by the presence of the Mynyddislwyn coal seam, known within this area as the Llantwit or Bedwas seam. The Mynyddislwyn seam is typically in two leaves; the bottom leaf is on average 0.7m thick and the top leaf tends to be thicker, reaching up to 1m thick. The Brithdir member is also approximately 200m thick.

10.5.25. The Brithdir Member contains the Dirty coal seam (1.95m thick) and the Brithdir Rider coal seam (0.7m thick). The Brithdir Rider coal seam is underlain by sandstone and mudstone and the Brithdir coal seam. The geological memoir for the area states that the Brithdir seam is thickest (1.6m) at Llanbradach which is 2.5km to the west of the Tips. At Bedwas it is represented by a thin bed of rashes only.

10.5.26. The Bedwas Colliery Company targeted the Black Vein, the Meadow Vein and the Rock Vein located within the Mynyddislwyn seam.

Surface water

10.5.27. There are no significant water courses which cross the site area. Nant y Bwch rises 250m north west of Tip 2 and flows into the Rhymney River located approximately 1.2km south of the site. The Nant y Bwch is formed by a spring at an elevation of approximately 285m AOD. A smaller watercourse rises directly to the south of Tip 2 and flows alongside the eastern side of Tip 1 before joining Bedwas Pond. The Sirhowy River is located approximately 700m to the north-east of the site, with springs feeding the Sirhowy River approximately 300m to the north-east of the site. These springs issue at approximately 220m AOD at their highest but also some issue at 190m and 160m AOD. In addition, the Nant Cwmhenfelin rises from the western edge of the North Site and this drains westward through farmland.

10.5.28. The surface water runoff from the Tips is collected and drained via concrete channels – these channels result in the site having a high surface water flood risk. The runoff is drained to a lake in the old quarry to the south of the site. The lake is artificial and used as a sediment trap to prevent coal waste reaching the Rhymney River (the sediment is emptied on a regular basis using an excavator). At the southern end of the lake there is an outflow pipe leading to a culvert which is understood to eventually drain to the Rhymney River. The southern sector of the Proposed Scheme also contains an ephemeral flowing drain which is in loop. The outflow of this drain (when wet) is unclear.

Hydrogeology

10.5.29. The hydrogeological properties of the study area have been identified using information from hydrogeological maps and BGS data and drilling information contained in the WYG ground investigation.

10.5.30. The bedrock beneath the site is classified as a Secondary A aquifer. Secondary A aquifers comprise permeable layers that can support water supplies and may form an important source of base flow to rivers. For clarity this designation includes the haul road alignment.

10.5.31. Both the soils and the bedrock beneath the site are designated as having a high groundwater vulnerability. A high groundwater vulnerability means that the area is easily able to transmit pollution to groundwater, characterised by high leaching soils and the absence of low permeability superficial deposits.

10.5.32. There are no SPZs within or in close proximity of the study area, including the haul road alignment. There is one abstraction well located at Ty Canol Farm adjacent to the east of the study area (refer to V2/S11-0001). During the drilling of this borehole in 2017 groundwater was struck at 20m bgl and rose to 13m bgl. Ground level is at approximately 195m AOD resulting in a groundwater level at approximately 182m AOD. There are no other abstraction wells located within 1km of the site boundary.

10.5.33. According to the 2002 WYG ground investigation report the groundwater levels are generally below the base of the Tip material. Groundwater flows were only encountered in exploratory holes on the former colliery surface but not on the spoil tips during the ground investigation works. Groundwater strikes occurred between 0.8mbgl and 11.3mbgl in the boreholes.

10.5.34. According to the 2004 Parsons Brinckerhoff report[136], away from the spoil tips groundwater was encountered as perched groundwater in Made Ground, as shallow groundwater within the glacial drift materials and also as deeper groundwater within the sandstones.

10.5.35. Groundwater is known to be below 282m AOD in the deeper sandstones from borehole ST19SE20 400m north-west of the northern tip (dry to 50mbgl with ground level at 332m AOD).

10.5.36. The springs issuing at lower elevations in the vicinity of the site will be fed by groundwater within the sandstones. Even with the lower hydraulic conductivity siltstones and mudstones present between the sandstone units, the fractured and faulted nature of the formation is likely to mean that most sandstone layers have at least limited hydraulic connectivity with one another. It would appear in drawings issued as part of the 2004 Parsons Brinckerhoff report that the till on at least the lower flanks of Tip 2 does in places comprise gravel material. In this setting some limited connectivity between groundwater within shallow and perched layers and the deeper groundwater is anticipated and this may result in a small link between the groundwater directly beneath the tips and the groundwater issuing at the springs.

10.5.37. The study area is outside any flood risk zones.

Mineral Workings and Reserves

10.5.38. The study area is identified as within a historical coal mining area. A review of the Coal Authority interactive mapping service indicated there are no recorded mine entries within the site boundary. Within approximately 0.5km to the north-east of the northern tip there are four mine entries identified (all suspected to be adits) and a further six mine entries located to the south (two of which are suspected to be adits), south-west of Tip 1(V2/S11-0001). These represent the closest of groups of shafts to the Proposed Scheme.

10.5.39. Of the four mine entries located to the north-east none have been treated according to the records. In the south / south-west, of the six mine entries identified, two have been treated and the remaining four have not. There are no details provided on the treatment of the two mine entries.

10.5.40. Mining is indicated as occurring beneath the site on the Coal Authority Interactive Viewer, although this is indicated as deep mining.

10.5.41. The majority of the site, including Tip 1 and 2 are not within a Coal Authority development high risk area (although is located 1km to the south of the site), however parts of the haul road are located within a Coal Authority development high risk area.

10.5.42. It is unclear as to the status of mine gas at the site, but plans provided in the 2004 Parsons Brinckerhoff report refer to a methane drainage pump house which suggest that mine gas was present at least in the underground environment during the period of active mining.

Radon

10.5.43. The UK Radon Map records that the northern area and Tip 2 fall into the Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Whereas the

[136] Parsons Brinckerhoff (2004) *Bedwas Colliery Remediation Scheme, Remediation Strategy – Issue 1*.

southern area and Tip 1 fall into the intermediate probability radon area (3% - 5% of homes are estimated to be at or above the Action Level).

Animal burial pits

10.5.44. There are no known animal burial pits resulting from foot and mouth and other widespread diseases within the search area, but this does not rule out isolated occurrences given the farmland setting of the surrounding area.

Landfill

10.5.45. The following landfill and waste management activities are present within 500 m of the Proposed Scheme area (refer yellow shaded area on refer drawing V2/S11-0001):

- Navigation Street, Licence held by British Benzol. Located at National Grid Reference E318000 N189400. First input was 31/12/1929 and last input was 19/03/1990. Located 200m south of the Tip 1 area. Likely to have been associated with demolition materials form the colliery/benzol plant and coke works.

Contamination

10.5.46. According to the GQRA carried out by Capita Real Estate and Infrastructure in 2020, the soil samples taken from the site do not exceed the threshold values (LQM S4UL's) for Public Open Space - Parks land use (POS parks) and therefore the concentrations of soil contaminants are not considered to represent a significant risk to future workers or future site users.

10.5.47. For the controlled waters risk assessment, two leachate samples were collected from the tip material. Ammonium in one sample slightly exceeded the Drinking Water Standard of 0.5mg/l (with a value of 0.51mg/l) and Selenium in one sample exceeded the Drinking Water Standard of 10μg/l (with 12μg/l).

10.5.48. Whilst there is no evidence of soils exceeding threshold values on the site, this is not the case for former landfill, benzol plant, coking works and associated tanks which lay within the eastern sections of the main colliery site. These features all lie 90m to 180m beyond the southern site boundary as shown on drawing V2/S11-0001). The soil conditions in the highlighted areas exceed the above-mentioned threshold value (or dd in 2002 when samples were recovered and tested). Naphthalene, trimethyl-benzene and phenanthrene were key chemical of interest in soils but there were others. In addition to soil contamination, four areas of groundwater impact was detected (shaded blue on above mentioned drawing) and at least for the largest -irregular shaped area, it was recorded in 2002 that Light Non-aqueous Phase Liquid was present at the top of the water table. The liquid contamination was a mixture of chemicals, depending on location, but key chemicals mentioned were: naphthalene, trimethyl-benzene, xylene, ethylbenzene and toluene. There is no record of remediation being actioned at the colliery area and it would appear that a dilute and disperse rationale has been applied since 2004, perhaps in conjunction with restricted access to parts of the site.

10.5.49. The conceptual model for the site, amongst other pollution linkages, identified the risk of dispersal of mobile contamination from springs which then feed surface channels. There is a small potential that should the hydraulic gradient be increased on the Proposed Scheme the liberation of contamination on the neighbouring property could result and ultimately affect the quality of off-site springs during construction when parts of the site will be most exposed to rainfall.

10.5.50. A summary of the baseline Conceptual Site Model (CSM) is provided in Table 10-6. The potential impacts and baseline risks quoted are those before any mitigation is applied.

Table 10-6 - Baseline CSM

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
Contaminated soil / colliery spoil	Site users	Particulate inhalation/ dermal contact	Low	Medium	3
		Vapour inhalation	Low	Medium	3
	Adjoining site users	Particulate inhalation/ dermal contact	Unlikely	Medium	2
	Construction/ maintenance workers	Particulate inhalation/ dermal contact	Low	Medium	3
		Vapour inhalation	Low	Medium	3
	Future site use (vegetation)	Root uptake	Low	Medium	3
	Controlled waters – local watercourses	Leaching to ground then movement to watercourse	High	Medium	5
	Controlled waters - Secondary A Aquifer and well at Ty Canal Farm	Leaching to ground then movement to aquifer	Low	Severe	4
Contaminated groundwater and mine water	Site users	Ingestion and/ or dermal contact	Unlikely	Medium	2
	Adjoining site users	Movement of contaminated water	Unlikely	Medium	2
	Construction/ maintenance workers	Movement of contaminated water	Low	Medium	3

Source	Receptor	Pathway	Probability	Consequence	Risk at baseline without mitigation
	Controlled waters – local watercourses	Movement of contaminated water to local watercourse. There is a spring that serves Nant Cwmhenfelin. Ochreous mine water could emerge in neighbouring areas.	Medium	Medium	3
	Controlled waters – Secondary A Aquifer	Movement of contaminated water to aquifer	Medium	Severe	4
Ground gas	Site users	Toxic gas inhalation	Unlikely	Medium	2
	Adjoining site users	Toxic gas inhalation	Unlikely	Medium	2
	Construction / maintenance workers	Toxic Gas inhalation	Low	Medium	3
	Nearby properties	Structural damage due to explosion of combustible gas	Unlikely	Severe	3

10.5.51. It can be seen from the table that the highest risks are to the surface waters which could be affected by infiltrating rainwater and emergence at springs and or baseflow from sandstone units. WSP has reviewed this Capita baseline and concur with its findings but unfortunately the gas monitoring results contained in an appendix are missing from the WYG ground investigation report meaning that these particular results cannot be checked. The relevant appendix has been requested.

Human Health and Environmental Impacts

10.5.52. A summary of potential human health and environmental impacts baseline of the development is presented in Table 10-7.

Table 10-7 - Baseline impact significance

Source (pathways in brackets)	Receptor	Baseline
	Site users	Low

Source (pathways in brackets)	Receptor	Baseline
Contaminated soil (dust inhalation / soil ingestion / dermal contact / leaching with flow)	Adjacent site users	Low
	Construction / maintenance workers	Moderate / low
	Local watercourse	Moderate
	Secondary A Aquifer	Moderate
Contaminated water flow of surface runoff or groundwater (ingestion-including farm animals / ecology of rivers)	Site users	Low
	Adjacent site users	Very Low
	Construction / maintenance workers	Low
	Local watercourse	Moderate
	Secondary A Aquifer	Moderate
Ground gas (asphyxiation / explosion)	Site users	Very low
	Adjoining site users	Very low
	Construction / maintenance workers	Low
	Nearby properties (Ty Canon Farm)	Moderate

10.6 PRELIMINARY IMPACT ASSESSMENT

POTENTIAL IMPACTS DURING CONSTRUCTION AND OPERATION

Made Ground

10.6.1. Any made ground encountered during the works will be dealt with according to current standards and best practice and the requirement for the contractor to deliver suitable land quality in accordance with the Proposed Scheme remediation strategy which will be approved by the planning authority. The GQRA has confirmed that colliery spoil has low reactivity and Welsh Colliery spoil tips are not considered to be contaminated as they comprise natural rock from the Coal Measures strata. It is understood that the colliery spoil will be processed on-site by a beneficiation plant and the recovered high ash coal will be sold for industrial and domestic end-uses (not for energy generation). The remediated spoil will be deposited and landscaped to restore Tip 2 to upland grazing and Tip 1 to grassland.

10.6.2. However, the colliery spoil is almost certainly locally high in iron, manganese and sulphate, and when oxidised and combined with rainwater, there is a risk of acid run-off and turbid run-off. All run-off is currently captured using drainage channels which runs into a settling pond where treatment occurs before water is discharged into watercourses. However, as mentioned previously there is an anticipated small connection between the perched water beneath the tips and waters emerging at springs and temporary (i.e. construction phase impact) with more acidic and/or dissolved sulphate and metal containing groundwater is possible.

10.6.3. The haul road is already an existing forest track and will be improved using a small quantity of sandstone excavated during construction works. Some inert made ground may also be present along the existing track, although it is not expected to be contaminated.

Man-Made Features

10.6.4. The southern edge of the site overstep by 5-10m a former colliery settlement lagoon which may comprise a peripheral clay bund. The site contains a number of stoned trackways. The remnants foundations to the Bedwas Colliery buildings (demolished in the mid 1980s) lie off site with the closest buildings (minor bathhouse) being some 30m beyond the site boundary. Quarry lake, which is used as an attenuation pond has the appearance of a part flooded former sandstone quarry.

10.6.5. Drainage channels are also present on site to control the run-off and an existing forest track allowing access to the site.

Topsoil

10.6.6. Both Tip 1 and Tip 2 are described as having very little topsoil, with heavy scouring and erosion due to poor drainage, hence the vegetation covering is sparse. All topsoil and any subsoil from beneath the spoil tips will be excavated and stored in piles to be used in final restoration of the newly created landforms. There is expected to be a shortfall of natural soil on the site, therefore relevant soil forming material will be imported as necessary to ensure successful revegetation and restoration to upland grazing habitat.

Geology and Geomorphology

10.6.7. The study area comprises of colliery spoil tips which are created as a result of discarding material from historical mining operations, and an existing track to be used as a haul road (except where the road joins the main road network). Therefore, any geomorphological features that might have been present, were likely removed by the spoil deposition activities. In the same way, there is unlikely to be any geological exposures present.

Hydrogeology

10.6.8. The Hughes Formation which underlies the site generally comprises massive greywacke sandstones. These sandstones are well cemented and as a result possess very little primary porosity or intergranular permeability. Rock mass permeability therefore relies upon the distribution, aperture width, infilling type e.g. clay, quartz, and aperture persistence present. These fractures could either be natural joints, stress/stress relief fractures due to mining or faulting.

10.6.9. Groundwater percolates through the joints and generally passes downwards due to gravity. Where an impermeable layer is encountered, such as a shale/mudstone, coal or seat earth, or vertical jointing discontinues, they can change the flow path to more horizontal direction. Where this flow breaks the surface, a spring forms. Springs therefore are present on the hillslopes and are recorded

to the immediate west of the site which feeds the Nant Cwmhenfelin stream. Springs are also present north west of Tip 2 (source of the Cwm y Bwch) and to the north east of the Upper Bedwas Tip where at least 20 springs issue in the Sirhowy Valley Country Park. Springs are also present to the east and west of the Lower Bedwas Tip all of which feed into the Rhymney River. There are at least three to the west of the Lower Bedwas Tip and at least twelve in the first 500 m to the east of this tip. In addition, a collection of springs are shown as being present 350-400m south of the southern site boundary.

10.6.10. Groundwater flow directions within the Hughes Formation are likely to reflect the topography of the landscape, although will be further complicated by the presence of adits and faulting. It is not known whether the north-south trending fault directly beneath Tip 2 forms a barrier boundary or a highly conductive conduit for groundwater flow.

10.6.11. Currently the Lower Bedwas Tip presents potential for tip failure due to the potential covering of springs. This colliery spoil was placed on the hillside, this is where the potential for springs increases. The Proposed Scheme will improve this situation by removing the Lower Tip material from the hillside and placing it using engineering techniques on top of the ridge line. The Tip 1 area will be returned to its original landform contour and no colliery spoil material will be emplaced (except a thin layer of topsoil).

10.6.12. On Tip 2, the colliery spoil is to be processed for coal and then placed as engineered fill.

10.6.13. As a result, it is believed that Tip 1 removal will be a positive improvement for any potential interaction between Tip 1 and the groundwater in terms of quantity. This is because there will be less surface water runoff as the gradient of the slope becomes shallower, allowing more rainfall to infiltrate groundwater and return to pre-colliery conditions. The impact on the upper area is likely to be neutral, and any risk of failure of tip material as a result of interaction with groundwater is likely to be low due to the engineered design of the slopes. As the angle of the slope in Tip 1 does not significantly change then the amount of surface water runoff is likely to be unchanged. The form of the engineered design of Tip 2 is slightly different to that at present with the maximum height of the tip being 10m higher than that currently with slightly steeper average slopes than at present. Therefore, there may be minor differences in the volume of surface water runoff directed to lower levels, although this is thought to be insignificant in terms of overall quantities involved.

10.6.14. The proposed drainage system for Tip 2 is such that only the western and southern part of the tip's surface runoff will be collected, passing to the storage ponds and ultimately to the plant for treatment. Currently surface water runoff is collected from the eastern and southern sides of Tip 2, passing to the storage ponds. A minor change in volumes infiltrating to the aquifer is therefore likely but this is unlikely to have a significant impact on volumes available as baseflow to river or to abstractions such as that at Ty Canol.

10.6.15. The construction and operation phase impact on quantities of water available to peripheral water courses and the old quarry lake due to on-going rainwater infiltration and the changed infiltration regime is likely to be low.

10.6.16. The construction and operation phase impact on the volume of groundwater available at the private well at Ty Canol is also likely to be low.

10.6.17. The construction and operation phase impact on mine adit discharges due to on-going rainwater infiltration and the changed infiltration regime is likely to be low.

10.6.18. However, the impact on groundwater and surface water quality from the remobilisation of potential contaminants in the tip material is considered to be more significant than the impact on volume. Disturbance of the potentially contaminated material, both in the region of Tip 1 and Tip 2, may promote the creation of acid rock drainage and remobilise contaminants such as metals,. Whilst this remobilisation may be a temporary effect until materials have settled, there is the possibility of this impacting the quality of groundwater as contaminants percolate down to groundwater, and then flow down hydraulic gradient to surface water springs and potentially the private abstraction at Ty Canol. Whilst it is appreciated that the surface water runoff will be collected and treated, not all rainfall will form runoff but a proportion will infiltrate to groundwater allowing the migration of contaminants downwards. The fractured and faulted nature of the sandstones is likely to produce unpredictable flowpaths, meaning that, although the well at Ty Canol is at least 200m cross gradient from the east of Tip 1, there may be pathways from Tip 2 that link to this well.

10.6.19. There will be diesel powered pumps needed to manage the movement of waters to the settlement lakes and clean water pumping and also for the fuelling of earthmoving plant and certain items of the beneficiation plant. The fuel will be stored in accordance with best practices and spill kits will be available in line with the Construction Environment Management Plan (CEMP).

10.6.20. The considerable separation of the offsite contaminated areas located in the eastern section of the former colliery from the site and the location of this contamination ‘downhill’ means that vapours or liquids will not seep/flow up dip or uphill to affect site workers.

10.6.21. Where fill is being placed there can be a squeezing risk due to compression effects of overlaying ground. In practice there will be venting in the exposed sides of mound and there is planned widespread use of soakage trenches that would have a secondary venting effect. Added to this given that two farms are 300m to 500m from the placement areas then risk of asphyxiation or explosive risk due to migrating ground gas is very low.

10.6.22. Any increase in infiltration in the southern parts of the site could locally drive hydraulic heads within the glacial till and upper coal measure units which, if this was to occur uphill of the landfill/ old benzol works, could act to spread dissolve phase contamination which may manifest itself in springs. The assessment of this risk will require the installation of boreholes equipped with piezometers to better understand the groundwater heads, aquifer units and permeabilities. Water balance type calculations will be required following the installation of the boreholes to assess dispersion risk. In the interim it is conservatively assumed that small changes will occur.

10.6.23. The construction and operation phase impact on mine adit discharges due to on-going rainwater infiltration and the changed infiltration regime is considered to be minimal due to the insignificant change in overall volumes of infiltrations across the site. Indeed there is no evidence that mine adits are currently discharging waters.

SUMMARY OF POTENTIAL IMPACTS DURING CONSTRUCTION AND OPERATION

10.6.24. Table 10-8 summarises the potential impacts from geology and soils during the construction and operation phase.

Table 10-8 - Potential Impacts of the Proposed Scheme during Construction and Operation Phase

Receptor name	Impact	Effect	Magnitude	Significance
Soil quality	Made Ground associated from historical activities placed in stockpiles, locally re-used as fill.	Localised reduction in soil quality.	Minor	Negligible (adverse)
	Importation of natural soil to ensure successful restoration.	Overall improvement in soil quality.	Moderate	Significant (beneficial)
Groundwater resource including private well	Some leaching from Made Ground during construction activities.	Reduction in groundwater quality.	Moderate	Minor (adverse)
	Remediation of spoil material to remove high ash coal with unavoidable oxygenation of soils are these exposed.	Minor acidification of infiltrating waters and liberation of sulphate	Moderate	Significant (adverse but short term)
	Minor fuel spills	Localised reduction in groundwater/surface water quality.	Minor	Negligible (adverse)
	Changed infiltration patterns	Changes to water levels in aquifer	Minor	Negligible (adverse)
	Impacts on mine water	Changes to flow rate or quality	Minor	Negligible (adverse)
Geology and Geomorphology	Deposition of material to Upper Tips	Removal or concealment of the superficial deposits and bedrock.	Minor	Negligible (adverse)
	Excavation of Lower Tips material to restore to original landform level, deposition of material to Upper Tips to create upland grazing.	Change to the landscape features could lead to the loss of geomorphological features in the local landscape.	Minor	Negligible (adverse)
	Re-profiling of the slopes.	Increased slope stability	Minor	Negligible (beneficial)
Quarry Lake and peripheral streams and springs	Some leaching from Made Ground during construction activities.	Reduction in surface water quality.	Moderate	Minor (adverse)

Receptor name	Impact	Effect	Magnitude	Significance
Offsite unnamed stream - emanating south of landfill in areas of offsite benzol plant	Changes to infiltration pattern, locally raising water heads in glacial gravel units.	Reduction in quality	Minor (most likely but more assessment needed in boundary edge zone)	Negligible (adverse)
Mine water	Changes of infiltration pattern during earthworks	Rise of mine water heads	Minor	Negligible (adverse)

POTENTIAL IMPACTS DURING POST-OPERATION

10.6.25. The effects of the Proposed Scheme during its post-operational phase are expected to be negligible compared to those of the construction phase with regard to geology and soils. The impacts surrounding the improvement to topsoil and groundwater quality discussed in the construction and operation phase will remain in the post-operational phase. Once the vegetation has become established, it could lead to a slower percolation rate and increased slope stability.

10.6.26. There will be a post-operational phase impact on peripheral water courses and old Quarry Lake due to on-going rainwater infiltration although the change in infiltration regime is considered to be minimal. There is the possibility that some leaching of metals may occur beneath the 3 or 4 settlement ponds due to the build up of sediments from the drainage system.

10.6.27. The post-operational phase impact on mine adit discharges due to on-going rainwater infiltration and the changed infiltration regime is considered to be minimal due to the insignificant change in overall volumes of infiltrations across the site. Indeed there is no evidence that mine adits are currently discharging waters.

10.6.28. Any increase in infiltration in the southern parts of the site due to new drainage infrastructure could locally drive hydraulic heads within the glacial till and upper coal measure units which, if this was to occur uphill of the landfill / old benzol works, could act to spread dissolve phase contamination which may manifest itself in springs. The assessment of this risk will require the installation of boreholes equipped with piezometers to better understand the groundwater heads, aquifer units and permeabilities. Water balance type calculations will be required following the installation of boreholes to assess dispersion risk. In the interim it is conservatively assumed that small changes will occur during construction/operation and that changes will also be in action during post-operation.

SUMMARY OF POTENTIAL IMPACTS DURING POST-OPERATION

Table 10-9 summarises the potential impacts from geology and soils during the post-operational phase.

Table 10-9 - Potential Impacts of the Proposed Scheme during the Post-Operation Phase

Receptor name	Impact	Effect	Magnitude	Significance
Soil quality	Importation of natural soil to ensure successful restoration.	Overall improvement in soil quality.	Moderate	Significant (beneficial)
Groundwater resource	Remediation of spoil material to remove high ash coal. Established vegetation may lead to a slower percolation rate.	Overall improvement in groundwater quality and changes to water levels in aquifer	Moderate	Significant (beneficial)
Geology and Geomorphology	Re-profiled slopes.	Increased slope stability	Minor	Negligible (beneficial)
Quarry Lake and peripheral streams	Remediation of spoil material to remove high ash coal leading to improved leachate quality linking to surface waters	Improved soil quality reduces leachate concentrations to surface waters	Minor	Negligible (beneficial)
Offsite unnamed stream - emanating south of landfill in areas of offsite benzol plant	Changes to infiltration pattern, locally raising water heads in glacial gravel units. New landscaping may mitigate.	Reduction in quality	Minor (most likely but more assessment needed in boundary edge zone)	Negligible (adverse)
Mine water	Vegetation application may reduce infiltration on a site wide average basis	Slight reduction in mine water heads on average	Minor	Negligible (beneficial)

10.7 MITIGATION, ENHANCEMENT AND MONITORING

MITIGATION AND MONITORING

10.7.1. The excavated soils will be stripped and stockpiled in accordance with the Construction Code of Practice for the Sustainable Use of Soils in Construction[137]. The following actions should be avoided during construction and operation:

- Cross contamination of soil;
- mixing of topsoil with subsoils;
- over-compaction or running over emplaced topsoil; and
- incorporation of vegetation in soil stockpiles.

[137] Defra (2009) *Construction Code of Practice for the Sustainable Use of Soils in Construction*.

10.7.2. The following actions are recommended during construction and operation:

- decompaction and aeration of soil prior to placement;
- use of tracked plant to excavate, transport and replace soil;
- implementation of designated haul routes to avoid damaging in-situ soils; and
- excavation and deposition during dry conditions.

10.7.3. The risks to construction workers during the construction and operational phase of the project will be mitigated by implementation of Health and Safety measures. This will include suitable working methods and the correct use of Personal Protective Equipment (PPE). These measures will be developed as part of the CEMP for the Proposed Scheme.

10.7.4. As a minimum the CEMP will include the following methods and permit application to effectively manage work in contaminated areas and avoid releases of harmful substances to the environment and/or the unwanted movement of dust, waters and gases. These measures will include:

- methods to control noise, waste, dust (i.e. damping down), odour, gases and vapours;
- methods to control spillage and prevent contamination of adjacent areas;
- the management of human exposure for both construction workers and people living and working nearby;
- methods for the storage and handling of excavated materials (both contaminated and uncontaminated), or this information may be contained in a sister Site Waste Management Plan (SWMP) document;
- management of any unexpected contamination found during construction via a watching brief; and
- storage requirements for hazardous substances such as diesel.

10.7.5. At this stage, no additional measures are considered necessary to mitigate risks from anthropic land contamination during the construction or operational stage for soil quality within the site itself.

10.7.6. There is a small risk during construction and operation that the spring which serves Nant Cwmhenfelin could have a small level of impact with increased acidity, dissolved metals and sulphate and it would be prudent to implement focused water quality monitoring, and also to develop suitable mitigation actions which may entail one or more actions such as altering the alignment/depth of soakage trench in this specific locality and if necessary more invasive action such as pumping out of the soakage trench and passing waters through appropriate filtration equipment.

10.7.7. Prior to construction and operation, further drilling and water head monitoring is recommended to be undertaken by the Client at the site boundary closest to Ty Canal farm abstraction well and at the south eastern boundary zone (i.e. locations up-hill of the registered landfill (and former benzol works) to clarify the groundwater model present and allow calculation to assess how changes to the infiltration pattern could affect the well and in the case of the landfill / benzol area springs and outflowing stream. Pending the outcome of this groundwater protection report it is possible that investigative borehole would be converted to monitoring wells and a monitoring plan instigated. This will need (in the outcome where the hydrogeological report finds an issue) to include action triggers for water head and provision of methods to control them (e.g. pumping from wells and with discharges taken beyond the area fronting the old landfill).

10.7.8. Natural contamination in the form of sulphur compounds and iron containing in the broken rock of the coal measure has potential to liberate iron and acidified waters to groundwater but the effect will reduce within a short number of years after the new landform has been created but will be most active during the construction phase. To mitigate adverse effects the Proposed Scheme has a number of embodied measures included in the scheme and these are:

- Construction of a peripheral loop of coarse gravel and geotextile lined infiltration strips which will act a recharge of shallow aquifer units at the periphery of the site. The substantial liner extent of the strip will in places penetrate the glacial till layer and provide direct recharge to the thick sandstone unit which are prevalent at the site;
- A section of this loop is located close to the spring that serves the Nant Cwmhenfelin and as such will maintain flow into the head of the stream; and
- The settlement ponds will be lined with clay or highly weathered shales so that any leaching of dissolved metals or sulphates will be limited by the low permeability layer.

ENHANCEMENT

10.7.9. As no new geological features will be exposed by the works there is little scope for the enhancement of this resource in the area. Slope stability risk will be reduced by delivery of the works. Overall soil quality will be improved as the fines content which have a higher content of heavy metals will be removed from a large area of the site. This will improve the phytoxicity status of the near surface soils in the main site.

10.8 RESIDUAL IMPACT ASSESSMENT

10.8.1. On review of the information available, it is assessed that there are no residual impacts on geology and soils arising from the construction, operational or post-operational phase of the Proposed Scheme but this takes account of a focused additional investigation programme as well as implementation of a groundwater monitoring plan.

10.9 CUMULATIVE EFFECTS

10.9.1. The sensitive geological receptors are set in an upland quite remote setting and separated from adjacent schemes that may involve earth working, meaning cumulative effects with other projects are unlikely.

10.10 SUMMARY

10.10.1. This chapter assesses the potential effects associated with geology and soils with respect to the Proposed Scheme.

10.10.2. There are no geological or geomorphological features of scientific interest or importance within or adjacent to the study area.

10.10.3. The colliery spoil provides a potential source of contamination with colliery spoil known to be a source of metals and sulphate and in some cases acidic run off. To manage the dissolved metals / sulphate in run-off, a number of embedded mitigations are applied in the design comprising swales, berms, runnels and settlement ponds.

10.10.4. The ALC for the Northern Tip is assessed as class 4 – poor quality agricultural land with a small area of class 5 – very poor-quality agricultural land to the west, south-west.

10.10.5. The ALC for the Southern Tip Section is assessed as mainly class 4 – poor quality agricultural land with a small area of class 3b – moderate quality agricultural land. There is also two small areas class 5 – very poor-quality agricultural land to the west and south-west and one small area of Non-Agricultural land to the south-east of the tip.

10.10.6. The land corridor on which the haul road traverses has been subject to on-line searches of environmental free access data bases to identify the baseline setting for the production of this report.

10.10.7. Two localised receptors are present off site (around 180m), one is a private well serving Ty Canon farm (east of the site) and one is a group of springs which rise a little beyond an off-site landfill and within the relict contamination area from a former Benzol plant. Further ground investigation for determination of hydrogeological model is required within edge areas of the site to confirm that no mitigation actions are needed to minimise possible effects of either outflows from the site (the well receptor) or increased hydraulic gradients (the springs receptors). It is a possible recommendation from the groundwater reporting that a monitoring programme is actioned and triggers for intervention measures formulated.

10.10.8. With the implementation of additional groundwater investigation, correct procedures and guidance, and appropriate techniques during construction and operation, and the peripheral loops of infiltration trench and that linings are applied to settlement lagoons then the potential effects can be controlled and managed, such that the significance of negative effects on the geology, soils and hydrogeology of the study area can be limited to a minor to negligible adverse level, including the private well at neighbouring Ty Canol farm and springs which lie at the former location of the now demolished off-site Benzolplant.

10.10.9. It is also considered that the remediation works carried out as part of the Proposed Scheme and the final landform will improve soil and groundwater quality, physical conditions and land stability, therefore causing a significant beneficial effect to the geology and soils of the study area. Mine water is deep seated and there is no evidence of flow from adits present in the near environs of the site. On this basis mine water is not regarded as being at risk of worsening quality or greater flows from construction or operation of the Proposed scheme.

11 MATERIALS AND WASTE

11.1 INTRODUCTION

11.1.1. This ES Chapter provides an assessment of potential impacts from the generation and management of waste and a consideration of material use. The current baseline conditions have been assessed and subsequently considered against the potential effects of any construction, demolition and excavation activity, processing and post-operational/aftercare phases of the Proposed Scheme.

11.1.2. According to the Institute of Environmental Management and Assessment (IEMA) Guide to Materials and Waste[138], 'Materials' are physical resources that are used across the lifecycle of a development.

11.1.3. Waste can be defined as per the Waste Framework Directive[139] (transposed into UK law by Section 75 of the Environmental Protection Act 1990 (as amended)[140] as "any substance which the holder discards or intends or is required to discard".

11.1.4. The principal objective of sustainable waste and material resource management is to use material resources more efficiently, thereby preventing and reducing the amount of waste generated as well as minimising the quantity of waste that requires final disposal to landfill. It is proposed that waste and materials would be dealt with in line with the Government's waste hierarchy, for sustainable waste and material resource management to which regard must be had under regulation 15(1) of the Waste (England and Wales) Regulations 2011[141].

11.1.5. This assessment focuses on the consumption of materials and products; the use of materials offering sustainability benefits; the significant beneficial impact of the reprocessing and remediation of the historic colliery spoil within Tip 1 and Tip 2; the use of excavated and other arisings that fall within the scope of waste exemption criteria; and the production and disposal of waste.

11.1.6. The welfare waste from site works during the reprocessing and remediation activities are expected to have negligible waste impacts as this is likely to be very low in quantity and good recycling and waste recovery routes exist for this type of material.

11.1.7. A Scoping Report was prepared by Capita Real Estate and Infrastructure on behalf of the applicant, Energy Recovery Investments (ERI), the designers and operators of the Proposed Scheme in April 2020. It has scoped out the construction and excavation waste associated with temporary works, as this material is likely to be reused onsite with minimal taken offsite.

[138] IEMA (2020) *IEMA Guide to: Materials and Waste in Environmental Impact Assessment.*
[139] UK Government (2008) *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.* Available online at: https://www.gov.uk/government/publications/legal-definition-of-waste-guidance/definition-of-waste-2018-waste-framework-directive-amendments#:~:text=English%20and%20Welsh%20law%20was,and%20end%20of%20waste%20criteria.
[140] UK Government (1990) *Environmental Protection Act*. Available online at: https://www.legislation.gov.uk/ukpga/1990/43/part/IIA.
[141] UK Government (2011) *The Waste (England and Wales) Regulations 2011*. Available online at: http://www.legislation.gov.uk/uksi/2011/988/contents/made.

STUDY AREA

11.1.8. The material proposed for reprocessing and remediation from the Tip 1 and Tip 2 within the Red Line Boundary (RLB) will form the study boundary for this topic.

11.1.9. The primary study area would include the material volume from the Tip 1 and Tip 2 proposed for reprocessing and remediation and any waste and/or materials brought onto site for reuse.

11.1.10. A secondary study area extends to the destination sites if unsuitable historic colliery spoil is transported offsite for reuse, recycling, recovery, or disposal.

11.2 LEGISLATION AND POLICY

11.2.1. The impact methodology for this chapter has been informed by the following current legislation and policy documents.

UK WASTE REGULATION

Control of Pollution (Amendment) Act[142] 1989

11.2.2. Sets out the provision for the registration of carriers of controlled waste and to make further provision with respect to the powers exercisable in relation to vehicles shown to have been used for illegal waste disposal.

Environmental Protection Act 1990[140] (EPA)

11.2.3. Sets out the framework for waste management, regulations for waste disposal and the requirement for waste management licences.

The Environment Act[143] 1995

11.2.4. Sets out the provisions for the establishment of a body corporate to be known as the Environment Agency, to provide for the transfer of functions, property, rights and liabilities to those bodies and for the conferring of other functions on them and to make provision with respect to contaminated land and abandoned mines.

Clean Neighbourhoods and Environment Act[144] 2005

11.2.5. An Act to make provision relating to the transportation, collection, disposal and management of waste.

The List of Wastes (Wales) Regulations[145] 2005

11.2.6. Sets out the provisions for the purposes of the determination of whether a material or substance is a waste or a hazardous waste, as the case may be and the classification and coding of wastes and hazardous waste.

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[142] UK Government (1989) *Control of Pollution (Amendment) Act 1989.* Available online at: https://www.legislation.gov.uk/ukpga/1989/14.
[143] UK Government (1995) *The Environment Act 1995.* Available online at: https://www.legislation.gov.uk/ukpga/1995/25/introduction.
[144] UK Government (2005) *Clean Neighbourhoods and Environment Act 2005.* Available online at: https://www.legislation.gov.uk/ukpga/2005/16/introduction.
[145] UK Government (2005) *The List of Wastes (Wales) Regulations 2005.* Available online at: https://www.legislation.gov.uk/wsi/2005/1820/body/made.

Hazardous Waste (England and Wales) Regulations[146] 2005 and 2018 amendment

11.2.7. Sets out the requirement for the fulfilment of Duty of Care requirements with respect to hazardous waste. The production or removal of hazardous waste can only occur on premises registered with the Environment Agency/Natural Resources Wales (NRW) or exempt from the regulations.

The Waste (England and Wales) Regulations[147] 2011 and 2012 amendment

11.2.8. Transposed the EU Waste Framework Directive into UK law, including requirements for businesses to apply the waste hierarchy to their activities. EU Waste Framework Directive 2008 – defines the waste hierarchy, defines what materials are classified as waste and sets recycling targets for non-hazardous construction and demolition waste (70% reduction by weight by 2020).

The Wellbeing of Future Generations[148] (Wales) Act 2015

11.2.9. An Act to make provisions required by public bodies to do things in pursuit of the economic, social, environmental and cultural well-being of Wales in a way that accords with the sustainable development principle and for connected purposes.

The Environmental Permitting (England and Wales) (Amendment) Regulations[149] 2018

11.2.10. These regulations aim to ensure that waste activities are authorised and that their discharges do not harm human health or the environment. They also include measures to lay down basic safety standards for protection against the dangers arising from exposure to ionising radiation. For the Proposed Scheme, environmental permits must be granted by the Environment Agency. The Regulations combine the requirements for an integrated waste management approach and for hazardous waste management. This provides a framework for regulation that enables the Environment Agency to assess permitting and compliance.

NATIONAL POLICY

Towards Zero Waste – One Wales: One Planet[150] 2010

11.2.11. Sets out a waste strategy for Wales up to 2050 in line with the requirements of the Waste (England and Wales) Regulations 2011. It forms part of the national waste management plan for Wales.

[146] UK government (2005/2018) *Hazardous Waste (England and Wales) Regulations 2005 and 2018 amendment.* Available online at: http://www.legislation.gov.uk/uksi/2005/894/contents/made (2005); http://www.legislation.gov.uk/wsi/2018/721/contents/made (2018).
[147] UK government (2011/2012) *The Waste (England and Wales) Regulations 2011 and 2012 amendment.* Available online at: http://www.legislation.gov.uk/uksi/2011/988/contents/made (2011); http://www.legislation.gov.uk/uksi/2012/1889/made (2012).
[148] Welsh Government (2015) *The Wellbeing of Future Generations (Wales) Act 2015.* Available online at:: Well-being of Future Generations (Wales) Act 2015 (legislation.gov.uk).
[149] UK Government (2018) *The Environmental Permitting (England and Wales) (Amendment) Regulations 2018.* Available online at: The Environmental Permitting (England and Wales) (Amendment) (No. 2) Regulations 2018 (legislation.gov.uk).
[150] Welsh Assembly Government (2010) *Towards Zero Waste – One Wales: One Planet.* Available online at: https://gov.wales/sites/default/files/publications/2019-05/towards-zero-waste-our-waste-strategy.pdf.

The Waste Prevention Programme for Wales[151] (2013)

11.2.12. Supports 'Towards Zero Waste', the waste strategy for Wales, by describing the outcomes, policies, targets and work programme to address waste prevention in Wales. The primary objective of the Waste Prevention Programme will be to decouple economic growth from the environmental impacts of waste generation and to enable households and businesses to reduce waste, while at the same time saving money.

LOCAL POLICY

Southeast Wales Regional Waste Plan[152]

11.2.13. The Southeast Wales RWP 1st Review is a non-statutory plan prepared through a voluntary agreement between 11 Local Planning Authorities in the South East Wales Region. The Plan will assist the region in developing an integrated and adequate network of modern waste facilities.

11.2.14. The Plan has the following aims:

- To minimise adverse impacts on the environment and human health;
- To minimise adverse social and economic impacts and maximise social and economic opportunities;
- To meet the needs of communities and businesses; and
- To accord with the legislative requirements, targets, principles and policies set by the European and national legislation and policy framework.

Caerphilly County Borough Local Development Plan[153] up to 2021

11.2.15. The Caerphilly County Borough Local Development Plan seeks to protect the environment whilst allocating land for essential new development. The Local Development Plan contains the following policies in relation to materials and waste.

- SP8 - The Council will contribute to the regional demand for a continuous supply of minerals by:
  - Safeguarding known resources of coal, sand and gravel and hard rock.
  - Maintaining a minimum 10-year land bank of permitted aggregate reserves in line with national guidance.
- SP9 - The Council will implement a sustainable, integrated approach to waste management, which minimises the production of waste and its impact on the environment, and maximises the use of unavoidable waste as a resource. To assist in this aim the following land use commitments are made:

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[151] Welsh Government (2013) *The Waste Prevention Programme for Wales (2013).* Available online at: https://www.gov.wales/sites/default/files/publications/2019-05/the-waste-prevention-programme-for-wales.pdf.

[152] South East Wales Regional Waste Group (2008). *South East Wales Regional Waste Plan.* Available online at: https://apps.caerphilly.gov.uk/LDP/Examination/PDF/SEW10.pdf.

[153] Caerphilly County Borough Council (2010) *Local Development Plan up to 2021*. Available online at: https://www.caerffili.gov.uk/caerphillydocs/ldp/written-statement.aspx.

- All allocated and protected class B2 industrial sites are designated as potentially suitable locations for new in-building waste management facilities, which provides substantial choice in meeting the estimated land requirement of up to 10.4 ha.
- The Area of Search maps identified in the RWP are adopted as appropriate advice as to where developers should first seek sites for in-building and open air facilities.

WASTE HIERARCHY

11.2.16. The waste hierarchy (shown in Table 11-1) has been transposed into UK law through the Waste (England and Wales) Regulations 2011, meaning that all businesses or organisations that produce or handle waste must take all reasonable steps to prevent waste and apply the waste hierarchy to any waste that is produced.

Table 11-1 – The waste hierarchy

Stages	Description
Prevention	Using less material in design, manufacture and operation, keeping products for longer, re-use, using less hazardous materials.
Prepare for re-use	Checking, cleaning, repairing, refurbishing, whole items or spare parts.
Recycling	Turning waste into a new substance or product and includes composting if it meets quality protocols.
Other recovery	Includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste, some backfilling.
Disposal	Landfill and incineration without energy recovery.

11.3 GUIDANCE

11.3.1. The assessment has been carried out in accordance with Chapter 7.12 Material assets from the ICE guidance[154] and the IEMA Guide to Materials and Waste in EIA.

11.4 ASSESSMENT METHODOLOGY

Establishing the Baseline

11.4.1. A Scoping report prepared by Capita Real Estate and Infrastructure (REI) (now WSP) on behalf of the applicant, Energy Recovery Investments (ERI), the designers and operators of the Proposed Scheme

[154] ICE Publishing (2019) *Environmental Impact Assessment Handbook*.

has helped in establishing the baseline. A review of the desktop and client information will be carried out to establish the current waste produced on site.

11.4.2. The assessment of the baseline will also establish whether there are activities currently taking place on-site that produce waste and amount of material available for reprocessing and remediating.

Identifying the Receptors

11.4.3. A desk analysis of Ordnance Survey map data, publicly accessible data, the EIA Scoping Report, the project Materials Management Plan (estimates of the cut and fill balance), and the application of waste management knowledge and judgement were used to identify receptors.

Identifying the Potential Impacts and Effects

11.4.4. The reprocessing of historic colliery spoil will result in the creation of a number of products, which will be categorised, and their usage and disposal will be evaluated to determine the impact on the present site and any surrounding sites.

11.4.5. The historic colliery spoil is a large deposit of colliery waste placed prior to the environmental controls of the Mining Waste Directive[155], Control of Pollution Act (1974) and the Environmental Protection Act (1990). To be classed as non-waste, the material must meet the end of waste test (as defined within Article 6(1) of the Waste Framework Directive. The reprocessing of the spoil aims to remove any waste properties that exist (such as contamination) and turn it into a useful material that will be used in place of another non-waste material, i.e. the reprocessed material will meet end of waste criteria.

Identifying the cumulative Effects

11.4.6. According to the Scoping report, no specific waste and material cumulative impacts have been identified since the Proposed Scheme tries to remediate material without disrupting local waste infrastructure, and the ultimate state is unlikely to create any waste material.

Identifying the Mitigation Measures

11.4.7. The waste hierarchy concept will be used when considering any mitigating measures. In consultation with the customer and design team, measures that move waste and materials up the hierarchy will be prioritised and identified.

SIGNIFICANCE CRITERIA

11.4.8. The significance of waste arisings is largely based on the nature of the waste, the location and capacity of local and regional waste management facilities and the sustainability of the disposal or processing method.

11.4.9. Overall, the purpose of a waste management assessment is to characterise waste types and arisings and to identify existing and potential methods employed for their management, as well as the significance of change associated with a Proposed Scheme in comparison to the current and likely future situation without the development. For the purposes of this assessment, a methodology has

[155] Directive 2006/21/EC on the management of waste from extractive industries (referred to as the Mining Waste Directive).

been utilised that allocates a 'score' based on various considerations of waste type and quantity, as well as disposal. This score is used to determine the significance of impact.

11.4.10. This approach broadly conforms with the standard Environmental Impact Assessment (EIA) approach of assessing significance as a function of the magnitude of impact and sensitivity of any receptors. In this case, magnitude of impact and proximity and sustainability of receptors. The IEMA Guide to Materials and Waste in EIA[138] divides the assessment of the sensitivity into the sensitivity of materials as a receptor and the sensitivity of landfill void capacity.

11.4.11. The sensitivity of materials can be determined by identifying where one or more of the criteria displayed in Table 11-2 below are met.

Table 11-2 - Assessment criteria for the sensitivity of material receptors

Significance	Description – material receptors
Negligible	Are forecast (through trend analysis and other information) to be free from known issues regarding supply and stock; and/or are available comprising a very high proportion of sustainable features and benefits compared to industry-standard materials.
Low	Are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock; and/or are available comprising a high proportion of sustainable features and benefits compared to industry-standard materials.
Medium	Are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock; and/or are available comprising some sustainable features and benefits compared to industry-standard materials
High	Are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock; and/or comprise little or no sustainable features and benefits compared to industry-standard materials.
Very High	Are known to be insufficient in terms of production, supply and/or stock; and/or comprise no sustainable features and benefits compared to industry-standard materials.

11.4.12. The sensitivity of landfill void capacity can be determined using Table 11-3 and Table 11-4.

Table 11-3 - Inert and non-hazardous landfill void capacity sensitivity

Significance	Description – Inert and non- hazardous receptors
Across construction and/or operation phases, the baseline/future baseline (i.e., without development of regional (or where justified, national) inert and non-hazardous landfill void capacity is expected to…	

Significance	Description – Inert and non- hazardous receptors
Negligible	...remain unchanged or is expected to increase through a committed change in capacity.
Low	...reduce minimally: by <1% as a result of wastes forecast.
Medium	...reduce noticeably: by 1-5% as a result of wastes forecast.
High	...reduce considerably: by 6-10% as a result of wastes forecast.
Very High	...reduce very considerably (by >10%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.

Table 11-4 - Hazardous landfill void capacity sensitivity

Significance	Description – Hazardous receptors
Across construction and/or operation phases, the baseline/future baseline (i.e., without development of regional (or where justified, national) hazardous landfill void capacity is expected to…	
Negligible	...remain unchanged or is expected to increase through a committed change in capacity.
Low	...reduce minimally: by <0.1% as a result of wastes forecast. 2829
Medium	...reduce noticeably: by 0.1-0.5% as a result of wastes forecast.
High	...reduce considerably: by 0.5-1% as a result of wastes forecast.
Very High	...reduce very considerably (by >1%); end during construction or operation; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.

11.4.13. The IEMA methodology divides the assessment of magnitude of impact into the sensitivity of materials as a receptor and the sensitivity of landfill void capacity.

11.4.14. The magnitude of impact from materials can be determined using Table 11-5 below.

Table 11-5 - Assessment criteria for the magnitude of impacts from materials

Magnitude	Description – Impact from materials
The assessment is made by determining whether, through a development, the consumption of:	
No change	…no material is required.

Magnitude	Description – Impact from materials
Negligible	...no individual material type is equal to or greater than 1% by volume of the regional baseline availability.
Minor	...one or more materials is between 1-5% by volume of the regional baseline availability; and/or the development has the potential to adversely and substantially impact access to one or more allocated mineral site (in their entirety), placing their future use at risk.
Moderate	...one or more materials is between 6-10% by volume of the regional baseline availability; and/or one allocated mineral site is substantially sterilised by the development rendering it inaccessible for future use.
Major	...one or more materials is >10% by volume of the regional baseline availability; and/or more than one allocated mineral site is substantially sterilised by the development rendering it inaccessible for future use.

11.4.15. The magnitude of impact from inert and non-hazardous waste can be determined using Table 11-6.

Table 11-6 - Assessment criteria for the magnitude of impacts from inert and non-hazardous waste

Magnitude	Description – Impact from inert and non-hazardous waste
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce regional landfill void capacity baseline by <1%.
Minor	Waste generated by the development will reduce regional landfill void capacity baseline by 1-5%.
Moderate	Waste generated by the development will reduce regional landfill void capacity baseline by 6-10%.
Major	Waste generated by the development will reduce regional landfill void capacity baseline by >10%.

11.4.16. The magnitude of impact from hazardous waste can be determined using Table 11-7.

Table 11-7 - Assessment criteria for the magnitude of impacts from hazardous waste

Magnitude	Description – Impact from hazardous waste
No change	Zero waste generation and disposal from the development.
Negligible	Waste generated by the development will reduce national landfill void capacity baseline by <0.1%.
Minor	Waste generated by the development will reduce national landfill void capacity baseline by 0.1-0.5%.
Moderate	Waste generated by the development will reduce national landfill void capacity baseline by 0.5-1%.
Major	Waste generated by the development will reduce national landfill void capacity baseline by >1%.

Assessing significance of impact

11.4.17. The significance of impact can be determined using the sensitivity of receptor and the magnitude of impact to identify thresholds as shown in Table 11-8.

Table 11-8 - Thresholds of impact

Sensitivity of receptor	Magnitude of impact					
	No change	**Negligible**	**Minor**	**Moderate**	**Major**
Very High	Neutral	Slight	Moderate or large	Large or very large	Very large
High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

11.4.18. Impacts which reach a threshold of moderate or above are considered significant. Where the threshold is “slight or moderate”, professional judgement should be used in combination with documented justification, to determine an outcome.

LIMITATIONS AND ASSUMPTIONS

11.4.19. There is an assumption that the whole material within the Tip 1 and Tip 2 is historic colliery spoil, as well as the total volume and approximate composition of material for reprocessing. The final land use (upland grazing) is assumed to produce no waste that requires management or human intervention.

11.4.20. Reprocessed historic colliery spoil (i.e. coal) will only be exported for industrial use such as a reductant in cement manufacturing and will not be used as a thermal fuel, such as in power stations.

11.5 BASELINE CONDITIONS

11.5.1. The baseline shall consist of all colliery spoil connected with historical usage inside the RLB of Tip 1 and Tip 2. This includes the complete depth of spoil accumulated during the active mining years.

11.5.2. There are currently no waste operations on the site, and this will serve as the baseline for post-operation/aftercare waste.

AVAILABILITY OF MATERIAL RESOURCES

11.5.3. The area where Bedwas Tips is located has been identified as being underlain with sandstone with the potential for high specification aggregate from the Mineral Resource map[156] for Southeast Wales. It falls under Category 1 Aggregates Safeguarding Areas determining that the resource is considered nationally important.

11.5.4. Category 1 resources are resources that have a national importance as inferred by the information provided in the Regional Technical Statements for both North and South Wales[157]; and national policies and guidance in Minerals Planning Policy Wales and Minerals Technical Advice Note Wales 1: Aggregates[158]. This includes aggregate minerals that are specifically referenced in policy as being of limited occurrence and therefore particularly susceptible to sterilisation in the region. As a result, these minerals are economically important due to their high quality and / or limited occurrence across the United Kingdom.

GROUND CONDITIONS

11.5.5. The ground profile consists of made ground including historic colliery spoil, glacial deposits and sandstone bedrock. The tips are identified with historic colliery spoil of about 32m depth in Tip 1 and 20m in Tip 2. Glacial clay and gravel were found beneath the area between the tips. The glacial deposits beneath the tips appear to be about 1-3m thick. Bedrock (sandstone) is then found directly beneath the glacial deposits.

EXISTING DEPOSITS OF WASTE

11.5.6. There is one historic landfill site located within 500m of the Proposed Scheme, confirmed by using NRW historic landfill site[159] data on historic landfill site boundaries:

- Navigation Street, Licence held by British Benzol - located just to the south of the lower tip area, adjacent to (within 20m of) the RLB at the old quarry at National Grid Reference E318000

[156] British Geological Survey (2006) *Mineral resource map for South-East Wales.* Available online at: *https://www2.bgs.ac.uk/mineralsuk/planning/resource.html#MRW.*
[157] Swansea Council (2020) *Regional Technical Statements for both North and South Wales.* Available online at: *https://www.swansea.gov.uk/regionaltechnicalstatement?lang=en.*
[158] Welsh Government (2004) *Minerals Technical Advice Note Wales 1: Aggregates*. Available online at: https://www.gov.wales/minerals-technical-advice-note-mtan-wales-1-aggregates.

[159] Natural Resources Wales (2023) *Historic landfill site data*. Available online at: http://lle.gov.wales/catalogue/item/HistoricLandfillSites/?lang=en.

N189400. The first input was 31/12/1929 and last input was 19/03/1990, likely to have been associated with the coke works.

11.6 PRELIMINARY IMPACT ASSESSMENT

CONSTRUCTION AND OPERATIONAL (PROCESSING) PHASE

Earthworks and Construction Materials

11.6.1. The majority of the impacts associated with the Proposed Scheme in terms of materials and waste will occur during the construction and operational (processing) phase. They relate to the extraction and use of raw materials and the generation and disposal of wastes from the Proposed Scheme.

11.6.2. The Proposed Scheme is reprocessing the spoil and restoring the land to its previous use, which remediates a significant historical colliery spoil tip and the associated liabilities of the historic colliery spoil from the environment.

11.6.3. All earthworks material utilised in the construction process will come from the excavation of the site, there will be no requirement for earthworks materials to be imported.

11.6.4. A total of 8 million tonnes of historic colliery spoil will be excavated from the existing site. The estimated excavation rate is 30,000 cubic metres per week.

11.6.5. Mobile or semi-static plant (with an appropriate permit in place) will be used to process the excavated historic colliery spoil and separate it into two end uses. Approximately 8% of the total volume of material will be reprocessed for industrial use. The remaining material will be reused on site for the recovery / remediation operation. Checks will be in place to ensure that the material is suitable for use, and any unsuitable or contaminated material will be removed off-site for disposal to a licensed facility.

11.6.6. Approximately 2,000 tonnes of Sandstone will also be excavated from the site and used in the construction of the haul road (improvement of the existing forestry track) to provide current and future access to the site. The Sandstone bedrock is estimated to be 200m thick in the Caerphilly / Bedwas area (see the Chapter 10: Geology and Soils for more information), therefore the quantity of Sandstone to be excavated and used in construction is insignificant. The top portion of rock will also be poorer quality weathered rock, therefore the quantity of rock to be excavated is not expected to impact the higher quality sandstone.

11.6.7. It is anticipated that there will also be a small quantity of other construction materials required during the construction of the Proposed Scheme, including 1,000 tonnes of cement. It is expected that the materials will be locally sourced and aim to contain 20% recycled content where possible.

Storage of Materials and Waste

11.6.8. Temporary storage areas will be provided with the capacity to store excavated material required for reuse on the Proposed Scheme. Guidance provided by the Department for Environment, Food &

Rural Affairs (Defra)[160] on the stockpiling of topsoil will be followed and topsoil will not be stored at heights greater than 3m.

11.6.9. Further measures to control the management and temporary storage of materials and waste during construction will be detailed within a Construction Environmental Management Plan (CEMP) and are therefore not covered in this assessment.

Waste

11.6.10. The following wastes may be generated from the construction of the Proposed Scheme:

- Contaminated or unsuitable excavated materials;
- Vegetation from site clearance;
- Waste associated with construction vehicle and plant maintenance; and
- Construction worker welfare wastes.

11.6.11. The waste will be source segregated using coloured skips and recycled (where possible) or disposed of off-site at licensed waste facilities.

Construction and Operation (Processing) Impacts

11.6.12. An assessment of the construction and operation impacts in terms of materials use and waste is presented in Table 11-9.

Table 11-9 - Significance of effect with regard to materials use and waste during the construction and operation phase

Receptor name	Impact	Effect	Magnitude	Significance
Onsite mineral resources (High sensitivity)	Reduction in mineral resources in the area	Depletion or sterilisation of onsite mineral resources	Minor – although the site falls within a Category 1 Aggregates Safeguarding Area and a small quantity of Sandstone will be excavated and used in construction, the works are not expected to sterilise the area and it is likely that the mineral resources may have already been affected by the previous deposits of historic colliery spoil.	Not significant
Consumption of mineral resources (Low sensitivity)	Reduction in availability of mineral resources at local quarries	Depletion of mineral resources within the region	Negligible – the Proposed Scheme will only use site-won material.	Not significant

[160] Defra (2009) *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. Available online at: Chttps://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites.

Receptor name	Impact	Effect	Magnitude	Significance
Local waste management facilities	Reduction in the waste capacity of the region	Strain upon waste management capabilities of the region	Minor – there may be a small insignificant amount of waste from construction (e.g. workers waste) and unsuitable excavated material that will require disposal to landfill.	Not significant
Landfill capacity	Reduction in the landfill capacity of the region	Strain upon waste management capabilities of the region	Minor – there may be a small insignificant amount of waste from construction (e.g. workers waste) and unsuitable excavated material that will require disposal to landfill. Waste will be diverted to recycling facilities wherever possible.	Not significant

POST-OPERATION / AFTERCARE PHASE

11.6.13. The effects of the Proposed Scheme during its post-operation phase are expected to be minimal regarding materials and waste, as there is little or no waste associated with upland grazing.

11.6.14. Effects will be principally limited to routine maintenance activities. The volume of materials generated from these activities would be small, infrequent, and unlikely to differ from the baseline conditions and therefore burden any of the surrounding waste management facilities. As such, the magnitude of impact for materials and waste for the post-operation phase is assessed as 'negligible' and the significant of impact is 'not significant'.

11.7 MITIGATION, ENHANCEMENT AND MONITORING

MITIGATION AND MONITORING

Mitigation

11.7.1. Mitigation measures are proposed to reduce the volume of material disposed to landfill using the principles of the waste hierarchy in line with the Waste Framework Directive and complying with industry best practice. This means that disposal to landfill would be the final option and the potential for sites in the area to act as a receiver for the material.

11.7.2. Measures will be implemented to collectively mitigate the impacts identified from both the use of materials and the management of waste in relation to the Proposed Scheme. There is significant synergy between material re-use and the avoidance of the generation of waste, and therefore there is a substantial overlap between the mitigation measures for materials and waste.

11.7.3. The importance of careful management of materials to promote re-use and waste reduction has been widely recognised by the construction industry. Both legislation and voluntary best practice mechanisms have been developed and implemented. These provide measurable and accountable processes and provide the basis for mitigating environmental effects associated with materials and waste.

11.7.4. Waste from construction activities is likely to be generated from surplus site-won materials (from excavations of natural and made ground). The reuse of site won materials would be subject to

conformance with material specification and assessment criteria to ensure suitability for use. Any materials that do not initially comply with suitable for use criteria would be treated or processed until suitable for reuse.

11.7.5. The principal mitigation measure relating to this topic will be the development and implementation of a Construction Environmental Management Plan (CEMP). The CEMP will be developed during the detailed design phase (i.e. before the start of construction) and implemented during construction phase. The CEMP will include the following:

- Details of the approach to environmental management throughout the construction and operation phase, with the primary aim of mitigating any adverse impacts from construction activity on the identified sensitive receptors;
- Methods for the prevention and control of any potential short-term construction phase impacts (e.g. construction dust, and the risk of accidental spillages of contaminating materials) and also permanent impacts (e.g. disturbance to vegetation, archaeology and heritage);
- Good materials management methods, such as location of temporary haul routes and re-use of temporary works materials from haul routes, plant and piling mattresses etc; and
- Risk / impact-specific method statements and strategic details of how relevant environmental impacts will be addressed throughout the Proposed Scheme.

11.7.6. A Materials Management Plan (MMP) will also be developed and implemented. An MMP will:

- Demonstrate the quantity of material to be reused on site;
- identify the origin of the material to be used on site, and / or identify the receiver site for surplus material; and
- demonstrate that the material is suitable for reuse and there would be no risk to either human health or the environment by reusing the material either on site or on the receiver site.

11.7.7. An MMP allows for imported material to come from donor sites for reuse and prevents the material being classified as waste. The MMP controls the quantity of this excavated material classified as waste and this may require the material to be managed in accordance with the Definition of Waste: Development Industry Code of Practise (CL:AIRE, 2011).

11.7.8. In addition, the MMP outlines the material management options for donor sites. Both for material that remains unsuitable for reuse such as surplus topsoil that may be suitable for use on other donor sites and where sites could act as a receiver site allowing material from other sites where the material may meet the specifications thus avoiding the waste classification subsequent disposal of material to landfill.

11.8 RESIDUAL IMPACT ASSESSMENT

11.8.1. To recognise any residual effects, potential impacts and consequences are revalued while taking into account any recognised mitigating actions.

11.8.2. Careful management of material from the earthworks can avoid material that is not suitable to be reused onsite being sent to landfill. Material treated or processed and then reused onsite would reduce what is required for disposal.

11.8.3. It is reasonable to assume, that if the material unsuitable for reuse cannot be used onsite then as part of the mitigation in the MMP, the material is more likely to be managed in a Waste Transfer Station than sent to landfill.

11.8.4. The effect on the availability of material resources and the impact on the depletion of non-renewable resources is neutral or slight and the environmental effects is not significant. There is no secondary mitigation relevant for the material resources use and the effect remains as neutral or slight, which is not significant.

11.8.5. On the basis that no secondary mitigation or enhancement measures are proposed, the residual effect remains neutral or slight and is not significant.

11.9 CUMULATIVE EFFECTS

11.9.1. There may be additional impacts on materials use and waste disposal when assessed in combination with other Proposed Schemes. However, there are no cumulative developments identified within 1km of the Proposed Scheme which would have an effect on the assessment.

11.10 SUMMARY

11.10.1. This chapter has assessed the potential effects associated with material resources and waste for the Proposed Scheme.

11.10.2. The Proposed Scheme is reprocessing the spoil and restoring the land to its previous use, which remediates a significant waste tip and the associated liabilities of the historic colliery spoil from the environment.

11.10.3. All earthworks material utilised in the construction process will come from the excavation of the site, therefore there will be no requirement to import earthworks material. Checks will be in place to ensure that the material is suitable for use, and any unsuitable or contaminated material will be removed off-site for disposal to a licensed facility. It is anticipated that there will also be a small quantity of other construction materials required during the construction of the Proposed Scheme, including 1,000 tonnes of cement. Therefore, as the Proposed Scheme will utilise site-won material and the quantity of other construction materials required is expected to be small (being locally sourced and containing a minimum of 20% recycled content where possible), the impact on the availability of materials during the construction and operation phase has been assessed as neutral or slight, which is not significant.

11.10.4. There may be a small insignificant amount of other waste generated from the construction phase e.g. construction worker welfare wastes. The waste will be source segregated using coloured skips and recycled (where possible) or disposed of to licensed off-site waste facilities. Therefore, the impact on the capacity of local waste management infrastructure during the construction and operation phase has been assessed as neutral or slight, which is not significant.

11.10.5. Effects from the operational phase will be limited to routine maintenance activities. The volume of materials generated (or required by) these activities would be small, infrequent, and unlikely to differ from the baseline conditions. Therefore, the impact on the availability of materials and the capacity of local waste management infrastructure during the post-operation/aftercare phase has been assessed as neutral or slight, which is not significant.

11.10.6. Overall, the Proposed Scheme is not expected to give rise to significant effects with respect to materials and waste.

12 NOISE

12.1 INTRODUCTION

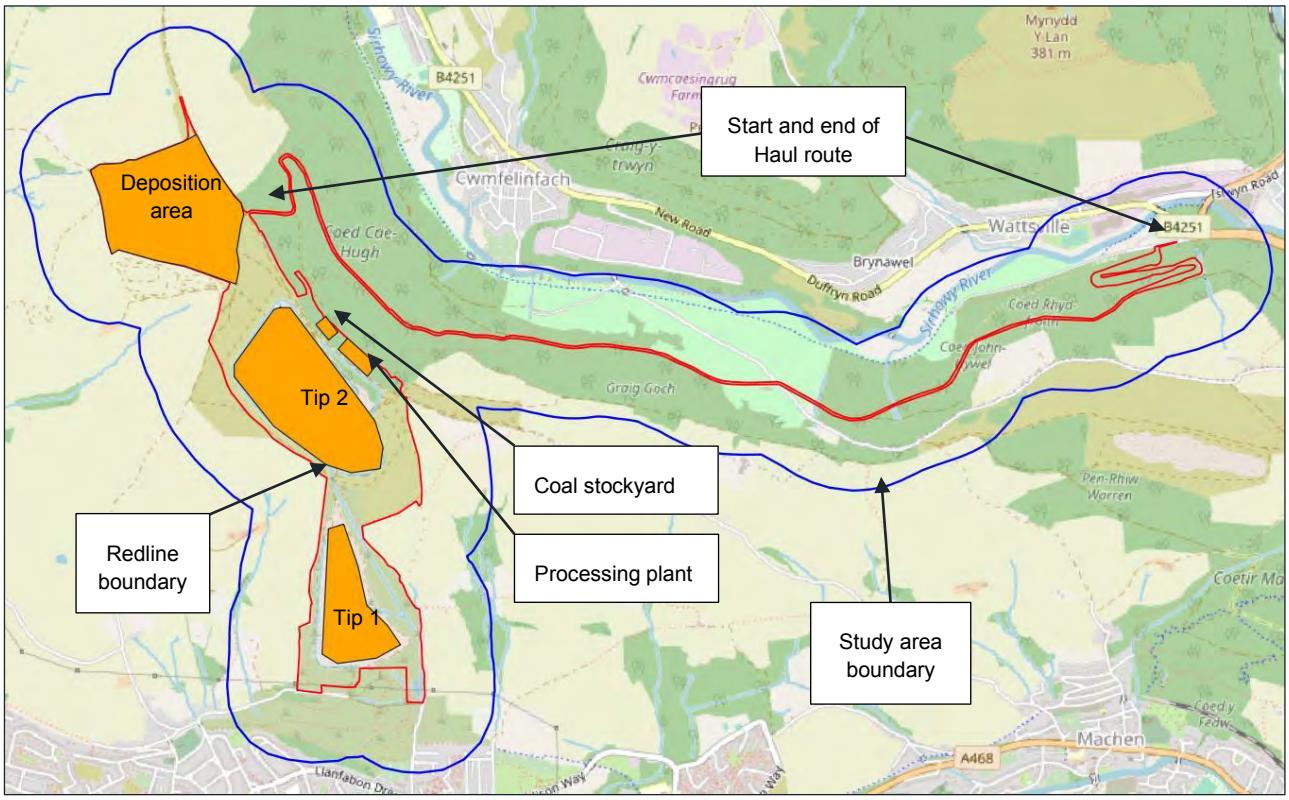
12.1.1. This chapter assesses the potential noise effects upon the existing noise sensitive receptors in the vicinity of the Proposed Scheme from the construction activities at the site. Activities that are assessed include the extraction, deposition and repositioning of the tips, the processing of material at a plant site, and associated traffic. Construction traffic effects on highway scoped out due to being below thresholds. Construction/improvement works for the haul road have also been scoped out as it is unlikely for the works to continue for more than 10 days in a row with 300m of any of the receptors identified.

12.1.2. No potential vibration sensitive receptors have been identified within 100m of the works, which is the typical area where works may give rise to noticeable vibration. Consequently, vibration effects have been scoped out of this assessment. There will not be any noise sources during the operation of the Proposed Scheme (which is represented by the remediated land). Therefore, operational noise effects have been scoped out.

STUDY AREA

12.1.3. The study area has been defined as the area within 300m of Proposed Scheme's Red Line Boundary (RLB). This is a wider area than typically considered for construction works but it was considered appropriate given the rural nature and the varying topography of the area. The segments shown include the areas required for the extraction, transport and deposition of the tips (see Figure 12-1).

Figure 12-1: Construction phase study area



12.2 LEGISLATION AND POLICY

LEGISLATION

12.2.1. The Control of Pollution Act 1974 Section 60 defines the control of noise on construction sites. Section 61 describes the obtention of prior consent for work on construction sites. In the same Act, Section 71 requires Welsh Ministers (as transferees of the functions of the Secretary of State) to approve a code of practice for the carrying out of works to which section 60 applies. Section 72 defines Best Practicable Means when referred to construction.

12.2.2. The Noise from Audible Intruder Alarms (Wales) (Revocation) and Control of Noise (Codes of Practice for Construction and Open Sites) (Wales) Order 2017, approves British Standard BS 5228-1:A1:2014 for the purpose of giving guidance on appropriate methods for minimising noise from construction sites, as required by Section 71 of the Control of Pollution Act 1974.

PLANNING POLICY

12.2.3. Planning Policy Wales (PPW) Edition 11 February 2021161 constitutes the relevant national policy in terms of noise. The section about Restoration and Aftercare of Mineral sites does not include specific policies on noise.

12.2.4. Paragraph 6.7.26 of the Policy on Managing Potential Environmental Risk Arising through Construction Phases states that "Planning authorities must consider the potential for temporary environmental risks, including airborne pollution... arising during the construction phases of development. Where appropriate, planning authorities should require a construction management plan, covering pollution prevention, noisy plant, hours of operation… and details for keeping residents informed about temporary risks."

12.2.5. Paragraph 2.51 and 2.9 of Caerphilly County Borough (CCB) Local Development Plan (LDP) up to 2021 adopted November 2010162 provides the relevant local planning policies on noise and amenity respectively:

- Policy CW 23 – Locational Constraints – Mineral Site Buffer Zones Section 2.51 states "Buffer zones aim to reduce the conflict between mineral extraction / processing and vibration from blasting. No new mineral development will be permitted within the buffer zone to prevent encroachment towards the sensitive land uses. No new sensitive development will be permitted both to prevent any encroachment but also to prevent an additional constraint for the mineral working."
- Policy CW 2 – Amenity Section 2.9 states "Development proposals must have regard for all relevant material planning considerations in order to satisfy the following requirements:
  - There is no unacceptable impact on the amenity of adjacent properties or land.
  - The proposal would not result in overdevelopment of the site and / or its surroundings.

[161] Welsh Government (2021) *Planning Policy Wales, February 2021*. Available online at: https://www.gov.wales/planning-policy-wales.

[162] Caerphilly County Borough Council (2010) *Local Development Plan (2010 (Adopted)).* Available online at: https://www.caerphilly.gov.uk/business/planning-and-building-control-for-business/local-development-plan/local-development-plan-2010-(adopted).

- The proposed use is compatible with surrounding land-uses and would not constrain the development of neighbouring sites for their identified land-use.
- Where applicable, the viability of existing neighbouring land uses would not be compromised by virtue of their potential impact upon the amenity of proposed new residential development."

12.3 GUIDANCE

12.3.1. The following guidance documents have been considered in this chapter:

- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration on construction and open sites. Noise;
- Minerals Planning Guidance: The Control of Noise at Surface Mineral Workings. (MPG 11 April 1993; Department of Environment and Welsh Office)[163]; and
- Minerals Technical Advice Note 2: Coal, January 2009[164].

12.4 ASSESSMENT METHODOLOGY

ASSESSMENT OF SHORT-TERM IMPACTS CONSTRUCTION PHASE

12.4.1. In addition to constituting the approved code of practice for the purpose of giving guidance on appropriate methods for minimising noise from construction sites, BS 5228-1 also includes several methodologies in order to assess the potential impacts arising from construction noise.

12.4.2. **Table 12.1** shows the BS 5228-1 'ABC' method, which categorises the sensitivity of the surrounding area to construction noise as a function of the current noise levels in that area. Thus, construction noise is more likely to be perceived to be present and intrusive in areas with low existing noise levels (Category A), than in areas with intermediate (Category B), or high noise levels (Category C).

12.4.3. Construction noise levels outside dwellings exceeding **Table 12.1** thresholds for a relevant period of time are likely to cause an adverse effect. A relevant period of time is considered to be 10 days (or nights) in any 15 consecutive days or at least 40 days of any six consecutive months. If construction noise levels slightly exceed those thresholds levels for a short period of time, these are typically considered bearable for most of the population.

Table 12.1: BS 5228-1 ABC method threshold of potential significant effects at dwellings

Period	Threshold value in dB $L_{Aeq,T}$		
	Category A[A]	Category B[B]	Category C[C]
Night-time (23:00-07:00)	45	50	55
Evening and weekends	55	60	65

[163] Department of the Environment Welsh Office (1993) *Mineral Planning Guidance 11*. Available online at: https://www.gov.wales/sites/default/files/publications/2019-01/minerals-planning-guidance-11.pdf.

[164] Welsh Government (2009) *Minerals Technical Advice Note 2: Coal, January 2009.* Available online at: https://www.gov.wales/sites/default/files/publications/2018-11/minerals-technical-advice-note-mtan-wales-2-coal.pdf.

Period	Threshold value in dB $L_{Aeq,T}$		
	Category A[A]	Category B[B]	Category C[C]
Daytime (07:00-19:00) and Saturday (07:00-13:00)	65	70	75

[A] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

[B] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

[C] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[D] 1900-2300 weekdays, 1300-2300 Saturdays and 0700-2300 Sundays.

12.4.4. For construction works involving substantial earth moving for a period exceeding six months, BS 5228-1 Section E.5 considers that these construction works might be more akin to surface mineral extraction than to conventional construction activity. In this situation, paragraphs 31-42 of MPG11: The Control of Noise at Surface Mineral Workings (1993) suggests a limit of 55dB $L_{Aeq,1h}$ (free-field) is adopted for daytime construction noise for these types of activities, however it also suggests that in some circumstances a higher nominal limit of 55 – 60dB $L_{Aeq,1h}$ (free-field) may normally be justified. However, in this study a level of 55dB $L_{Aeq,1h}$ (free-field) is considered in line with good working practice.

12.4.5. The construction works of the Proposed Scheme are expected to last for six months.

SENSITIVE RECEPTORS

12.4.6. Noise sensitive receptors are defined as any occupied premises outside a site used as dwellings (including gardens), places of worship, educational establishments, hospitals or similar institutions, or any other properties likely to be adversely affected by an increase in noise levels.

12.4.7. The effects of noise on noise sensitive receptors are varied and complex. They include interference with speech communication, disturbance of work or leisure activities, disturbance of sleep, annoyance and possible effects on mental and physical health. In any neighbourhood, some individuals will be more sensitive to noise than others.

SIGNIFICANCE CRITERIA

12.4.8. After the assessment of short-term impacts in line with BS 5228-1, other considerations will be utilised to arrive to the conclusion on whether significant adverse effects are likely. Some of these considerations are as follows:

- Whether the adverse noise effects are limited to nuisance, causing a change of behaviour and therefore affecting the quality of life; or otherwise the adverse noise effects cause disturbance, potentially affecting health;
- Whether the adverse noise effects are so widespread that affect the community as a whole; or otherwise only effect a very limited number of noise-sensitive receptors at a level which can be considered ‘private’; and
- The duration of the adverse effects.

LIMITATIONS AND ASSUMPTIONS

12.4.9. A construction model has been created with the environmental noise prediction software CadnaA (version 2022 MR 1 - build 191.5229). CadnaA includes the prediction model of BS 5228-1 Annex F for estimating noise from construction sites.

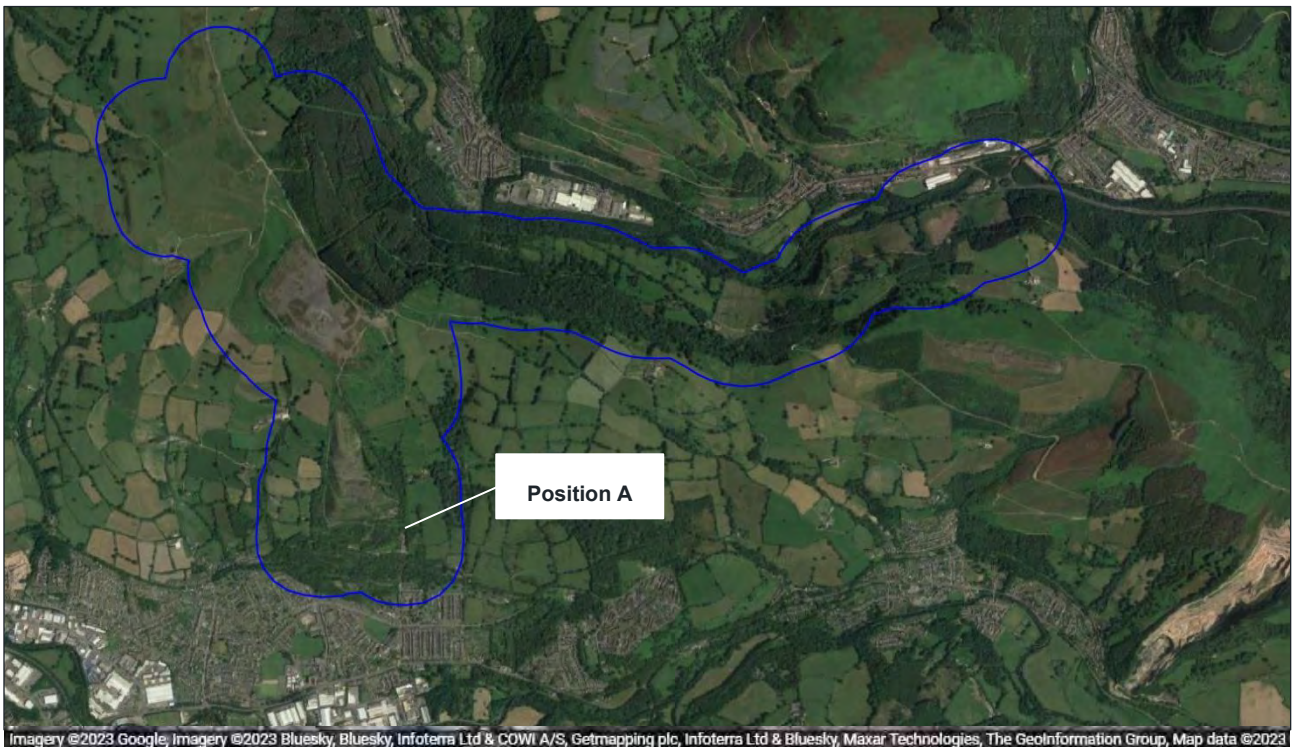
12.4.10. The following assumptions apply to the assessment presented in this chapter:

- The proposed hours of site operation will be 6am – 10pm weekdays and 7am – 10pm on Saturdays. At other times, only maintenance would be carried out;
- The transport of material will require approximately 18 truckloads daily, 90 weekly averaged over a period of 60 months. As an assumption, total daily Heavy Goods Vehicle (HGV) movements have been evenly distributed over a working shift of 16 hours a day;
- HGV passby noise exposure of significance has been assumed to last for a duration of 30 seconds travelling on the haul route at an average speed of 32km/h at the worst affected façades of the noise sensitive receptors identified in the study area;
- It has been assumed that the total journey time on the haul route to be 15 minutes for an HGV from the start of the route at the coal tips until joining on to the A467 at the Sirhowy Valley Park Roundabout, the route as indicated in Figure 12-1;
- Excavation and tip hauling would cease at 6pm each evening;
- Loading of spoil into the plant by front loader will continue at the site of the washery located to the north east between 6pm – 10pm;
- The haul road construction / upgrades will not exceed 10 consecutive days for any of the noise sensitive receptors identified and is therefore phased out of further assessment;
- The construction works at the coal tips will be carried out by a tracked crusher, dozer, two HGVs and an excavator mounted rock breaker. Since no noise emission data has been made available for these items of plant; sound level data in BS 5228-1 Annex C on site equipment and site activities have been used. Specifically, the following sources from Table C.6 Sound level data on opencast coal site, Table C.8 Sound level data on waste disposal sites, Table C.9 Sound level data on hard rock quarries and Table C.10 Sound level data on other quarries (i.e. sand and gravel):
    - Table C.6 item no 26: Articulated dump truck with a sound pressure level at 10m of 79dB $L_{Aeq,T}$;
    - Table C.8 item no 9: Articulated dump truck with a sound pressure level at 10m of 79dB $L_{Aeq,T}$;
    - Table C.9 item no 13: Excavator mounted rock breaker with a sound pressure level at 10m of 95dB $L_{Aeq,T}$;
    - Table C.9 item no 6: Tracked hydraulic excavator with a sound pressure level at 10m of 91dB $L_{Aeq,T}$; and
    - Table C.10 item no 12: Articulated dump truck with a sound pressure level at 10m of 79dB $L_{Aeq,T}$.

12.5 BASELINE CONDITIONS

12.5.1. **Figure 12-2** shows the noise study area (typically defined as the area within 300m of the Proposed Scheme's RLB). The site is located north of Trethomas and Bedwas and comprises an area previously occupied by Bedwas Colliery. The character of the area is rural, with Ty Canol Farm approximately 250m to the east of Tip 1, two cottages near Colliery Rd approximately 130m and 250m to the west of Tip 1, MG Watts Farm approximately 250m to the west of Tip1. Ynys Hywel Centre is located approximately 800m to the northeast of Tip2, G Owens Farm is located along the Haul Route and residential dwellings near the B4251.

Figure 12-2: Construction and operational phase study area



12.5.2. A noise survey to define the acoustic character of the area was carried out by an experienced WSP acoustician. A noise logger was left unattended at one location, indicated in **Figure 12-2** as Position A, for the period between 4 April and 11 April 2023.

12.5.3. Noise levels at Position A were dominated by wildlife and nature sounds. Noise from hedge trimmers and farm vehicles was noted on the return visit to the site. Adverse weather was also noted via weather monitoring on 10 and 11 April, therefore, these two dates have been excluded from our data analysis.

12.5.4. **Table 12.2** presents the average weekday results measured at the noise monitoring position. Nature sounds are the dominant source in this area in line with the rural character of the site, occasional farm associated noises are the secondary contributor to the overall makeup of the soundscape.

Table 12.2: Noise levels according to BS-5228-1 'ABC' method periods

Position	Measured Sound Pressure Levels (dB)		
	$L_{Aeq,12h}$ weekday daytime	$L_{Aeq,4h}$ weekday evening	$L_{Aeq,8h}$ night-time
A	48	46	41

12.5.5. The noise sensitive receptors around the site are in quiet locations and would be classified as Category A in **Table 12.1** above.

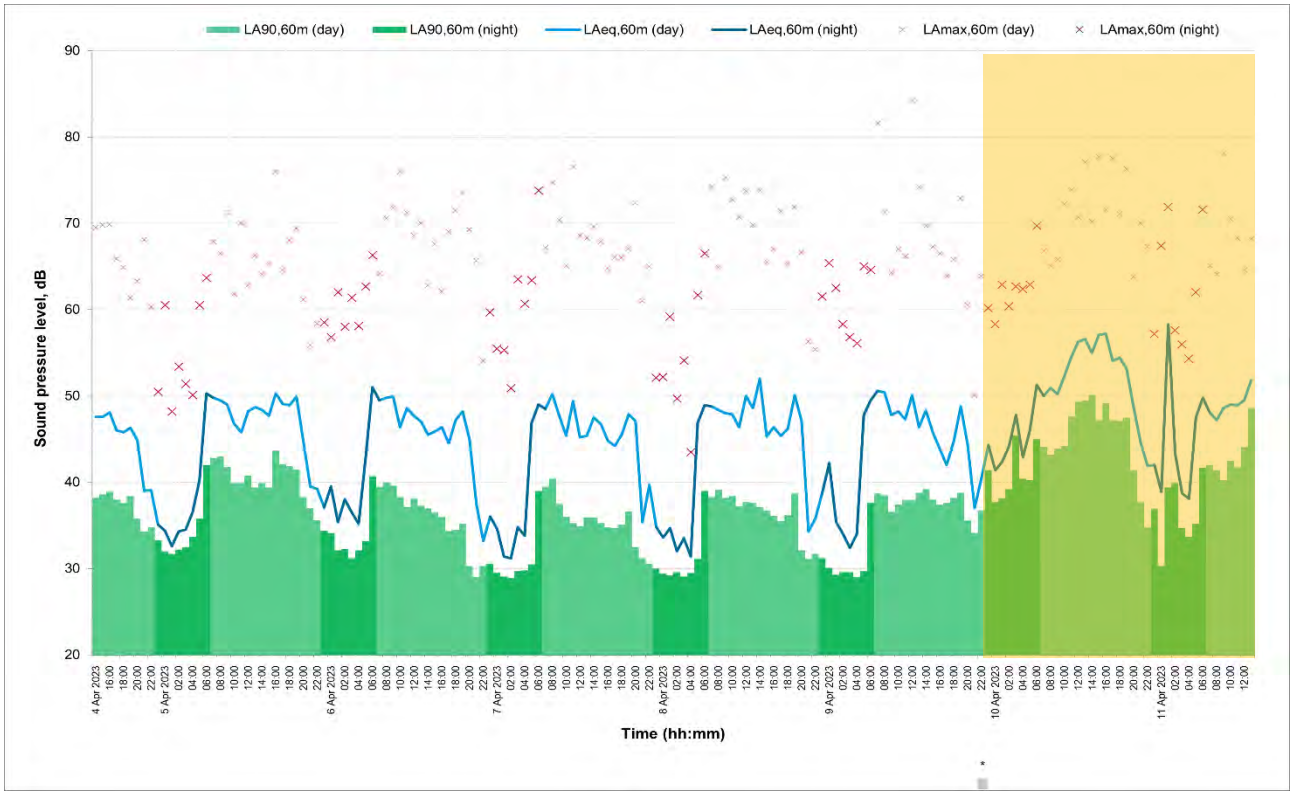
12.5.6. The proposed site operational hours are 6am – 10pm weekdays and 7am – 10pm on Saturdays. At other times, only maintenance work would be carried out.

12.5.7. Based on the results of the long term noise survey, the noise levels follow a daytime pattern beginning at around 6am and start to subside by 7pm. The noise levels subside between 8pm – 10pm. We have thus considered daytime as 6am – 7pm, evening as 7pm – 10pm.

12.5.8. Data from Monday 10 April to Tuesday 11 April has been discarded from our analysis due to presence of hedge trimmers in the vicinity of the monitoring location coupled with periods of adverse weather conditions.

12.5.9. **Figure 12-3** below shows the time history graph of the long-term noise survey, the area in orange corresponds to data that has been discarded from all analysis.

Figure 12-3: Time history graph of noise survey



12.6 IMPACT ASSESSMENT

CONSTRUCTION PHASE

12.6.1. A noise model has been created to predict the expected noise levels during construction. The construction works will include the excavation of material from the existing tips, deposition, and on-site processing of extracted material. The processed material is then to be transported along a haul route eventually joining with the A467. The lower tip (Tip 1) will be extracted first. The assumptions and working conditions introduced in the noise model have been detailed in the subsection Limitations and Assumptions in paragraph 12.4.10 above.

12.6.2. **Table 12.3** presents the predicted noise levels at the surrounding noise-sensitive receptors. **Figure 12-4** below shows the closest noise sensitive receptors considered in this study. The results are presented in terms of average noise levels ($L_{Aeq,1h}$) which represent the average noise level along a working day, where the different excavators and other items of plant are working around each of the site areas. Construction noise levels are also presented in terms of the highest noise level ($L_{Aeq,1h,highest}$) which is the expected noise level if all the plant in an area were all concentrated in the area closest to the receptor. In practice, this would only occur occasionally.

Table 12.3: Predicted construction noise levels as daily averages and highest levels

Receptor	Construction noise levels [dB(A)]		
	$L_{Aeq,1h,typical}$ Tip 1	$L_{Aeq,1h,typical}$ Tip 2	$L_{Aeq,1h,typical}$ Haul road
G Owens Farm	41	41	38
Ty Canol Farm	55	38	36
Cottages near Colliery Rd	55	40	20
MG-Watts Farm	51	39	28
Ynys Hywel Centre	41	42	38
Residents near B4251	38	38	38

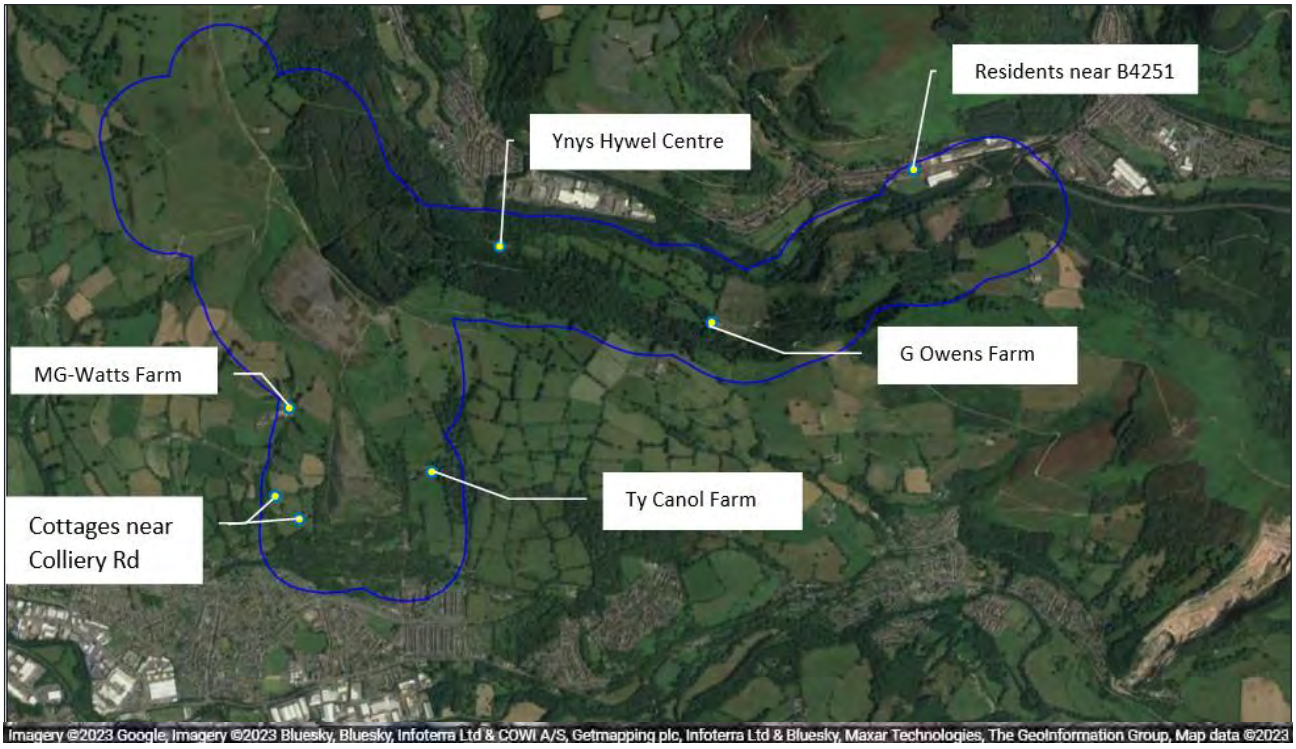
12.6.3. Construction noise levels at the closest noise sensitive receptors considered in this study are predicted be approximately 55 dB $L_{Aeq,T}$.

12.6.4. The receptors most affected during Tip 1 works would be Ty Canol Farm, Cottages near Colliery Rd and MG-Watts Farm.

12.6.5. During Tip 2 works, the receptors most affected would-be Cottages near Colliery Rd, Ynys Hywel Centre and G Owens Farm.

12.6.6. The haul route would be the largest noise contributor for all the rest of the noise sensitive receptors considered in this study (shown in **Table 12.3**).

Figure 12-4: Noise sensitive receptors



12.6.7. As detailed in Section 12.4, BS 5228-1 suggests a limit of 55 dB $L_{Aeq,1h}$ (free-field) for daytime and evening construction noise for earth moving activities likely to occur for a period in excess of six months. As shown in **Table 12.3** above this limit is not typically breached during the daytime periods considered in this study for any of the receptors considered in this study. On this basis, the noise effects arising during the works would not be significant during day-time hours.

12.6.8. BS 5228-1 suggests a limit of 55 dB $L_{Aeq,1h}$ (free-field) for daytime and evening construction noise for earth moving activities likely to occur for a period in excess of six months. Based on the assumptions regarding plant items, their operation and location with respect to the closest noise sensitive receptors and the assumption that excavation and tip hauling would cease at 6pm, the potential for the 55dB $L_{Aeq,1h}$ (free-field) limit being exceeded during the evening hours (as specified in Section 12.5.7) at Ty Canol Farms and Cottages near Colliery Road, which are the closest noise sensitive receptors to Tip 1 is low. Accordingly, no significant noise effects arising from the proposed development are predicted to arise during evening hours at any of the nearest residential receptors.

12.6.9. No residential receptors are expected to experience noise level exceedances as a result of construction activities at Tip 2.

12.7 MITIGATION, ENHANCEMENT AND MONITORING

MITIGATION AND MONITORING

Short-term Impacts

12.7.1. The following mitigation in the form of best practicable means is envisaged:

- The programme of works will be communicated to the closest residents. The residents will be provided with the Contractor contact details. If complaints are received, the contractor will monitor the construction noise levels at Ty Canol Farm and cottages near Colliery Road. If these are found to be continuously exceeding the 55 dB $L_{Aeq,1h}$ limit, mitigation measures will be introduced to reduce construction noise such as noise barriers at the properties; and
- Construction/operational works should only take place during site hours as specified in Section 12.4.10 above.

12.8 CUMULATIVE EFFECTS

12.8.1. Works are expected to last five years in duration, this has been considered in order to determine the threshold of potential adverse effects in line with BS 5228-1.

12.9 SUMMARY

12.9.1. This chapter has assessed the potential noise effects during the construction phase of the Proposed Scheme. BS 5228-1:A1:2014 is the approved code of practice for the purpose of giving guidance on appropriate methods for minimising noise from construction sites, as required by Section 71 of the Control of Pollution Act 1974.

12.9.2. BS 5228-1 suggests a limit of 55dB $L_{Aeq,1h}$ (free-field) for daytime and evening construction noise for earth moving activities likely to occur for a period in excess of six months and a level of 45 dB $L_{Aeq,1h}$ (free-field) for night-time. The cumulative duration of the works is in excess of six months. These limits are not expected to be exceeded at any residential receptor for a period in excess of six months. Consequently, noise adverse effects during construction are considered negligible.

12.9.3. Construction vibration and operational noise and vibration effects were scoped out at the scoping stage.

13 WATER ENVIRONMENT

13.1 INTRODUCTION

13.1.1. The purpose of this chapter is to provide an assessment of the potential generic and specific impacts on the water environment likely to arise as a result of the Proposed Scheme during the construction and operational phases. Aspects of the water environment considered in this assessment are hydrology, flood risk and water quality.

13.1.2. This chapter assesses any changes to rivers quality and hydromorphology that could occur as a result of the Proposed Scheme and the impact of these upon the Water Framework Directive (WFD) classification of the water features, based on a supporting WFD Compliance Screening Assessment (V3-S13/0001). Also considered are the potential impacts on surface water drainage and flooding based on a Flood Consequences Assessment (FCA) (V3-S13/0002) The principal features of the water environment that are referred to throughout this chapter can be seen in V2-S13/0001.

13.1.3. The drainage and surface water design has been iteratively updated to reflect issues identified during the impact assessment, as such conclusions reported within this document reflect the current design inclusive of embedded mitigations.

13.1.4. The impact of the Proposed Scheme on groundwater quality and quantity are considered separately in Chapter 10: Geology and Soils. Potential impacts from changes in groundwater quantity or quality to surface water and groundwater flooding are addressed within this chapter.

13.2 STUDY AREA

13.2.1. The Proposed Scheme lies at the head of both the Rhymney River and the Sirhowy River valleys, and so the site drains towards both of these watercourse catchments. As such the study area focuses on these two river valleys surrounding the Proposed Scheme.

13.2.2. The study area covers the extent of the Proposed Scheme area with a 2km buffer surrounding the site boundaries, as depicted in V2-S13/0001. This covers the aforementioned catchments as well as the network of minor drains and watercourses located both within the site and immediately surrounding the site.

13.3 LEGISLATION AND POLICY

13.3.1. The following list sets out the principal legislation and European, national, regional and local policies of relevance to the assessment on water quality and flood risk.

WATER ENVIRONMENT (WATER FRAMEWORK DIRECTIVE) (ENGLAND AND WALES) REGULATIONS 2017 (TRANSPOSED INTO UK LAW 2020)

13.3.2. The Water Framework Directive (Directive 2000/60/EC) established a framework across the European Union for the protection of water bodies (including terrestrial ecosystems and wetlands directly dependent upon them) which aims to prevent further deterioration, enhance their status, promote sustainable water use, reduce pollution and mitigate the effects of floods and droughts. This was subsequently transposed into UK law. Water bodies include surface waters (rivers, large lakes, canals, transitional and coastal waters) and groundwater bodies (superficial and bedrock aquifers). The baseline condition of all water bodies was presented in the River Basin Management Plans (RBMPs) in 2009, with Wales being split into its major river basin catchments. The RBMPs

2015 provided Cycle 2 and 2021 provided Cycle 3 updates and there is a further cycle to be repeated in 2027, by which point all waterbodies should be achieving Good status.

SEVERN RIVER BASIN DISTRICT RIVER BASIN MANAGEMENT PLAN (RBMP) (2015)

13.3.3. This document sets out the current state of water bodies within the Severn River Basin District and identifies the key pressures affecting the water environment. It also sets out environmental objectives for protecting and improving water bodies as well as a programme of measures, actions needed to achieve these objectives. This plan also reports on progress since the original 2009 plan.

FLOOD AND WATER MANAGEMENT ACT (2010)

13.3.4. The Flood and Water Management Act aims to manage and reduce flood risk posed to people, homes and businesses, as a result of increased climate change whilst helping to safeguard community groups from unaffordable rises in surface water drainage charges and protecting water supplies to consumers.

PLANNING POLICY WALES (2018)

13.3.5. Planning Policy Wales (PPW) sets out the land use planning policy for Wales and provides the policy framework for the effective preparation of local planning authorities' development plans.

13.3.6. Section 6.6 of PPW provides specific policies to protect people and property from flooding which must be implemented by all local planning authorities. The PPW also ensures that local planning authorities adopt a sequential approach to their decision making, steering development away from flood risk areas. Where development must be in locations at risk from flooding, local authorities are to ensure that the development is resilient or resistant to flooding and safe for use, without increasing risk to others.

13.3.7. This policy is also supplemented by Technical Advice Note (TAN) 15 (discussed below) amongst others.

CCBC FLOOD RISK MANAGEMENT PLAN (2015)

13.3.8. This Plan seeks to minimise the risk to communities to flooding by better understanding the risk from all sources and identifying measures to benefit communities and the natural environment. In doing so, the Flood Risk Management Plan takes forward the objectives and measures set out in the Local Flood Risk Management Strategy (LFRMS) described below.

CCBC LOCAL FLOOD RISK MANAGEMENT STRATEGY (2013)

13.3.9. Under the Flood and Water Management Act 2010, Caerphilly County Borough Council (CCBC) became a Lead Local Flood Authority (LLFA) and was given the duty to develop, maintain, apply and monitor a strategy for local flood risk management (the LFRMS), balancing the needs of communities, the economy and the environment. The LFRMS only deals with local flood risk which is defined in the act as being a flood risk from surface runoff, groundwater and ordinary watercourses.

13.3.10. The LFRMS requires new development to implement controls to restrict runoff to a rate no greater than the existing rate, although volume of total runoff may increase.

13.3.11. Groundwater flooding is not considered to be a high risk in CCBC but is difficult to predict as water must to percolate through clay before entering former mine workings. Since the closure of the mines,

pumping has ceased and many workings have filled with water, which sometimes escapes through mine entrances and shafts, occasionally discharging in unexpected locations.

CAERPHILLY COUNTY BOROUGH LOCAL DEVELOPMENT PLAN (2010)

13.3.12. The Caerphilly County Borough Local Development Plan (LDP) was adopted by the Council in November 2010. This provides the basis for determining planning applications, covering a 11-year period up to 2021.The policy which relates closest to the water environment is Policy CW5 'Protection of the Water Environment'.

13.4 GUIDANCE

13.4.1. The following guidance documents were referred to during the production of this chapter:

ICE ENVIRONMENTAL IMPACT ASSESSMENT HANDBOOK (ICE, 2019)

13.4.2. The Water Environment Chapter of the Environmental Statement (ES) will, like the majority of the report, be written using the Insitution of Civil Engineers (ICE) EIA Handbook for guidance, specifically chapter 7.5 of the handbook, which focuses on water. This has formed the basis for the allocation of 'values' to receptors and 'magnitudes' of impacts described below.

PINS ADVICE NOTE 18: THE WATER FRAMEWORK DIRECTIVE (PINS, 2017)

13.4.3. This advice note produced by the planning inspectorate provides guidance on the WFD, its purpose, legal context and its implications on development consent in the UK. Although the note is intended to be applied for Nationally Significant Infrastructure Project, it provides a helpful description of the various stages of a WFD assessment and the considerations to be made at each of these.

UPDATED LOCAL AUTHORITY SERVICES AND THE WATER ENVIRONMENT - ADVICE NOTE ON THE WATER FRAMEWORK DIRECTIVE (NRW AND WLGA, 2017)

13.4.4. This advice note produced by NRW and the Welsh Local Government Association (WLGA) provides further guidance on WFD, within the specific context of Wales, aimed primarily at Welsh Local Authorities.

TECHNICAL ADVICE NOTE 15 - DEVELOPMENT AND FLOOD RISK (WELSH GOVERNMENT, 2004)

13.4.5. This TAN provides technical guidance which supplements the policy set out in Planning Policy Wales in relation to development and flooding. It advises on development and flood risk and provides a framework within which risks arising from both river and coastal flooding, as well as from additional run-off from development in any location, can be assessed.

SUSTAINABLE DRAINAGE SYSTEMS STANDARD FOR WALES (2018) AND SUSTAINABLE URBAN DRAINAGE (SUDS) STATUTORY GUIDANCE (2019)

13.4.6. These form the Welsh Governments National standards. Schedule 3 to the Flood and Water Management Act 2010 establishes the SuDs Approving Body (SAB) in Wales. As such, any proposed drainage systems are to be evaluated and approved by the SAB.

13.5 ASSESSMENT METHODOLOGY

Study Area

13.5.1. The study area for this impact assessment has been determined to reflect the nature and magnitude of the proposals, considering impacts on surface water bodies within a radius of 2km of the Proposed Scheme Red Line Boundary (RLB). The extent of the study area can be seen in V2-S10/0001.

Baseline data collection

13.5.2. Sensitive receptors and baseline conditions have been established utilising the following sources:

- Flood Zone Maps produced by Natural Resources Wales (NRW). These maps display the extent of flooding that would occur on the basis that no flood defences are in place and describe the extent to which land is afforded protection by the presence of defences. This includes from rivers, surface water and reservoirs;
- Surface Flood Water Maps produced by NRW;
- Water Watch Maps produced by NRW. These maps are a collection which display the WFD Cycle 1, Cycle 2 and Cycle 3 information, including water body measure and objectives;
- Groundwater Vulnerability Maps produced by the British Geological Society;
- National River Flow Archive provided by the Centre for Ecology & Hydrology;
- River Basin Management Plan produced by NRW and the Environment Agency; and
- Ordnance Survey (OS) Terrain 5.

13.5.3. A drainage survey has been undertaken on site, to identify the location and nature of minor watercourses and drains within the RLB.

13.5.4. In addition, reference has been made to the Ground Investigation Report by White Young Green (WYG) in 2002 and the Generic Quantitative Risk Assessment (GQRA) undertaken by Capita Real Estate and Infrastructure in 2020. Following completion of the ground investigations in 2019/2020, contaminant concentrations were analysed using a GQRA based on safe levels for 'Public Open Space' end use in accordance with Contaminated Land: Applications in Real Environments (CL:AIRE) guidance.

13.5.5. Photographs collected during ecological, landscape and visual site visits were also utilised.

SIGNIFICANCE CRITERIA

13.5.6. The significance of potential impacts on water environment receptors has been determined in a consistent manner to cover impacts occurring both during the construction of the Proposed Scheme as well as during its operation. The significance of these impacts is based on:

- The ‘value’ (or sensitivity) of the receptor, taking into consideration its function, legal and policy framework protection status as well as other social and environmental factors, on a scale of sensitivity from ‘Low’ to ‘Very High’;
- The magnitude of the impact on the receptor; and
- The influence of embedded and additional mitigation measures.

13.5.7. The identification of the baseline conditions, using the sources above, will provide an understanding of the water environment receptors and allow for a 'value' (or sensitivity) to be allocated to each of these receptors. The 'value' of a receptor may vary, depending on a wide range of attributes, for example, water quality, hydromorphology or biodiversity, and will be attributed using the descriptors provided in Table 13-1.

Table 13-1 - Descriptions and Examples of Receptor Value or Sensitivity

Value or sensitivity of receptor (and Scale)	Quality / substitutability	Typical Examples
Very High (National Scale)	High quality / not substitutable	Surface waters used for a major public drinking water supply; source protection zone SPZ1 within a principal aquifer. Critical water source for a major fishery, water-dependent habitat or aquatic species with statutory protection. Flood defence asset system that protects critical national infrastructure or a significant number of residential properties. Essential infrastructure or highly vulnerable development.
High (Regional to Local Scale)	High quality / not readily substitutable	Surface waters or principal aquifer used for a major industrial/agricultural water abstraction; private drinking water supply. Water sources for a fishery, water-dependent habitat or aquatic species of regional/local importance. Flood defence asset system that protects several residential properties. More-vulnerable development.
Medium (Local Scale)	Medium quality / substitutable	Tributary watercourse with a continuous baseflow; secondary aquifer. Flood defence asset system that protects a small number of residential properties. Less-vulnerable development.
Low	Low quality / readily substitutable	Minor local water feature such as a ditch or surface water sewer. Unproductive strata (groundwater).

13.5.8. Once the value of receptors has been determined, comparing the baseline against the Proposed Scheme will help identify sources, pathways, and the 'magnitude' of any impacts on the water environment and flood risk occurring during the construction or operational phases of the development. The 'magnitude' of an impact will be defined in accordance with the descriptions and examples provided in Table 13-2, considering both adverse and beneficial impacts on each of the relevant water environment components. The 'magnitude' of an impact may vary between receptors, depending on the nature of the pathway available for that impact to manifest itself.

Table 13-2 - Description and Examples of Impact Magnitudes

Magnitude of Impact	Typical Description	Typical Examples
High	Loss of an existing or creation of a major new feature Significant change in the quality of a feature's key attributes Significant change in flood risk	Culverting of a significant length of watercourse (adverse); restoration of a significant length of watercourse (beneficial). Change in the status of any individual quality element used to define a water body's ecological status. Significant change in the peak flood level (>100mm) or in the duration of property flooding (>1 h).
Medium	Loss or restoration of part of a feature Moderate change in a feature's key attributes Moderate change in flood risk	Construction of a new concrete retaining wall along a river (adverse) or removal of an existing one, restoring a natural riverbank (beneficial). Moderate change in an individual quality element that does not result in that quality element changing status. Increase in the peak flood level (>50mm) or in the duration of property flooding (<1 h).
Slight	Minor or slight change	Removal or creation of minor, localised buffer zones or enhanced marginal habitats on a surface water body. Minor but measurable change in an individual quality element that does not result in that quality element changing status. Change in the peak flood level (>10mm).
Negligible	Change that is unlikely to be detectable	Adverse or beneficial change that is unlikely to be measurable or that is within the limits of uncertainty.

13.5.9. The prediction of effects and their significance will also be carried out with reference to the construction and operational phases of the Proposed Scheme, considering both adverse and beneficial effects on each of the relevant water environment components. These include the effects of runoff or pollution on surface water and groundwater bodies as well as the effects of flooding.

13.5.10. Determining the significance of effects identified is then essentially a function of the magnitude of an impact and the sensitivity of the receptor, as depicted in the significance matrix in Table 13-3. Descriptions are also provided for each of these significances in Table 13-4.

Table 13-3 - Water Environment Effects Significance Matrix

Magnitude of Impact	Receptor Value (or Sensitivity)				
		Very High	**High**	**Medium**	**Low**
	High	Major	Major	Moderate	Slight
	Medium	Major	Moderate	Slight to Moderate	Slight
	Slight	Moderate	Slight to Moderate	Slight	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Table 13-4 - Description of Effect Significance Categories

Significance category	Description
Major	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

13.5.11. For impacts associated with low probability events, the above methodology could suggest an artificially high significance of the effect on the water environment. Therefore, the output of the assessment has been reviewed using professional judgement, and where considered appropriate, the assessed magnitude has been reduced to reflect the low probability of occurrence.

13.5.12. The significance of potential impacts on the water environment was assigned both with and without any proposed mitigation. When assessing the Proposed Scheme without mitigation, the embedded mitigation measures were included in the assessment of impact. Additional mitigation was only included in the assessment of impact in the with mitigation scenario.

13.5.13. Cumulative effects of the Proposed Scheme and other committed developments within the area will be considered. The study area will be extended to include any Proposed Schemes with planning secured or those identified in the Local Development Plan that could have impacts on the local flood risk, water quality, hydromorphology, or aquatic ecology. The interactions between the effects will then be assessed.

13.5.14. The mitigation hierarchy, alongside best practice, has been applied to develop measures to mitigate against the potential temporary and permanent impacts of the Proposed Scheme. Workshops with environmental specialists and engineers have been undertaken to identify the best possible methods. Ongoing consultation with specialists from statutory bodies support this process.

13.5.15. For this assessment, the base year has been set as 2023 and the construction completion of the Proposed Scheme will be 2024.

LIMITATIONS AND ASSUMPTIONS

13.5.16. The assessments made regarding water quality impact are based on baseline data derived from available published water quality information as well as some site collected data. The assessments made on flood risk are based on data from NRW, a drainage survey and other relevant plans.

13.5.17. The drainage design is preliminary as it requires the results of infiltration testing to assure the soakaway and discharge design location capacity. This is also required for flood modelling to assure fluvial and pluvial flood risk to and from the Proposed Scheme. However, for this assessment it is assumed that the preliminary design is sufficient.

13.5.18. The nature and extent of contamination at the site has been assessed within the GQRA. Any additional data collected during future ground investigations or monitoring should be reviewed and the conclusions of this report will be reviewed to identify if there are any significant changes.

13.6 BASELINE CONDITIONS

SURFACE WATER

Surface Water Features

13.6.1. The Proposed Scheme does not lie directly within the floodplain of a main river but does lie within the catchment area of two main rivers.

13.6.2. As the development lies at the head of the valley of the Rhymney River, the majority of site boundary falls within the catchment of the Rhymney River, a designated Main River with its main channel located 1.2km south. After forming at its source near Rhymney, the river flows south through New Tredegar, onward to Caerphilly, at the southern end of the Rhymney Valley. The river then continues in a general south eastward direction, past Bedwas and Trethomas before flowing through Cardiff and into the Severn Estuary. The catchment is predominantly rural and semi-urban, characterised by narrow floodplains flowing through a steep-sided valleys. The land use at the sides and head of the valleys is primarily mixed agricultural use, woodland and previous mining sites.

13.6.3. The northern edge of the Site lies within the catchment of the Sirhowy River with its main channel located 700m north east. The Sirhowy River has its source on the slopes of Cefn Pyllau-duon, above Tredegar. The watercourse flows through Siôn-Sieffre's Reservoir before turning south through Tredegar and then Blackwood and Pontllanfraith. It turns eastwards near Cwmfelinfach and

confluences with the River Ebbw, near Crosskeys, approximately 800m east of the Proposed Scheme.

13.6.4. A number of ordinary watercourses form tributaries on each side of the ridgeline between these two main rivers, flowing either west or southwards to the River Rhymney or in a north eastern direction towards the River Sirhowy.

13.6.5. Ordinary watercourse Nant y Bwch rises to the north west of the Upper Tip (Tip 2) and flows directly west of it, down the valley, in a westward direction. The watercourse then turns southwards before entering the urabnised area of Bedwas, where it reaches the Rhymney River.

13.6.6. Ordinary watercourse Nant Cwmhenfelin rises within the northern deposition area (Tip 3) and flows westwards down the valley and into an area of woodland, before crossing below the A469 and entering the Rhymney River.

13.6.7. A smaller unnamed watercourse rises directly to the south of Tip 2 and flows alongside the eastern side of Tip 1 before joining the Quarry Pond. This has been historically modified, to suit the drainage from the site.

13.6.8. The surface water run-off from the current Bedwas Coal Tip catchments is collected and drained to the south to the Quarry Pond via concrete lined channels. All drainage channels within the Tips are heavily modified. The runoff is drained to a lake in the old quarry to the south of the site (Quarry Pond). The lake is artificial and used as a sediment trap to prevent coal waste reaching the Rhymney River (the sediment is emptied on a regular basis using an excavator by CCBC). At the southern end of the lake there is an outflow pipe leading to a culvert which is understood to eventually drain to the Rhymney River. The southern sector of the Proposed Scheme also contains an ephemeral flowing drain which is in loop, eventually draining to the Rhymney River.

Surface water quality

13.6.9. Due to the historic use of the site for mining activities, waterbodies in the area are currently affected by pollution from a number of sources including local industrial plants near the Site and colliery spoil material on the Bedwas Tips. As these are in hydraulic continuity with the surrounding drainage catchments, the water quality of the minor watercourses therefore potentially contribute to the water quality of the Rhymney River.

13.6.10. A recent water quality sample (collected on 16/01/2020 as part of the GQRA) showed that all the elements tested in the standard suite of analysis were within MAC-EQS standards, with the exception of Manganese (0.403 mg/l which is above the standard 0.123 mg/l). Subsequent samples taken from a point receiving water off the spoil tip showed a Mn content of 0.526 mg/l, whilst a sampling point significantly downstream of this in the quarry area which received run off water from the tip gave a Mn level of 0.251 mg/l. This strongly suggests that there is natural on-site mitigation occurring.

13.6.11. A Ground Investigation was undertaken at Trethomas Tip in January 2020 and included chemical testing of soils across the Bedwas tips, as well as the collection and testing of leachate samples. Leachate testing found Ammonium in one sample exceeded the Drinking Water Standard of 50mg/l, with a value of 0.51 mg/l. The Drinking Water Standard for Selenium of 10 ug/l was also exceeded in one sample (12 ug/l).

13.6.12. The Rhymney River and Sirhowy River are both subject to assessment under the WFD and currently have an overall potential of Moderate and Good respectively. Further information on these waterbodies is available in Table 13-5 below.

Table 13-5 - Baseline conditions for relevant WFD waterbodies

Waterbody	Water Framework Directive Status (2021)	Heavily Modified?	Reason for not achieving Good Status	Objectives	Designation(s) / Protected Area(s)
Sirhowy R - Rock Villas to conf Afon Ebwy GB109056032892 Surface waterbody	Overall: Good Ecological: Good Chemical: High	No	N/A	*Good* status by 2027	-
Rhymney R - conf Nant Cylla to Chapel Wood GB109057027280	Overall: Moderate Ecological: Good Chemical: Moderate	No	Point source and diffuse source Fluoranthene and Polyaromatic Hydrocarbons pollution	*Moderate* status by 2027	-
SE Valleys Carboniferous Coal Measures GB40902G201900 Groundwater body and Secondary A aquifer	Overall: Poor Quantitative: Good Chemical: Poor	N/A	Pollution from abandoned mines	*Good* chemical status by 2027	Drinking water protected area

Surface water abstractions and discharges

13.6.13. There are three surface water abstractions within the study area. These are for aquacultural and angling purposes and are located along the Rhymney River.

13.6.14. There are no public water supply abstractions within the study area. Public water supply reservoirs are located far upstream in the Rhymney and Ebbw river catchments.

13.6.15. There are 15 effective water quality permits for discharge into the River Rhemney and the River Sirhowy (as well as their tributaries) within the 2km study area. 13 permits are operated for the discharge of sewage and two for trade discharge.

Water dependent habitat

13.6.16. There is one surface water dependent habitat within the study area located 800m east of the Proposed Scheme (or 45m north from the Haul Road). This is the River Sirhowy Site of Importance for Nature Conservation (SINC), which comprises the full length of River Sirhowy and adjacent semi-natural habitats. This is designated due to the environment quality to support numerous species, including fish, otter, bat and birds. The river valley is lined by trees along most of its length and flows in natural rocky channel. This is a relatively unpolluted main river with unmodified bed and banks with adjacent semi-natural wetland, grassland and woodland habitats.

GROUNDWATER

13.6.17. The groundwater baseline can be found within Chapter 10: Geology and Soils.

13.6.18. In summary, the bedrock geology is the Pennant Sandstone Formation, which is classified as a is a secondary A bedrock aquifer by the NRW. These are Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

13.6.19. Superficial glacial deposits underlie the site and cover the adjacent hillside. These comprise clayey sandy gravel of coal and shale fragments as well as to a lesser extent, sandy gravely clay and clayey sandy cobbles and boulders. Investigation also found Made Ground including colliery spoil in the tip locations, varying between 1.0m and 40m thickness dependant on where on the tip the exploratory hole was located.

13.6.20. Both the soils and the bedrock beneath the site are designated as having a high groundwater vulnerability. A high groundwater vulnerability means that the area is easily able to transmit pollution to groundwater, characterised by high leaching soils and the absence of low permeability superficial deposits.

13.6.21. Groundwater provides a moderate quantity of baseflow to the River Rhymney and the River Sirhowy according to the National River Flow Archive Statistics for both catchments.

13.6.22. There is one groundwater abstraction within the study area, which is used to supply fish farms. There are no drinking water abstractions within the study area.

13.6.23. The entirety of the study area are underlain by the SE Valleys Carboniferous Coal Measures (GB40902G201900), a groundwater WFD body. It currently has a Poor Overall status, comprising a Good Quantitative status and Poor Chemical status. Further information on this waterbody is available in Table 13-5.

Water dependent habitat

13.6.24. There are two SINC sites within the study area which may have a dependency on groundwater. These are:

- Mynydd y Grug SINC (West of Cwmfelinfach) which is located within the Proposed Scheme (Tip 2 and Tip 3 sits partially within this habitat). This site contains two small marshy areas and three ponds which support Great Crested Newt.
- Mynydd Bach Slopes SINC (East of Llanbradach) which is located directly within the Proposed Scheme (Tip 2 sits partially within this habitat). This site contains marshy grassland which supports a variety of trees and vegetation, including ancient woodland and wet woodland.

13.6.25. These are considered to be wet areas due to poor drainage and infiltration based on soils and geology, rather than areas of groundwater upwelling to form the habitats.

FLOOD RISK

13.6.26. A Flood Consequences Assessment has been made in support of this ES, found in V3-S13/0002.

Fluvial Flooding

13.6.27. The NRW Flood Map for Planning indicate that the Proposed Scheme lies within DAM Zone A and Flood Zone 1 which is described as 'Considered to be at little or no risk of fluvial or coastal/tidal flooding' and is thereby not at risk of flooding from rivers and sea.

13.6.28. Bedwas, Trethomas and Cwmfelinfach are all shown to be at risk of fluvial flooding on the Development Advice Maps available on the NRW website. However, the fluvial flooding is confined to the valley floor and does not originate from the Bedwas Tips.

Ordinary watercourse and surface water flooding

13.6.29. The Proposed Scheme interacts with multiple small watercourses and drainage channels located across the site. Small areas of land at the tips are shown to be in Flood Zone 3, associated with small drainage channels on site. Tip 1 is also flanked by small watercourses which run southwards, towards Trethomas, shown to be in Flood Zone 3. The haul road route is shown not to be at risk of flooding from surface water and small watercourses.

13.6.30. The local communities of Bedwas, Trethomas and Cwmfelinfach have been identified as potential receptors of surface water flooding from the Bedwas Tips site.

13.6.31. The CCBC Preliminary Flood Risk Assessment (PFRA) Figure 3 - Flooding Incidents and Historic Flooding Events map shows historic records of flooding. It also references the Severe Weather Culvert Register, which identifies assets which could become a flood source should they become blocked or their capacity exceeded. The Register includes the Quarry Pond and is therefore considered to be a sensitive receptor.

13.6.32. The valley side between Tip 2 and Cwmfelinfach is forested and extremely steep, with a number of small ordinary watercourses flowing down the side of the valley towards the River Sirhowy. These small watercourses are likely to be extremely fast reacting, with flash flows and high velocities due to the steep slopes of the valley. Cwmfelinfach is shown to be at some risk of surface water flooding, however the risk of flooding is not generated from the direction of the Bedwas Coal Tips. It is noted that the smaller watercourses shown on OS Mapping are not identified as surface water flood risk within the surface water modelling (a NRW model), and this may be attributed to the steepness of the valley slopes.

Groundwater Flooding

13.6.33. A number of springs were located on the valley side, which could have the potential for groundwater flooding. However no historic records have been identified.

Other sources of flooding

13.6.34. The DG5 incidents register includes records of sewer flooding and is summarised in the Preliminary Flood Risk Assessment (PFRA19). There are no relevant high-risk areas identified in the DG5 register and the Coal Tips are not known to be served by a sewer system. The Proposed Scheme location is not at risk of flooding from reservoirs, sewers or tidal sources.

FUTURE BASELINE

Site Drainage

13.6.35. The existing surface water drainage at the Tips is considered ineffective and likely to further deteriorate over time. This would likely have ramifications for baseline flood risk and contamination effects to the water environment, most likely increasing their exposure and vulnerability to decline.

Climate Change

13.6.36. In the UK, the effects of climate change are likely to comprise more extreme weather events, a general increase in summer temperatures and warmer, milder winters. Changes in rainfall distribution and a rise in sea levels are also expected. As a result, it is expected that storm events will occur more regularly in the future, and that high flows within the local watercourses and drains associated with Bedwas Tips are likely to increase in intensity and regularity, further increasing the risk of flooding.

13.7 PRELIMINARY IMPACT ASSESSMENT

13.7.1. This section considers the magnitude of impact that the construction, (short-term) operation, (medium-term) and post-operation (long-term) the Proposed Scheme could have on the water environment. The assessment considers the Proposed Scheme with the inclusion of embedded mitigation, i.e. aspects of the basic design that mitigate impacts on the water environment. The Proposed Scheme has been designed as far as possible to have a neutral impact to the water environment and includes the following embedded mitigation measures:

- Drainage attenuation will be achieved during the construction phase via the existing infrastructure or the new operational scheme consisting of channels, storage lagoon, soil bunds and soakaways. As such, there will be no interim where site surface waters are not captured and attenuated;
- Drainage treatment will be achieved during the construction phase via the existing infrastructure or the new operational scheme consisting of settling lagoon, reedbeds and soakaways. As such, there will be no interim where site surface waters are not captured and treated;
- Drainage design at Tip 2 will ensure no surface waters can discharge to Sirhowy River (infiltration testing will confirm this, and drainage amendments made as required to assure design eliminates surface water flows into Sirhowy River);
- Maintenance of the drainage system, which will ensure the systems remain effective;
- The import of materials to form the depositional area will be contoured and placed so as not to effect the existing site drainage patterns and therefore have no effect on drainage capacity of the existing system. (This will need to be assured within the design);
- Haul road construction will avoid watercourses thereby eliminating direct effects;

CONSTRUCTION AND OPERATIONAL PHASE

13.7.2. All construction and operational impacts (as well as their magnitude and significance) are summarised in Table 13-6.

Hydromorphology

13.7.3. The Proposed Scheme is creating changes to the existing drainage arrangement and minor watercourses within all Tips. These watercourses are either artificial or already heavily modified as a result of the historical mining activities on site, therefore their sensitivity is considered to be low. Changes to hydromorphology will be negligible magnitude as there will be no measurable change in quality. This will result in a negligible significance.

13.7.4. The ordinary watercourses surrounding and directly downstream of the Bedwas Tips will not be physically altered during construction and operation. Therefore no impact to receptors, negligible significance.

13.7.5. The construction and operation of the Proposed Scheme will not directly physically alter any main rivers in the study area as the proposals are located at the head of the Rhymney River and Sirhowy River valleys. Therefore, there are no impact to receptors, negligible significance.

13.7.6. During construction and operation, there will be increased infiltration and changes to the patterns of infiltration due to both excavations and the drainage design. This will lead to a change in water balance within the aquifer, due to increased volume entering via infiltration, which will have an impact to baseflow supply to Rhymney River and Sirhowy River. However, this will be highly localised change in hydraulic head, and slow to infiltrate through the landscape to these local rivers. In addition the rivers also have a low baseflow index, and therefore the impact will be slight to high value receptors resulting in a slight non-significant effect.

Water Quality

13.7.7. The activities required to construct and operate the Proposed Scheme will require transportation of materials to and from site. Thus, numerous heavy vehicle movements have the potential to temporarily mobilise soil, dust and pollutants, within the site and on the haul road, which could enter the watercourses in the vicinity as a result via run off. This would lead to a reduction in water quality including effects that could result in the poisoning of animals and plants along the banks and within the channel.

- All ordinary watercourses within and surrounding the Tips areas are either artificial or already heavily modified, therefore their sensitivity is considered to be low. The magnitude of impact to ordinary watercourses will be slight, due to lack of existing quality leading to only minor local and temporary changes in quality. This will result in a negligible non-significant effect.
- Other surrounding ordinary watercourses within the study area may also be affected by run off from site and on the haul road, however these are also considered to be of low sensitivity value due to being ditches or minor local watercourses. The magnitude of impact to ordinary watercourses will be slight, due to lack of existing quality leading to only minor local and temporary changes in quality. This will result in a negligible non-significant effect.
- Rhymney River and Sirhowy River may also be affected by run off from site and on the haul road as these are connected via the ditches and ordinary watercourses. These are considered to be high value receptors. Impacts will be slight, as attenuation within the drainage leading to the

watercourses will naturally occur thereby limiting magnitude to slight which will result in a slight non-significant effect.

13.7.8. The activities required to construct and operate the Proposed Scheme, such as the use of plant for water treatment, risk spillage of fuel entering run off leading to pollution in nearby surface waters. This would result in a medium magnitude impact to all surface waters. For ordinary watercourses still would result in a slight significant effect. For Rhymney River and Sirhowy River this would result in a moderate significant effect.

13.7.9. Activities such as excavation will disturb ground which is contaminated. Some surface waters (run off), such as rainfall, will infiltrate through the ground avoiding the site drainage treatment areas. This will lead to toxic and contaminated substances entering surface waters via baseflow from groundwater. This is medium magnitude as this could result in a moderate change water quality within Rhymney River and Sirhowy River which would lead to a moderate significant effect. However, this will be highly localised and slow to infiltrate through the landscape to these rivers. In addition, these rivers have a low baseflow index, therefore the risk will be lower.

13.7.10. During construction and operation, there will be increased infiltration and changes to the patterns of infiltration due to both excavations and the drainage design. This will lead to a change in water balance within the aquifer, due to increased volume entering via infiltration, which will increase the risk of spread of toxic and contaminated substances entering surface waters via baseflow from groundwater. This could also manifest within the springs to the south of Tip 1, and therefore enter Rhymney River overland. This is medium magnitude as this could result in a moderate change water quality within Rhymney River and Sirhowy River which would lead to a moderate significant effect. However, these rivers have a low baseflow index and the treatment as part of the design will also mitigate some of this risk, therefore the risk will be lower. Further assessment is required to understand this risk, and is detailed in Chapter 10: Geology and Soils.

13.7.11. Construction activities such as excavation will disturb ground which is contaminated, in addition there will be changes to run off and drainage across the land fill sites through excavations, material storage area, temporary structures and increased impermeable surfaces. This will result in increased run off rates containing contaminants and sediments potentially reaching surface waters. However the drainage design embedded within the scheme will mitigate this impact. Therefore magnitude will be slight, resulting in a slight non-significant effect.

13.7.12. Construction activities such as excavation will disturb ground which is contaminated. Some surface waters, such as rainfall, will infiltrate through the ground avoiding the site drainage treatment areas. This will lead to toxic and contaminated substances entering SE Valleys Carboniferous Coal Measures WFD groundwater body decreasing water quality. The leachate analysis on site concluded that, generally, the risk of potential contamination of groundwater bodies in the area is low. The magnitude of this impact is considered to be medium, with a significance of slight to moderate. Due to the known depth of the groundwater body (particularly at the Tips site) and presence of impermeable strata protecting deeper groundwater, the significance of the impact has been deemed to be slight and not a significant effect.

13.7.13. The activities required to construct the Proposed Scheme, such as the use of plant for water treatment risk spillage of fuel entering run off and infiltrating leading to pollution of the SE Valleys Carboniferous Coal Measures WFD groundwater body decreasing water quality. This would result in a medium magnitude impact with a significance of slight to moderate. Due to the known depth of the

groundwater body (particularly at the Tips site) and presence of some impervious strata protecting deeper groundwater, the significance of the impact has been deemed to be slight and not a significant effect.

Groundwater resources

13.7.14. During construction and operation, there will be increased infiltration and changes to the patterns of infiltration due to both excavations and the drainage design. This will lead to a change in water balance within the aquifer, due to increased volume entering via infiltration. However this is expected to be relatively minor in terms of the size of the overall aquifer. In addition this would accumulate at a slow rate as it drains through the landscape. Therefore any effects will be limited overall. Further details are within Chapter 10: Geology and soils regarding hydrogeology. Impacts on water balance to the SE Valleys Carboniferous Coal Measures WFD groundwater body are therefore expected to be slight magnitude as this will be a highly localised and minor change resulting in a slight non-significant effect.

Flood risk

13.7.15. There will be changes to run off and drainage across the land fill sites through excavations, material storage area, temporary structures and increased impermeable surfaces. This will result in increased run off rates and changes to surface water flow routes affecting flood risk to construction staff as well as equipment and plant on site as well as to the communities of Bedwas, Trethomas and Cwmfelinfach. However, due to the fast reacting nature of the smaller tributaries draining the valley sides it is unlikely that Main River flooding and ordinary watercourse flood peaks would coincide, so fluvial flood risk is considered to be low in this case. In addition, the drainage design is such that it will have capacity to ensure no increased flood risk to receptors to or from the development site. This is considered a slight magnitude, which will result in a negligible significance.

Water Abstraction

13.7.16. The construction and operation of the Proposed Scheme will have no impacts on water abstraction, as no water abstraction is considered to be required. Existing water abstractions in the area are not sufficiently close to activities to be affected.

13.7.17. Impacts to groundwater abstractions are considered within Chapter 10: Geology and soils.

Water Dependent Habitat

13.7.18. No changes to water supply to the River Sirhowy SINC is anticipated as part of the works. The drainage design will ensure there is no surface water discharge to the River Sirhowy SINC. Therefore no impact to receptor, and a negligible significance.

Summary of Potential Impacts

13.7.19. Table 13-6 summarises the potential construction impacts.

Table 13-6 - Preliminary construction and operation phase impacts

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
Sirhowy River - Rock Villas to conf Afon Ebwy	High	Increased volume of infiltration leading to a change in water balance within the aquifer which provides baseflow to locally to Sirhowy River.	Minor potential increase in baseflow to watercourse leading to small localised water level rise which is unlikely to measurably affect hydromorphological processes.	Slight Adverse	Slight
		Indirect impact from heavy vehicle movements around the construction site and haul road mobilising soil, dust and pollutants within run off.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel. This will be attenuated within the site drainage and by distance from the site and therefore effect limited.	Slight Adverse	Slight
		Fuel spillages entering run off and surface water flow pathways.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel which would be a long lasting and wide area reaching effect.	Medium Adverse	Moderate
		Disturbance of contaminated materials during excavations infiltrating to groundwater and transferring to surface waters via baseflow.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel. However, this will be highly localised and slow to infiltrate through the landscape to the river. In addition, the river has a low baseflow index, therefore the risk will be lower.	Medium Adverse	Moderate
		Increased volume of infiltration leading to a change in water balance within the aquifer increase risk of spread of contaminants via baseflow connections with surface waters.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel. However, this will be highly localised and slow to infiltrate through the landscape to the river. In addition, the river has a low baseflow index, therefore the risk will be lower.	Medium Adverse	Moderate

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
		Increased run off rates containing contaminants and sediments potentially reaching surface waters from excavations, material storage areas, temporary structures and impermeable surfaces.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel.	Slight Adverse	Slight
Rhymney River - conf Nant Cylla to Chapel Wood	High	Increased volume of infiltration leading to a change in water balance within the aquifer which provides baseflow to locally to Rhymney River.	Minor potential increase in baseflow to watercourse leading to small localised water level rise which is unlikely to measurably affect hydromorphological processes.	Slight Adverse	Slight
		Indirect impact from heavy vehicle movements around the construction site and haul road mobilising soil, dust and pollutants within run off.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel. This will be attenuated within the site drainage and by distance from the site and therefore effect limited.	Slight Adverse	Slight
		Fuel spillages entering run off and surface water flow pathways.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel which would be a long lasting and wide area reaching effect.	Medium Adverse	Moderate
		Disturbance of contaminated materials during excavations infiltrating to groundwater and transferring to surface waters via baseflow.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel. However, this will be highly localised and slow to infiltrate through the landscape to the river. In addition, the river has a low baseflow index, therefore the risk will be lower.	Medium Adverse	Moderate
		Increased volume of infiltration leading to a change in water	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along	Medium Adverse	Moderate

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
		balance within the aquifer increasing risk of spread of contaminants via baseflow connections with surface waters or overland flow from springs.	the banks and within the channel. However, this will be highly localised and slow to infiltrate through the landscape to the river. In addition, the river has a low baseflow index, therefore the risk will be lower.		
		Increased run off rates containing contaminants and sediments potentially reaching surface waters from excavations, material storage areas, temporary structures and impermeable surfaces.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel.	Slight Adverse	Slight
Ordinary watercourses within the study area	Low	Indirect impact from heavy vehicle movements around the construction site and haul road mobilising soil, dust and pollutants within run off.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel. This will be attenuated within the site drainage and in addition effect limited due to low quality of the receptor.	Slight Adverse	Negligible
		Fuel spillages entering run off and surface water flow pathways	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel which would be a long lasting and wide area reaching effect.	Medium Adverse	Slight
		Increased run off rates containing contaminants and sediments potentially reaching surface waters from excavations, material storage areas, temporary structures and impermeable surfaces	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel.	Slight Adverse	Negligible
Unnamed drains/ordinary	Low	Indirect impact from heavy vehicle movements around the	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along	Slight Adverse	Negligible

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
watercourses within the Bedwas Tips		construction site and haul road mobilising soil, dust and pollutants within run off.	the banks and within the channel. This will be attenuated within the site drainage and in addition effect limited due to low quality of the receptor.		
		Fuel spillages entering run off and surface water flow pathways	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel which would be a long lasting and wide area reaching effect.	Medium Adverse	Slight
		Increased run off rates containing contaminants and sediments potentially reaching surface waters from excavations, material storage areas, temporary structures and impermeable surfaces	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel	Slight Adverse	Negligible
Working areas, floodplain and valley side	Low	Changes to runoff rates and flow characteristics that increase local flood risk through storage of material/temporary structures as well as works to the drainage network. Increase in impermeable surfaces through hard standing or compaction of soils.	Potential to temporarily alter surface water flow routes and increase run off within the construction area. This could pose a flood risk to construction staff as well as equipment and plant on site.	Slight Adverse	Negligible
Flood Risk receptors in Bedwas, Trethomas and Cwmfelinfach	High	Changes to runoff rates and flow characteristics that increase local flood risk through storage of material/temporary structures as well as works to the drainage network. Increase in impermeable surfaces through hard standing or compaction of soils.	Potential to temporarily alter surface water flow routes and increase runoff off site, affecting the local communities of Bedwas, Trethomas and Cwmfelinfach.	Slight Adverse	Slight

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
SE Valleys Carboniferous Coal Measures	Medium	Excavation disturbing contaminated ground which is mobilised by rainfall and infiltrates into groundwater aquifer.	Reduction in water quality. However this will be mitigated by the drainage treatment and in addition, risk reduced as contaminated material is removed and ground stabilised.	Medium Adverse	Slight
		Fuel spillages entering groundwater.	Potential for contaminants and pollutants to infiltrate the ground and enter the aquifer leading to reduction in water quality. Depth of the groundwater body and presence of impervious strata reduce the risk of this effect.	Medium Adverse	Slight
		Increased volume of infiltration.	Change in water balance within the aquifer, increasing head. This will be a small change due to the large scale of the overall aquifer unit in addition to the slow rate this would accumulate as it drains through the landscape. Therefore any effects will be limited.	Slight Adverse	Slight

POST OPERATION PHASE

13.7.20. After five years of operation, the plant will be decommissioned and removed from the site. However the drainage system that controls the water quality and quantity on-site will remain as these are passive. All long-term post-operational impacts (as well as their magnitude and significance) are summarised in Table 13-7.

Hydromorphology

13.7.21. The Proposed Scheme has created changes to the existing drainage arrangement and minor watercourses within both Tips and the depositional area. These watercourses are either artificial or already heavily modified as a result of the historical mining activities on site, therefore their sensitivity is considered to be low. Changes to hydromorphology will be negligible magnitude as there will be no measurable change in quality. This will result in a negligible significance.

13.7.22. There will be increased infiltration and changes to the patterns of infiltration due to changes to the ground, contours and the drainage design. This will lead to a change in water balance within the aquifer, due to increased volume entering via infiltration, which will have an impact to baseflow supply to Rhymney River and Sirhowy River. However, this will be highly localised change in hydraulic head, and slow to infiltrate through the landscape to these local rivers. In addition these rivers have a low baseflow index, the impact will be slight to high value receptors resulting in a slight non-significant effect.

13.7.23. Post-operation, there will be no surface water drainage discharge changes south to ordinary watercourses (via the quarry pond) and ultimately to the Rhymney River (as is currently under baseline). Overall changes to hydromorphology will be negligible magnitude as there will be no measurable change. This will result in a negligible significance.

13.7.24. Post-operation, drainage will be altered across the site towards the north, and therefore towards the Sirhowy River. However, the drainage design will ensure all surface waters are captured and therefore no discharge overland to the Sirhowy River. Changes to hydromorphology will be negligible magnitude as there will be no measurable change in quality. This will result in a negligible significance.

Water Quality

13.7.25. There will be increased infiltration and changes to the patterns of infiltration due to the drainage design. This will lead to a change in water balance within the aquifer, due to increased volume entering via infiltration, which will increase the risk of spread of toxic and contaminated substances entering surface waters via baseflow from groundwater where these are substances are present below ground or from leachate from the settlement lagoons. This could also manifest within the springs to the south of Tip 1, and therefore enter Rhymney River. This is slight magnitude as this will be highly localised and slow to infiltrate through the landscape to the river which will provide natural attenuation. In addition, the river has a low baseflow index, therefore the risk will be lower. This could result in a minor change water quality within Rhymney River which would lead to a slight significant effect. However, the treatment as part of the design will also mitigate some of this risk, therefore the risk will be lower. Further assessment is required to understand this risk, and is detailed in Chapter 10: Geology and Soils.

13.7.26. There will be an overall improvement in water quality for all surface watercourses as there will be greater volumes of water treated, and contaminated spoil removed or remediated. This will result in

reduced leachate concentrations entering surface waters locally constituting a beneficial change of slight magnitude and slight non-significant effect for main rivers and negligible non-significant effects for ordinary watercourses.

13.7.27. Post-operation, drainage will be altered across the site towards the north, and therefore towards the Sirhowy River. However, the drainage design will ensure all surface waters are captured and therefore no discharge overland to the Sirhowy River. Changes to water quality will be negligible magnitude as there will be no measurable change in quality. This will result in a negligible significance.

Groundwater Resources

13.7.28. There will be increased infiltration and changes to the patterns of infiltration due to the drainage design. This will lead to a change in water balance within the aquifer, due to increased volume entering via infiltration. However this is expected to be relatively minor in terms of the size of the overall aquifer. Further details are within Chapter 10: Geology and Soils regarding hydrogeology. Impacts on water balance to the SE Valleys Carboniferous Coal Measures WFD groundwater body are therefore expected to be slight magnitude as this will be a highly localised and minor change resulting in a slight non-significant effect.

Flood Risk

13.7.29. The FCA undertaken for the Proposed Scheme aims to confirm that the design of surface water drainage for the Proposed Scheme will ensure that no changes to flows occur downstream of the Bedwas Tips. In addition to this, the new drainage is considered to constitute an improvement on the current baseline, due to the current drainage arrangement falling into a state of disrepair. This will therefore have a slight beneficial impact on surface water drainage and flood risk, with a slight significance.

Water Abstraction

13.7.30. The post-operational Proposed Scheme will have no impacts on water abstraction, as no water abstraction is considered to be required. Existing water abstractions in the area are not sufficiently close to the Proposed Scheme site to be affected.

Water Dependent Habitat

13.7.31. No changes to water supply or water quality to the River Sirhowy SINC is anticipated as part of the finished scheme. The drainage design will ensure there is no surface water discharge to the River Sirhowy SINC. Therefore no impact to receptor, and a negligible significance.

13.7.32. There will be an overall improvement in water quality for all surface watercourses as there will be greater volumes of water treated, and contaminated spoil removed or remediated. This will result in reduced leachate concentrations entering surface waters locally (and therefore potentially River Sirhowy SINC) constituting a beneficial change of slight magnitude and slight non-significant effect.

Summary

13.7.33. Table 13-7 summarises the potential operational and post-operational impacts.

Table 13-7 - Preliminary post-operational phase impacts

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
Sirhowy River - Rock Villas to conf Afon Ebwy	High	Increased volume of infiltration leading to a change in water balance within the aquifer which provides baseflow to locally to Sirhowy River.	Increased baseflow into watercourse leading to raised water level affecting hydromorphological processes. However, this will be highly localised and slow to infiltrate through the landscape to the river. In addition, the river has a low baseflow index, therefore the risk will be lower.	Slight Adverse	Slight
		The new drainage design permanently modifying channels and surface water flow pathways.	Negligible change in channel hydromorphology as a result of new surface water input. The drainage design will ensure all surface waters are captured within the Tips and therefore will not discharge overland into the Sirhowy River.	Negligible	Negligible
		Greater volumes of water treated, and contaminated spoil removed or remediated.	Reduced risk of leachate concentrations entering surface waters locally constituting a beneficial change to water quality.	Slight Beneficial	Slight
		The new drainage design permanently modifying channels and surface water flow pathways within the catchment.	The drainage design will ensure all surface waters are captured within the Tips and therefore will not discharge overland into the Sirhowy River and therefore limits risk to water quality from new potential surface water input.	Negligible	Negligible
Rhymney River - conf Nant Cylla to Chapel Wood	High	Increased volume of infiltration leading to a change in water balance within the aquifer which provides baseflow to locally to Rhymney River.	Increased baseflow into watercourse leading to raised water level affecting hydromorphological processes. However, this will be highly localised and slow to infiltrate through the landscape to the river. In addition, the river has a low baseflow index, therefore the risk will be lower.	Slight Adverse	Slight
		The new drainage design permanently modifying channels and surface water flow pathways.	Negligible change in channel hydromorphology as no change to surface water channels which discharge to the Rhymney.	Negligible	Negligible

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
		Leachate from settlement lagoons entering aquifer due to increased volume of infiltration leading to increasing risk of spread of contaminants via baseflow connections with surface waters or overland flow from springs.	Reduction in water quality within the watercourse which could lead to the poisoning of animals and plants along the banks and within the channel. However, this will be highly localised and slow to infiltrate through the landscape to the river. In addition, the river has a low baseflow index, therefore the risk will be lower.	Slight Adverse	Slight
		Greater volumes of water treated, and contaminated spoil removed or remediated.	Reduced leachate concentrations entering surface waters locally constituting a beneficial change to water quality.	Slight Beneficial	Slight
Ordinary watercourses within the study area	Low	Greater volumes of water treated, and contaminated spoil removed or remediated.	Reduced leachate concentrations entering surface waters locally constituting a beneficial change to water quality.	Slight Beneficial	Negligible
Unnamed drains/ordinary watercourses within the Bedwas Tips	Low	The new drainage design permanently modifying channels and surface water flow pathways.	Change in channel morphology of existing heavily modified drains.	Negligible	Negligible
		Greater volumes of water treated, and contaminated spoil removed or remediated.	Reduced leachate concentrations entering surface waters locally constituting a beneficial change to water quality.	Slight Beneficial	Negligible
Floodplains and flood risk receptors in Bedwas, Trethomas and Cwmfelinfach	High	The new drainage design permanently modifying channels and surface water flow pathways.	Reduction of surface water flood risk posed within the Bedwas Tips area and downstream.	Slight Beneficial	Slight
		Improvement to the drainage network at Bedwas Tips.	Reduction of surface water flood risk posed within the Bedwas Tips area and downstream.	Slight Beneficial	Slight

Receptor	Sensitivity	Impact	Effect	Magnitude	Significance
SE Valleys Carboniferous Coal Measures	Medium	Increased volume of infiltration.	Change in water balance within the aquifer, increasing head.	Slight Adverse	Slight
Water dependent habitat – Sirhowy SINC	Medium	Greater volumes of water treated and contaminated spoil removed or remediated.	Reduced leachate concentrations entering surface waters locally constituting a beneficial change to water quality.	Slight Beneficial	Slight

13.8 MITIGATION, ENHANCEMENT AND MONITORING

MITIGATION AND MONITORING

13.8.1. The risk of pollution to the water environment during construction will be reduced through the adoption of good working practice. Although withdrawn in 2015, the Pollution Prevention Guidelines provide environmental good practice guidance. Replacements for certain aspects have subsequently been updated in the form of the Guidance for Pollution Prevention and therefore should be considered in the creation of the Construction Environment Management Plan (CEMP).

13.8.2. As a minimum the CEMP will also include:

- methods to control spillage and prevent contamination of adjacent areas;
- methods for the storage and handling of excavated materials (both contaminated and uncontaminated), or this information may be contained in a sister Site Waste Management Plan (SWMP) document;
- management of any unexpected contamination found during construction via a watching brief;
- storage requirements for hazardous substances such as diesel and other fuels;
- best practice methods will be applied to prevent pollution events such as oil spill or increased sediment loading of watercourses;
- fuel will be stored in accordance with best practices and spill kits will be available; and
- best practice methods will be applied to prevent surface water flooding during construction.

Flood Risk

13.8.3. The design of the Proposed Scheme will require careful considerations for surface water drainage to ensure that it does not increase the risk of surface water and groundwater flooding. Further considerations for drainage should be made throughout the detailed design process.

13.8.4. In order to mitigate the residual flood risks associated with the potential failure of temporary storage areas and clean water pumps, the following measures be implemented *(to be confirmed*):

- Integrate local telemetry measures into the design, to enable water level monitoring, alongside stated exceedance bunding and capacity levels;
- Install a backup system of pumps; and
- Produce a site management plan that includes procedures for emergency and out-of-hours response in case the clean water pumps or temporary storage areas fail.

Water Quality

13.8.5. The settlement ponds will be lined with clay or highly weathered shales so that any leaching of contaminants will be limited by the low permeability layer.

13.8.6. Prior to construction and operation, further water head monitoring is required at the south eastern boundary zone (i.e. locations up-hill of the registered landfill (and former benzol works) to clarify the groundwater model present and allow calculation to assess how changes to the infiltration pattern could affect the springs and outflowing stream below Tip 1. The assessment of this risk will require the installation of boreholes equipped with piezometers to better understand the groundwater heads, aquifer units and permeabilities. Water balance type calculations will be required following the installation of boreholes to assess dispersion risk to surface waters. See Chapter 10: Geology and Soils.

ENHANCEMENT

13.8.7. It is considered that the site drainage and water quality elements of the design discussed above constitute an improvement on the current site drainage and run off water quality baseline at the site.

13.8.8. The Proposed Scheme design includes promoting of soil recovery, the revegetation of the area and enhancing biodiversity, all of which are likely to have a positive impact on water quality through reduction in runoff contaminants and natural attenuation and therefore constitute an improvement on the current baseline.

13.9 RESIDUAL IMPACT ASSESSMENT

CONSTRUCTION PHASE

13.9.1. It is anticipated that measures outlined in above will be incorporated into a CEMP. The CEMP will mitigate against all impacts associated with construction. The CEMP would need to be approved by NRW, CCBC and the LLFA prior to construction commencing.

13.9.2. Where measures are implemented, it is anticipated that no significant residual construction impacts will occur.

OPERATIONAL AND POST-OPERATIONAL PHASE

13.9.3. Following the implementation of mitigation measures outlined in Section 14.7 above, it is considered that no significant adverse effects on Water Environment receptors will remain.

13.10 CUMULATIVE EFFECTS

13.10.1. The cumulative effect of the Proposed Scheme, in conjunction with other proposed developments in the vicinity of the Proposed Scheme have been assessed qualitatively. This was through consideration of any proposed developments with planning secured, or those identified in the Local Development Plan, that could have impacts on the local flood risk, water quality or hydromorphology. In addition to this, the planning conditions assigned to any of the proposed developments have also been considered.

13.10.2. There are no other developments identified to be within proximity of the Proposed Scheme that may have a cumulative impact on the surrounding water environment. Therefore there are no significant cumulative effects anticipated from the development of the Proposed Scheme.

13.11 SUMMARY

13.11.1. This chapter has assessed the potential effects of the Proposed Scheme on the Water Environment and Flood Risk during its construction, operation and post-operational stages. The Proposed Scheme is expected to have no residual significant adverse effects on Water Environment & Flood Risk receptors in the local area. In summary:

- The landfill spoil provides a potential source of contamination. To manage the risk of dispersal to groundwater and surface waters a number of embedded mitigations are applied within the design;
- Flood risk will be managed through embedded mitigations as part of the drainage design of the site;
- The CEMP will manage all impacts associated with the construction phase, including flood risk, run off, sediment/soils and pollution;

- With the implementation of additional groundwater investigation, correct procedures and guidance, and appropriate techniques during construction and operation, and drainage treatment measures built into the design, all impacts to water quality will be minimised to insignificant; and
- It is considered overall that the remediation works carried out as part of the Proposed Scheme, and the implemented passive drainage regime, will provide a beneficial effect to water quality, although not significant.

14 CUMULATIVE EFFECTS

14.1 INTRODUCTION

14.1.1. Cumulative effects refer to the collective influence of the Proposed Scheme and any other developments in the area, proposed or existing, on an aspect of the environment, including anthropogenic receptors. Each technical chapter of this Environmental Statement (ES) has assessed the cumulative effects considering the impacts from both the Proposed Scheme and any other developments in the area. These are known as inter-project effects. In comparison, this chapter assesses the cumulative effects on a single receptor from the impacts of multiple environmental topics caused only by the Proposed Scheme. These are known as intra-cumulative effects. The assessment of both inter- and intra-project effects is defined in more detail in Section 14.3.

14.1.2. When considered in isolation, as individual environmental topics, the environmental effects of the Proposed Scheme on a receptor may not be significant. However, where individual effects are considered in combination, the resulting cumulative effect may be significant. For example, residents in a community located within close proximity of a construction site may be adversely affected by changes to noise levels, air quality and visual aesthetics which, as assessed individually in the ES, are not significant. However, when considered together these could cause a significant effect on that community that would not be picked up without a separate cumulative assessment.

14.1.3. It should be noted, however, that certain environmental topics are closely linked, for example, biodiversity and landscape. As such, as part of the iterative nature of Environmental Impact Assessment (EIA) and design development, multiple impacts may already have been considered.

14.1.4. This chapter aims to highlight the combined intra-project effect of impacts across all technical disciplines. It should be read in conjunction with the individual environmental topic chapters which address the potential from cumulative effects resulting from inter-project effects. It does not attempt to reiterate all effects on receptors as detailed in each of the topic chapters; instead it identifies where multiple effects on a receptor may combine to create an effect which is more significant.

STUDY AREA

14.1.5. The study area for the assessment of environmental impacts is set for each individual technical discipline with reference to best practice guidance unique to each. As such, there is not always a common study area boundary across topics with those used ranging from a distance of 2km to within the confines of the development site. The assessment of intra-project cumulative effects therefore brings together all impacts identified on a receptor across the specialist topic chapters, regardless of the study area extent applied.

14.2 LEGISLATION, POLICY AND GUIDANCE

14.2.1. The assessment of cumulative effects is required within EIA through the Town and Country Planning (EIA) (Wales) Regulations 2017. Schedule 4, Paragraph 5 of the Regulations states that an ES should include a description of the likely significant effects of the development resulting from, among other items, "the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources".

14.2.2. This chapter has been prepared in line with the following relevant legislation and guidance:

- Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017[165];
- Institute of Environmental Management and Assessment (IEMA) Outlook Journal, Volume 7: 'Demystifying cumulative effects' 2020[166];
- Design Manual for Roads and Bridges (DMRB) Sustainability and Environment Appraisal LA104 'Environmental assessment and monitoring' 2020[167]; and
- 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' 1999[168].

14.3 ASSESSMENT METHODOLOGY

TYPES OF IMPACT

14.3.1. **Intra-project cumulative effects:** a resource or receptor is affected by impacts from a single project and those impacts act together to create a combined impact greater than the individual components.

14.3.2. **Inter-project cumulative effects:** a resource or receptor is affected by impacts from multiple projects at the same time and those impacts act together to create a combined impact greater than the individual components.

IMPACT IDENTIFICATION AND ASSESSMENT

14.3.3. The cumulative impacts of the Proposed Scheme have been identified by cross referencing the individual receptors (or categories of receptors) affected and their residual impacts within each topic chapter. Therefore, any mitigation proposed is taken into account in the assessment of cumulative effects.

[165] Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. Available online at: https://www.legislation.gov.uk/wsi/2017/567/contents/made.

[166] IEMA Outlook journal, July 2020. Volume 7: Demystifying cumulative effects. Available online at: https://www.iema.net/recognition/eia-quality-mark/impact-assessment-outlook-journal.

[167] Highways England, 2020. Design Manual for Roads and Bridges (DMRB) Sustainability and Environment Appraisal LA104 'Environmental assessment and monitoring'. Available online at: https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a.

[168] European Commission, 1999. Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. Available online at: https://ec.europa.eu/environment/archives/eia/eia-studies-and-reports/pdf/guidel.pdf.

14.3.4. The receptors and impacts were combined using a matrix (Table 14-4) whereby receptors were listed against topic chapters and a mark placed in the matrix where an impact (beneficial or adverse) had been identified. The matrix was then evaluated to identify where multiple impacts apply to a receptor.

14.3.5. As some topic chapters use different scales of significance, reporting in the matrix has been simplified to the scale detailed in Table 14-1**.**

Table 14-1 - Impact significance scale used in the matrix of cumulative effects.

Symbol	Description
•	Positive effect
O	Negative effect
/	No effect or Neutral effect
-	Not applicable or receptor not assessed

DETERMINING THE SIGNIFICANCE OF CUMULATIVE EFFECTS

14.3.6. Where multiple impacts are identified on the same receptor there is potential for the combined significance of effects to be greater than the significance on its own. There is also potential for a receptor to be affected adversely under one topic but have beneficial effects under another. In such cases, a balance between the two has been established based on professional judgement.

14.3.7. The significance of cumulative effects is determined by the extent to which the impacts can be accommodated by the receptor.

14.3.8. In determining significance, the following factors were considered:

- the receptors affected;
- how the activity or activities will affect the condition of the receptor / resource;
- the probability of such effects occurring; and
- what capacity the receptor / resource has to absorb further effects before the change becomes irreversible.

Where cumulative effects were identified, their significance has been assessed against the framework outlined in Table 14-2.

Table 14-2 - Framework for determining the significance of cumulative effects.

Significance	Effect
Severe	Effects that the decision-maker must take into account as the receptor/resource is irretrievably compromised.
Major	Effects that may become a key decision-making issue.
Moderate	Effects that are unlikely to be issues on whether the project design should be selected. Future work may be necessary to improve on current performance.
Minor	Effects that are locally significant.
Not significant	Effects that are beyond the current forecasting ability or are within the ability of the resource / receptor to adapt to such change.

LIMITATIONS AND ASSUMPTIONS

14.3.9. The interaction of impacts on a receptor / resource can be complex and subjective, making the prediction and assessment of cumulative effects difficult. This is further complicated when final details of certain elements of the Proposed Scheme or other proposed developments are not known. The assessment of cumulative effects is therefore based on all agreed parameters and known details at the time of publication, but effects may be subject to change as the Proposed Scheme progresses. However, where final details are not known, a worst case has been assumed. Assessments also will require a level of professional judgement.

14.3.10. The study area for the assessment of environmental effects is set by best practice guidance for the individual topic areas covered in the ES. As such no common boundary was used to carry out the cumulative assessment and only the study areas assessed within the technical chapters themselves were considered.

14.4 ASSESSMENT OF EFFECTS

14.4.1. As stated in Section 14.1.1, this chapter only assesses the intra-project cumulative effects, however, these effects have been broken down into those associated with the construction and operational phases of the Proposed Scheme. Only effects that are of a Moderate level or higher are considered. Negligible and minor impacts have not been brought forward to the intra-project cumulative impact assessment.

POTENTIAL FOR CONSTRUCTION RELATED INTRA-PROJECT EFFECTS

14.4.2. The assessments made within the technical chapters of the ES did not identify any moderately adverse residual impacts for during the construction phase of the Proposed Scheme. Therefore, there are no construction phase impacts assessed within this chapter. Additionally, as works progress across the Proposed Scheme, the magnitude of different impacts will vary, as different stages of construction works will generate variable impact magnitudes. However, these impacts will be temporary and transient in nature.

POTENTIAL FOR OPERATIONAL RELATED INTRA-PROJECT EFFECTS

14.4.3. The Proposed Scheme will introduce a new landform (the deposition tip) on the hillside beside Tip 1 and alter the landforms of the current Tip 1 and Tip 2. Table 14-4 sets out the receptors that are likely to be sensitive to operational phase effects. The residual effect column identifies effects from the technical assessment chapters that cause greater than negligible effects and identify whether there are any individual impacts that could combine as an effect upon a given receptor. Table 14-3 below provides a summary of the interactions between identified effects of the Scheme and where these combine to produce cumulative effects.

Table 14-3 - Operational phase receptors and residual / cumulative effects

Receptor(s)	Residual Effect	Potential for Cumulative Effect
Viewpoint 2. Footpath by turbines	Moderate adverse due to a loss of visual amenity at these receptors.	With the appropriate mitigation stated within the individual chapters of the ES, there is not expected to be any cumulative effects from these receptors.
Viewpoint 3. By the Caerns		
Viewpoint 6. Entrance to Common Hynydd Dinlaith common / Pandymawr Road		
Viewpoint 14. PRoW Common RUDR / FP4 / 3		
Mynydd y Grug Field Boundary (HA1)	Visual impact resulting in varying degrees of change and severance of cultural links	
Ditch and Bank/ Pound (HA2)		
Bedwas Navigation Colliery Tips (HA4)		
Mynydd y Grug Common including field boundaries (HA5)		
Twyn Cae Hugh Round Barrow (HA6)		

Receptor(s)	Residual Effect	Potential for Cumulative Effect
Acid grassland / heath / lichen-bryophyte habitats (County / Regional)	Slight moderate adverse impacts due to seeding as part of the works to cause permanent loss to Open Mosaic Habitats.	
Rock exposure artificial – colliery spoil (County)	Moderate adverse due to permanent loss of habitat.	
Multiple species – bats, birds, reptiles, small mammals and invertebrates	Slight moderate beneficial impacts due to incorporation of the enhancement measures within the Proposed Scheme including: ▪ Provision of bat and bird boxes; ▪ Creation of dew ponds and modification of retained ponds for wildlife; ▪ Creation of brash/log piles; and ▪ Native, wildflower planting for invertebrates.	
Soil quality	Moderate beneficial through the remediation of spoil material and importation of natural soil enhancing the overall quality.	
Groundwater	Moderate beneficial as established vegetation may lead to a slower percolation rate and overall improvement in groundwater quality/beneficial changes to water levels in the aquifer.	

Table 14-4 - Matrix of intra-project cumulative effects

Environmental Receptor	Air Quality	Cultural Heritage	Landscape and Visual Effects	Biodiversity and Nature Conservation	Geology, Soils and Waste	Materials and Waste	Noise	Water Environment	Significance
Viewpoint 2. Footpath by turbines	/	/	O	/	/	/	/	/	Not significant
Viewpoint 3. By the Caerns	/	O	O	/	/	/	/	/	Not significant
Viewpoint 6. Entrance to Common Hynydd Dinlaith common / Pandymawr Road	/	/	O	/	/	/	/	/	Not significant
Viewpoint 14. PRoW Common RUDR / FP4 / 3	/	/	O	/	/	/	/	/	Not significant
Acid grassland / heath / lichen-bryophyte habitats (County / Regional)	/	/	/	O	/	/	/	/	Not significant
Rock exposure artificial – colliery spoil (County)	/	/	/	O	/	/	/	/	Not significant

Environmental Receptor	Air Quality	Cultural Heritage	Landscape and Visual Effects	Biodiversity and Nature Conservation	Geology, Soils and Waste	Materials and Waste	Noise	Water Environment	Significance
Mynydd y Grug Field Boundary (HA1)	/	O	O	/	/	/	/	/	Not significant
Ditch and Bank/ Pound (HA2)	/	O	O	/	/	/	/	/	Not significant
Bedwas Navigation Colliery Tips (HA4)	/	O	O	/	/	/	/	/	Not significant
Mynydd y Grug Common including field boundaries (HA5)	/	O	O	/	/	/	/	/	Not significant
Twyn Cae Hugh Round Barrow (HA6)	/	O	O	/	/	/	/	/	Not significant
Multiple species – bats, birds, reptiles, small mammals and invertebrates	/	/	/	●	/	/	/	/	Not significant
Soil quality	/	/	/	/	●	/	/	/	Not significant
Groundwater	/	/	/	/	●	/	/	●	Not significant

O : Negative effect ● : Positive effect / : No effects or neutral effects - : Not applicable or Receptors not assessed

14.5 SUMMARY

14.5.1. During the construction phase, no receptors are expected to be impacted by any cumulative impacts.

14.5.2. During the operational phase, the main adverse impacts will be on the landscape and the cultural heritage of the area, but these impacts will reduce over time and will not cause any cumulative impacts during the operational phase of the Proposed Scheme.

14.5.3. The Proposed Scheme will overall have a beneficial impact on the area for biodiversity, soil quality, groundwater, as well as for the long-term record / preservation of known heritage features.

15 SUMMARIES AND CONCLUSIONS

15.1 INTRODUCTION

15.1.1. This chapter provides a summary of the environmental topics with significant residual construction or operational effects associated with the Proposed Scheme under each of the individual environmental topic assessments. Significant effects are those that are rated as Moderate or higher.

15.1.2. This chapter also draws overall conclusions for the environmental implications of the Proposed Scheme based on the identified residual effects.

15.2 SUMMARY OF RESIDUAL EFFECTS

AIR QUALITY

15.2.1. The residual effects of dust and PM_{10} generated by construction activities following the application of mitigation measures and good site practice would be direct, temporary, short-term and negligible. Therefore, the residual effects would be not significant.

15.2.2. The residual effects of mineral dust related to the operation of the Proposed Scheme on local air quality would be direct, temporary and negligible and therefore are not significant.

CULTURAL HERITAGE

15.2.3. The cultural heritage impact assessment identified the potential direct and indirect (visual) impacts of the Proposed Scheme on all heritage assets within a 250m study area, together with an assessment of the potential impact on the setting and significance of Value A statutory designated sites within a wider 3km study area. This included a direct physical impact on five heritage assets including Mynydd y Grug Field Enclosure (HA1), Ditch and Bank/ Pound (HA2), Bedwas Navigation Colliery Tips (HA4), Concrete base (HA48) and Scheduled Monument Twyn Cae Hugh Round Barrow (HA6). Scheduled Monument Twyn Cae Hugh Round Barrow (HA6) falls outside the red line boundary of the Proposed Scheme but remains at risk of a minor adverse direct impact of moderate significance. A series of mitigation measures are proposed to reduce the potential direct effect on heritage assets on the archaeological resource. Provided that these are implemented, then the residual direct impact of the Proposed Scheme will be reduced to ‘None’.

15.2.4. The assessment has concluded that the Proposed Scheme has potential to have an indirect visual impact on a total of thirteen heritage assets.

15.2.5. A total of four Scheduled Monuments have been identified for setting and significance impact assessment. Twyn Cae Hugh Round Barrow (HA6) will be subject to a Major setting impact due the construction of the proposed deposition area on the immediately adjacent common, whilst Twyn yr Oerfel Western Round Barrow (HA7), Pen-y-rhiw Round Cairn (HA10) and Maesycymmer Cairnfield (HA11) will be subject to a Slight setting impact.

15.2.6. The changes to the topography and the character of the landscape as a result of the Proposed Scheme will be permanent. The proposed mitigation in the form of sensitive design of the final landforms and seeding them with stored topsoil originating from the common may assist in reducing visual and setting impacts on some intervisible Scheduled Monuments, but not enough to have a measurable impact on magnitude.

LANDSCAPE AND VISUAL

15.2.7. This assessment has considered the operation phase visual impacts of the Proposed Scheme at 19 agreed viewpoints, the significance of effects at each location and how these will be mitigated and enhanced. During the operation phase, visual impacts will be associated with the construction vehicles and process plant, site compounds and associated temporary lighting, and the loss of some existing vegetation. During the construction of the new road and its associated structures, heavy machinery, including lifting equipment, will be brought onto the site and remain there for periods. This will have an adverse visual effect from several viewpoints. None of the operational impacts have resulted in a beneficial effect on the visual amenity from any particular viewpoint.

15.2.8. Table 8-16 shows the Preliminary Assessment of the post-operation landscape at Year 15 (without mitigation) when the land is permanently returned to grassland and used for informal recreation. Trees will have been growing for between 15 and 22 years due to planting taking place at different stages of progressive restoration during the construction phase, including the initial preparatory period prior to the commencement of coal processing. By Year 15, it is unlikely that temporary effects remain as there will have been a minimum 15 years of establishment and growth. Trees planted to provide woodland, and screening will be approaching maturity, and it is expected that patches of bare ground will be fully vegetated and a dense grassland sward has been achieved.

15.2.9. Temporary nighttime effects are likely to occur during the construction period, however, there is no mitigation for nighttime effects. At Year 1 and Year 15 post-operation phase, light and noise levels in the upland site areas will return to the current level.

ECOLOGY AND NATURE CONSERVATION

15.2.10. Desk studies and field surveys have shown the site to be located within and adjacent to valued nature conservation areas in terms of Sites of Importance for Nature Conservation (SINC) designations and Priority habitats. The site encompasses a large portion of the Mynydd y Grug SINC designated for its mosaic of habitats e.g., marshy grassland and ponds which support Great Crested Newts (GCN).

15.2.11. Proposed targeted mitigation relies heavily on sensitive clearance methods for species such as GCN, reptiles, ground nesting birds and small mammals. An European Protected Species Licence will be obtained to minimise impacts to GCN covering areas within 500m of two GCN breeding ponds. This would include an appropriate site clearance method statement and requirements for a suitable receptor area to translocate individuals, alongside appropriate fencing to prevent individuals re-entering the site. A site clearance method statement would also be required to protect reptiles, ground nesting birds and small mammals.

15.2.12. The Proposed Scheme will result in slight to large, short and medium-term (5-10 years) adverse effects on the existing ecological features of the site. With the implementation of the mitigation, long-term effects will largely be neutral to slight adverse. Where residual impacts of moderate adverse remain, for example for the acid grassland / heath / lichen-bryophyte habitats, the proposed mitigation measures yet to be confirmed at the time of writing this chapter, would have potential to be reduce these impacts to neutral to slight adverse. Where enhancement measures are incorporated into the Proposed Scheme this could result in a slight to moderate beneficial effect in the long-term.

GEOLOGY AND SOILS

15.2.13. During the construction phase there is the potential for moderate significant adverse effects from the remediation of the spoil material to remove high ash coal causing unavoidable oxygenation of soils if they are exposed. This would lead to minor acidification of infiltrating waters and liberation of sulphate. However, with focused additional investigation and implementation of a groundwater monitoring plan would reduce this effect to not significant.

15.2.14. During post-operation there is the potential for moderate significant beneficial effects on the soil quality and groundwater resource through the remediation of spoil material and importation of natural soil which would ensure a successful restoration. Established vegetation may lead to a slower percolation rate and overall improvement in groundwater quality and beneficial changes to water levels in the aquifer.

MATERIALS AND WASTE

15.2.15. The residual effects on materials and waste for both the construction and operation phases of the Proposed Scheme are neutral or slight and not significant. Careful management of the material from the earthworks can avoid material that is not suitable to be reused onsite being sent to landfill. It is assumed that if the material unsuitable for reuse cannot be used on site then, as part of the mitigation in the Materials Management Plan, the material is more likely to be managed in a Waste Transfer Station than sent to landfill.

NOISE

15.2.16. During the construction phase there is a limit of 55dB $L_{Aeq,1h}$ (free-field) for daytime and evening construction noise for earth moving activities likely to occur for a period in excess of six months and a level of 45 dB $L_{Aeq,1h}$ (free-field) for night-time recommended by the BS 5228-1 code of practice. These limits are not expected to be exceeded at any residential receptor. Therefore, there are no significant adverse effects for noise and any adverse effects are expected to be negligible.

15.2.17. The Proposed Scheme will not produce any adverse noise effects during operation.

WATER ENVIRONMENT

15.2.18. During both construction and operation, potential moderate adverse effects on water quality can be avoided with mitigation measures proposed for the Construction Environment Management Plan (CEMP). These include settlement ponds being lined with clay or highly weathered shales so any leaching of contaminants will be limited and further water head monitoring prior to construction to clarify the groundwater model. With mitigation measures in place it is anticipated that no significant adverse effects on the water environment will occur.

INTRA-PROJECT CUMULATIVE EFFECTS

15.2.19. The assessment of intra-project cumulative effects has determined that there will be no cumulative effects on any of the receptors impacted by the Proposed Scheme during both the construction and operation phases.

15.3 CONCLUSIONS

15.3.1. The Proposed Scheme, as a “major development” (as it exceeds 1ha in area), has been subject to the Pre-Application Consultation (PAC) process and this Environmental Statement (ES) has been

subject to statutory and public stakeholder review and consultation, as part of the PAC process, prior to submission for full planning application.

15.3.2. The Proposed Scheme design has been shaped by consultation with Caerphilly County Borough Council (CCBC) and the authors of the environmental assessments within this ES. As such the design includes embedded mitigation to reduce the environmental effects of the construction and operation of the Proposed Scheme. This includes landscape design, drainage design, topsoil and vegetation management and construction management practices.

15.3.3. There will be significant adverse effects associated with the construction phase of the scheme, however, these will be temporary in nature and managed through mitigation and best practice working methods which will be detailed in a future CEMP.

15.3.4. There will be beneficial effects from the Proposed Scheme on biodiversity, soil quality and groundwater. There will, however, be significant adverse effects associated with the post-operational phase of the Proposed Scheme, most of which are related to landscape and visual impacts. These effects will be subject to consultation during the PAC process, and potentially future revision based on the outcomes of the pre-application discussion and feedback.

15.3.5. Where any uncertainty exists for any given topic, a ‘worst case’ has been assumed and assessed. As such this creates opportunities to refine the Proposed Scheme design and mitigation following the PAC process.

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