# ENVIROPARKS HIRWAUN, HIRWAUN, RHONDA CYNON TAFF, SOUTH WALES

# SHADOW HABITAT REGULATIONS ASSESSMENT: STAGE 1 SCREENING REPORT

A Report to: Environmental Visage Limited

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The information which we have prepared is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management's Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

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## NON-TECHNICAL SUMMARY

This report has been produced by Middlemarch Environmental Ltd for Environmental Visage Limited (Envisage) on behalf of the planning applicant, Enviroparks (Wales) Ltd (EWL) and presents a shadow Habitats Regulations Stage 1 Screening Report associated with the proposed Enviroparks Hirwaun development at Hirwaun, Rhonda Taff, South Wales.

In 2008 Enviroparks (Hirwaun) Limited submitted planning applications to Rhondda Cynon Taf County Borough Council (RCT) and Brecon Beacons National Park Authority (BBNPA) for planning permission for development of a sustainable waste recovery and energy production park at the site. Planning applications were made to two planning authorities because the boundary between the two crosses the application site. Planning permission was granted by both authorities on 21 December 2010 (RCT reference 08/1735/10 and BBNPA reference 08/02488/FUL). Permission was granted subsequently for various amendments to the approved proposals.

Since 2010 the planning permissions have been implemented through the construction of the first phase of the development. The operator, which is now called EWL, wishes to proceed with the second phase of the development. However, since the original scheme design was prepared in 2008, advances in waste recovery technologies and a much-changed policy and commercial landscape for waste recovery and renewable energy generation have necessitated a review of the original master plan for the Enviroparks site. Revised planning applications have been prepared for the site, and this shadow Habitats Regulations Assessment: Stage 1 report is submitted alongside these applications to provide an updated assessment of the likely significant effects of the proposals on three Special Areas of Conservation (SACs): Blaen Cynon SAC; Coedydd Nedd a Mellte SAC; and, Cwm Cadlan SAC.

The 2009 shadow Habitats Regulations Assessment report (RT-MME-104641) which was produced concluded that with the mitigation proposed at the time in place, the Enviroparks scheme would have no Likely Significant Effect on any of the Natura 2000 sites. A Biodiversity Scheme was agreed with Countryside Council for Wales and Rhondda Cynon Taf County Borough Council (RCT) and Brecon Beacons National Park Authority (BBNPA), and secured through a Section 106 agreement as part of the mitigation package. It is understood that whilst Enviroparks have provided the agreed financial contribution associated with the Biodiversity Scheme, no works have been carried out on the Biodiversity Scheme by Butterfly Conservation.

The conservation objectives for each of the Natura 2000 sites considered in this report are associated with preserving the favourable conservation status of qualifying habitats and species. In 2008, CCW published Core Management Plans for all of the sites considered in this report, which describe known areas of vulnerability for these sites. These areas of vulnerability are all factors which could reduce the ability of the sites to meet their conservation objectives, therefore this assessment is focused on the ability of the proposed development to contribute to known areas of vulnerability. Since the original sHRA report was completed in 2009, new Natura 2000 – Standard Data Forms have been issued (in 2015) which also identify 'threats' to the specific Natura 2000 site. The assessment of the potential impacts of the development proposal have therefore been considered in accordance with these new data. Natural Resources Wales have also provided high-level information regarding the current management arrangements at Blaen Cynon SAC.

The Screening Report includes consideration of the in-combination effects of a number of committed projects within the local area, which have the potential to also have air quality impacts.

With respect to Blaen Cynon SAC, the assessment has shown that there are potentially effects from dust pollution of the SAC (given its proximity to the Enviroparks site) during construction. However, these potential effects can be controlled through development and implementation of a Dust Management Plan. The modelling has shown that without additional technological mitigation measures, the scheme could result in deposition at the closest point within Blaen Cynon SAC of nutrient nitrogen and acid deposition, which are at a level which cannot be considered insignificant. Increased nitrogen deposition is known to result in habitat changes within grassland habitats, where the increased nutrient levels can favour more nitrophilious species which can result in a loss of species-diversity. In accordance with the Habitats Regulations, it is important to recognise that the qualifying features of Blaen Cynon SAC are marsh fritillary *Euphydryas aurinia* as the site is considered to be one of the best areas for this butterfly in the United Kingdom. Therefore, any effects from changes in air pollution are considered indirect effects as they may impact plant species on which the marsh fritillary in its larval stage inhabit, but there are not considered to be any direct

effects on the butterfly individuals. An effect would be considered to affect the favourable conservation status of marsh fritillary butterfly if increased nitrogen and acid deposition resulted in a reduction in the population of the larval food plant for the species (Devil's-bit scabious *Succisa pratensis*), or a significant change in the habitats such that they would no longer provide habitat suitable to support the butterfly species. During the planning process, consultation with Natural Resources Wales has taken place and additional technological mitigation options have been explored by the project team. Modelling completed in August 2017 has shown that, with the implementation of these additional technologies the potential process contributions from the Enviroparks scheme would be at a level that they could be screened as insignificant based on accepted screening criteria.

The levels of nitrogen deposition and acid deposition at Blaen Cynon SAC which were presented in the 2009 sHRA are not directly comparable to the data presented in this report. This is due to the fact that the data in this report is from a grid reference closest to the Enviroparks development (as requested by Natural Resources Wales), rather than a central grid reference within the SAC (as was used in the 2009 assessment). The critical loads and critical levels have also been updated since 2009 by APIS and as such the current data is based on current guidance. ~~However, that aside, it is clear from the data that the levels of predicted nitrogen deposition for the current scheme are showing a lower deposition rate than in the 2009 assessment. The acid deposition levels are relatively similar for the 2009 and the current modelled data.~~

An assessment of the potential in-combination effects of the proposed Enviroparks scheme in addition to other committed projects and plans has been included in the modelling work. Although there are currently no published screening criteria associated with in-combination effects, due to the elevated background levels of nitrogen deposition and acid deposition within the local area, the in-combination predicted environmental concentrations for these two factors are above 1% of the relevant critical load at Blaen Cynon SAC.

Potential effects from the following on Blaen Cynon SAC have been screened out based on the modelling works completed to support this assessment: ammonia; oxides of nitrogen (NOx); sulphur dioxide; metals (cadmium, thalium and heavy metals); volatile organic compounds (VOCs); and Polycyclic Aromatic Hydrocarbons (PAH).

For the 2008 application, a Biodiversity Scheme was agreed with Countryside Council for Wales, RCT and BBNPA, and secured through a Section 106 agreement. This scheme was designed to provide compensatory marshy grassland habitat for marsh fritillary use within a 5km radius of the Enviroparks scheme as mitigation, compensation and enhancement for loss of habitat from the proposed development site and also any adverse effects on marsh fritillary populations within Blaen Cynon. Recent case law, published since 2009, has clarified the difference between 'compensation' and 'mitigation' with respect to the Habitats Directive and concluded that a conclusion of No Likely Significant Effect can only be reached where 'mitigation' is provided within an SAC which directly deals with the identified pathway to ensure that there is no adverse effect on the integrity of the SAC. It is therefore concluded that the Biodiversity Scheme which was agreed under the 2010 planning permission would not be considered to provide appropriate 'mitigation' associated with in-combination ~~the identified~~ effects from nitrogen and acid deposition. A review of the current management regime at Blaen Cynon SAC has been completed and consideration has been given to the management options available which would potentially reduce soil nutrients. The SAC site is currently managed through a range of different management agreements with Natural Resources Wales and is managed with low intensity grazing by heavy livestock. Published data suggests that grazing does not result in reductions in the nutrient status of a site, and may increase nutrient inputs through dunging and disturbance. However, hay cropping can be used to reduce nutrient nitrogen levels (although it is recognised that this is likely to be a slow process). In the absence of current guidelines from NRW on how to deal with schemes where there are already elevated background levels of pollutants and in-combination effects cannot be screened out using the screening criteria designed to assess the impact of schemes 'alone', the benefits of the already established Biodiversity Scheme to the conservation of the marsh fritillary butterfly (which should be conserved using a metapopulation approach) should be taken into account.

For Coedydd Nedd a Mellte SAC, potential effects from the Enviroparks development alone and in-combination with other projects and plans, when taking into account the implementation of additional mitigating technologies, have been screened out for the following: nitrogen deposition, ammonia; oxides of nitrogen (NOx); sulphur dioxide; metals (cadmium, thalium and heavy metals); volatile organic compounds (VOCs); and Polycyclic Aromatic Hydrocarbons (PAH). It can therefore be concluded that if additional technologies are implemented, there would be no adverse effects from the proposed development on this SAC site.

~~For Coedydd Nedd a Mellte SAC, it has been concluded that the majority of potential effects on this SAC can be screened out. The levels of nutrient nitrogen deposition from the Enviroparks scheme alone can be screened out based on the long-term realistic emissions data modelling, although it is recognised that there will be some in-combination effects which it may not be possible to screen out. The modelling shows that acid deposition cannot currently be screened out, either alone or in-combination with other projects, and given the site's designation for ancient woodland habitats, there may be an adverse effect within parts of the SAC as a result of the Enviroparks scheme, mostly when considering the in-combination effect with other projects. Chapter 9 identifies that further detailed mapping should be carried out to determine the extent to which the SAC might be affected by levels of nitrogen and acid deposition, as it is clear from the data currently available that nutrient nitrogen deposition levels can be screened out across parts of the SAC site. Further consideration is therefore required to determine whether the effects are considered to significantly impact the integrity of the whole of this large SAC site. Consultation with Natural Resources Wales is suggested to agree data interpretation and, if necessary, identify possible mitigation options associated with adverse effects.~~

At Cwn Cadlan SAC, the August 2017 modelling has shown that assuming that additional technologies are implemented as part of the scheme, potential effects, both alone and in-combination with other projects and plans, for the following can be screened out: nitrogen deposition, ammonia; oxides of nitrogen (NOx); sulphur dioxide; metals (cadmium, thalium and heavy metals); volatile organic compounds (VOCs); and Polycyclic Aromatic Hydrocarbons (PAH). It can therefore be concluded that if additional technologies are implemented, there would be no adverse effects from the proposed development on this SAC site.

~~For Cwm Cadlan SAC, it has been concluded that the majority of potential effects on this SAC can be screened out. However, the levels of acid deposition cannot be screened out, and given the site's designation for grassland and fen habitats, there may be an adverse effect within acid-sensitive habitats within the SAC as a result of the Enviroparks scheme, both alone and in-combination effect with other projects. Chapter 9 identifies that consultation with Natural Resources Wales is suggested with respect to identifying possible mitigation options associated with this effect.~~

Consideration has been given in this Screening Report to the potential in-combination effects from the proposed development when considered with identified energy projects within the local area, and from plans set out in the Local Development Plans for Rhondda Cynon Taff County Borough Council and Brecon Beacons National Park Authority which could have an impact on the three SACs discussed in this report.

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# 1. INTRODUCTION

## 1.1 PROJECT BACKGROUND

In March 2017, Environmental Visage Limited commissioned Middlemarch Environmental Ltd to undertake an updated Shadow Habitat Regulations Assessment (sHRA) (Stage 1: Screening) associated with a proposed development at Enviroparks Hirwaun, Rhonda Taff, South Wales. Middlemarch Environmental Ltd carried out a Shadow Appropriate Assessment for a development at the site in 2009 to support planning applications to Rhondda Cynon Taff County Borough Council (RCT) and Brecon Beacons National Park Authority (BBNPA), as the site spans two planning areas, associated with the development of a sustainable waste resource recovery and energy production park. Planning permission was granted by both authorities on 21 December 2010 (RCT reference 08/1735/10 and BBNPA reference 08/02488/FUL) following the completion of a planning obligations agreement under Section 106 of the Town and Country Planning Act 1990. Further to this, planning permission was granted subsequently for various amendments to the approved proposals.

Since then the planning permissions have been implemented through the construction of the first phase of the development. The operator, which is now called Enviroparks (Wales) Limited (EWL) wishes to proceed with the second phase of the development. However, since the original scheme design was prepared in 2008, advances in waste recovery technologies and a much-changed policy and commercial landscape for waste recovery and renewable energy generation have necessitated a review of the original master plan for the Enviroparks site. The current assessment is therefore required to inform a revised planning application for:

> *Amended phase II development and operation of a sustainable waste resource recovery and energy production park, comprising the consolidation of the approved gasification yard and pyrolysis building into a 6,270.43m$^2$ gasification hall; an emissions stack measuring 45m in height and 4.5m in diameter; a 2,102.86m$^2$ fuel storage hall and a 378m$^2$ turbine hall for electricity generation; and a 4,824m$^2$ open service yard containing ancillary structures including air-cooled condensers for the gasification plant, ancillary fire water tanks and a fire pumphouse, effluent pumps, gas boosters, transformers and a standby diesel generator and fuel tank, with boundary landscape and planting at land at Fifth Avenue, Hirwaun Industrial Estate, Hirwaun, Aberdare.*

In summary, the main differences between the development approved in 2010 and the amended scheme applied for now are as follows:

- It is proposed that the gasification yard, pyrolysis building and engine house all shown separately in the 2010 scheme should all be consolidated into a single building. This would be achieved by raising the height of the consented but unbuilt building on the Fifth Avenue frontage of the site by two metres to an eves height of 14.1 metres and a ridge height of 16.1 metres to accommodate a Fuel Storage Hall and Turbine Hall, and building a Gasification Hall to the north of this revised building, extending towards the centre of the site, with an eves height of 16.5 metres. and a ridge height of 18.5 metres.

- Raising the height of the consented but unbuilt emissions stack at the centre of the site from 40 metres to 45 metres to ensure the effective dispersion of atmospheric emissions without interference to air flow from the proposed Gasification Hall beneath. The stack would also be increased in diameter from 2.5 metres to a maximum 3.5 metres, which will enhance both its operational performance and structural integrity.

- Deletion of the consented anaerobic digestion tanks inside the western boundary of the site. This is because a similar facility has opened at Bryn Pica, nearby.

- The replacement of the consented but unbuilt green wall inside the south-western corner of the site with a belt of tree and shrub planting. The green wall had been proposed to conceal the open gasification yard. However, with the gasifiers located in the proposed Gasification Hall, this requirement falls away.

These amendments are a rationalisation of the existing approved development and are intended to afford a range of operational and amenity benefits. Placing all process elements into a single building is operationally efficient. Plant and equipment would be protected from the weather and operational monitoring would be assisted. Working conditions for staff would improve. From an amenity perspective, enclosing the gasifiers in a building greatly assists noise attenuation and odour containment, helps to avoid light pollution

and presents a less industrial and more visually coordinated feature in views from outside the site, including from the elevated terrain in the Brecon Beacons National Park to the north. The new and amended buildings would use the same elevational treatment and building materials approved for the development that was granted planning permission in 2010. For the avoidance of doubt, the revised proposals involve no change to the overall volume of materials processed at the site.

Consultation with Natural Resources Wales confirmed that a shadow Habitat Regulations Assessment would be required to inform the determination of the application, due to the proposed development site's proximity to a number of nature conservation sites. Reference to mapped data and as outlined by Natural Resources Wales, the following European statutory nature conservation sites are within a 5 km radius of the scheme: Blaen Cynon Special Area of Conservation (SAC), Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC. These sites form part of the Natura 2000 network of European statutory nature conservation sites.

This report comprises Stage 1 (Evidence Gathering and Screening) of a shadow Habitat Regulations Assessment for the scheme. The need for projects with the potential to impact upon Natura 2000 sites to be assessed is stated in Article 6 of the European Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (hereafter 'the Habitats Directive'). Articles 6 (3) and 6 (4) of this Directive state that an Appropriate Assessment is required for any plan or project that is considered likely to have a significant effect on a Natura 2000 site, either individually or in-combination with other plans or projects. Natura 2000 sites are those sites designated under the Habitats Directive to ensure the protection of European important habitats, and include SACs, SPAs, Offshore Marine Sites (OMS) and Ramsar sites. The Habitats Directive is transposed into UK legislation through the Habitat Regulations. Regulation 61 of the Habitat Regulations incorporates the requirements of Articles 6 (3) and 6 (4) of the Habitats Directive.

The competent authority can only agree to the proposed development after having ascertained that it will not adversely affect the integrity of any Natura 2000 sites. Where adverse impacts are anticipated, projects or plans may still be agreed provided that there are no alternative solutions and the plan is considered to be of overriding public interest. In such instances appropriate compensatory measures are required to ensure that the overall coherence of the Natura 2000 site network is protected.

### 1.2 CONSULTATION

Natural Resources Wales responded to a pre-application enquiry associated with the revised planning application on 20th February 2017. They provided the following comments in their response:

> *A HRA, to be undertaken by the Local Authority, will be required to inform the determination of this application. A HRA was undertaken for the previous application at Enviroparks and that should now be updated to consider the new proposals. The new proposals result in different emissions (such as Ammonia, Benzene, Heavy Metals, Cadmium and Poly Aromatic Hydrocarbons (PAH), and different rates of acid and nitrogen deposition. In addition, since the original HRA, new developments have been proposed / constructed in the local area and these will need to be considered in the context of the HRA.*

A meeting was held at Natural Resources Wales offices on 9th May 2017 to discuss the project and the initial results of the air quality modelling. During this meeting NRW provided further information regarding the SAC sites considered in this Stage 1 report, and requested that a draft version of the report be circulated to NRW for their comments. A draft version of the report was provided to NRW and subsequently a final version was also provided to RCT and BBNPA as part of the planning application process.

Comments on the Draft version of the report were received from NRW on 27th June 2017. A full copy of the consultation response is included in Appendix 5. The consultation concluded the following:

> ***"Requirement** - Further information is required to demonstrate that emissions can be controlled to an acceptable level to demonstrate that there is no adverse effect on the integrity of the relevant Special Areas of Conservation (SAC).*
>
> ***Atmospheric Dispersion Modelling***
> *Summary – Worst Case IED Limits Emissions Data should be used, with a 70% conversion ratio of NO2:NOx.*

***Habitats Regulations Assessment***
*Summary – With the information currently available, the project is likely to have a significant effect on the European Sites / SACs identified. In the determination of this application, your Authority must make an Appropriate Assessment of the implications for those sites in view of their conservation objectives.*

***Mitigation***
*Summary – the measures proposed by the Applicant by way of mitigation are not considered to be acceptable. To ensure that the proposals will not give rise to adverse effects on the SACs, further information should be submitted to demonstrate that technical solutions are available and will be utilised within the design to control emissions to an acceptable level."*

On receipt of the above consultation response from NRW, the Enviroparks team engaged with an experienced technology provider to further consider the technological mitigation measures which could be included within the proposed system, as a way of ensuring that the emissions from the development were reduced to levels which were considered insignificant. The Envisage (2017c) report from August 2017 (add reference) provides the following clarification of the approach taken:

*"Emissions of $NO_x$, $SO_2$, $NH_3$, and HCl have been reduced or removed by the use of comprehensive abatement measures, in order to ensure that the resultant impact on the local environment is not only acceptable from a human health perspective, but can also be screened as insignificant at the very local sensitive ecological receptors.*

*Details of the technologies to be applied are not detailed within this report, but will be included as part of a wider submission to the Local Planning Authority in due course. However, the ability of the abatement systems to meet the specified pollutant discharge concentrations is assured."*

A further meeting was held with Natural Resources Wales and Welsh Government on 19th July 2017 to discuss progress made by the applicant, EWL, in relation to the identification and assessment of alternative technologies which could be implemented as part of the scheme to provide the 'mitigation' measures requested above in relation to air pollution / air quality changes.

During the process of ongoing liaison with Natural Resources Wales they provided additional mapped information regarding the habitat distribution at Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC, in addition to information regarding the current management arrangements within Blaen Cynon SAC.

# 2. METHODOLOGY

The current assessment is based on the best practice for Habitat Regulations Assessment as outlined in The Habitat Regulations Handbook (DTA Publications, 2013 and subsequent updates). This document expands upon previous guidance published by the Impacts Assessment Unit at Oxford Brookes University (2001) and the Department for Communities and Local Government (2006).

Best practice guidance identifies that the Habitat Regulations Assessment process is broadly divisible into four stages, with the need to complete each stage determined by the results of the previous stage. In summary, these stages are:

- **Stage 1: Evidence Gathering and Screening**
  This stage is associated with collecting evidence regarding those parts of the Natura 2000 network that have the potential to be impacted by the strategic land-use plan, either alone or in-combination with other projects or plans. Where no significant effects are perceived, sites may be screened out of the need for further assessment during Stage 2.

- **Stage 2: Appropriate Assessment of Significant Impacts**
  Where it is considered a Natura 2000 site may experience significant effects from a project or strategic land-use plan, either alone or in-combination, a detailed assessment of likelihood and severity of the perceived impact on the integrity of the Natura 2000 network is undertaken. This assessment is based on a detailed review of the project or plan in conjunction with the structure, function and conservation objectives of the Natura 2000 site. This stage may also include a preliminary assessment regarding the potential for the identified impacts to be mitigated.

- **Stage 3: Assessment of Alternative Solutions**
  Where impacts on the integrity of the Natura 2000 network are perceived, this stage examines alternative ways of achieving the objectives of the project or strategic land-use plan in order to avoid these impacts.

- **Stage 4: Imperative Reasons of Overriding Public Interest and Compensation Measures**
  Where the potential for adverse impacts remains, and where it is deemed that a project or land-use plan should proceed for Imperative Reasons of Overriding Public Interest (IROPI), an investigation of appropriate compensatory measures is undertaken.

This report focuses on Stage 1 of the Habitat Regulations Assessment process. Evidence gathering and screening is undertaken for those Natura 2000 Sites identified as being of relevance to the current project. The following Natura 2000 sites are considered in this screening report: Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC. These sites form part of the Natura 2000 network of European statutory nature conservation sites. The location of the site is shown on Drawing C124755-01 in Chapter 11.

Implicit in the Habitats Directive is the application of the **precautionary principle**, which requires that the conservation objectives of Natura 2000 should prevail where there is uncertainty whether there will be an impact or not (Oxford Brookes, 2001). The European Commission's Final Communication from the Commission on the Precautionary Principle (European Commission, 2000a) states that the use of the precautionary principle presupposes:

- Identification of potentially negative effects resulting from a phenomenon, product or procedure; and,
- A scientific evaluation of the risks which because of the insufficiency of the data, their inconclusive or imprecise nature, makes it impossible to determine with sufficient certainty the risk in question (CEC, 2000).

According to best practice guidance, this means that the emphasis for assessment should be on objectively demonstrating, with supporting evidence, that there will be no significant effects on a Natura 2000 site. The publication 'Managing Natura 2000 Sites: The Provision of Article 6 of the 'Habitats' Directive 92/43/EEC' (European Commission, 2000b) provides explanatory guidance regarding this point, which is paraphrased below.

> *It is clear from the context and from the purpose of the directive that the 'integrity of the site' relates to the site's conservation objectives. For example, it is possible that a plan or project will adversely affect the integrity of a site only in a visual sense or only habitat types or species other than those listed in*

*Annex I or Annex II. In such cases, the effects do not amount to an adverse effect for the purposes of Article 6(3), provided that the coherence of the network is not affected.*

*The expression 'integrity of the site' shows that focus is here on the specific site. Thus, it is not allowed to destroy a site or part of it on the basis that the conservation status of the habitat types and species it hosts will anyway remain favourable within the European territory of the Member State.*

*As regards the connotation or meaning of 'integrity', this can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation. The 'integrity of the site' has been usefully defined as 'the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or levels of populations of the species for which it was classified' (IEEM, 2006).*

*The integrity of the site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site's conservation objectives.*

Conservation objectives for the Natura 2000 sites considered in this assessment are presented in Chapters 6 to 8.

# 3. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

## 3.1 CURRENT LAND USE

The Application Site is located on Fifth Avenue in Hirwaun Industrial Estate (central National Grid Reference SN 938 068). The site is situated at the northern edge of the industrial estate, with industrial buildings located to the south and east. Penderyn Reservoir forms the northern site boundary, with early-mature sessile oak lining the boundary and over-shading much of the track. A pumping station and an area of pasture with scattered trees forms the western site boundary. Fifth Avenue forms the southern site boundary and Ninth Avenue forms the majority of the eastern site boundary, with the remainder marked by a water treatment works.

The 2009 sHRA report states that the site was dominated by an area of flat, made ground, with incorporated drainage channels. It was understood that the area was previously built upon (within the last 100 years). The central area of the site was dominated by marshy grassland, however occasional gorse and planted scattered trees were present towards the edges of this habitat. The area was grazed by horses and thus subjected to a high level of poaching. Fenced off areas were present along the eastern and western site boundaries, with protected areas of young broad-leaved plantation woodland and scattered trees in marshy grassland.

A grassy track ran along the northern site boundary, bound between lines of trees (northern side of track) and broad-leaved woodland (southern side of track). A small stream extended along the western edge of the site, with a second shallower brook flowing into this stream forming a triangular area of willow carr, scattered trees and marshy grassland separate from the main area of the site (the third side was formed by a dry ditch which separated this area from the grassy track).

In 2017 an Environmental Statement Addendum was prepared by Savills. Chapter 13 of this ES Addendum, states that "*The habitats present within the Application Site remain broadly unchanged since the 2008 ES chapter*". The ES Addendum however, does identify the following changes to the ecological baseline of the site since 2008:

- Since the submission of the 2008 ES, construction works for Phase 1 are largely completed with the exception of the Phase 1 car park. The Phase 1 area now includes a large building, known as the Fuel Preparation Hall, in the south-east part of the site, a gatehouse, an access road running across the site between Ninth Avenue and Fifth Avenue, temporary construction laydown and parking areas and foul and surface water drainage works.
- A reduced temporary SUDS attenuation swale was constructed as part of Phase 1, which will be replaced by the full scale attenuation and landscape area along the southern boundary which was identified in the original consented site plan. This will be constructed as part of the Phase 2 works and will provide the required mitigation for the loss of reptile and amphibian habitat elsewhere on the site.
- During Phase 1, mitigation was provided for reptiles and amphibians through good quality habitat being retained within the Temporary Wildlife Protection Area (TWPA).
- Additional works during 2015/16 impacted part of the TWPA, resulting in the need to modify the TWPA perimeter.
- Additional mitigation works were undertaken during August and September 2016 to ensure that habitat for reptiles and amphibians was, and continues to be adequately protected.

## 3.2 SCOPE OF THE PROPOSED DEVELOPMENT

The Environmental Statement Addendum (Savills, 2017) provides a detailed description of EWL's proposals which are covered by the planning application. A short summary of the processes that would take place on the site, and the individual buildings within which these processes would be accommodated is given below.

Processes will include:

- Waste management;
- Water reception;
- Fuel preparation; and,
- Gasification.

The buildings which have been built and are proposed for the site include:

- Fuel preparation hall (already built);
- Fuel storage hall;
- Gasification hall;
- Stack;
- Turbine hall;
- Service yard;
- On site high-energy user building;
- Biomax building;
- Visitor centre and administration building; and,
- Areas for site access, circulation and parking.

Extensive landscape and planting is proposed around the periphery of the site and within the car park. Plant species would be selected to reflect the aims of integrating new planting with that which already exists on the site boundaries, providing a suitable visual foil for the buildings and some ecological benefit.

# 4. CUMULATIVE SCHEMES

## 4.1 INTRODUCTION

As part of the updated air quality assessment work completed in support of the current planning application, consideration was given to the in-combination effects on air quality as a result of projects and plans within the local area. Chapter 9 Air Quality of the Environmental Statement Addendum (Savills, 2017) identifies the projects and plans which have been considered.

## 4.2 IN-COMBINATION PROJECTS

Chapter 9 Air Quality provided the following discussion regarding projects which are considered 'in-combination' as part of the air quality modelling works:

*"Located on an industrial estate, the Enviroparks development is in close proximity to operations that might have an impact on air quality. Eden UK, across Ninth Avenue from the site, holds a Local Authority Environmental Permit for its coating processes, from which the main regulated pollutant is $PM_{10}$. Other Local Authority Environmental Permits registered in or around Hirwaun include a coal handling Permit for Tower Regeneration Ltd, a coatings manufacturing Permit for Eftec Limited, which produces engineered materials and application systems for bonding, coating, sealing and damping in vehicles, and a wood product Permit application for the Celtic Communities Wood Fuel Limited. None of these installations and processes are expected to have a significant impact upon local air quality, due to their type, size and distance from existing Air Quality Management Areas or other vulnerable areas.*

*Since the 2008 ES, a number of energy plants have been constructed or proposed on the Hirwaun Industrial Estate. These include the Green Frog Short Term Operating Reserve (STOR) located off Main Avenue, and operational since 2012. Additionally, a Nationally Significant Infrastructure Project, Hirwaun Power was awarded a Development Consent Order in July 2015, for the development of an open-cycle gas turbine peaking plant to generate up to 299 $MW_e$, and Premier Green Energy Ltd has been awarded a change of use planning permission to develop a renewable energy generation facility comprising a pyrolysis plant for the conversion of non-hazardous mixed waste wood materials into 8 $MW_e$ energy.*

*Several other new, proposed or committed developments have been identified in the area, including the Abergorki Wind Farm, situated on land to the North East of Forch-Orky; land remediation and reclamation of old tips, derelict land and buildings, surface coal extraction and associated ancillary development at the Tower Colliery site; potential development of the former Ferrari's Bakery site in Hirwaun, for which the site was sold at auction in July 2016 although there are no further details on whether or not the proposed development will progress at the site at this time.*

*When considering the potential cumulative effects of proposed or committed developments in the Hirwaun area, the air quality assessment prepared for the ES Addendum has taken the following schemes* [see Table 4.1] *into account:*

| Development Name | Scheme | Consideration |
|---|---|---|
| Abergorki Wind Farm | Three wind turbines | Construction traffic impacts |
| Hirwaun Power | Gas fired 'peaking' power generating plant providing up to 299mwe | Construction traffic and operational emissions |
| Hirwaun Energy Centre | Wood pyrolysis energy plant | Operational emissions |
| Green Frog Connect Ltd, | STOR generator farm | Operational emissions |

**Table 4.1: Cumulative Effects Considered in Air Quality Assessment**

Chapter 9 Air Quality states that with respect to other identified schemes with limited additional or a reduced impact on current background air quality levels:

*"Other identified schemes have been assessed as having limited additional, or as having a reduced impact on current background air quality levels, e.g. reduced traffic movements at Tower Colliery, or are*

*considered to have insufficient information available for consideration e.g. the likely proposals for the Ferrari's Bakery site."*

### 4.3 IN-COMBINATION PLANS

In addition to considering in-combination schemes, Chapter 9 Air Quality of the Environmental Statement Addendum (Savills, 2017) provides the following assessment of plans which have been considered as part of the air quality assessment modelling. Chapter 9 states that:

*"Allocated land within the Rhondda Cynon Taf Local Development Plan includes:*

*Policy NSA 8 - Land South of Hirwaun*
*Land is allocated South of Hirwaun for the construction of 400 dwellings, 36 hectares of employment, a new primary school, a retail store of 2000m$^2$ net floor space, medical /community centre and informal recreation contained in a landscape setting. Development on the Strategic Site will be subject to a large-scale reclamation scheme.*

*Policy NSA 9 - Housing Allocations*
*Land is also allocated in the Northern Strategy Area of Rhondda Cynon Taf for residential development on non-Strategic Sites in the following locations:*
*Land South of Rhigos Road, Hirwaun, a 0.57 hectare flat field situated on the edge of Hirwaun, located behind a low density residential street has been identified for 15 Dwellings.*

*Policy NSA 21 - Park and Ride / Park and Share Provision*
*Provision for park and ride / park and share facilities will be provided on land to the South of Hirwaun.*

*Although allocated for development, these schemes are not yet in the planning system. The Local Authority applies a consistent and proportionate approach to their consideration of development applications which could either have the potential to adversely affect local air quality or introduce a relevant population to an existing area of potentially poor local air quality. Should a development meet the relevant criteria and it is proportionate to do so, the Local Authority will require an Air Quality Assessment to be produced in order to objectively examine the air quality implications of the proposed development, and to provide sufficient information to allow the Local Planning Authority to evaluate the material planning consideration. In this way, the Local Authority attempts to ensure that future developments will negate or mitigate any impacts on local air quality whilst continuing to treat each application for planning consent on its individual merits."*

As such, whilst these plans have been identified, their air quality impacts have not been considered in this assessment as they are not yet 'committed developments' and as such there is no air quality data available to base an assessment on.

The one scheme which this does not necessarily apply for is Ferrari's Bakery site. This site has the potential to increase traffic movements and result in associated air quality impacts, and the planning consent expires on 28/10/2019. A search for air quality data associated with this site for inclusion in this assessment was carried out by Environmental Visage Ltd, however available data was limited and it is understood that the site was sold at auction in 2016, having not been developed. As such, there is currently no data associated with the development proposals on which an assessment can be made. It is understood that the site initially failed to sell at auction, but a deal was done subsequently. Bearing in mind the location of this site (in Hirwaun itself rather than on the Industrial Estate) and the uncertainty over its future as well as a lack of detailed information on the only possible 'in-combination' effect from traffic changes, Environmental Visage Limited screened this projects out of the detailed assessments.

Consideration has also been given to any in-combination effects which might be outlined in the following documents:

- 'Habitat Regulations Assessment (Appropriate Assessment) Report. Rhondda Cynon Taf County Borough Council. Draft Deposit Local Development Plan' (Enfusion, 2009).
- 'Brecon Beacons National Park Local Development Plan - Final Sustainability Appraisal Report (incorporating Strategic Environmental Assessment)' (TRA, 2013).

In-combination effects from these plans are discussed further below.

Rhondda Cynon Taf County Borough Council. Draft Deposit Local Development Plan
The Appropriate Assessment (Enfusion, 2009) provides the following conclusions with respect to air quality impacts on Blaen Cynon SAC:

> *"The LDP has the potential to increase levels of traffic along the A465 and A4059 through the development of Strategic Site 5: Land South of Hirwaun and Employment allocation 9 (North of Fifth Avenue, Hirwaun Ind Estate, Hirwaun). Increased traffic could lead to an increase in airborne pollutants at Blaen Cynon SAC as the A465 and A4059 are within 200m. The plans and programs that have the potential for in-combination effects in relation to increased traffic along the A465 and A4059 are:*
> - *The Trunk Road Forward Programme 2002 proposes the dualling of the A465 from Abergavenny to Hirwaun. Section 7 (A465:A470 to Hirwaun) is in close proximity to the SAC. This in-combination with the development proposed in the LDP has the potential to increase levels of airborne pollutants through increased traffic.*
> - *The Brecon Beacons National Park (BBNP) Local Development Plan Preferred Strategy identifies the potential for a small amount of growth in Peneryn, the precise location and size of development is as yet not unknown, however allocations outside the main settlement of Brecon are likely to be small in number. There is a small likelihood that development in this area may increase levels of traffic along the A4059 which is within 200m of Blaen Cynon SAC. The BBNP Preferred Strategy contains strong policies in regard to environmental protection and climate change (minimise greenhouse emissions).*
>
> *RCT's Deposit Draft Plan contains a number of policies that will assist in mitigating any potential increase in traffic and therefore airborne pollutants, such as ensuring improvements to and encouraging the use of public transport, walking and cycling routes. The proposed level of employment development will also help to reduce daily out-commuting to work from RCT by private car. The Core Management Plan for the Blaen Cynon SAC (CMP) does not identify air pollution as being a significant issue at this site. "There are no known off-site factors, such as pollution, that are affecting the marsh fritillary to any significant extent, although there is still much industry in the locality". The CMP also states that as management of the SAC habitat improves, off-site factors could become more apparent. Based on information provided in the CMP and from the JNCC; site level management issues (grazing and scrub management) are currently the most important factor in terms of maintaining and improving the marsh fritillary habitat. Taking these factors into account it is assessed that the LDP will not have significant effects on Blaen Cynon SAC either alone or in-combination in regards to airborne pollution."*

Consultation with NRW during a meeting on 9th May 2017, clarified that whilst air quality was not considered to be a threat in the 2008 Core Management Plan for Blaen Cynon SAC (as suggested above), it is now considered to be a threat to the SAC.

The Transport Statement which forms part of the Environmental Statement Addendum provides the following with respect to the proposed A465 dualling works:

> *"…significant works have been undertaken on the Heads of the Valleys Road (A465), which provides strategic road access to Hirwaun Industrial Estate. Upgrades to sections of the A465 between Dowlais and Brynmawr to the east of Hirwaun are complete, and improvements between Dowlais and Hirwaun are programmed to commence in 2018."*

Consultation with Welsh Government (Meredith, *Pers. Comm.*) confirmed that an Environmental Impact Assessment associated with the stretch of the A465 between Hirwaun and Dowlais is currently being completed, and should be publicly available in July 2017. However, this means that there is currently no data which can be used to carry out further modelling work on the potential 'in-combination' effect of this section of the strategic project.

With respect to air quality (concentrations in air at ground level), the transport assessment works (Chapter 8, Environmental Statement Addendum, Savills, 2017) for works completed to date, on which the conclusions presented in Sections 6.4.3.10, 7.4.4.9 and 8.4.3.9 are based, use a Tempro assessment methodology which includes an expected increase in traffic levels in line with local development proposals. The Tempro assessment uses national data applied at a local level into which the local authority would have provided their input from strategic traffic improvement proposals.

Whilst no data is currently available on which a more detailed assessment of this scheme can be competed, it should be recognised that whilst the A465 dualling works could result in an increase in traffic levels, one of the key reasons for the dualling works is to is to improve the flow of traffic and potentially this could reduce contributions to air pollution from traffic due to improved traffic flows in proximity to the SAC.

Enfusion (2009) do not identify any potential adverse effects from the Local Development Plan on Ceodydd Nedd a Mellte SAC or Cwm Cadlan SAC and as such, it can be concluded that there would be no in-combination effects from the proposed development and the Local Development Plan on these sites.

Brecon Beacons National Park Local Development Plan

The TRA (2013) SER report provides a summary of the Appropriate Assessment works that were completed for the Local Development Plan. The following summary is provided:

> *"A HRA for the LDP has been undertaken as a separate process to the SA/SEA. A summary of the process, results and recommendations are provided below…*
>
> *The second stage of the screening undertaken at Deposit stage (including proposed site allocations) identified that there was potential for likely significant effects at five European sites (Blaen Cynon SAC, Llangorse Lake SAC, River Usk SAC, River Wye SAC and Usk Bat Sites SAC) both alone (as a result of the location of certain candidate sites) and combined with other plans and programmes.*
>
> *The screening recommended a number of policy safeguards that seek to address issues identified through the assessment. These recommendations were subsequently incorporated into the LDP. Monitoring measures and a joint Water Cycle Study (after adoption of the LDP) were also recommended as a result of data limitations and the uncertainty surrounding the implementation of development.*
>
> *The screening concluded that with the recommended policy safeguards and monitoring measures incorporated into the Plan, the Deposit LDP would not have likely significant effects on European sites either alone or in-combination with other plans or projects."*

Assuming that the proposed Enviroparks is policy compliant, it may therefore be possible to conclude that the proposed Enviroparks scheme will not have any adverse in-combination effects from other schemes outlined in the plan. A copy of the Appropriate Assessment report has been requested from BBNPA and will be reviewed in greater detail once this document has been provided.

TRA (2013) do not identify any potential adverse effects from the Local Development Plan on Ceodydd Nedd a Mellte SAC or Cwm Cadlan SAC and as such, it can be concluded that there would be no in-combination effects from the proposed development and the Local Development Plan on these sites.

# 5. RELEVANT NATURA 2000 SITES

This report presents evidence to allow potential impacts on relevant Natura 2000 sites to be assessed and the need for a full Habitat Regulations Assessment to be screened.

Chapter 9 Air Quality from the Environmental Statement Addendum (Savills, 2017) sets out the methodology used to assess air quality impacts on ecological receptors (as identified by Natural Resources Wales in their pre-application responses, see Section 1.2). The assessment included designated sites located within 10 km of the Enviroparks facility. This assessment identified that there were three Natura 2000 sites within this radius: Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC.

The qualifying criteria and relative distances of the sites from the 2017 application site boundary are summarised in Table 5.1. It should be noted that the site boundary for the current application is smaller than that from the original planning application.

| NATURA 2000 SITE | QUALIFYING FEATURES | DISTANCE FROM APPLICATION SITE |
|---|---|---|
| Blaen Cynon SAC [UK 0030092] | The site contains an extensive complex of damp pastures and heaths supporting the largest metapopulation of marsh fritillary butterfly *Euphydryas aurinia*, an Annex II species, on the southern edge of the Brecon Beacons National Park. | 125 m east |
| Coedydd Nedd a Mellte SAC [UK 0030141] | The site is a very large and diverse example in South Wales of the Annex I habitat 'Old sessile oak woods with *Ilex* and *Blechnum*'. The woods extend along a series of deeply incised valleys and ravines, and contain complex mosaics of sessile oak *Quercus petraea* woodland, ash *Fraxinus excelsior* woodland (some of which is referable to the qualifying Annex I habitat type 9180 *Tilio-Acerion* forests of slopes, screes and ravines), and transitions to lowland woodland types. | 1.24 km west north-west |
| Cwm Cadlan SAC [UK 0013585] | The site has the largest recorded example of Annex 1 habitat 'Molinia meadows on calcareous, peaty or clayey-silt-laden soils' in Wales and also supports the Annex 1 habitat 'Alkaline fens'. | 2.48 km north-east |

**Table 5.1: Summary of Natura 2000 Qualifying Criteria and Distance from Application Site Boundary**

The location of these sites in relation to the proposed development site is shown on Drawing C124755-01 in Chapter 11.

The designation criteria, conservation objectives, known areas of vulnerability and consideration of the development impacts for each of the Natura 2000 sites listed in Table 5.1 are detailed in Chapters 6 to 8.

# 6. BLAEN CYNON SAC

## 6.1 QUALIFYING CRITERIA

The following information is taken from the Joint Nature Conservation Committee (JNCC) site description and accompanying Natura 2000 data sheet, both of which are available at:
http://jncc.defra.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0030092

Information has also been obtained from the Countryside Council for Wales (CCW, 2008a) Core Management Plan for the site.

| | |
|---|---|
| **Country:** | Wales |
| **Unitary Authority:** | East Wales |
| **Centroid:** | SN946066 |
| **Latitude:** | 51.77722222 |
| **Longitude:** | -3.505277778 |
| **Site Code:** | UK0013585 |
| **Status:** | Designated Special Area of Conservation (SAC) |
| **Area (ha):** | 84.2 |

Blaen Cynon contains an extensive complex of damp pastures and heaths supporting the largest metapopulation of marsh fritillary *Euphydryas aurinia* on the southern edge of the Brecon Beacons National Park. The marsh fritillary butterfly *Euphydryas aurinia* is found in a range of habitats in which its larval food plant, devil's-bit scabious *Succisa pratensis*, occurs. Marsh fritillaries are essentially grassland butterflies in the UK, and although populations may occur occasionally on wet heath, bog margins and woodland clearings, most colonies are found in damp acidic or dry calcareous grasslands. Populations of marsh fritillary vary greatly in size from year to year, and, at least in part, this is related to cycles of attack from parasitic wasps. Adults tend to be sedentary and remain in a series of linked metapopulations, forming numerous temporary sub-populations, which frequently die out and recolonise.

Blaen Cynon also supports a range of habitats. Marshy grassland, and flush and spring are of particular importance as they provide habitat for the marsh fritillary. Also present are areas of raised bog, species-rich neutral grassland, acid grassland and semi-natural broadleaved woodland.

### 6.1.1 SAC Qualifying Criteria

#### 6.1.1.1 Qualifying Habitats

The site does not contain any Annex I habitats (Habitats Directive: 92/43/EEC) that are listed as primary reasons for selection.

#### 6.1.1.2 Qualifying Species

This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations of European importance listed on Annex II of the Directive). The SAC citation states that with respect to *Euphydryas (Eurodryas, Hypodryas) aurinia* this is considered to be one of the best areas in the United Kingdom.

## 6.2 CONSERVATION OBJECTIVES

The CCW (2008a) Core Management Plan for Blaen Cynon SAC includes the conservation objectives for designated features. Each conservation objective consists of the following two elements: vision for the feature; and, performance indicators. During a meeting on 9th May 2017 with Natural Resources Wales, it was confirmed that whilst an updated management plan for Blaen Cynon SAC is currently being produced, this has not yet been published and therefore the 2008 plan is considered to represent the most up to date management plan for the site.

### 6.2.1 SAC Feature: Marsh Fritillary Butterfly

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- The site will contribute towards supporting a sustainable metapopulation of the marsh fritillary in the Penderyn/ Hirwaun area. This will require a minimum of 50ha of suitable habitat, of which at least

10 ha must be in good condition, although not all is expected to be found within the SAC. Some will be on nearby land within a radius of about 2km.

- The population will be viable in the long term, acknowledging the extreme population fluctuations of the species.
- A minimum of 30% of the total site area will be grassland suitable for supporting marsh fritillary (as the total area of the SAC is 66.62 ha, 30% represents approximately 20 ha.)
- At least 40% of the suitable habitat (approximately 8 ha) must be in optimal condition for breeding marsh fritillary.
- Suitable marsh fritillary habitat is defined as stands of grassland where *Succisa pratensis* is present and where scrub more than 1 metre tall covers no more than 10% of the stands.
- Optimal marsh fritillary breeding habitat will be characterised by grassland where the vegetation height is 10-20 cm, with abundant purple moor-grass *Molinia caerulea*, frequent "large-leaved" devil's-bit scabious *Succisa pratensis* suitable for marsh fritillaries to lay their eggs and only occasional scrub. In peak years, a density of 200 larval webs per hectare of optimal habitat will be found across the site.

The performance indicators for the condition of the feature and the factors affecting the feature are provided in Table 6.1 below.

| **Performance Indicators for Feature Condition** | | |
|---|---|---|
| ***Attribute*** | ***Attribute rationale and other comments*** | ***Specified limits*** |
| **A1.** Density of larval webs | Larval web density in a 'good' year for marsh fritillary has been identified as a measurable performance indicator of the population. During peaks in the population cycle a density of 200 webs per hectare of suitable habitat is an appropriate target to set as defining favourable condition for strong populations.<br><br>Wide fluctuations in abundance occur, with dramatic crashes in population size occurring every ten years or so. Recovery from these crashes may take 4 or 5 yrs. | *Upper limit:* not required<br><br>*Lower limit:* in one year in six the number of larval webs is estimated to be 200 per hectare of Good Condition habitat. |
| **Performance Indicators for Factors Affecting the Feature** | | |
| ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| **F1. Extent and quality** of the marshy grassland as habitat for marsh fritillary | The marsh fritillary is a highly localised and sedentary butterfly that inhabits unimproved *Molinia* grassland in the lowlands. It has an annual life-cycle and feeds as a larva on *Succisa pratensis*, especially on large-leaved plants that are growing amongst vegetation that is between 10 and 20 cms tall in late summer/autumn. The larvae over winter communally amongst litter in such situations and the shelter provided by leaf litter and tussocks is considered to be important.<br><br>Approximately 50 ha of habitat is required to maintain the population in the long-term, with at least 10ha is good condition. Not all is expected to be within the SAC. The operational limits reflect the minimum contribution of the Blaen Cynon SAC towards the favourable conservation status of the species in the Hirwaun/ Penderyn area.<br><br>**Definition of Good Condition marsh fritillary habitat**<br>Grassland, with *Molinia* abundant where, for at least 80% of sampling points, the vegetation height is within the range of 10 to 20 cm (when measured using a Boorman's disc) and *Succisa pratensis* is present within a 1 m radius. Scrub (>0.5 metres tall) covers no more than 10% of area<br><br>**Definition of Suitable marshy grassland**<br>Stands of grassland where *Succisa pratensis* is present at lower frequencies but still widely distributed (>5% of sampling points) throughout the habitat patch and in which scrub (>0.5 metre tall) covers no more than 25% of area. Alternatively, *Succisa* may be present at high density in close-cropped swards.<br><br>[note: Available habitat is the total of Good Condition and Suitable habitat] | 20 hectares of Available marshy grassland, including:<br><br>8 hectares of Good Condition marsh fritillary habitat Within Areas 1, 2, 3 and 4 50% of the vegetation meets the following criteria:<br><br>Within a 50cm radius:<br>*Molinia* is present<br>*AND*<br>The cover of *Succisa* is 10% or greater<br>*AND*<br>The vegetation height is between 10-20cm when measured using a Boorman's disc.<br>**AND**<br>The cover of *Juncus* spp. does not exceed 50% |

**Table 6.1: Performance Indicators for Blaen Cynon SAC Feature – Marsh Fritillary Butterfly**

Natural Resources Wales provided a plan of Blaen Cynon SAC that shows the marsh fritillary butterfly habitat within the SAC boundaries. A copy of this map is provided in Appendix 1. This map shows that the SAC includes 6 different areas of land, which all include some pockets of marsh fritillary habitat. The SAC unit which is in closest proximity to the Enviroparks scheme is the largest of the six, and contains the largest concentration of marsh fritillary habitat. Marshy fritillary habitat is shown to be present along the western side of this SAC unit, in close proximity to the Enviroparks development area.

Other Factors to Consider

*Owner/occupier objectives* - the owners/occupiers of the land typically have an interest in securing some financial/agricultural benefit from the land. This return could be optimised by the agricultural improvement of the land, e.g. by installing new drainage, fertiliser application, or re-seeding; however these operations would cause significant long-term damage to the marsh fritillary habitat, namely the marshy grassland. Additionally unimproved marshy grasslands that are waterlogged for much of the year are difficult to manage for many landowners, possibly resulting in a mixture of over- and undergrazing, with a tendency for scrub to spread. Because of the wet nature of some of the ground, some landowners may be reluctant to graze large stock. This factor will be controlled through management agreements and the SSSI legislation. An operational limit is not required.

*Weather conditions* **-** Weather conditions have an effect on the breeding success of the marsh fritillary. In particular, poor weather conditions during the adult flight period will reduce opportunities for mating, egg-laying and dispersal from core areas. Weather conditions during early spring influence the rate of larval development of the marsh fritillary and the effects of the parasitic wasp (see below). This site is situated in an area of relatively high rainfall, which has a large influence on the population dynamics of the marsh fritillary. This factor is outside the influence of the site manager and an operational limit is not required.

*Parasites* **-** The larvae of marsh fritillaries can be parasitised by species of braconid wasp of the *Cotesia* genus. The parasites can have good years and infect a large number of larval webs, causing a crash in the subsequent adult population of marsh fritillary. This factor is outside the influence of the site manager; and an operational limit is not required.

### 6.2.2 Additional SSSI Features

Blaen Cynon SAC consists of two Sites of Special Scientific Interest (SSSIs): Cors Bryn y Gaer SSSI and Woodland Park and Pontpren SSSI. These sites are included in the Natura 2000 series for their population of marsh fritillary butterfly. The sites also host the following six SSSI features, for which conservation objectives are provided in the Core Management Plan for Blaen Cynon SAC:

- Marshy grassland;
- Flush and spring;
- Raised bog;
- Species-rich neutral grassland;
- Acid grassland; and,
- Semi-natural broadleaved woodland.

The vision for each of these SSSI features and performance indicators for the factors affecting the features have not yet been defined. Furthermore, with the exception of marshy grassland, limited detail is provided with respect to performance indicators for the condition of each feature.

Table 6.2 presents the performance indicators for Blaen Cynon SAC features – SSSI Features.

| **Feature** | | | |
|---|---|---|---|
| **Marshy grassland** | **Performance Indicators for Feature Condition** | | |
| | ***Attribute*** | ***Attribute rationale and other comments*** | ***Specified limits*** |
| | A1. Extent of marshy grassland | Monitoring will be a map-based exercise. The area of marshy grassland will be mapped as a baseline extent and the total area measured. Repeat monitoring will either re-map the site or review the baseline map in the field.<br><br>Extent of marshy grassland is defined by the amount of habitat required for marsh fritillaries<br><br>SSSI feature – Core Management Plan report states that section is to be completed. | Upper Limit: not needed<br>Lower limit: 20 hectares of Available marshy grassland |
| | A2. Condition of the marshy grassland | The definition of good condition marshy grassland follows that given for the marsh fritillary habitat, as follows:<br><br>**Definition of Good Condition marsh fritillary habitat** Grassland, with *Molinia* abundant where, for at least 80% of sampling points, the vegetation height is within the range of 10 to 20 cm (when measured using a Borman's disc) and *Succisa pratensis* is present within a 1 m radius. Scrub (>0.5 metres tall) covers no more than 10% of area<br><br>**Definition of Suitable marshy grassland** Stands of grassland where *Succisa pratensis* is present at lower frequencies but still widely distributed (>5% of sampling points) throughout the habitat patch and in which scrub (>0.5 metre tall) covers no more than 25% of area. Alternatively, *Succisa* may be present at high density in close-cropped swards.<br><br>[note: Available habitat is the total of Good Condition and Suitable habitat] | This section follows the operational limits for the marsh fritillary feature above:<br>8 hectares of Good Condition marsh fritillary habitat Within Areas 1, 2, 3 and 4 50% of the vegetation meets the following criteria:<br><br>Within a 50cm radius:<br>*Molinia* is present<br>*AND*<br>The cover of *Succisa* is 10% or greater<br>*AND*<br>The vegetation height is between 10-20cm when measured using a Boorman's disc.<br>**AND**<br>The cover of *Juncus* spp. does not exceed 50% |
| | **Performance Indicators for Factors Affecting the Feature** | | |
| | ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| | SSSI feature - Core Management Plan report states that section to be completed. | | |
| **Remaining features** (Flush and spring, raised bog, species-rich neutral grassland, acid grassland, semi-natural broadleaved woodland) | **Performance Indicators for Feature Condition** | | |
| | ***Attribute*** | ***Attribute rationale and other comments*** | ***Specified limits*** |
| | A1. Extent of feature | Monitoring is likely to be a map-based exercise. The area of the feature will be mapped as a baseline extent and the total area measured. Repeat monitoring will either re-map the site or review the baseline map in the field. | SSSI feature - Core Management Plan report states that section to be completed. |
| | A2. Condition of the feature | SSSI feature - Core Management Plan report states that section to be completed. | SSSI feature - Core Management Plan report states that section to be completed. |

**Table 6.2: Performance Indicators for Blaen Cynon SAC Features – SSSI Features**

### 6.3 VULNERABILITY OF THE SAC

The CCW Core Management Plan (2008a) includes an assessment of the conservation status of qualifying features and management requirements to maintain or restore each feature.

#### 6.3.1 SAC Feature: Marsh Fritillary Butterfly

In 2008, the conservation status of the marsh fritillary butterfly was **unfavourable**. This was due to the following principal issues:

- Inappropriate grazing;
- Scrub invasion; and,

- Inappropriate tree planting and past agricultural improvements in the management units.

Further details are provided in Table 6.3.

| Issue contributing to Unfavourable Status of Feature | Explanation and Management Required |
|---|---|
| Inappropriate grazing | Without an appropriate grazing regime, the grassland will become rank and eventually turn to scrub and woodland. Conversely, overgrazing, or grazing by inappropriate stock (particularly sheep) will also lead to unwanted changes in species composition, through selective grazing, increased nutrient inputs and poaching. Balancing grazing is the single most important issue in the management of this site. There is now considerable experience in managing sites for marsh fritillaries in Wales, and the needs of the species are now reasonably well understood. |
| Scrub invasion | Scrub encroachment is an issue, particularly on some wet grassland areas. A programme of scrub control is currently (2008) being undertaken, but it is likely that even with the ideal grazing management, a more or less continuous programme of scrub control will be required at this site. It is clear from aerial photographs and from discussions with landowners, that many areas that are currently covered in alder and willow woodland were formerly wet pasture. Therefore a long-term aim would be to investigate returning some of this to wet pasture that would likely increase the availability of marsh fritillary habitat. |
| Inappropriate tree planting and past agricultural improvements in the management units | Parts of Woodland Park and Pontpren, notably units 3 and 4 have been subject to improvement in preparation for tree planting, including draining, planting with trees and use of fertiliser. These areas have a programme of scrub removal and cattle grazing in place, to restore the grassland to a condition where it can be used by marsh fritillaries. Some drains have been blocked, to restore the hydrology of the site. |

**Table 6.3: Summary of Issues Contributing to Unfavourable Status of Feature and Management Required**

### 6.3.2 Additional SSSI Features

The conservation statuses of all SSSI features (marshy grassland, flush and spring, raised bog, species-rich neutral grassland, acid grassland and semi-natural broadleaved woodland) were **unfavourable** in 2008. Management requirements for these features were not provided.

### 6.3.4 Current Threats to SAC

The Natura 2000 – Standard Data Form (2015a) states that the main threats to this SAC are:

High-rank threats:

- Changes in abiotic conditions – both inside and outside of the SAC; and,
- Air pollution, airborne pollutants – both inside and outside of the SAC.

Medium-rank threats:

- Other ecosystem modifications – both inside and outside of the SAC.

Low-rank threats:

- Biocenotic evolution, succession – both inside and outside the SAC;
- Grazing – inside the SAC;
- Human induced changes in hydraulic conditions – both inside and outside the SAC;
- Invasive non-native species – both inside and outside the SAC; and,
- Pollution to groundwater (point sources and diffusion sources) – inside the SAC.

## 6.4 Potential Effects on Blaen Cynon SAC

This section of the report provides an assessment of the potential effects of the proposed development on the Blaen Cynon SAC. The section has been structured to provide consideration of each of the likely pathways for impacts and the site's vulnerabilities as identified in Sections 6.2 and 6.3. Some of the identified 'risks' are identified from the 2008 Core Management Plan for the site (CCW, 2008a), and some are from the 2015 Natura 2000 Standard Data Form. Where there are overlaps between the 'risks' outlined in the two documents, these have been discussed together.

The proposed development has the potential to result in direct impacts on the SAC through changes in local conditions which might affect the SAC, and also indirect effects which may include loss of supporting habitat outside of the SAC which is used by qualifying species.

**DIRECT IMPACTS**
Direct impacts on the qualifying feature of the SAC, ie marsh fritillary butterflies, as a result of the proposed development would include disturbance of individuals of marsh fritillary within the SAC boundary.

### 6.4.1 Disturbance
This section assesses whether the proposed development at the site will cause a direct disturbance to marsh fritillary individuals during either the construction or operational stage.

Populations of marsh fritillaries vary greatly in size and form from year to year, related at least in part to cycles from attack by parasitic wasps (JNCCa, no date). Adults tend to be sedimentary, rarely flying more than 50 – 100 m (Butterfly Conservation, 2008), and therefore form a series of linked metapopulations, with numerous temporary sub-populations which frequently die out and recolonise (JNCCa, no date). Where the habitat is very fragmented, populations do not appear to be able to persist and therefore the conservation of clusters of sites in close proximity is important for the species.

In terms of the reaction of marsh fritillary to disturbance, consultations with the Senior Invertebrate Ecologist from CCW (Fowles, 2009) identified that CCW have not carried out any research on the potential impacts of disturbance on butterflies. Fowles (2009) concluded that the major concern from developments close to a known marsh fritillary site (accepting that habitat fragmentation and metapopulation connectivity has been accounted for) would be from the potential impact on hydrology, as groundwater changes may impact on the marshy grassland that supports the marsh fritillaries. He went on to state that *'Whilst some…other threats might affect marsh fritillaries there is no indication to suggest that they are likely to be significant, at least in the scenarios we deal with here in Wales.'*

Therefore, as there is no evidence to suggest that marsh fritillary butterflies are affected by construction or operational disturbance, it can be concluded that disturbance will not result in a direct adverse impact on the integrity of this qualifying feature of Blaen Cynon SAC.

**INDIRECT IMPACTS**
Indirect impacts include those pathways which may result in changes to the habitats within the SAC upon which the marsh fritillary butterfly depends. As part of the assessment works for the 2009 sHRA report (RT-MME-104641), the Environment Agency Wales provided a copy of the Air Pollution Assessment for Blaen Cynon SAC (EAW, no date) which stated that:

> *A reduction in the occurrence of Devil's-bit scabious would put pressure on the marsh fritillary populations, and if the plant is completely lost then the marsh fritillary will disappear from the site.*

Thus, indirect effects on the marshy fritillary butterfly are considered to include pathways through which the habitats which support Devil's-bit scabious could be affected to such an extent that they are no longer able to support this larval foodplant species.

In addition, loss of habitat outside of the SAC, but which could form part of the marshy fritillary's range would also be considered to be an indirect effect.

These potential effects are discussed in further detail in Sections 6.4.2 to 6.4.7 below.

### 6.4.2 Changes in Abiotic Conditions
Changes in abiotic conditions are considered to be a high-ranking threat to the SAC. Abiotic factors are non-living conditions which can influence where plants or animals live such as: temperature, light intensity; moisture content of soil; and pH of the environment.

<u>Dust</u>
Abiotic factors which have the potential to affect Blaen Cynon SAC include dust pollution of the SAC as a result of construction activities within the proposed development site which is located c.100 m west of the SAC at its closest point. Chapter 9 Air Quality states that with respect to dust emissions during the construction phase of the development:

*"Dust emissions from the proposed development site will occur predominantly during construction. The main sources of dust include that generated from land stripping and excavation, piling and foundation works, aggregate and materials handling and preparation, and traffic movements across the site which will, periodically at least involve movement across open ground...*

*The earthworks required at the site will be classed as medium scale, due to the size of the site and the operations required. Construction and track-out impacts will be large scale, due to the size of the buildings, and the number of construction vehicle movements required at peak operation...*

*the potential impact on ecological receptors can be considered. However, as the sensitive ecological sites are all located more than 50 m from the development site, the overall sensitivity is considered to be low. With a medium, low and low sensitivity class for the effects of dust and soiling effects, human health and ecological impacts respectively, the combined sensitivity of the area is considered to be low."*

Taking into account the sensitivity of the potential receptors, the Chapter 9 Air Quality concludes that with respect to the magnitude of the impact from dust during construction:

*"The overall risk of dust impacts from the construction activities at the proposed development site is therefore considered to be low."*

In their pre-application response, Natural Resources Wales (Griffiths, 2017, *Pers. Comm*.) stated the following with respect to dust impacts:

***Dust impacts upon designated sites***
*If dust mitigation can avoid dust depositions of 200mg/m$^2$/day at the nearest designated site then that should be sufficient to reduce the potential risk of damage to the features. It is generally accepted that dust depositions of 200mg/m$^2$/day are considered nuisance deposition at residential receptors. Therefore, we will ask that a condition be imposed on any permission granted that a Dust Management Plan (covering both the construction and operational phases) be submitted and agreed with the LPA's prior to any development commencing.*

With the mitigation outlined above implemented (as detailed in Chapter 8), it is clear that this potential pathway could be controlled and as such there would be no significant adverse effect on Blaen Cynon SAC as a result of the proposed development, either alone or in-combination with other plans or projects.

Changes in pH
Changes in the pH of the SAC as a result of air pollution are considered in Section 6.4.3 below.

### 6.4.3 Air Pollution, Airborne Pollutants

The 2009 sHRA Report (RT-MME-104641) provided an in-depth discussion of the potential air quality impacts of the proposed development on the habitats and qualifying features within Blaen Cynon SAC. This data has been reviewed and the sections below provide an updated assessment of the potential impacts of the proposed development based on the updated modelling completed as part of the Environmental Statement Addendum (Savills, 2017).

A description of the model used by the air quality consultants to provide the data discussed in this section of the report is given in Chapter 9 Air Quality of the Environmental Statement Addendum (Savills, 2017) and Envisage (2017c) report entitled 'Atmospheric Dispersion Modelling Assessment of Proposed Emissions from Enviroparks Wales Ltd, Hirwaun Industrial Estate, Aberdare'. In response to pre-application consultation with Natural Resources Wales, further modelling works were completed in April and May 2017 and the results of this additional modelling work are presented in this report. A discussion regarding the original air quality modelling results was provided in Chapter 13 Ecology of the Environmental Statement Addendum (Savills, 2017), however, the results provided in this sHRA report supersede these data. Further to receipt of consultation responses from Natural Resources Wales and the numerous meetings and data exchange between the project team and NRW, this RevA version of the report provides further air quality modelling results, from August 2017, which take- into account additional 'mitigation' measures which have been identified by the technology provider as being deliverable as part of the scheme.

As part of the assessment works for the 2009 sHRA report (RT-MME-104641), the Environment Agency Wales provided a copy of the Air Pollution Assessment for Blaen Cynon SAC (EAW, no date). This

document states that the habitats within Blaen Cynon are comprised of acid, neutral and calcareous grassland types, all of which may be supporting the marsh fritillary butterfly. Table 6.4 presents a summary of the potential pollutants and the Environment Agency's assessment of their effect on the marsh fritillary qualifying feature of Blaen Cynon SAC.

| Pollutant | Effect on Marsh Fritillary in Acid Grasslands | Effect on Marsh Fritillary in Calcareous Grasslands |
|---|---|---|
| Nitrogen oxide ($NO_x$) | No threat is perceived where the butterfly inhabits acid grassland. | If the grassland is calcareous potential changes to community composition and increased susceptibility to secondary stresses such as drought and frost may lead to an overall adverse effect on the grasslands that the butterfly inhabits. A reduction in the occurrence of Devil's-bit scabious would put pressure on the marsh fritillary populations, and if the plant is completely lost then the marsh fritillary will disappear from the site. |
| Sulphur dioxide ($SO_2$) | The butterfly is not considered to be sensitive to exposure of high levels of $SO_2$ if it inhabits acid grasslands. | Calcareous grasslands are considered to be sensitive to exposure of high levels of $SO_2$. The key concerns are visible decline symptoms such as leaf discolouration and stimulated growth at low concentrations of S potentially changing community composition. |
| Ammonia ($NH_3$) | High concentrations of ammonia can cause stresses on plants and changes to plant morphology. Plants that are less sensitive to the effects of ammonia will become dominant, replacing more sensitive species. The larvae of the butterfly relies on the presence of Devil's bit scabious, if concentrations of ammonia exceed the critical level then there is the possibility that this plant will decrease in numbers or become lost from the site. | |
| Ozone | The butterfly is not considered to be sensitive to exposure of high levels of ozone if it inhabits acid grasslands. | Calcareous grasslands are considered to be sensitive to exposure to high levels of ozone. The key issues are: visible injury to foliage, reduction in growth rate, selection against ozone sensitive genotypes and a changed reaction to water stress. |
| Nutrient nitrogen deposition | The butterfly species relies on the presence of Devil's-bit scabious, on which the larvae feed. An increase in nutrient nitrogen (N) will potentially change the species matrix of both calcareous and acid grasslands, with grasses becoming more dominant. If Devil's–bit scabious is lost from the site then so too will the marsh fritillary butterfly. | |
| Acidification | Whilst in the larval stage the marsh fritillary feeds only on Devils-bit scabious, which is a grassland species. Thus although the larvae and the adults are not directly affected by acidification they may be indirectly affected by damage to, or loss of Devils-bit scabious. The threat to acid grasslands from acid deposition is thought to be small, however there is very little information available on this. | In areas of calcareous grassland it is generally agreed that acid deposition has no effect due to the buffering capacity. |

**6.4: Summary of Air Quality Effects on Grassland at Blaen Cynon SAC (after EAW, no date)**

The Core Management Plan (CCW, 2008a) for the site, identifies that management Units 1, 2, 3 and 4 are in closest proximity to the proposed development site. Appendix 1 includes a plan showing the management units for Blaen Cynon SAC. The key habitats within these units are marshy grassland (Units 1, 2 and 3) and flushes and springs (Unit 4), with flushes and springs, raised bog, species-rich neutral grassland habitats and acid grassland all noted as being other habitats that are important to the management unit, but not the main focus of management and monitoring. Thus it is clear that the potential pollutants outlined in Table 6.4 which might affect 'calcareous grassland' include nitrogen oxide, sulphur dioxide, ammonia, ozone and nutrient nitrogen.

When considering air pollution effects, critical levels and critical loads are used to set thresholds against which changes in the levels of air pollutants as a result of a process can be assessed as being 'insignificant' or, if they cannot be considered 'insignificant' may be 'significant' based on further assessment.

APIS (see http://www.apis.ac.uk/overview/issues/overview_Cloadslevels.htm#_Toc279788050) provides the following definitions of critical levels and critical loads:

- Critical Loads are defined as: *" a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*"

- Critical levels are defined as "*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge*".

APIS state that it is important to distinguish between a critical load and a critical level. The critical load relates to the quantity of pollutant deposited from air to the ground, whereas the critical level is the gaseous concentration of a pollutant in the air.

The EAW (no date) report provided information with respect to the critical levels for a number of air pollutants related to Blaen Cynon SAC, detailed in Table 6.5.

| Pollutant | Current Level |
|---|---|
| Nitrogen dioxide ($NO_2$) | A critical level of $NO_2$ has not been set. |
| Nitrogen oxide ($NO_x$) | The marsh fritillary butterfly is considered to be sensitive to concentrations of NOx above 30 µg/$m^3$. All of the EAW estimated levels lie below the critical level. It can be concluded that current NOx concentrations are not high enough at Blaen Cynon to be having an adverse effect on the integrity of the site. |
| Sulphur dioxide ($SO_2$) | The marsh fritillary butterfly has a critical level of 20 µg/$m^3$. All of the EAW estimated levels lie below the critical level. The current levels, both estimated and measured show there is no current threat from $SO_2$ concentrations to the SAC features. |
| Ammonia ($NH_3$) | The marsh fritillary butterfly has a critical level of 1 µg/$m^3$. It can be concluded that NH3 levels are not currently having a negative effect on the Blaen Cynon SAC feature. |
| Ozone | The marsh fritillary butterfly is sensitive to ozone concentrations above a critical level of AOT 40 3000 ppb.h. The APIS estimated level of ozone AOT 40 3537 ppb.h is higher than the AOT 40 3000 ppb.h limit for the natural vegetation features. |

**Table 6.5: Summary of Air Pollution Critical Levels at Blaen Cynon SAC (from EAW, no date)**

In addition to the information provided in Table 6.5, the Air Pollution Information System (APIS) website (see http://www.apis.ac.uk/srcl/select-a-feature?site=UK0030092&SiteType=SAC&submit=Next) provides a range of critical levels and critical loads for Blaen Cynon SAC associated with the habitat types which are found within the site. These have been used to inform the air quality assessment modelling works.

In response to comments from Natural Resources Wales as part of the pre-application process, air quality modelling was carried out specifically to inform this sHRA Stage 1 report. The assessment methodology included using a grid reference to the closest possible point within the ecological receptor (ie the Natura 2000 site) from the source, as this was considered to give a maximum value for the deposition rates within the SACs. For Blaen Cynon SAC, the modelling is based on the closest point of the SAC to the development site, located at grid reference 294099, 206960.

Air Quality and Air Pollution Screening Criteria

When considering the potential effect of air quality and air pollution on sensitive ecological receptors, a series of screening criteria are used to identify whether a project will result in changes to air quality or air pollution which are below a threshold at which they can be considered 'insignificant'.

The values for critical loads and critical levels give levels above which a habitat may experience adverse effects from the air quality criteria or air pollution levels. Where the scheme is considered to provide a contribution towards air quality or air pollution, but the critical load or critical level in not exceeded, it can be concluded that the scheme would not have a significant adverse impact on the ecological receptor from the relevant air pollutant. If the scheme does result in the critical load or critical level being exceeded, the an additional set of screening criteria apply.

The Institute of Air Quality Management (IAQM, 2016) 'IAQM Position Statement - Effect of Air Quality Impacts on Sensitive Habitats' states that:

> *"The EA recognised early in its process of developing guidance that there would always be a level of emission from an installation such that its impact would be so small as to constitute an 'inconsequential effect', when considered in isolation or in-combination with the background or other*

*sources. It chose to set this level at 1% of the relevant criterion, which is typically the critical level for vegetation or the critical load for the habitat being considered…*

*it is the position of the IAQM that the use of a criterion of 1% of an assessment level in the context of habitats should be used only to screen out impacts that will have an insignificant effect. It should not be used as a threshold above which damage is implied and is therefore used to conclude that a significant effect is likely. It is instead an indication that there may be potential for a significant effect, but this requires evaluation by a qualified ecologist and with full consideration of the habitat's circumstances. The criterion also is intended to apply to an individual source and is not intended to be applied to multiple sources 'in-combination'."*

The IAQM Position Statement (IAQM, 2016) provides the following clarification with respect to the use of 1% as a screening threshold:

*"it should be recognised that the criterion was set as 1% and not 1.0%. It may be considered by some that it is prudent to explore the likelihood of an adverse effect when the impact is, say 1.2% of a critical load, but the reality is that this was never the original intention of the methodology. The calculation of impacts is always subject to some uncertainty, especially where deposition is concerned. It would be more in the spirit of the original proposal to use 1% as a criterion if impacts that were clearly above 1% were treated as being potentially significant, rather than impacts that are about 1% or slightly greater."*

Chapter 9 Air Quality of the Environmental Statement Addendum (Savills, 2017) confirms that the initial screening stage which has been applied to the modelled data was based on the following:

*"The Environment Agency sets criteria for considering the impact of process contributions to ambient air, which states that process concentrations equating to less than 1% of the long-term assessment level, or 10% of the short-term level can be screened as insignificant."*

If the process contribution (PC) cannot be screened as insignificant based on the criteria above, then a further screening methodology is set out by the Environment Agency (and applied directly by NRW) on their webpage 'Guidance – Air Emissions Risk Assessment for your Environmental Permit'. (see https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit):

*"If your long-term PC is greater than 1% and your PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – you don't need to assess them any further."*

The consideration of the potential effects from air quality changes and air pollution on Blaen Cynon SAC is therefore discussed below in accordance with these screening criteria.

On 20 March 2017 the High Court handed down its judgment in the case of *Wealden DC v Secretary of State for Communities and Local Government, Lewes DC and the South Downs National Park Authority and Natural England* [2017] EWHC 351 (Admin). The *Wealden* case related to the Habitats Regulations Assessment of a local plan, rather than of a project (as is the case with this assessment), however, since the HRA legal regime is expressed identically for the assessment of plans and projects, this judgement is considered in this assessment.

The case considered the application of the HRA screening criteria outlined above, in light of the legislative requirement that an assessment of a plan or project must be carried out 'alone or in-combination with other plans or projects'. The court did not dismiss use of the screening criteria, but it held that it was not appropriate to apply the screening criteria only to traffic impacts of the subject local plan alone, and on that basis to 'screen it out', when there also existed a neighbouring local plan with predicted traffic impacts on the very same road. Instead, in applying the screening criteria, the court concluded that the *combined* air quality impacts (from traffic) of the subject local plan and the neighbouring local plan on the specific road in question should be considered. For this assessment, the main predicted air quality impacts will not be from traffic, but from emissions from the plant. However, the principal of using screening criteria for considering in-combination effects, rather than effects from the scheme alone would be applicable to this assessment.

It is understood that leave to appeal this judgment is being sought from the Court of Appeal but, at the time of writing, there has been no decision on whether leave will be granted, let alone the outcome of any Court of Appeal decision.

Envisage (2017a) produced an 'Addendum to an Atmospheric Dispersion Modelling Assessment of Proposed Emissions from Enviroparks Wales Ltd Hirwaun Industrial Estate, Aberdare' report which provides technical details associated with the modelling works that have been completed in order to inform this Stage 1 Screening Report. The reader is referred to this for additional technical information regarding the modelling works. In August 2017, a further report entitled 'Atmospheric Dispersion Modelling Assessment of Proposed Emissions from Enviroparks Wales Ltd, Hirwaun Industrial Estate, Aberdare' was produced by Envisage (2017c) to provide the results of further atmospheric dispersion modelling using emissions data from the credible technology provider, who has confirmed that they could meet the proposed discharge rate releases for the three gasification units proposed for the site.

The August 2017 modelling assessment (Envisage, 2017c) considered the following process situation:

- Emissions concentration data was largely modelled in line with the requirements of the Industrial Emissions Directive. However, the mass release of emissions from the gasifiers differ from the Directive's requirements for Oxides of Nitrogen (NOx), Sulphur Dioxide ($SO_2$), Ammonia ($NH_3$), and Hydrogen Chloride (HCl) as well as additional contributions being specified for Polycyclic Aromatic Hydrocarbons (PAH), and Poly Chlorinated Biphenyls (PCBs). PAH and PCBs are specified as per the technology provider's assessment of emissions, despite not having limits specified in the Industrial Emissions Directive presently. Emissions of NOx, $SO_2$, $NH_3$, and HCl have been reduced or removed by the use of comprehensive abatement measures, in order to ensure that the resultant impact on the local environment is not only acceptable from a human health perspective, but can also be screened as insignificant at the very local sensitive ecological receptors.
- Additional abatement technologies are proposed for the plant and the discharge temperature and velocity of emissions release have increased in order to minimise the process contribution to, and potential impact on the local environment.
- Within the modelling assessment, Nitrogen Dioxide has initially been modelled as total Oxides of Nitrogen. Process contributions of NOx to Critical Levels has been assessed using total (100 %) NOx. As Nitric Oxide does not deposit at a significant rate, contributions from NOx to nutrient Nitrogen and acid deposition calculations for assessment against the Critical Loads are assumed to be 70 % of the total NOx figure, thereby representing the fraction of Nitrogen Dioxide likely to be present in the NOx, which may be available to deposit.

It is also noted that the background concentrations recorded on the APIS website have been updated since the initial modelling work was undertaken (December 2016), and hence the background data applied in the modelling assessment and in the new data presented in this report have been amended in line with updated background concentrations obtained in August 2017.

*6.4.3.1 Nutrient Nitrogen*

Table 6.6 provides a summary of the modelled deposition rates for nutrient nitrogen at Blaen Cynon SAC taking the Enviroparks scheme only into account, and also when considering the effects in-combination with the other schemes identified in Chapter 4.

Details of the gasifier release characteristics to be considered within the modelling were supplied by the Enviroparks design team and have their base in the maximum allowable emission limits which will be imposed on the site operations. These are taken from Annex VI (Technical provisions relating to waste incineration plants and waste co-incineration plants) of the Industrial Emissions Directive (IED) (Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on Industrial Emissions (Integrated Pollution Prevention and Control) (Recast)), and provide the worst-case scenario figures as this modelling adopts the maximum allowable emission limits and assumes that the site will be operational at these maximum allowable emission limits at all times.

For Blaen Cynon SAC, a lower critical load of 10 was used as this is the lowest critical load identified by APIS which would be relevant to some of the habitats found within the SAC. This critical load relates to acid grassland habitats which are recorded as being present within SAC unit 3 (see CCW Drawing in Appendix 1) which is the closest unit to the Enviroparks development site. Table 6.6 also presents the data using the higher critical load for acid grassland at Blaen Cynon SAC.

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 1.752 | 2.351 |
| Current Minimum Background (kg N/ha/yr) | 21.98 | 21.98 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 23.73 | 24.33 |
| **Lower Critical Load:** | | |
| Lower end of Critical Load range (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower critical load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower critical load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **17.5%** | **23.5%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **Yes** |
| Long-term PEC as % of lower Critical Load | **237.3%** | **243.3%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher end of Critical Load range (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | **11.7%** | **15.7%** |
| Long-term PC < 1 % of higher Critical Load? | **No** | **Yes** |
| Long-term PEC as % of higher Critical Load | **158.2%** | **162.2%** |
| Long-term PEC < 70 % of higher Critical Load? | **No** | **No** |

**Table 6.6: Modelled Nutrient Nitrogen Deposition Using IED Limits Emissions Data at Blaen Cynon SAC**

In the 2009 sHRA assessment, nutrient nitrogen was considered based on two different modelling approaches. The first was the standard modelling approach outlined in Chapter 9 Air Quality of the Environmental Statement Addendum (Savills, 2017). The second modelling was based on an approach used by Laxen and Marner (2005) who concluded that it was usual for the proportion of $NO_2$ in $NO_x$ from industrial sources to be lower than the proportion of NO, and as such, they included an assumption of 50% $NO_2$ in $NO_x$ release as being a robust approach. Using these modelling parameters (which were accepted in the 2009 sHRA Report RT-MME-104641), data associated nutrient nitrogen deposition from the new Enviroparks scheme, both alone and in-combination with other projects, are given in Table 6.7.

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 1.430 | 2.030 |
| Current Minimum Background (kg N/ha/yr) | 21.98 | 21.98 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 23.41 | 24.01 |
| **Lower Critical Load:** | | |
| Lower end of Critical Load range (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **14.3%** | **20.3%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **234.01%** | **240.1%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical Load (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | **9.5%** | **13.5%** |
| Long-term PC < 1 % of higher Critical Load? | **No** | **No** |
| Long-term PEC as % of higher Critical Load | **156.1%** | **160.1%** |
| Long-term PEC < 70 % of higher critical load? | **No** | **No** |

**Table 6.7: Modelled Nutrient Nitrogen Deposition Using IED Limits Emissions Data at Blaen Cynon SAC and Laxen and Marner (2005) Assessment Methods**

Tables 6.6 and 6.7 present a worst-case scenario based on the emissions being at IED limits. However, in reality, the site is highly unlikely to permanently discharge emissions at the limit concentration, and the gasifier design team estimate much lower emissions generally for the majority of the emissions which will contribute to the nutrient nitrogen and acid deposition rates. As these are long-term assessment values, it is considered appropriate to re-assess the deposition rates resulting from these lower, long-term emission concentrations, whilst recognising that, for short periods during any year, higher releases, up to the emission limit value (and therefore as presented in Tables 6.6 and 6.7) could occur.

Table 6.8 therefore considers the more realistic long-term emission levels from the process (as detailed in the dispersion modelling report submitted with the Environmental Statement Addendum, Savills, 2017), and applies the Laxen and Marner methodology to emissions of $NO_x$ to represent a robust assessment of the levels of $NO_2$ within the $NO_x$, to re-consider the levels of nutrient nitrogen and acid deposition to the SACs from the process.

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 1.358 | 1.958 |
| Current Minimum Background (kg N/ha/yr) | 21.98 | 21.98 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 23.338 | 23.938 |
| **Lower Critical Load:** | | |
| Lower end of Critical Load range (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **13.6%** | **19.6%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **233.4%** | **239.4%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher end of Critical Load range (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | **9.1%** | **13.1%** |
| Long-term PC < 1 % of higher Critical Load? | **No** | **No** |
| Long-term PEC as % of higher Critical Load | **155.6%** | **159.6%** |
| Long-term PEC < 70 % of higher Critical Load? | **No** | **No** |

**Table 6.8: Modelled Nutrient Nitrogen Deposition Using Long-Term Realistic Emissions Data at Blaen Cynon SAC and Laxen and Marner (2005) Assessment Methods**

The consultation response from Natural Resources Wales (see Appendix 5) stated the following with respect to the use of the Laxen and Marner (2005) Assessment Methods:

> *"…in calculating the deposition data, a long term NO2:NOx ratio of 50% has been specified with reference to a report assessing air quality impacts on vegetation. This report is not a peer reviewed study and we would therefore expect the submitted risk assessment worst case scenario to use a 70% conversion of $NO_x$ to $NO_2$, unless a valid site specific justification is given for a lower conversion ratio."*

In response to these comments, the additional modelling works (Envisage, 2017c) completed in August 2017 using additional technological 'mitigation' measures, utilised a 70% conversion of NOx to $NO_2$ for long-term assessments. Table 6.9 presents the modelled data taking into account the additional technologies, using IED limits emissions data and a 70% conversation of NOx to $NO_2$.

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.091 | 0.510 |
| Current Minimum Background (kg N/ha/yr) | 23.8 | 23.8 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 23.891 | 24.31 |
| **Lower Critical Load:** | | |
| Lower end of Critical Load range (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.9% | **5.1%** |
| Long-term PC < 1 % of lower Critical Load? | Yes | **No** |
| Long-term PEC as % of lower Critical Load | 238.9% | **243.1%** |
| Long-term PEC < 70 % of lower Critical Load? | No | **No** |
| **Higher Critical Load:** | | |
| Higher end of Critical Load range (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.6% | **3.4%** |
| Long-term PC < 1 % of higher Critical Load? | Yes | **No** |
| Long-term PEC as % of higher Critical Load | 159.3% | **162.1%** |
| Long-term PEC < 70 % of higher Critical Load? | No | **No** |

**Table 6.9: Modelled Nutrient Nitrogen Deposition Using Additional Technologies and IED Emissions Limits Data at Blaen Cynon SAC and 70% Conversion of NOx to $NO_2$**

Tables 6.6 to 6.9 clearly show that the background concentrations of nutrient nitrogen within Blaen Cynon SAC (21.98 kg N/ha/yr during the original assessments and updated to 23.8 kg N/ha/yr in the August 2017 modelling work) are already significantly above both the lower critical load (10 kg N/ha/yr) and the higher critical load (15 kg N/ha/yr) for acid grassland (the most sensitive of the habitat-types within the SAC to nutrient nitrogen deposition). Acid grassland has been chosen for use in this assessment as it has the lowest critical load identified by APIS of all of the habitat types within the SAC. APIS identifies that the other sensitive habitat types within the SAC include calcareous grassland and fen, marsh and swamp have a critical load range of 15-25 kg N/ha/yr. It is therefore clear that the background nutrient nitrogen levels are exceeded for the lower end of the critical load range for all of the habitats within the SAC Units 1, 2, 3 and 4 (those closest to the Enviroparks development), although the higher critical load for these habitats is not exceeded.

Whilst the lower and higher critical loads for nutrient nitrogen within the SAC acid grassland are already exceeded due to the background levels, further consideration has been given to the potential additional contributions of the proposed development to the levels of nutrient nitrogen likely to be experienced at Blaen Cynon SAC, both on its own and in-combination with other projects.

It is clear from the worst case scenario data presented in Table 6.6, that when the emissions are considered to be at the IED emission limits, the scheme's contribution to nitrogen nutrient will be 17.5% (alone) and 23.5% (in-combination) of the lower critical load for nutrient nitrogen, or 11.7% (alone) and 15.7% (in-combination) of the higher critical load. Table 6.8 is considered to represent the long-term realistic emissions data and this shows that the process contribution will represent 13.6% of the lower critical load and 9.1% of the higher critical load in isolation, and 19.6% of the lower critical load and 13.1% of the higher critical load when considered in-combination with the projects set out in Chapter 4. As such, these levels cannot be screened out as being 'insignificant' and further modelling is required.

Table 6.9 presents the results of the most recent modelling which has taken into account additional technologies which can be provided as part of the scheme's design as 'mitigation' measures to reduce the nitrogen deposition from the scheme. This data shows that with these additional technologies employed, other emissions at their IED limits, and using a 70% conversion of NOx to $NO_2$, would result in a process contribution of 0.9% of the lower critical load to 0.6% of the higher critical load, when considered 'alone'. When the scheme is considered 'in-combination' with other projects and plans, the nitrogen deposition would be 5.1% of the lower critical load and 3.4% of the higher critical load.

It should be noted that the IAQM (2016) statement identifies that the 1% screening criteria is not intended to be applied to multiple sources in-combination', although no screening criteria for in-combination schemes are provided by IAQM (2016). Therefore, based on the data presented in Table 6.9, it is possible to conclude that, using the IAQM (2016) screening criteria, the effects on the scheme in relation to nitrogen deposition can be considered 'insignificant' and screened out. However, the judgement in the recent *Wealden* case

suggests that 'in-combination' effects should also be considered as part of any screening assessment. The *Wealden* case does not specifically set out what these 'in-combination' screening levels should be, and it is understood that CIEEM and IAQM are currently working on producing additional guidance, although this is not yet available.

As the 'in-combination' effect of the proposal would result in nitrogen deposition which is 5.1% of the lower critical load, consideration is given to the additional screening criteria associated with the PEC. Table 6.9 (considered to provide the worst-case scenario data taking into account application of additional technologies ~~long-term realistic emissions data~~), shows that the PEC is 243.1% ~~233.4%~~ of the lower long-term critical load ~~for the Enviroparks scheme, and 239.4%~~ when the scheme is considered in-combination with the other projects outlined in Chapter 4. With respect to the higher critical load, the ~~long-term realistic PEC is~~ ~~155.6% (alone) and 159.6%~~ worst-case scenario data taking into account application of additional technologies is 162.1% 'in-combination'. As outlined above, the screening criteria require these levels to be less than 70% to conclude that they are 'insignificant'.

In light of the recent *Wealden* case, a recent paper in The Habitats Regulations Assessment Journal (Issue 8: June 2017) by Chapman (2017) entitled 'The 1% threshold – where did it come from, and can it be justified?' concludes that:

> *"The Wealden decision will prompt some much needed changes in thinking but I firmly believe that a sensible approach will emerge. Bernie Fleming"s article on page 29 refers to guidance currently being drafted by CIEEM and IAQM in this regard and Natural England are also working on associated guidance for their staff to follow. In my professional opinion I suspect that a sensible way forward will need to:*
> *A) Consider the credible evidence for a real risk to site integrity from a given air pollutant and identify the impact mechanism of most concern*
> *B) Recognise the main sources of pollution for the site concerned, without all contributions (however small) becoming guilty by association, and*
> *C) Explore options for strategic approaches to mitigation for air pollution impacts."*

Further detailed consideration of the potential ecological effects of nutrient nitrogen on the habitats within Blaen Cynon is therefore required to assess whether the 'in-combination' effects pose a significant risk to the integrity of the SAC.

The Open University (no date) states that atmospheric deposition of nitrogen can alter competitive relationships between plant species within a terrestrial community, thus causing significant changes in community composition, as species differ in their relative responses to elevated nutrient levels. Atmospheric deposition of nutrients can reduce, or even eliminate, populations of species that have become adapted to low nutrient conditions and are unable to respond to increased nutrient availability. Some vegetation communities of conservation interest are therefore directly threatened by atmospheric pollution.

Limpens et al (2003, cited by Ascough, 2005) concluded that nitrogen deposition enhances nitrogen availability in the rhizosphere, encouraging the growth of vascular plants, and that water table and phosphate availability are important in explaining species specific responses to nitrogen deposition.

Ascough (2005) states that nitrogen deposition has a negative impact on nutrient poor environments as it increases productivity and favours vascular plants, accelerating successional changes. Studies involving the vascular plant species purple-moor grass *Molinia caerulea* and silver birch *Betula pubescens* found that increased nitrogen facilitates their invasion and stimulates the total above ground biomass production of the vegetation.

The critical loads for the habitats within Blaen Cynon have a range: between 10-15 kg N/ha/yr for acid grassland; and, between 15-25 kg N/ha/yr for fen marsh and swamp, and calcareous grassland. It is clear from Tables 6.7 to 6.9 that the background concentration (and the predicted environmental concentration with the Enviroparks scheme in place) already exceeds both the lower and the upper limits for acid grassland, but does not exceed the upper limit for fen, marsh swamp and calcareous grassland habitats, even with the Enviroparks scheme and the other schemes outlined in Chapter 4. The study by Caporn et al (2016) concluded that based on their research and modelling work (which was focussed on heathland, acid grassland, bog and sand dune grassland habitats), a decline in species richness commences at the low end of the N deposition range and by the upper end of the critical load range a substantial loss has already occurred. The authors state that for the habitats included in their study, at higher loads of N deposition

beyond the critical load range, the integrity of sites may be threatened by graminoid domination and structural change to the habitat. Whilst their report was not focussed on the mire and mesotrophic grassland habitats found within Blaen Cynon SAC, they do confirm that ecosystems which share similarities in species and soil type are likely to show similar responses to those found within their report.

During consultation with Countryside Council for Wales as part of the original planning application, Barter (2009, *Pers. Comm.*) identified three key habitats within Blaen Cynon SAC which are of importance to the marsh fritillary butterfly and provided information with respect to the likely impact of increased nutrient nitrogen deposition on these habitats.

*Base-poor flushed vegetation and relatively dry Molinia-dominated marshy grassland on thin organic soils*
These habitats comprised NVC Habitat M25: *Molinia caerulea-Potentilla erecta* mire. This habitat is a community of moist, but well aerated, acid to neutral peats and peaty mineral soils in the wet and cool western lowlands of Britain (Elkington et al, 2001). Averis et al (2004) state that the soils are usually acid, with a pH ranging from 4.0 to 5.5, although the herb-rich *Angelica* sub-community shows signs of moderate nutrient enrichment, they are are well-aerated and are kept wet by moving water, although stands can be inundated in winter.

Barter (2009) stated that within Blaen Cynon SAC this habitat was presently relatively open in structure and rich in scabious *Succisa* sp. (the foodplant of the marsh fritillary butterfly). She identified that *Molinia caerulea* and *Juncus acutiflorus* are the most likely species to benefit from increased nutrient deposition likely resulting in an increase in the plant's height and density which may lead to shading of *Succisa* leaves and reduced recruitment from seed with light suppression and less open ground for germination.

Barter (2009) stated that *Molinia caerulea* are the species within the relatively dry Molinia-dominated marshy grassland on thin organic soils habitat most likely to benefit from increase nutrient deposition, although she does identify that there may be other factors such as soil moisture content that may restrict the growth potential. She does however, state that there may be some positive effect from increased nutrient deposition, and concludes that if *Molinia caerulea* does not bulk up to the extent where is smothers the *Succisa* then this species may utilise the additional nitrogen and become larger more vigorous plants.

*Mesotrophic grassland*
This habitat includes NVC Habitat MG5c: *Cynosurus cristatus-Centaurea nigra* grassland, *Danthonia decumbens* sub-community. The habitat is typical of grazed hay-meadows treated in the traditional fashion on circumneutral brown soils throughout the lowlands of Britain. The *Danthonia decumbens* sub-community soils are superficially acid with no signs of podzolisation (Rodwell, 1992).

Barter (2009) states that with respect to this habitat, increased nutrient deposition may result in the pasture grasses within the habitat being more successful and thus changing the species composition from the less vigorous species. A change in the composition towards more pasture grasses could increase the palatability to stock, particularly selective grazers such as sheep / ponies and the habitat could become overgrazed. This would result in a more even and shorter sward which would be more difficult to manage to ensure suitable growth by *Succisa* for marsh fritillary use.

It is clear from the evidence presented above that increases in nutrient nitrogen as a result of the proposed development could result in changes to the habitats within Blaen Cynon SAC which could subsequently impact on the availability of *Succisa*, the larval foodplant of marsh fritillaries. A reduction in the foodplant available to the species could therefore impact on the population of the marsh fritillary within the SAC.

With respect to Blaen Cynon SAC, the Core Management Plan (CCW, 2008a) states that:

> ***"Management Requirements of Feature 1***
> *The current status of the feature overall is unfavourable. The principle reasons for this are inappropriate grazing, scrub invasion, inappropriate tree planting and past agricultural improvements in the management units.*
>
> *Without an appropriate grazing regime, the grassland will become rank and eventually turn to scrub and woodland. Conversely, overgrazing, or grazing by inappropriate stock (particularly sheep) will also lead to unwanted changes in species composition, through selective grazing, increased nutrient inputs and poaching. Balancing grazing is the single most important issue in the management of this site.*

*There is now considerable experience in managing sites for marsh fritillaries in Wales, and the needs of the species are now reasonably well understood.*
*Scrub encroachment is an issue, particularly on some wet grassland areas. A programme of scrub control is currently (2008) being undertaken, but it is likely that even with the ideal grazing management, a more or less continuous programme of scrub control will be required at this site. It is clear from aerial photographs and from discussions with landowners, that many areas that are currently covered in alder and willow woodland were formerly wet pasture. Therefore a long-term aim would be to investigate returning some of this to wet pasture that would likely increase the availability of marsh fritillary habitat.*

*Parts of Woodland Park and Pontpren, notably units 3 and 4 have been subject to improvement in preparation for tree planting, including draining, planting with trees and use of fertiliser. These areas have a programme of scrub removal and cattle grazing in place, to restore the grassland to a condition where it can be used by marsh fritillaries. Some drains have been blocked, to restore the hydrology of the site.*

*There are no known off-site factors, such as pollution, that are affecting the marsh fritillary to any significant extent, although there is still much industry in the locality. The two overwhelming issues of grazing and scrub encroachment would probably obscure any off-site issues. As management of the site improves off-site factors may become more apparent.*

No management information is presented for Features 2, 3, 4, 5, 6 or 7. Despite the 2008 Core Management Plan concluding that air pollution is not considered to be a significant off-site factor affecting the management of the SAC, the 2015 Natura 2000 - Standard Data Form now concludes that air pollution is a high-rank threat to the SAC.

Desk-based research was carried out as part of the 2009 sHRA Report (RT-MME-104641) to identify whether any other studies associated with marsh fritillary specifically or *Succisa pratensis* and the impacts of air pollution has been completed. Data from this assessment is included below to inform this screening report.

In a study from the Jura in Switzerland by Venterink and Vittoz (2008) *Succisa pratensis* was recorded in small quantities (<1% of the quadrat area) in quadrat plots that were being studied, mainly to assess whether the biomass production of *Saxifraga hirculus* was controlled by nitrogen availability. Although the study was mainly focussed on *Saxifraga hirculus* the authors conclude that biomass production of this species was clearly N-limited and conclude that conservation management for this species (and therefore the whole habitat) should focus on preventing N enrichment. They state that manure or mineral fertilisation should be avoided, as well as draining of the site (as this often stimulates N mineralisation and N availability). The authors also suggest that atmospheric deposition (15-30 kg N ha $yr^{-1}$ in the Jura) is another major N input source in Swiss fens.

Saarinen et al (2005) completed out a study in Finland associated with the restoration of forest grazing in an area to restore a population of marsh fritillary. The authors collected soil samples in 2003 from two areas: one grazed meadow and one ungrazed meadow (the control site) to assess any difference in soil pH, nitrogen, phosphorous and potassium between the two sites. The study identified that the soil pH within the two sites was similar, but that concentrations of nitrogen (1.9 vs. 2.6 g $kg^{-1}$), phosphorus (0.6 vs. 0.8 g $kg^{-1}$) and potassium (5.6 vs. 6.8 g $kg^{-1}$) were slightly higher in the ungrazed site. The grazed site was grazed by 2-3 heifers for two months between June and October. Their study showed that the number of marsh fritillary communal webs and larvae declined rapidly immediately after grazing commenced, but recovered and then increased. They state that the greatest number of larvae were found in the areas with the highest densities of *Succisa* shoots and that the adults appeared to prefer the grazed meadows and conclude that based on the transect counts over the whole study period, the abundance of marsh fritillary was significantly higher (using a Wilcoxon paired samples test) in the grazed habitat. However, the authors state that between 1995 and 2004 the numbers of *Succisa pratensis*, recorded in three grazed plots and one ungrazed plot, were not significantly different (using a Mann-Whitney U test), although a separate count of *Succisa* shoots in August 2004 did show that the numbers were six times higher in the grazed than in the ungrazed meadow. The authors conclude that their results show that the grazing regime benefited not only the marsh fritillary and its larval host plant *Succisa pratensis* but also the butterfly fauna and meadow flora in general.

In the study above, the authors highlighted that although *Succisa* shoots contain alkaloids (Hultin and Torssell, 1964, cited by Saarinen et al, 2005), which make the species unpalatable for cattle, the number of

adult plants, the relative proportion of seedlings and seed-set have all been reported to correlate negatively with grazing intensity (Bühler and Schmid, 2001, cited by Saarinen et al, 2005). The Saarinen et al (2005) study suggested that by ensuring that the grazing pressure is correct, the numbers of *Succisa pratensis* plants will disperse into suitable adjacent habitat, thus extending the habitat available for use by marsh fritillary butterflies.

Saarinen et al (2005) compared their study with one completed by Konvička et al (2003, cited by Saarinen et al, 2005) who reported that marsh fritillary larval nests were associated with dense clumps of host plants of low to medium height and mechanical disturbance. These authors stated that nests were more often found in more acidic and less nitrogen-rich conditions, a similar finding to those presented by Saarinen et al (2005).

Although the findings from the Saarinen et al (2005) study with respect to nitrogen levels within the soils in the grazed and ungrazed plots were not from an extensive study, they appear to show that although the nitrogen levels in the soils within the grazed plot were higher than those in the ungrazed plot, the abundance of marsh fritillary within the grazed plot was significantly higher than the ungrazed plot. This would suggest that in this instance, the management of the habitat was of the highest importance to the marsh fritillary population when considering options for restoration.

In relation to the management of nutrient levels within grasslands, although not the same habitat as those found within Blaen Cynon SAC, in a paper regarding the conservation of floodplain meadows (NVC Habitat MG4), Gowing et al (2002, cited by Jefferson and Pinches, no date) state that in situations where nutrient inputs from external sources are very heavy or where excessive or rank vegetation is becoming problematic, a second hay cut or earlier cuts may be necessary to aid recovery of MG4 grassland habitats.

Jongejans et al (2006) carried out garden experiments over three years (2000 – 2003) to test whether perennial herbs, when faced with the risk of being out-competed by succession, either increase their biomass allocation to flowers or invest more in vegetative growth. This included growing *Succisa pratensis*, *Hypochaeris radicata*, *Cirsium dissectum* and *Centaurea jacae* in amongst a tall tussock-forming grass *Molinia caerulea* as this may successionally replace them in their natural habitat. Nutrient enrichment was applied to half of the plants at an equivalent application of 120 kgN/ha/year. The results showed that the total biomass of *M. caerulea* tripled on average in response to nutrient addition, and that in general *S. pratensis* plants were able to build up significantly more biomass and rosettes when nutrients were given. Not all *S. pratensis* plants were able to increase in size to prevent being dominated by the grasses, resulting in high plant size variation in the high-nutrient treatment. *S. pratensis* was the only species where all of the plants survived (in both the high and no nutrient experiments), showing that of the four species studied, this was the most resilient to successional pressure from *M. caerulea* even when high levels of nutrients were added. The authors state that sexual reproduction in the species increased significantly under simulated successional change through nutrient addition. The authors conclude that of the four species studied, the two short-lived species with high turnover of leaf biomass *H. radicata*, *C. dissectum* could not compete with the biomass accumulating grass species *M. caerulea*. However, in the other two species *S. pratensis* and *C. jacae* larger plants were able to grow larger and secure their place in the vegetation, successfully competing with the *M. caerulea*. Jongejans et al (2006) state that these results are in agreement with Swiss field observations which showed that with increasing site productivity *S. pratensis* density decreased, but plant size and seed production increased (Billeter et al, 2003, cited by Jongejans et al, 2006).

The study by Jongejan et al (2006) suggests that although the proposed development may result in an increase in deposition from nitrogen, there may not be any significant adverse effect on the maintained presence of *S. pratensis* within Blaen Cynon SAC as a result of elevated nutrient deposition within the site. The Core Management Plan (2008a) suggests that more significant issues (grazing level, scrub encroachment, tree planting and past agricultural management) are the cause of the current unfavourable status of the site. However, the Natura 2000 – Standard Data Form does suggest that air pollution changes are a potential high-rank threat to the SAC, although no further detail of the specific risks are provided.

Caporn et al (2016) examined recent vegetation study data to understand the relationships that exist between species (composition and richness) and nitrogen deposition, and to determine the effects of incremental increases in N. Across the habitats and datasets studied (which were mainly focussed on acid grassland, bogs, upland and lowland heath and sand dune grassland), increasing N deposition was correlated with quantifiable declines in species richness and change in species composition. However, it should be recognised, that for Blaen Cynon SAC, the qualifying criteria are the marsh fritillary butterfly, rather than the habitats which support it, and as such, the important criteria for maintaining the integrity of the SAC is not species composition, nor species richness of the habitats within the SAC site, but in fact the

maintenance of the butterfly's larval foodplant *S. pratensis*, which the Jongejan et al (2006) study suggests should be able to continue to grow in conditions with elevated nitrogen deposition levels.
As this sHRA is considering a scheme which has already been granted planning permission, consideration is given at this point in the report to a comparison between the previously modelled nitrogen deposition from the 2008 Enviroparks scheme, and the modelled results from the current proposals. The data presented in the 2009 sHRA (Report RT-MME-104641) is not directly comparable to the data presented in this report due to the use of a different grid reference (as NRW requested that the current data was modelled using the closest point of the SAC to the development), and the use of different critical levels, which are now available via APIS, but at the time of the 2009 report, were not.

The 2009 sHRA report provided the following data for nitrogen deposition at Blaen Cynon SAC:

- For wet and dry deposition, the percentage of the critical load was 71.14% for marsh fritillary: alkaline fen and reedbed (poor fen);
- For dry deposition only, the percentage of the critical load was 60.54% for marsh fritillary: alkaline fen and reedbed (poor fen);
- For wet and dry deposition, when using the Laxen and Marner (2005) assessment method and combining the flues of the process, the percentage of the critical load was 6.59% for marsh fritillary: alkaline fen and reedbed (poor fen); and,
- For dry deposition only, when using the Laxen and Marner (2005) assessment method and combining the flues of the process, the percentage of the critical load was 1.94% for marsh fritillary: alkaline fen and reedbed (poor fen).

Chapter 9 Air Quality provides the following summary of the changes between the 2008 and the 2017 schemes:

> *"The number of process exhausts from the site have reduced significantly with the revised scheme. The 2008 ES considered three engine releases discharged at 40 m, and four flares planned at 16.5 m high. The four flares served the engines which burned the gases produced by the site processes, and were due to operate during start-up and shut-down to ensure stable conditions and control emissions, and during emergencies, for example should an engine fail.*
>
> *The rationalisation of the site energy production processes to three, identical gasification lines, removes the requirement for flaring, and results in only three discharge flues being required at the site, each serving a single gasification line, and incorporated into a single stack at 45 metres. Additionally, the proposed scheme now includes abatement systems, which were not proposed for the currently consented scheme. These include:*
> - *Urea dosing for the reduction and removal of Oxides of Nitrogen;*
> - *Lime dosing for the reduction and removal of acid gases (Sulphur Dioxide and Hydrogen Chloride);*
> - *Activated Carbon dosing for the reduction and removal of Heavy Metals and Dioxins;*
> - *Bag filtration for the reduction and removal of Particulate, including abatement residues.*

Owen, (2017, *Pers. Comm.*) confirmed that the inclusion of abatement within the scheme is a result of changes in relevant Directives and alternations to the scheme design and as such the technology providers have incorporated NOx abatement. This NOx abatement is in line with requests that were made by CCW / EAW during the consultations regarding the original scheme proposals in 2008 / 2009, although at that stage, they were not required as part of the scheme design. The NOx abatement has resulted in a reduction in the oxides of nitrogen (NOx) emissions, but the dosing using urea means that the levels of ammonia will potentially be increased, which accounts for the increases in the modelled nutrient nitrogen deposition rates when using the Laxen and Marner (2005) assessment method and applying the combined flues.

After consultation with Natural Resources Wales as set out in Section 1.2, further investigation was carried out by the project team to identify available technologies that could be employed to reduce the emissions of nitrogen deposition further. The modelling presented in the August 2017 (Envisage, 2017c) report presents this data, and also responds to comments from NRW in their consultation response from June 2017 (see Appendix 5).

Based on the modelled data from August 2017 using additional technologies, the research completed in 2009 regarding the potential effects of nitrogen increases on the larval foodplants of the marsh fritillary butterfly, screening data set out by the Environment Agency and IAQM (2016) and data provided in the 2015 Natura 2000 – Standard Data Form, potential effects from the Enviroparks scheme, when considered alone

~~and in-combination with other projects cannot~~ can be screened out using the screening criteria set out by IAQM (2016) and GOV.UK 'Guidance – Air Emissions Risk Assessment for your Environmental Permit'. In-combination effects cannot be screened out using the same screening criteria. It should be noted that guidance has not yet been produced by the regulatory authorities to confirm whether this screening criteria should be applied to in-combination effects, and so no specific screening criteria is available. However, it should be reiterated that the main contributing factor to deposition at Blaen Cynon SAC remains the elevated background levels.

The Hirwaun Power Station, which was granted permission by the Secretary of State on 23rd July 2015 via the Hirwaun Generating Station Order 2015 under the Planning Act 2008, was subject to a Habitats Regulations Assessment associated with the potential air quality impacts on this scheme on Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC in 2014. The conclusions of this assessment were examined as part of the planning process. The Planning Inspectorate (2014) document 'Report on the Implications for European Sites - Proposed Hirwaun Power Station' shows that potential 'in-combination' effects of the Hirwaun Power Station were identified which were above the 1% level and states that:

> *"The applicant pointed out that the Environment Agency H1 guidance, Annex F contains the statement 'It is unlikely that an emission at this level will make a significant contribution to air quality since process contributions will be small in comparison to background levels even if a standard is exceeded, where this level refers to less than 1% of a long term quality standard'. In the applicant's view this indicates that process contributions can be considered insignificant even when taking into account contributions from other sources."*

However, Hirwaun Power in their document entitled 'The Hirwaun Power (Gas Fired Power Station) Order - Comments on the RIES' (November 2014) provides the following additional information regarding this point:

> *"The Applicant agrees that under the Habitats Regulations a project which does not have a significant effect on its own can still contribute to an in-combination significant effect. However, there are also circumstances one step removed from this where a project's impacts are imperceptibly small (i.e. de minimis) and are immaterial in the context of an in-combination assessment, therefore, it cannot be said to contribute to, or give rise to, a significant in-combination effect.*
>
> *The Applicant agrees with NRW's explanation (which echoes European Commission Guidance) of this at the environmental matters ISH in the context of the Project: "whilst there are circumstances in which insignificant effects combine to give rise to an effect which is significant, the Hirwaun Power Station was at one remove from that situation in that its air quality effects are not just insignificant, but imperceptible (or immeasurable)."*

The text above would suggest that a scheme can only be considered to have an insignificant contribution to the in-combination effects where the process contribution of the scheme itself is not only insignificant, but is imperceptible. With respect to the levels being considered imperceptible, the Hirwaun Power PI report states that "*Using the EPUK (2010 update) guidance a process contribution of < 1 % is classed as imperceptible*", which therefore equates to the same as 'insignificant' as set out in the IAQM (2016) Position Statement. The potential in-combination effects at Blaen Cynon SAC could therefore be considered acceptable, based on the precedent set out at Hirwaun Power.

As outlined in the paper by Chapman (2017), discussed above, it is important to recognise that the exceedance of the critical loads when considering the in-combination effects is mainly as a result of the already elevated levels of nitrogen in the atmosphere at this location. Whilst background research into the potential effects of increased nitrogen deposition on the habitat types and larval foodplant of the marsh fritillary butterfly has been carried out and is presented above, it is understood that no site-specific assessment works have been completed by NRW or other interested parties to confirm whether the already elevated nitrogen background levels have actually had a measurable impact on the integrity of Blaen Cynon SAC. Chapman (2017) would suggest that one of the key elements of an assessment should be to "*Recognise the main sources of pollution for the site concerned, without all contributions (however small) becoming guilty by association".* In this case, as it has been shown that with the implementation of additional technologies, the contribution of the scheme alone is insignificant, but in-combination effects cannot be screened out using the same criteria. Chapman (2017) suggest that a sensible way forward would be to "*Explore options for strategic approaches to mitigation for air pollution impacts".* This is particularly relevant as the main contributing factor to deposition at Blaen Cynon SAC remains the elevated background levels.

~~However, it should be noted that~~ This sHRA report is concerned with the potential effects of the scheme on the qualifying criteria for the SAC, the marsh fritillary butterfly. The Jongejan et al (2002) data concluded that with increasing site productivity (ie increased nutrient nitrogen levels), the larval food plant of marsh fritillary *S. pratensis* density decreased, but plant size and seed production increased. Table 6.4 states that "*A reduction in the occurrence of Devil's-bit scabious would put pressure on the marsh fritillary populations*" and as such, if the density of the plant decreased (even if plant size and seed production increased) within the SAC as a result of increased nitrogen deposition, then this could have an adverse effect on the integrity of Blaen Cynon SAC. However, Natural Resources Wales have not provided any data in relation to monitoring works to confirm that this effect is being experienced at Blaen Cynon SAC as a result of the elevated background levels.

Whilst it is recognised that recent case law has clarified the difference between 'mitigation' and 'compensation' (see further detail in Chapter 9), a Biodiversity Scheme was agreed with Countryside Council for Wales and the two local planning authorities with respect to the 2008 application in relation to providing additional marsh fritillary habitat within a 5km radius of the proposed Enviroparks site. Assuming that the additional technologies are implemented, it has been shown that any adverse effects associated with nitrogen deposition from the scheme would be considered insignificant when considered alone. In-combination effects cannot be screened out using the same screening criteria. As suggested above, a more 'strategic' approach could be taken whereby consideration is be given to the opportunities to ensure that the population of marsh fritillary is maintain. For the Blaen Cynon SAC site, this could include additional management within the SAC (if this was considered by NRW to be required based on scientific monitoring of the site), and / or provision of additional habitat within the area surrounding the SAC (as already agreed through the Biodiversity Scheme for example). NRW have confirmed that they "do not have a standard approach to considering high background levels or the issue of in combination effects" (Baynon, 2017, *Pers. Comm.*).

~~In order to ensure that this scheme can be used to provide suitable mitigation to control the potential adverse effects of nitrogen deposition on Blaen Cynon SAC, the measures outlined in Section 9.2 should be adhered to.~~

Further details are given in Section 9.2.3.

6.4.3.2 Acid Deposition

Table 6.10 provides a summary of the modelled deposition rates at the IED limits for acid deposition at Blaen Cynon SAC taking the Enviroparks scheme only into account, and also when considering the effects in-combination with the other schemes identified in Chapter 4.

The lower critical load has been determined using data from APIS for Blaen Cynon SAC. The lower critical load used for acid deposition (1.018 keq) is comprised of the lowest critical load provided for N plus the lowest critical load provided for S. The higher critical load (1.77 keq) is calculated as the highest critical load provided for N plus the highest critical load provided for S.

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 2.10 | 2.10 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.3906 | 0.4402 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.4906 | 2.5402 |
| **Lower Critical Load:** | | |
| Lower critical load (keq) | 1.018 | 1.018 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **38.4%** | **43.2%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **244.6%** | **249.5%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher critical load (keq) | 4.05 | 4.05 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 9.6% | 10.9% |
| Long-term PC < 1 % of higher Critical Load? | No | No |
| Long-term PEC as % of higher Critical Load | 61.5% | 62.7% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 6.10: Modelled Acid Deposition Using IED Limits Emissions Data at Blaen Cynon SAC**

Table 6.11 presents acid deposition data taking into account the approach adopted by Laxen and Marner (2005).

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 2.10 | 2.10 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.3676 | 0.4172 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.4676 | 2.5172 |
| **Lower Critical Load:** | | |
| Lower critical load (keq) | 1.018 | 1.018 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **36.1%** | **41.0%** |
| Long-term PC < 1 % of lower critical Load? | **No** | **-** |
| Long-term PEC as % of lower Critical Load | **242%** | **247%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher critical load (keq) | 4.05 | 4.05 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 9.1% | 10.3% |
| Long-term PC < 1 % of higher Critical Load? | No | - |
| Long-term PEC as % of higher Critical Load | 60.9% | 62.2% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 6.11: Modelled Acid Deposition Using IED Limits Emissions Data at Blaen Cynon SAC and Laxen and Marner (2005) Assessment Methods**

Table 6.12 presents the modelled acid deposition data using long-term realistic emissions data and applying the Laxen and Marner (2005) assessment methods.

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 2.10 | 2.10 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.2186 | 0.2703 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.3186 | 2.3703 |
| **Lower Critical Load:** | | |
| Lower critical load (keq) | 1.018 | 1.018 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **21.5%** | **26.6%** |
| Long-term PC < 1 % of lower critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **227.8%** | **232.8%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher critical load (keq) | 4.05 | 4.05 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 5.4% | 6.7% |
| Long-term PC < 1 % of higher Critical Load? | No | No |
| Long-term PEC as % of higher Critical Load | 57.2% | 58.5% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 6.12: Modelled Acid Deposition Using Long-Term Realistic Emissions Data at Blaen Cynon SAC and Laxen and Marner (2005) Assessment Methods**

Based on the additional modelling work competed in August 2017, Table 6.13 presents the modelled acid deposition using IED limits, and a 70% conversion of NOx to $NO_2$, taking into account the additional technologies which could be incorporated into the scheme.

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 2.19 | 2.19 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0088 | 0.0454 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.1988 | 2.2354 |
| **Lower Critical Load:** | | |
| Lower critical load (keq) | 1.018 | 1.018 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.9% | **4.5%** |
| Long-term PC < 1 % of lower critical Load? | Yes | **No** |
| Long-term PEC as % of lower Critical Load | 216.0% | **219.6%** |
| Long-term PEC < 70 % of lower Critical Load? | No | **No** |
| **Higher Critical Load:** | | |
| Higher critical load (keq) | 4.05 | 4.05 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 0.21% | 1.1% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes (rounded down) |
| Long-term PEC as % of higher Critical Load | 54.3% | 55.2% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 6.13: Modelled Acid Deposition Using Additional Technologies and IED Emissions Limits Data at Blaen Cynon SAC and 70% Conversion of NOx to $NO_2$**

Tables 6.10 to 6.13 show that the background levels (2.10 keq/ha/yr in the original assessments and updated to 2.19 keq/ha/yr using data from APIS which was accessed in August 2017) already significantly exceed the lower critical load for the habitats within Blaen Cynon. With the process contributions in place, both alone and in-combination with other projects and plans, the lower critical load for the SAC will therefore be exceeded.

With respect to the higher critical load for acid deposition, Tables 6.10 to 6.13 show that the higher critical load will not be exceeded, either alone or in-combination with other projects, based on the worst case acid deposition model (Table 6.10) or based on model using the additional technologies and a 70% conversion of NOx to $NO_2$ ~~long-term realistic emissions data~~ (Table 6.13).

Table 6.10 shows that using the IED emissions limits and without any additional technologies applied to mitigate the effects, ~~any of the assessment methodologies,~~ Blaen Cynon SAC will experience an increased

acid deposition from the process contribution of ~~between 21.5% (Table 6.11) and~~ 38.4% (Table 6.9) of the lower critical load, when considered in isolation from other projects. The predicted environmental contribution as a percentage of the lower critical loads exceeds the 70% screening threshold in Tables 6.10, 6.11 and 6.12, both in isolation, and in-combination with other projects outlined in Chapter 4.

However, when the model output takes into account the additional technologies proposed and using a 70% conversion of NOx to $NO_2$, the process contribution would not exceed 1% of either the lower or the higher critical loads. These levels for the scheme alone are therefore below the 1% screening threshold for the process contribution as a percentage of the critical load (as set out by IAQM, 2016). As such the scheme's process contribution to acid deposition at Blaen Cynon SAC when assessed alone, is considered to be insignificant.

However, as set out in Section 6.4.2, consideration is also given in this assessment to the in-combination effects of the project and plans set out in Chapter 4. Using the data presented in Table 6.13, it is apparent that the in-combination effects could not be screened out as insignificant (if a screening criteria of 1% is applied) as the contribution would be 4.5% of the lower critical load, and the long-term predicted environmental contribution would be above 70% of the lower critical load.

The potential effects of acid deposition on Blaen Cynon SAC cannot therefore be considered insignificant and further consideration of the potential effects on the integrity of the SAC is therefore set out below.

Kros et al (2016) state that abiotic site factors are affected by changes in atmospheric deposition of sulphur (S) and nitrogen (N) compounds, groundwater level changes, changes in management and land use and internal processes such as accumulation of organic matter and vegetation succession. These changes can affect the structure and functioning of semi-natural ecosystems such as grassland and thus the biodiversity. Kros et al (2016) identify two types of effects from enhanced atmospheric deposition of N and S:

(i) soil acidification, leading to enhanced leaching of base cations and increased dissolution of potentially toxic aluminium; and,
(ii) eutrophication due to N enrichment causing an enhanced growth of nitrophilious species outcompeting other species.

Kros et al (2016) suggest that increasing N availability and or nitrate ($NO_3$) concentration often causes an overall decline in plant species diversity even at long-term low N inputs. However, in some cases, especially under very nutrient-poor conditions, an increase in plant species diversity has been observed due to the expansion of nitrophilious species.

APIS identifies that the following exceedance effects from acid deposition on Blaen Cynon SAC could be experienced: leaching will cause a decrease in soil base saturation, increasing the availability of Al3+ ions, mobilisation of Al3+ may cause toxicity to plants and mycorrhiza and may have direct effect on lower plants (bryophytes and lichens).

Although the grasslands of Blaen Cynon SAC are not the designated feature of the SAC, their protection is important to ensure the survival of the marsh fritillary butterfly at the SAC, although it should be recognised that this sHRA report is focussed on the integrity of the qualifying species, marsh fritillary, and as such it is of key importance to ensure that the habitats maintain devil's-bit scabious *Succisa pratensis* the larval foodplant for this species. A discussion associated with the effects of increased nitrogen deposition (a component part of acid deposition) on this larval foodplant has already been provided in Section 6.4.3.1.

Although the broad habitat of the SAC is listed as acid grassland, the site is in reality, a mixture of calcareous, neutral and acid grasslands, and thus there is the potential for some buffering capacity at the site (Environment Agency, no date). This is particularly important when considering acidification as in areas of calcareous grassland, acid deposition is unlikely to have any significant effect due to the buffering capacity of the land (Environment Agency, no date).

The Core Management Plan (CCW, 2008a) identified that Management Units 2 and 3, which are in closest proximity to the Enviroparks development, include acid grassland, marshy grassland and species-rich neutral grassland habitats.
The 2009 sHRA report (RT-MME-104641) provided the following data with respect to acid deposition at Blaen Cynon SAC:

- The dry deposition rate for acid deposition as a percentage of the critical load for Blaen Cynon SAC was 14.83%; and,

- The maximum dry deposition rate for acid deposition as a percentage of the critical load for Blaen Cynon SAC was 38.34%.

It is therefore clear that the acid deposition levels associated with the Enviroparks scheme, based on the 2017 assessment, are within a similar range as those modelled for the 2009 sHRA Report (RT-MME-104641). As the 2017 modelling is based on a location in close proximity to the Enviroparks development, this also represents a 'worst-case' figure which is close to the 'maximum' figure outlined above from the 2009 assessment.

As discussed in Section 6.4.3.1, consideration should be given to the fact that the in-combination effects are mainly as a result of elevated background acid deposition levels, rather than a significant contribution from the scheme itself. As such, consideration should be given to how the project can provide a strategic improvement to the marsh fritillary habitat provision within the area, if evidence proves that the elevated background levels are having an adverse effect on the habitats within Blaen Cynon SAC. A Biodiversity Scheme was agreed with Countryside Council for Wales and the two local planning authorities with respect to the 2008 application in relation to providing additional marsh fritillary habitat within a 5km radius of the proposed Enviroparks site as part of the sHRA works completed in 2009. ~~In order to ensure that this scheme can be used to provide suitable mitigation to control the potential adverse effects of acid deposition on Blaen Cynon SAC, the measures outlined in Section 9.2 should be adhered to.~~

Further information is provided in Section 9.2.2.

6.4.3.3 Ammonia

Table 6.14 provides details of the modelled ammonia levels using IED emissions limits data at Blaen Cynon SAC as a result of the Enviroparks development proposals. In-combination data is not provided as there are not any additional local impacts from the other schemes outlined in Chapter 4.

For Blaen Cynon SAC, a critical level of 3 was used as this is the critical level identified by APIS for fen, marsh and swamp, acid grassland and calcareous grassland.

| **Ammonia ($NH_3$)** | **Enviroparks Only** |
|---|---|
| Background Concentration (µg NH3/$m^3$ annual mean) | 0.64 |
| Annual Average Process Contribution (PC) NH3 (ug/$m^3$) | 0.2134 |
| Predicted Environmental Concentration (PEC) (µg NH3/$m^3$ annual mean) | 0.8534 |
| Long-term Environmental Quality Standard<br>Lower Critical Level (µg NH3/$m^3$ annual mean) | 3 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 7.1% |
| Long-term PC < 1 % of Critical Level? | No |
| Long-term PEC % of Critical Level | 28.45% |
| Long-term PEC < 70 % of critical level? | Yes |

**Table 6.14: Modelled Ammonia Using IED Emissions Limits Data at Blaen Cynon SAC**

Table 6.14 shows that the critical level for ammonia has been set by APIS for Blaen Cynon SAC at a level of 3 µg NH3/$m^3$ annual mean. The current background concentrations of ammonia at the SAC are 0.64 µg NH3/$m^3$ annual mean, and the process contribution would be 0.2134 µg NH3/$m^3$ annual mean. The Predicted Environmental Concentration (PEC) would therefore be 0.8534 µg NH3/$m^3$ annual mean. This means that even with the proposed development in operation, the critical level, above which direct adverse effects on the habitats may occur, will not be exceeded and as such the scheme can be concluded to have no significant adverse effect from ammonia pollution.

Table 6.14 shows that whilst the process contribution cannot be considered insignificant as it is above 1% of the lower critical level, the PEC values are less than 70% of the critical level.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including ammonia) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effect on Blaen Cynon SAC as a result of ammonia pollution from the proposed development. No additional in-combination effects are predicted as the other projects outlined in Chapter 4 will not result in an additional local impacts.

6.4.3.4 Oxides of Nitrogen

Table 6.15 provides details of the modelled annual mean oxides of nitrogen levels at Blaen Cynon SAC using IED emissions limits data as a result of the Enviroparks development proposals and in-combination with the other schemes outlined in Chapter 4. Table 6.16 presents the short-term 24-hour mean data based on the same parameters.

The critical levels for NOx are detailed by APIS for Blaen Cynon SAC as:

- Annual mean - 30 µg/m$^3$ over a calendar year; and,
- 24 hour mean - 75 µg/m$^3$.

| Oxides of Nitrogen (NOx) | Enviroparks Only | In-Combination |
|---|---|---|
| Background Concentration (ug/m$^3$) | 9.0186 | 9.0186 |
| Annual Average Oxides of Nitrogen Process Contribution (PC) (ug/m$^3$) | 4.4697 | 8.6343 |
| Predicted Environmental Concentration (PEC) (ug/m$^3$ annual mean) | 13.4883 | 17.653 |
| Long Term Environmental Quality Standard (EQS)<br>Critical Level (µg NOx/m$^3$ annual mean) | 30 | 30 |
| Do background levels exceed the long-term Critical Level? | No | No |
| Do PEC levels exceed the long-term Critical Level? | No | No |
| Long-term PC as % of Critical Level | 14.9% | 28.8% |
| Long-term PC < 1 % of Critical Level? | No | No |
| Long-term PEC as % of EQS | 44.96% | 58.84% |
| Long-term PEC < 70 % of Critical Level? | Yes | Yes |

**Table 6.15: Modelled Annual Mean Oxides of Nitrogen Using IED Emissions Limits Data at Blaen Cynon SAC**

| Oxides of Nitrogen (NOx) | Enviroparks Only | In-Combination |
|---|---|---|
| Background Concentration (ug/m$^3$) | 9.0186 | 9.0186 |
| 24-Hour Average Oxides of Nitrogen Process Contribution (PC) (ug/m$^3$) | 4.2691 | 8.1642 |
| Predicted Short-term Environmental Concentration (ug/m$^3$) | 13.2877 | 17.1828 |
| Short-term Environmental Quality Standard (EQS)<br>Critical Level (µg NOx/m$^3$ 24-hour mean) | 75 | 75 |
| Do background levels exceed the short-term Critical Level? | No | No |
| Do Short-term PEC levels exceed the short-term Critical Level? | No | No |
| Short-term PC as % of Critical Level | 5.69% | 10.89% |
| Short-term PC < 10 %? | Yes | No |

**Table 6.16: Modelled 24-Hour Mean Oxides of Nitrogen Using IED Emissions Limits Data at Blaen Cynon SAC**

As Table 6.15 illustrates, with the Enviroparks development in place the long-term PEC NOx levels will be 13.4883 µg NOx/m$^3$ annual mean. When considering the scheme in-combination with other projects, the long-term PEC will be 17.653 µg NOx/m$^3$ annual mean. It is therefore evident that with the development in place, and taking into account the other in-combination projects, the critical levels for NOx at Blaen Cynon SAC will not be exceeded.

As the critical level will not be exceeded, there is no need to consider the process contributions further as there will be no air pollution from the development (alone or in-combination) which will result in the critical level being exceeded. However, in order to ensure that all data is presented, Table 6.15 shows that the Enviroparks development on its own will result in a long-term process contribution of 14.9%. The long-term Predicted Environmental Concentration (PEC) contribution percentage increase will be 44.96%, based on the annual critical level of 30 µg NOx/m$^3$ annual mean. In-combination with other schemes this percentage contribution will be 58.84%. Both of these are less than 70% of the PEC as a percentage of the critical level.

As the annual mean critical level for NOx will not be exceeded, either alone or in-combination with the other projects set out in Chapter 4, then it can be concluded that there would be no adverse effects on the habitats within Blaen Cynon SAC from long-term NOx pollution as a result of the proposed development.

Table 6.16 also shows that the short-term process contribution will be below the critical level of 75 µg NOx/m$^3$ 24-hour mean and as such any impacts can be screened as insignificant. For the scheme in

isolation, the short-term process contribution is also below 10% of the short-term critical level. When considering the in-combination effects, the process contribution is only very slightly above the 10% screening level (at 10.89%) set out in Section 6.4.3, however as outlined above, the critical level is still not exceeded.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including oxides of nitrogen) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no significant adverse effect on the integrity of Blaen Cynon SAC as a result of long-term or short-term oxides of nitrogen as a result of the Enviroparks development, either alone or in-combination with the other projects identified in Chapter 4.

6.4.3.5 Sulphur Dioxide

Table 6.17 provides details of the modelled sulphur dioxide levels using IED emissions limits data at Blaen Cynon SAC as a result of the Enviroparks development proposals, and in-combination with the other schemes outlined in Chapter 4.

Whilst APIS does not show a critical level for sulphur dioxide ($SO_2$) the EAW (no date) information (see Table 6.5) states that the critical level should be 20 µg $SO_2/m^3$ annual mean.

| **Sulphur Dioxide ($SO_2$)** | **Enviroparks Only** | **In-Combination** |
|---|---|---|
| Background Concentration (ug/$m^3$) | 2.79 | 2.79 |
| Annual Average Process Contribution (PC) $SO_2$ (ug/$m^3$) | 1.0881 | 1.1455 |
| Predicted Environmental Concentration (µg $SO_2/m^3$ annual mean) | 3.878 | 3.936 |
| Long Term Environmental Quality Standard (EQS) Critical Level (µg $SO_2/m^3$ annual mean) | 20 | 20 |
| Do background levels exceed the Critical Level? | No | No |
| Do PEC levels exceed the Critical Level? | No | No |
| Long-Term PC as % of Critical Level | 5.44% | 5.7% |
| Long-term PC < 1 %? | No | - |
| Long-term PEC as % of Critical Level | 19.39% | 19.68% |
| Long-term PEC < 70 %? | Yes | Yes |

**Table 6.17: Modelled Sulphur Dioxide Using IED Emissions Limits Data at Blaen Cynon SAC**

As detailed in Table 6.17, the long-term PEC will be 3.878 µg $SO_2/m^3$ annual mean with the Enviroparks scheme in place, and 3.936 µg $SO_2/m^3$ when the scheme is considered in-combination with the other projects outlined in Chapter 4. These values clearly show that even with all of the proposed developments in place (ie the in-combination data), the levels of $SO_2$ will still be significantly lower than the critical level of 20 µg $SO_2/m^3$ annual mean, the level at which concentrations of $SO_2$ could have a direct adverse effect on habitats within Blaen Cynon SAC. As such, the proposed development is not considered to have an adverse effect on Blaen Cynon SAC as a result of sulphur dioxide pollution.

Table 6.17 also shows whilst the long-term process contribution as a percentage of the critical level is above 1%, the long-term predicted environmental concentrations will be less than 70% of the environmental quality standard (critical level) and as such the effects are considered insignificant using this additional screening criteria.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including sulphur dioxide) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

Thus it can be concluded that the proposed development, either alone or in-combination with other projects, will not result in any adverse effects on Blaen Cynon SAC via this pathway.

6.4.3.6 Metals

The GOV.UK guidance on 'Air Emissions Risk Assessment for your Environmental Permit' highlights a requirement to calculate the process contribution for substance deposition and consider the impact they have when absorbed by soil and leaves (known as deposition).

For the Environmental Statement Addendum works (Savills, 2017), deposition of metals was modelled as part of the air quality assessment. The model has provided the outputs shown in Tables 6.18 (cadmium and thallium) and 6.19 (heavy metals), both have been modelled using IED emissions data limits. There are no in-combination affects from the projects outlined in Chapter 4.

| Cadmium and Thallium | Enviroparks Only |
|---|---|
| Background Concentration (ug/m$^3$) | 0.155 |
| Annual Average Process Contribution (PC) Cd (ug/m$^3$) | 1.1945 |
| Predicted Environmental Concentration (PEC) (µg Cd/m$^3$ annual mean) | 1.3495 |
| Long Term Environmental Quality Standard (EQS)<br>Critical Level | 5 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 23.9% |
| Long-term PC < 1 % of Critical Level? | No |
| Long-Term PEC as % of Critical Level | 26.99% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 6.18: Modelled Cadmium and Thallium Using IED Emissions Limits Data at Blaen Cynon SAC**

| Heavy Metals | Enviroparks Only |
|---|---|
| Background Concentration (ug/m$^3$) | 0.00643 |
| Annual Average Heavy Metals Process Contribution (PC) (ug/m$^3$) | 0.0111 |
| Predicted Environmental Concentration (PEC) (µg Heavy Metals/m$^3$ annual mean) | 0.0175 |
| Long Term Environmental Quality Standard (EQS)<br>Critical Level | 0.25 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 4.4% |
| Long-term PC < 1 % of Critical Level? | No |
| Long-term PEC as % of Critical Level | 7.01% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 6.19: Modelled Heavy Metals Using IED Emissions Limits Data at Blaen Cynon SAC**

Tables 6.18 and 6.19 show that the critical levels for cadmium and thallium and heavy metals would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4. As such, the scheme will not result in an adverse impact on Blaen Cynon SAC from these pollutants.

Tables 6.18 and 6.19 also illustrate that although the process contribution will be above 1% of the critical level, the long-term predicted environmental concentrations will be less than 70% of the critical level and as such the affects can be screened as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including metals) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Blaen Cynon SAC as a result of pollution from cadmium and thallium, or heavy metals.

6.4.3.7 Volatile Organic Compounds (VOC)

For the Environmental Statement Addendum works (Savills, 2017), volatile organic compounds (VOCs) as benzene were modelled as part of the air quality assessment, using IED emissions limits data. The model has provided the outputs shown in Table 6.20. There are no in-combination affects from the projects outlined in Chapter 4.

| Volatile Organic Compounds (VOC as benzene) | Enviroparks Only |
|---|---|
| Background Concentration VOC (ug/m$^3$) | 0.207 |
| Annual Average Process Contribution (PC) VOC (ug/m$^3$) | 0.2232 |
| Predicted Environmental Concentration (PEC) (µg VOC/m$^3$ annual mean) | 0.4302 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 5 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 4.5% |
| Long-term PC < 1 % of Critical Level? | No |
| Long-term PEC as % of Critical Level | 8.60% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 6.20: Modelled Volatile Organic Compounds Using IED Emissions Levels Data at Blaen Cynon SAC**

Table 6.20 shows that the critical levels for VOCc as benzene would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4. As such, the scheme will not result in an adverse impact on Blaen Cynon SAC from these pollutants.

Table 6.20 also illustrates that although the process contribution is more than 1% of the critical level, it is also possible to conclude that any effects would be insignificant due to the fact that the predicted environmental concentration is less than 70% of the critical level.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including VOCs) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Blaen Cynon SAC as a result of deposition from VOCs as benzene.

6.4.3.8 Polycyclic Aromatic Hydrocarbons (PAH)

Table 6.21 shows the modelled data, using IED emissions limits data, for Polycyclic Aromatic Hydrocarbons (PAH). There are no in-combination affects from the projects outlined in Chapter 4.

| Polycyclic Aromatic Hydrocarbons (PAH) | Enviroparks Only |
|---|---|
| Background Concentration PAH (ug/m$^3$) | 0.188 |
| Annual Average Process Contribution (PC) PAH (ug/m$^3$) | 0.0222 |
| Predicted Environmental Concentration (PEC) (µg PAH/m$^3$ annual mean) | 0.2102 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 1 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of EQS | 2.2% |
| Long-term PC < 1 % of EQS? | No |
| Long-term PEC as % of EQS | 21.02% |
| Long-term PEC < 70 % of EQS? | Yes |

**Table 6.21: Modelled Polycyclic Aromatic Hydrocarbons Using IED Emissions Levels Data at Blaen Cynon SAC**

Table 6.21 shows that the critical levels for PAH would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4. As such, the scheme will not result in an adverse impact on Blaen Cynon SAC from these pollutants.

Table 6.21 also shows that whilst the process contribution is more than 1% of the critical level, it is possible to conclude that any effects would be insignificant due to the fact that the predicted environmental concentration is less than 70% of the environmental quality standard.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented

in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including PAH) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Blaen Cynon SAC as a result of deposition from PAH.

6.4.3.9 Ozone

The EAW data outlined in Tables 6.4 and 6.5 identify that ozone could also potentially have an adverse effect on the habitats within Blaen Cynon SAC which support marsh fritillary butterfly. The air quality consultants, Envisage (Owen, *Pers. Comm.,* 2017) confirmed that the technology providers have not suggested any releases from ozone.

It is therefore concluded that there would be no adverse effects on Blaen Cynon SAC as a result of ozone releases from the proposed development, either alone or in-combination with other schemes.

6.4.3.10 Traffic Considerations

Chapter 9 Air Quality of the Environmental Statement confirms that:

> *"In preparing the ES Addendum, the potential changes in proposed traffic levels and resultant emissions has been considered in chapter 8 and in a supporting Transport Statement.*

With respect to traffic generated during the construction phase of the development, the following information is provided in Chapter 9 Air Quality:

> *"Traffic movements during construction have been estimated based on the identified technology requirements, and likely staffing and labour figures…They result in a significant increase in the numbers proposed by the original scheme, and these may also coincide with other committed development construction periods… the methodology applied by the Design Manual for Roads and Bridges (DMRB,* [2007]*) has been used to assess the likely impact of construction vehicles, whether alone or in combination with other committed developments, during the proposed construction phase (2017 – 2019)."*

The 2017 assessment concludes that:

> *"Similarly to the 2008 assessment, the DMRB screening methodology concludes that the increase in pollutant concentrations for each year from the development construction traffic showed little change in all pollutant concentrations, with increases being consistently less than 1 µg $m^{-3}$. The largest increase was predicted at the petrol station on the A465 to the east, where the traffic from the construction of the Enviroparks site, the Abergorki Wind Farm and the Hirwaun Power facility in combination could result in an additional contribution to the background levels of Oxides of Nitrogen of 0.1 µg $m^{-3}$ in 2018. This obviously assumes that each of the developments is indeed constructed at their proposed timescales, but still results in the impact of the proposed development traffic on the local air quality being considered to be insignificant."*

With respect to the potential impacts of traffic during the operational phase of the development, Chapter 9 Air Quality states that:

> *In summary, levels of operational traffic reduce substantially, largely due to the fact that the revised scheme will not accept waste from refuse collection vehicles, the local fleet of which would otherwise visit the site several times each day. Site staffing numbers also reduce… As such…the operational vehicle movements have reduced* [compared with the 2008 assessment] *and have not therefore been assessed further by the Transport Statement,"*

The 2009 sHRA Report (RT-MME-104641) concluded the following with respect to the additional impacts of traffic during operation of the site, compared with the emissions from the proposed industrial process:

> *"the difference in the percentage contribution to the critical loads of industrial emissions and industrial and transport emissions and shows that the contribution of predicted traffic emissions to the process contribution is negligible."*

As the operational traffic levels are predicted to decrease under the new scheme proposals, it can be concluded that the contribution of operational traffic to the air quality assessment provided above would also be considered negligible.

No additional effects on Blaen Cynon SAC as a result of air pollution are therefore predicted from traffic generated by the development, during construction or operation, either alone or in-combination with other projects and plans.

### 6.4.4 Inappropriate Tree Planting and Past Agricultural Improvements in the Management Units / Other Ecosystem Modifications

Other ecosystem modifications are considered to be a medium-rank threat to the SAC according to the 2015 Natura 2000 Standard Data Form. The proposed development will have no impact on tree planting, other agricultural management practices, or any ecosystem modifications not considered elsewhere in this chapter. As a result it can be concluded that there would be no likely significant effect on Blaen Cynon SAC as a result of this pathway, either alone or in-combination with other projects or plans.

### 6.4.5 Scrub Invasion / Biocenotic Evolution / Succession / Invasive Non-Native Species

These are considered to be low-rank threats where they are included on the 2015 Natura 2000 Standard Data Form. Other than via potential changes to air quality (which are discussed in Section 6.4.2), given the fact that there is a separation of c.100 m between the proposed development site and the closest Blaen Cynon SAC unit, it is not considered that the proposed development would result in any adverse effects on the SAC via this pathway, either alone or in-combination with other plans or projects.

### 6.4.6 Grazing

This threat is considered to be a low-rank threat on the 2015 Natura 2000 Standard Data Form. Inappropriate grazing regimes by horses, sheep and cattle have been identified in the Core Management Plan as being an issue for Blaen Cynon SAC. The Core Management Plan identifies that action was needed to ensure that management agreements with the landowners of the different SAC land parcels were in place.

The development site is currently fenced off and there are no opportunities for horse-grazing at the site. As such, loss of the land within the development site will not result in any changes to grazing regimes within the SAC and the proposals are therefore not considered to have any adverse effects on the grazing regimes within the SAC, either alone or in-combination with other plans or projects.

### 6.4.7 Human Induced Changes in Hydraulic Conditions / Pollution to Groundwater (Point Sources and Diffusion Sources)

This threat is considered to be a low-rank threat on the 2015 Natura 2000 Standard Data Form. The 2009 sHRA report (RT-MME-104641) stated that:

> *"The proposed development site is not hydrologically connected to Blaen Cynon SAC through surface water systems, as those surface water features within and adjacent to the site flow in a southerly direction and do not outfall into Blaen Cynon SAC;*
>
> *The hydrological studies completed prior to the 2009 assessment showed that the groundwater moves in a south-west direction and therefore any changes to the groundwater levels as a result of a change in the drainage system within the site will not impact on groundwater beneath Blaen Cynon SAC as this is located up gradient of the proposed development site"*

The 2009 sHRA report concluded that there would be no significant adverse impacts on the integrity of the Blaen Cynon SAC as a result of human induced changes to hydraulic conditions and as there are no changes to the drainage proposals from the current application, this conclusion is maintained.

With respect to pollution to groundwater, as it has been shown that the application site does not have any hydrological groundwater connection to the SAC, it can be concluded that there would be no impacts from this pathway as a result of the proposed development, either alone or in-combination with other projects and plans.

### 6.4.8 Loss of Marsh Fritillary Habitat Outside of SAC

The proposed development will not require any landtake from the European Site nor will they affect the boundary of the site. However, given the proximity of Blaen Cynon SAC to the proposed development site (125 m away) the effects of habitat loss at the proposed development site are discussed below.

As part of the 2009 sHRA report (RT-MME-104641) consideration was given to the potential for use of habitats within the Enviroparks site by marsh fritillary. Marsh fritillary surveys were undertaken within the proposed development site in 2008 in three stages to determine the presence of marsh fritillary:

*Stage 1: Habitat and Food Plant Assessment*
The first stage involved an initial habitat and food plant survey of the site and the surrounding area to provide an assessment of the breeding potential within the site itself and whether there is any potential for dispersal into surrounding habitats. The marsh fritillary is associated with two main habitat types: damp neutral or acidic grasslands (Rhos pastures); and, dry chalk and limestone grasslands. The main larval foodplant is Devil's-bit scabious, with field scabious and small scabious occasionally used.

The majority of the proposed development site is covered in rush-dominated marshy grassland. The site was subject to heavy grazing and therefore the sward was short in-between rush patches (generally less than 5 cm) with occasional sparse tussocks of tufted hair-grass *Deschampsia caespitosa*. An area of semi-improved neutral grassland was present along the southern and eastern site boundaries and was unmown with an average sward length of approximately 40 cm. The sward height of the grassland was deemed to be too high to provide ideal habitat for marsh fritillary as the species prefer intermediate to shorter sward lengths.

A search for Devil's-bit scabious (the larval food plant) revealed only a single patch of five individual plants within the south-eastern corner of the site within the semi-improved neutral grassland habitat. No field scabious *Knautia arvensis* or small scabious *Scabiosa columbaria* were identified within the survey site.

Penderyn Reservoir is located to the north of the site and the grassy slopes of the reservoir were regularly mown, and no devil's-bit scabious was recorded on the slopes. It was not possible to gain access to land within the water treatment works (to the north-east of the site), however when viewed through the fence, the grassland within this habitat appeared to comprise regularly mown amenity grassland with few forb species present. Industrial units and hard standing formed the remainder of the eastern boundary. The land to the south of the site was occupied by further industrial units, surrounded by regularly maintained amenity planting. These habitats surrounding the site are therefore considered to provide unsuitable habitat for marsh fritillary.

*Stage 2: Marsh Fritillary Adult Survey*
The second stage involved using the Butterfly Monitoring Scheme methodology, to complete a series of counts along a fixed route across the site during given weather conditions. Adult marsh fritillary butterflies seen within 5 m of each side of the transect route were be recorded. Butterfly surveys were completed on 30th May 2008, 30th June 2008 and 16th July 2008. No marsh fritillary butterflies were recorded during any of the butterfly survey visits, or during any of the other visits to the site.

*Stage 3: Larval Foodplant Survey*
The final stage of the survey identified the quantity of larval food plant across the proposed development site, and included survey using quadrats or by examination of the individual plants for the larval form and eggs of the marsh fritillary. The five Devil's-bit scabious plants in the south-eastern corner of the site were searched for the presence of eggs on 16th June 2008 and 27th August 2008. No marsh fritillary eggs were found during these surveys.

No marsh fritillaries (adults, larvae or eggs) were recorded during any of the surveys. The site provided sub-optimal habitat for marsh fritillary, with only a single small patch of devil's bit scabious (the larval food plant) noted. Adult marsh fritillary rarely fly more than 50-100 m thus reducing the likelihood of the adults utilising the Application Site which is 100 m away at its closest point.

Since 2008, development works at the site have been completed which involved the construction of the Phase 1 area of the site, and reptile mitigation works which involved trapping and translocation and ground works (see Chapter 13 Ecology, of the Environmental Statement Addendum, 2017). It is therefore considered that marsh fritillary butterflies are highly unlikely to be now using the site and as such there would be no indirect effects on the species from the loss of habitat within the application site.

# 7. COEDYDD NEDD A MELLTE SAC

## 7.1 QUALIFYING CRITERIA

The following information is taken from the Joint Nature Conservation Committee (JNCC) site description and accompanying Natura 2000 data sheet, both of which are available at:
http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUcode=UK0030141

Information has also been obtained from the Countryside Council for Wales (CCW, 2008b) Core Management Plan for the site.

| | |
|---|---|
| **Country:** | Wales |
| **Unitary Authority:** | East Wales |
| **Centroid:** | SN919093 |
| **Latitude:** | 51.77222222 |
| **Longitude:** | -3.567222222 |
| **Site Code:** | UK0030141 |
| **Status:** | Designated Special Area of Conservation (SAC) |
| **Area (ha):** | 376.32 |

Coedydd Nedd a Mellte SAC is underpinned by Dyffrynoedd Nedd a Mellte, Moel Penderyn SSSI and Blaen Nedd SSSI. The area covered by these SSSI is greater than that of the SAC. These SSSI are notified for a wide range of biological and geological features, but it is the bulk of the oak and ash woodland which comprises the SAC interests.

The CCW Drawing in Appendix 2 shows the SAC and SSSI boundaries of the nature conservation site.

### 7.1.1 SAC Qualifying Criteria

#### 7.1.1.1 Qualifying Habitats

The site contains the following Annex I habitats (Habitats Directive: 92/43/EEC) that are listed as primary reasons for selection:

**91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles**

Coedydd Nedd a Mellte is a very large and diverse example of old sessile oak wood in south Wales. The woods extend along a series of deeply incised valleys and ravines, and contain complex mosaics of sessile oak *Quercus petraea* woodland, ash *Fraxinus excelsior* woodland (some of which is referable to Annex I type 9180 *Tilio-Acerion* forests of slopes, screes and ravines), and transitions to lowland woodland types. The whole site is biologically rich, with many woodland plant communities represented and rich bryophyte and lichen assemblages. Notable higher plant species include wood fescue *Festuca altissima* and the ferns *Dryopteris aemula*, *Hymenophyllum tunbrigense* and *Asplenium viride*.

The site also contains the following Annex 1 habitats that are present as a qualifying feature, but are not a primary reason for selection:

**9180 Tilio-Acerion forests of slopes, screes and ravines**

Semi-natural broad-leaved woodland corresponding to the following NVC types:

- W8 *Fraxinus excelsior – Acer campestre – Mercurialis perennis* woodland (sub-communities d-g)
- W9 *Fraxinus excelsior – Sorbus aucuparia – Mercurialis perennis* woodland

#### 7.1.1.2 Qualifying Species

The site does not support any Annex II species that are listed as primary reasons for selection.

## 7.2 CONSERVATION OBJECTIVES

The CCW (2008b) Core Management Plan for Coedydd Nedd a Mellte SAC includes the conservation objectives for designated features. Each conservation objective consists of the following two elements: vision for the feature; and, performance indicators. During a meeting on 9th May 2017 with Natural Resources Wales, it was confirmed that whilst an updated management plan for Coedydd Nedd a Mellte SAC is currently being produced, this has not yet been published and therefore the 2008 plan is considered to represent the most up to date management plan for the site.

### 7.2.1 SAC Feature: Old sessile oak woods with Ilex and Blechnum in the British Isles

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- Sessile oak woodland will occupy at least 175 ha of the total site area.
- The canopy should be predominantly oak and locally native trees will be common in the woodland.
- Ferns will be common ground flora species.
- Bryophytes will continue to be abundant and the bryophyte flora will continue to include those western/Atlantic species that mark out this woodland type. A suite of rarer species and species at the edge of their geographical range will continue to be present.
- Heathy species such as bilberry and common heather *Calluna vulgaris* will be common in some areas.
- Introduced invasive species such as rhododendron will be absent and any conifers seeding in from adjoining plantations will be removed whilst at the seedling/sapling stage.
- Damage to the ground flora and soil erosion due to public pressure will be at a minimum.
- All factors affecting the achievement of these conditions are under control.

The performance indicators for the condition of the feature and the factors affecting the feature are provided in Table 7.1.

| **Performance Indicators for Feature Condition** | | |
|---|---|---|
| ***Attribute*** | ***Attribute rationale and other comments*** | ***Specified limits*** |
| A1. Extent of sessile oak woodland | The extent should not fall below the area mapped in 1996. The maximum extent is governed by the underlying geology and soil types. | *Upper limit*: None (but is naturally limited).<br>*Lower limit*: 175 ha |
| A2. Distribution | Should be present in the following units:<br>Blaen Nedd: Units BN7, BN8, BN9.<br>Dyffrynoedd Nedd a Mellte: DNM3-11, DNM13-16 | *Upper limit*: none<br>*Lower limit*: Significant presence in all units indicated in adjoining column. |
| A3. Canopy cover | Continuous canopy cover to be met with in at least 90% of samples over the whole site. | *Upper limit* : 100%<br>*Lower limit:*90% |
| A4. Canopy composition & understorey composition | The canopy and understorey composition will consist of at least 95% native woody species typical of the habitat in at least 90% of samples over the whole site. | *Upper limit:* None<br>*Lower limit:* 90% |
| A5. Regeneration | To be met in at least 50% of significant gaps in canopy. Such gaps should be recorded at each monitoring visit. Gaps should be created naturally and a more varied age structure should develop. Evidence of regeneration elsewhere on the site would be a positive sign that any grazing is sufficiently low.<br>There should also be a note made of regeneration of non-native species like beech or conifers. | *Upper limit:* None<br>*Lower limit:* Presence of viable saplings at least 1.5 m high within 10-15 years of gap appearing. |
| A6. Woodland structure | To be met in at least 75% of samples over the site as a whole. | *Upper limit:* None<br>*Lower limit:* Presence of understorey and field layer, consisting of locally native species. |
| A7. Deadwood | To be met in at least 50% of samples over the site as a whole. | *Upper limit:* None<br>*Lower limit:* Presence of standing and/or fallen deadwood with a minimum diameter of 20 cm and minimum length of 2 m. |
| A8. Ground flora | At least 80% of woodland flora the cover of typical ground flora woodland plants is 30%. Ferns should be common (see definitions - may need refining).<br>See also under A9 bryophytes. | *Upper limit:* None<br>*Lower limit:* 30 % cover |
| A9. Bryophytes, lichens and filmy ferns | Bryophytes define this woodland type - further work is required to be able to set suitable limits, but typical ground covering species should be present at high cover in about 80% of the woodland. The range of scarcer species of bryophyte, lichens and filmy ferns should continue to have viable populations. | *Upper limit:* None<br>*Lower limit:* 80% of woodland ground cover in core areas should have 50 % cover of typical bryophytes (provisional). |

**Table 7.1: Performance Indicators for Coedydd Nedd a Mellte SAC Feature**: **Old sessile oak woods (continues)**

| **Performance Indicators for Factors Affecting the Feature** | | |
|---|---|---|
| ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| F1. Livestock grazing | Grazing to the extent practiced routinely by the farming community prevents regeneration of woodland and damages the field layer. Cessation of all grazing over a long period, however, may be detrimental to the field layer, especially bryophytes, as these become shaded out. The ideal may be to mimic the very low level within a natural woodland ecosystem, or to periodically vary grazing pressure. It is something that is kept under constant review. | *Upper limit*: grazing levels likely to be in the region of 0.1 LSU/ha/yr or less.<br>*Lower limit*: None |
| F2. Non-native species | As many of the bryophytes typical of this habitat grow on the trunks of the oak trees, there will be low tolerance of non-native species. In particular there will be zero tolerance of invasive species such as Rhododendron, which has not yet got a foothold in the site. A maximum of about 5% of non-native trees and shrubs, including conifers, will be tolerated. | *Upper limits:* 5% cover of non-native trees in the canopy.<br>AND:<br>No rhododendron (or other invasive non-native shrubs) in the understorey or shrub layer<br>*Lower limit:* None. |
| F3. Woodland Management | Natural ecological processes should be allowed to operate as far as possible. In the majority of units these should gradually create greater structural diversity. Any areas can be identified which may benefit from thinning; the thinning should focus on removing the non-native species. As thinning would alter the relative humidity of the site, limits would need to be imposed. | *Upper limit:*<br>*Lower limit:* |
| F4. Access and visitor management and human and grazing induced bare ground | Poorly maintained footpaths, coupled with increasing visitor numbers have resulted in erosion problems in some areas. In addition, the area has proved to be very popular with outdoor groups engaging in such activities as gorge walking. Further investigation is required to assess and address impacts from these activities and will be incorporated into the management plan for the whole area.<br><br>Throughout the site the cover of bare soil or denuded rocks due to footpaths, trampling and grazing and other activities undertaken by visitors (but not including natural landslips, naturally bare ground where leaf litter etc), should be less than X % (limit to be determined but likely to be close to the area taken up by footpaths). Additional limits may need to be set to address issues in more sensitive parts of the site. | *Upper limit:* X% (to be determined) bare ground due to human or animal induced activities.<br>*Lower limit:* |

**Table 7.1 (continued): Performance Indicators for Coedydd Nedd a Mellte SAC Feature**: **Old sessile oak woods**

### 7.2.2 SAC Feature: Tilio-Acerion forests of slopes, screes and ravines

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- Upland ash woodland will occupy at least 18 ha of the total site area.
- The canopy should be predominantly ash and the following trees will be common in the
- woodland:
- Ferns will be common ground flora species.
- Although they may be present in the canopy in small quantities, sycamore and beech should not
- become dominant at the expense of ash.
- Introduced invasive species will be absent and any conifers seeding in from adjoining plantations
- will be removed whilst at the seedling/sapling stage.
- Damage to the ground flora and soil erosion due to public pressure will be at a minimum.
- All factors affecting the achievement of these conditions are under control.

The performance indicators for the condition of the feature and the factors affecting the feature are provided in Table 7.2 below.

| **Performance Indicators for Feature Condition** | | |
|---|---|---|
| ***Attribute*** | ***Attribute rationale and other comments*** | ***Specified limits*** |
| A1. Extent of upland as woodland | The extent should not fall below the area mapped in 1996. The maximum extent is governed by the underlying geology and soil types. | *Upper limit*: None (but is naturally limited).<br>*Lower limit*: 18 ha |
| A2. Distribution | Should be present in the following units:<br>Blaen Nedd: Units BN7, BN8, BN9.<br>Dyffrynoedd Nedd a Mellte: DNM2, DNM4, DNM9, DNM11, DNM16 | *Upper limit*: none<br>*Lower limit*: Significant presence in all units indicated in adjoining column. |
| A3. Canopy cover | Continuous canopy cover to be met with in at least 90% of samples over the whole site. | *Upper limit*: 100%<br>*Lower limit:* 90% |
| A4. Canopy composition and understorey composition | The canopy and understorey composition will consist of at least 95% native woody species typical of the habitat in at least 90% of samples over the whole site. | *Upper limit:* None<br>*Lower limit:* 90% |
| A5. Regeneration | To be met in at least 50% of significant gaps in canopy. Such gaps should be recorded at each monitoring visit. Gaps should be created naturally and a more varied age structure should develop. Evidence of regeneration elsewhere on the site would be a positive sign that any grazing is sufficiently low. There should also be a note made of regeneration of non-native species like sycamore, beech or conifers. | *Upper limit:* None<br>*Lower limit:* Presence of viable saplings at least 1.5m high within 10-15 years of gap appearing. |
| A6. Woodland structure | To be met in at least 75% of samples over the site as a whole. | *Upper limit:* None<br>*Lower limit:* Presence of understorey and field layer, consisting of locally native species. |
| A7. Deadwood | To be met in at least 50% of samples over the site as a whole. | *Upper limit:* None<br>*Lower limit:* Presence of standing and/or fallen deadwood with a minimum diameter of 20cm and minimum length of 2m. |
| A8. Ground flora | At least 80% of woodland flora the cover of typical ground flora woodland plants is 30%. Ferns should be common (see definitions - may need refining). | *Upper limit:* None<br>*Lower limit:* 30 % cover |
| A9. Bryophytes and lichens | Bryophytes are often abundant in this type of woodland, but are not as important a component in defining the woodland types as they are in defining 'sessile oakwood'. However, the two woodland types often grow in close proximity and it may be sensible to treat the upland ash woodland in the same manner as for the sessile oakwood until limits can be refined following further study and monitoring.<br><br>Typical ground covering species should be present at high cover in about 80%? of the woodland. The range of scarcer species of bryophyte and lichens should continue to have viable populations. | *Upper limit:* None<br>*Lower limit:* 80% of woodland ground cover in core areas should have 50 % cover of typical bryophytes (provisional). |
| **Performance Indicators for Factors Affecting the Feature** | | |
| ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| F1. Livestock grazing | Grazing to the extent practiced routinely by the farming community prevents regeneration of woodland and damages the field layer. Cessation of all grazing over a long period, however, may be detrimental to the field layer as these may become shaded out. The ideal may be to mimic the very low level within a natural woodland ecosystem, or to periodically vary grazing pressure. It is something that kept under constant review. | *Upper limit*: grazing levels likely to be in the region of 0.1 LSU/ha/yr or less.<br>*Lower limit*: None |

**Table 7.2: Performance Indicators for Coedydd Nedd a Mellte SAC Feature**: **Tilio-Acerion forests of slopes, screes and ravines (continues)**

| **Performance Indicators for Factors Affecting the Feature** | | |
|---|---|---|
| ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| F2. Non-native species | There will be low tolerance of non-native species. Although some sycamore will be tolerated, it should not be allowed to become dominant over ash. A maximum of about 5% of non-native trees and shrubs, including conifers, will be tolerated. | *Upper limits:* 5% cover of non-native trees in the canopy.<br>Sycamore - a limit<br>AND:<br>No invasive non-native shrubs in the understorey or shrub layer<br>*Lower limit:* None. |
| F3. Woodland Management | Natural ecological processes should be allowed to operate as far as possible. In the majority of units these processes should gradually create greater structural diversity. Any areas can be identified<br>which may benefit from thinning; the thinning should focus on removing the non-native species. As thinning would alter the relative humidity of the site,<br>limits would need to be imposed. | *Upper limit:*<br>*Lower limit:* |
| F4. Access and visitor management and human and grazing induced bare ground | Poorly maintained footpaths, coupled with increasing visitor numbers have resulted in erosion problems in some areas. In addition, the area has proved to be very popular with outdoor groups engaging in such activities as gorge walking and climbing. Further investigation is required to assess and address impacts from these activities and will be incorporated into a wide ranging management plan for the whole area.<br><br>Throughout the site the cover of bare soil or denuded rocks due to footpaths, trampling and grazing and other activities undertaken by visitors (but not including natural landslips, naturally bare ground where leaf litter etc), should be less than X % (limit to be determined but likely to be close to the area taken up by footpaths). Additional limits may need to be set to address issues in more sensitive parts of the site. | *Upper limit:* X% (to be determined) bare ground due to human or animal induced activities.<br>*Lower limit:* |

**Table 7.2 (continued): Performance Indicators for Coedydd Nedd a Mellte SAC Feature**: **Tilio-Acerion forests of slopes, screes and ravines**

During consultations regarding the assessment works, a plan was provided by Natural Resources Wales showing the NVC Phase II Woodland Habitat within Coedydd Nedd a Mellte SAC. A copy of this plan is included in Appendix 2. This plan shows that the habitats which are closest to the Enviroparks scheme include the following National Vegetation Classification habitats:

- W7a - *Alnus-Fraxinus-Lysimachia* woodland, *Urtica* sub-community;
- W10a - *Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland, Typical sub-community; and,
- W17c - *Quercus petraea-Betula pubescens-Dicranum majus* woodland *Anthoxanthum odoratum Agrostis capillaris* sub-community.

## 7.3 VULNERABILITY OF THE SAC

The CCW Core Management Plan (2008b) includes an assessment of the conservation status of qualifying features and management requirements to maintain or restore each feature.

### 7.3.1 SAC Feature: Old sessile oak woods with Ilex and Blechnum in the British Isles

A 2006 assessment found the conservation status of this feature to be **unfavourable**, due to:

- The presence of non-native species;
- Insufficient understorey cover in parts of the site due to heavy grazing in the past; and,
- Negative effects as a result of visitor pressure.

Further details are provided in Table 7.3.

| Issue contributing to Unfavourable Status of Feature | Explanation and Management Required |
|---|---|
| The presence of non-native species | Some thinning may be necessary to remove some of the non-native species in Unit DNM2. Some thinning of non-native trees may be required. |
| Insufficient understorey cover in parts of the site due to heavy grazing in the past | Units DNM2, DNM11, DNM16 are currently (2008) under management agreement but a sufficient understorey will take time to develop. Units DNM14 & DNM15 are largely unmanaged and ungrazed and an understorey should develop in time. Units DNM4 & DNM8 are largely fenced from grazing, although trespassing sheep do enter the wood from time to time, and an understorey should develop in time. |
| Negative effects as a result of visitor pressure | A management plan covering the wider 'waterfalls area' is being progressed (2008) by the BBNPA, FC and CCW, which amongst other things which amongst other things will be addressing issues arising from increasing numbers of visitors in the SAC and supporting SSSI. |

**Table 7.3: Summary of Issues Contributing to Unfavourable Status of Feature and Management Required**

### 7.3.2 SAC Feature: Tilio-Acerion forests of slopes, screes and ravines

A 2006 assessment found the conservation status of this feature to be **unfavourable**, due to:

- The presence of non-native species;
- Insufficient understorey cover in parts of the site due to heavy grazing in the past; and,
- Negative effects as a result of visitor pressure.

Further details are provided in Table 7.4.

| Issue contributing to Unfavourable Status of Feature | Explanation and Management Required |
|---|---|
| The presence of non-native species | Much of Unit DNM16 has now been fenced under a management agreement, however a sufficient understorey will take time to develop and some thinning may be necessary to remove some of the non-native species. Similar fencing has occurred in Units BN7 & BN9, with some thinning and coppicing initiated to reduce the frequency of sycamore. |
| Insufficient understorey cover in parts of the site due to heavy grazing in the past | As above |
| Negative effects as a result of visitor pressure | A management plan covering the wider 'waterfalls area' is being progressed (2008) by the BBNPA, FC and CCW, which amongst other things will be addressing issues arising from increasing numbers of visitors in the SAC and supporting SSSI. |

**Table 7.4: Summary of Issues Contributing to Unfavourable Status of Feature and Management Required**

### 7.3.3 Current Threats to SAC

The Natura 2000 – Standard Data Form (2015b) states that the main threats to this SAC are:

High-rank threats:

- Air pollution, airborne pollutants – both inside and outside the SAC;
- Interspecific floral relations – both inside and outside the SAC; and,
- Outdoor sports, leisure activities and recreational activities – inside the SAC.

Low-rank threats:

- Grazing – inside the SAC;
- Forest plantation management and use – inside the SAC; and,
- Problematic native species – inside the SAC.

## 7.4 Potential Effects on Coedydd Nedd a Mellte SAC

This section of the report provides an assessment of the potential effects of the proposed development on the Coedydd Nedd a Mellte SAC. The section has been structured to provide consideration of each of the likely pathways for impacts and the site's vulnerabilities as identified in Sections 8.2 and 8.3. Some of the identified 'risks' are identified from the 2008 Core Management Plan for the site (CCW, 2008b), and some

are from the 2015 Natura 2000 Standard Data Form. Where there are overlaps between the 'risks' outlined in the two documents, these have been discussed together.

**DIRECT EFFECTS**

### 7.4.1 Negative Effects as a Result of Visitor Pressure / Outdoor Sports, Leisure Activities and Recreational Activities

These types of threats are considered to be high-rank threats in the 2015 Natura 2000 Standard Data Form. Due to the nature of the proposed development being of an industrial nature, the proposed development will have no impact on visitor pressure or recreational activities, therefore no likely significant effects are predicted from this pathway, either alone or in-combination with other plans and projects.

### 7.4.2 Insufficient Understorey Cover in Parts of the Site due to Heavy Grazing in the Past / Grazing / Forest Plantation Management and Use / Problematic Native Species / Interspecific Floral Relations

These threats are considered to be high-rank (interspecific floral relations) and low-rank (grazing, forest plantation management and use, and problematic native species) threats in the 2015 Natura 2000 Standard Data Form.
Given the distance between the proposed development site and the SAC and the nature of the development, it can be concluded that the proposed development will have no impact on grazing or forest plantation management, including management with respect to problematic native species or the composition of flora, therefore no likely significant effects are predicted from this pathway, either alone or in-combination with other plans and projects.

### 7.4.3 The Presence of Non-Native Species

Coedydd Nedd a Mellte SAC is located 1.24 km west north-west of the proposed development site. Given the distance from the proposed development to the SAC it can be concluded that there would be no impacts regarding introduction, disturbance or spread of non-native species on the SAC as a result of the proposed development. No likely significant effects with respect to the presence of non-native species are predicted, either alone or in-combination with other plans and projects.

**INDIRECT EFFECTS**

### 7.4.4 Air Pollution and Airborne Pollutants

This section of the report provides modelling data associated with air quality changes as a result of the Enviroparks scheme, both alone and in-combination with other projects, on Coedydd Nedd a Mellte SAC. The methodologies applied to the modelling works are as outlined in Section 6.4.3 and as such are not repeated here.

For Coedydd Nedd a Mellte SAC, the modelling is based on the closest point of the SAC to the development site, located at grid reference 292525, 207199. This location is within SAC Management Unit DNM4 which contains both *Tilio-Acerion* forests of slopes, screes and ravines and Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles as key habitats (Core Management Plan, 2008b).

The screening criteria outlined Section 6.4.3 for Blaen Cynon SAC has also been applied to the assessment for Coedydd Nedd a Mellte SAC.

#### 7.4.4.1 Nutrient Nitrogen

Table 7.5 provides a summary of the modelled deposition rates using IED emissions limits for nutrient nitrogen at Coedydd Nedd a Mellte SAC taking the Enviroparks scheme only into account, and also when considering the effects in-combination with the other schemes identified in Chapter 4. This data is considered to represent a worst case scenario, likely to be only experienced when the gasifiers are emitting at the limits of their permits. Table 7.6 presents the data based on the Laxen and Marner (2005) assessment methodology and Table 7.7 presents the data using the Laxen and Marner (2005) methodology and based on long-term realistic emissions data.

Table 7.8 presents the data from the August 2017 modelling work (Envisage, 2017c) which takes into account the additional technologies, uses IED emissions limits data, applies a conversion of 70% NOx to $NO_2$ and includes the updated background concentrations provided by APIS and accessed in August 2017.

For Coedydd Nedd a Mellte SAC, a lower critical load of 10 was used as this is the lowest critical load identified by APIS, and a higher critical load of 15 was used (see http://www.apis.ac.uk/srcl/select-a-

feature?site=UK0030141&SiteType=SAC&submit=Next) which would be relevant to some of the habitats found within the SAC, and particularly those within Management Unit DNM4, closest to the Enviroparks development site. These critical loads relate to 'Old sessile oak woods with Ilex and Blechnum in the British Isles'. The higher critical load presented in Tables 7.5 to 7.8 was 15, again taken from APIS.

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 23.57 | 23.57 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.182 | 0.305 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 23.75 | 23.88 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **1.8%** | **3.0%** |
| Long-term PC < 1 % of lower Critical Load? | **See below** | **No** |
| Long-term PEC as % of lower Critical Load | **237.5%** | **238.8%** |
| Long-term PEC < 1 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical Load R (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | **1.2%** | **2.0%** |
| Long-term PC < 1 % of higher Critical Load? | **See below** | **No** |
| Long-term PEC as % of higher Critical Load | **158.3%** | **159.2%** |
| Long-term PEC < 1 % of higher Critical Load? | **No** | **No** |

**Table 7.5: Modelled Nutrient Nitrogen Deposition Using IED Limits Emissions Data at Coedydd Nedd a Mellte SAC**

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 23.57 | 23.57 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.140 | 0.263 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 23.71 | 23.83 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 1.4% | **2.6%** |
| Long-term PC < 1 % of lower Critical Load? | See below | **No** |
| Long-term PEC as % of lower Critical Load | **237.1%** | **238.3%** |
| Long-term PEC < 1 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical Load R (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.9% | **1.8%** |
| Long-term PC < 1 % of higher Critical Load? | Yes | **No** |
| Long-term PEC as % of higher Critical Load | 158.1% | **158.9%** |
| Long-term PEC < 1 % of higher Critical Load? | No | **No** |

**Table 7.6: Modelled Nutrient Nitrogen Deposition Using IED Limits Emissions Data at Coedydd Nedd a Mellte SAC and Laxen and Marner (2006) Assessment Method**

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 23.57 | 23.57 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.130 | 0.252 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 23.7 | 23.822 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 1.3% | **2.5%** |
| Long-term PC < 1 % of lower Critical Load? | See below | **No** |
| Long-term PEC as % of lower Critical Load | 237% | **238.2%** |
| Long-term PEC < 1 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical Load R (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.08% | **1.7%** |
| Long-term PC < 1 % of higher Critical Load? | Yes | **No** |
| Long-term PEC as % of higher Critical Load | 158% | **158.8%** |
| Long-term PEC < 1 % of higher Critical Load? | No | **No** |

**Table 7.7: Modelled Nutrient Nitrogen Deposition Using Long-Term Realistic Emissions Data at Coedydd Nedd a Mellte SAC and Laxen and Marner (2005) Assessment Methods**

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 26.6 | 26.6 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.011 | 0.096 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 26.611 | 26.696 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 10 | 10 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.11% | 0.96% |
| Long-term PC < 1 % of lower Critical Load? | Yes | Yes |
| Long-term PEC as % of lower Critical Load | 266.1% | 267.0% |
| Long-term PEC < 1 % of lower Critical Load? | No | No |
| **Higher Critical Load:** | | |
| Higher Critical Load R (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.07% | 0.64% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 177.4% | 178.0% |
| Long-term PEC < 1 % of higher Critical Load? | No | No |

**Table 7.8: Modelled Nutrient Nitrogen Deposition Using Additional Technologies and IED Emissions Limits Data at Coedydd Nedd a Mellte SAC and 70% Conversion of NOx to $NO_2$**

Tables 7.5 to 7.8 clearly show that the background concentrations of nutrient nitrogen within Coedydd Nedd a Mellte SAC (23.57 kg N/ha/yr) are already significantly above the lower and higher critical load (10 and 15 kg N/ha/yr respectively) for 'Old sessile oak woods with Ilex and Blechnum in the British Isles' (the most sensitive of the habitat-types within the SAC to nutrient nitrogen deposition). The background levels are also above the higher critical load for 'Old sessile oak woods with Ilex and Blechnum in the British Isles' which is 15 kg N/ha/yr and above the lower (15 kg N/ha/yr) and higher (20 kg N/ha/yr) critical loads for 'Tilio-Acerion forests of slopes, screes and ravines'.

Based on the data presented in Tables 7.5 to 7.7 the Enviroparks scheme, when considered on its own, will result in only a small increase in nutrient nitrogen above the 1% screening level based on the lower critical load; 1.8% based on the worst case modelling data in Table 7.5; 1.4% based on the Laxen and Marner (2005) methodology and 1.3% when considering the long-term realistic emissions data results in Table 7.6. If the data presented for the Enviroparks scheme was rounded to the nearest whole number, it would be 2% based on the worst case data in Table 7.5 and 1% based on the Laxen and Marner (2005) assessment methodology (Table 7.6) and the long-term realistic emissions data (Table 7.7), which, in accordance with the screening methodology set out in Section 6.4.3, would mean that any potential effects could be screened out.

Using the abatement technologies proposed with a 70% conversion of NOx to $NO_2$ the data presented in Table 7.8 shows that the scheme alone would result in a process contribution of 0.11% of the critical load, which is clearly at a level which could be screened as 'insignificant'.

Based on the higher critical load, the levels presented in Tables 7.5 to 7.8 to would be considered insignificant for the development alone.

Based on the data presented in Table 7.5, under the worst case model where the plant was operating at the IED emission limits at all times, and without any additional mitigating technologies, there would be an in-combination level of nutrient nitrogen deposition from the scheme which was 3.0% of the lower critical load. Based on the more realistic modelled data in Table 7.7, the in-combination effects of the process contribution would be 2.5% of the lower critical level. However, based on the modelled data presented which takes into account the additional technologies, using IED limits and a 70% conversion of NOx to $NO_2$, the in-combination effects of the scheme on Coedydd Nedd a Mellte SAC would be 0.96% of the lower critical load (see Table 7.8). At these levels, the potential effects of the scheme when considered in-combination would be screened as 'insignificant'.

The process contribution, when considered in-combination, would be between ~~2.5%~~ 0.96% (Table 7.8) and 3.0% (Table 7.5) of the higher critical load.

Further consideration is given below to the key risks identified in the Core Management Plan for the site to consider whether ~~such a~~ the small-scale increase in nutrient nitrogen shown in Tables 7.5 and 7.7 from the Enviropark scheme would really be considered 'significant'. Consideration is ~~therefore~~ given to the potential effects of the predicted nutrient nitrogen increase on the habitats within the SAC, however, if the technological mitigation which has been used to inform the modelled data presented in Table 7.8, is implemented, then as the levels would be 'insignificant' this further consideration is not required.

WHO (2000) states that an increase in the supply of an essential nutrient such as nitrogen will stimulate tree growth, and the initial impact of enhanced nitrogen will therefore be a fertiliser effect. However, continuous high inputs of nitrogen produce negative effects on tree growth (Chaplin, 1980, cited by WHO, 2000), and Wellburn (1988, cited by WHO, 2000) states that under such conditions, the health of the tree declines and their sensitivity to drought, frost, insect pests and pathogens can increase markedly.

JNCCb (no date) state that the *Tilio-Acerion* forests at Coedydd Nedd a Mellte SAC provide habitat for a number of uncommon vascular plants, including, dark-red helleborine *Epipactis atrorubens*, violet helleborine *Epipactis purpurata*, wood fescue *Festuca altissima*, purple gromwell *Lithospermum purpureocaeruleum* and herb-Paris *Paris quadrifolia*.

Some localities within the SAC have important assemblages of epiphytic lichens. WHO (2000) state that a survey in central Netherlands concluded that between 1958 and 1981 when nitrogen input increased from 20 N kg/ha/yr to 40 N kg/ha/yr all lichens disappeared from the woodland. A study from a large semi-natural *Fagus-Quercus* stand in France identified that between 1972 and 1991, where changes in the calcareous soils were followed, a significant increase in nitrophilous ground flora was observed in high pH (6.9) stands, and with an ambient deposition of 15-20 N kg/ha/yr a distinct effect of increasing nitrogen availability could be detected in the vegetation (Thimonier, 1994).

APIS states that the impacts of exceedance of the critical load on 'Old sessile oak woods with Ilex and Blechnum in the British Isles' includes a decrease in mycorrhiza, loss of epiphytic lichens and bryophytes and changes in ground vegetation and for 'Tilio-Acerion forests of slopes, screes and ravines' exceedance of nutrient nitrogen critical levels results in changes in ground vegetation.

Caporn et al (2016) state that the impact of N deposition on vegetation composition within deciduous broadleaved woodland is poorly understood partly due to the strong influence that tree canopy structure places on ground flora through inception of light, rainfall and pollution and the effect of woodland management and nitrogen deposition upon this structure. Nevertheless, the authors state that work has demonstrated that understory plants such as bryophytes, lichens and forbs can be negatively affected by N.

Caporn et al (2016) cite a study from mixed woodland around four intensive livestock units in Scotland which showed a change in species composition within 300m downwind of the units with grasses *Deschampsia flexuosa* and *Holcus lantantus* and the shrub *Rubus idaeus* and forbs *Urtica dioica* increasing in abundance close to the units. Another study of 103 woodlands between 1971 and 2001 showed that overall species

richness was unaffected by N but changes in composition were found, with some species responding positively to N (*Poa nemoralis/trivialis, Galium aparine, Allium ursinum, Athyrium filix-femina, Carex pendula, Urtica dioica*) and other responding negatively (*Deschampsia flexuosa, Agrostis capillaris, Ajuga reptans, Holcus lanatus, Pteridium aquilinum, Vaccinium myrtillus*).

Caporn et al (2016) conclude that with respect to deciduous broadleaved woodland, the lack of an overall relationship between species richness and N deposition makes it difficult to assume a dose-response relationship to broad-scale N deposition in woodlands over a national gradient, however, it seems likely that the edges of the woodlands are likely to be more strongly affected by a nearby pollutant source (such as an intensive livestock farm).

The Core Management Plan (2008b) for Coedydd Nedd a Mellte SAC states the following with respect to the conservation and management status of the SAC feature 1 Tilio-Acerion forests of slopes, screes and ravines (EU habitat Code: 9180):

> ***Conservation Status of Feature 1 - Tilio-Acerion forests of slopes, screes and ravines (EU habitat Code: 9180)***
> *The conservation status of the feature within the site is* ***Unfavourable*** *(2006).*
> *Further monitoring is required to fully assess the condition as the 2006 assessment used slightly different management units to those in the current plan.*
>
> *The upland ash woodland is considered to be unfavourable largely because of the presence of non-native species and insufficient understorey cover in parts of the site due to heavy grazing in the past - particularly in Unit DNM16 and Units BN7 and BN9.*
>
> *Negative effects as a result of visitor pressure are also affecting the feature, however at this stage (2008), the significance is not clear and further investigation is required. Following some initial monitoring work in 2007, it appears that the main problem areas are in Units DNM4, DNM11 and Unit BN7.*
>
> ***Management Requirements of Feature 1 - Tilio-Acerion forests of slopes, screes and ravines (EU habitat Code: 9180)***
> *Much of Unit DNM16 has now been fenced under a management agreement, however a sufficient understorey will take time to develop and some thinning may be necessary to remove some of the non-native species. Similar fencing has occurred in Units BN7 & BN9, with some thinning and coppicing initiated to reduce the frequency of sycamore.*
>
> *A management plan covering the wider 'waterfalls area' is being progressed (2008) by the BBNPA, FC and CCW, which amongst other things will be addressing issues arising from increasing numbers of visitors in the SAC and supporting SSSI.*

The Core Management Plan (2008b) for Coedydd Nedd a Mellte SAC states the following with respect to the conservation and management status of the SAC feature 2 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (EU Habitat Code: 91A0).

> ***Conservation Status of Feature 2 - Old sessile oak woods with Ilex and Blechnum in the British Isles (EU Habitat Code: 91A0)***
> *The conservation status of the feature within the site is* ***Unfavourable*** *(2006).*
> *Further monitoring is required to fully assess the condition as the 2006 assessment used slightly different management units to those in the current plan.*
>
> *The sessile oak woodland is considered to be unfavourable largely because of the presence of non-native species in management Units DNM4, DNM8, DNM14.*
>
> *The understorey was also considered to be insufficient in parts of the site, usually due to heavy grazing in the past - particularly in Units DNM2, DNM4, DNM8, DNM11, DNM14, DNM15, DNM16. Negative effects as a result of visitor pressure are also affecting the feature, however at this stage (2008), the significance is not clear and further investigation is required. Sizeable areas of ground, particularly around waterfalls are heavily trampled and denuded with the prospects for tree regeneration greatly reduced. Ultimately, some areas could lose their canopy cover. Following some initial monitoring work in 2007, it appear that the main problem areas are in Units DNM4, DNM5,*

*DNM7, DNM8, DNM11.*

***Management Requirements of Feature 2 - Old sessile oak woods with Ilex and Blechnum in the British Isles (EU Habitat Code: 91A0)***
*Units DNM2, DNM11, DNM16 are currently (2008) under management agreement but a sufficient understorey will take time to develop. Some thinning may be necessary to remove some of the non-native species in Unit DNM2.*

*Units DNM14 & DNM15 are largely unmanaged and ungrazed and an understorey should develop in time. Some thinning of non-native trees may be necessary.*
*Units DNM4 & DNM8 are largely fenced from grazing, although trespassing sheep do enter the wood from time to time, and an understorey should develop in time. Some thinning of non-native trees may be required.*

*A management plan covering the wider 'waterfalls area' is being progressed (2008) by the BBNPA, FC and CCW, which amongst other things which amongst other things will be addressing issues arising from increasing numbers of visitors in the SAC and supporting SSSI.*

It should be noted that the nutrient nitrogen deposition rates presented in Tables 7.5 to 7.7 are modelled from the closest point within the Coedydd Nedd a Mellte SAC to the Enviroparks development and as such represent a worst-case scenario deposition rate for the whole of the SAC. This is particularly the case with the data in Table 7.5. Table 7.7 is considered to represent the long-term realistic emissions data from the proposed development (and shows that nitrogen deposition from the development itself would be screened as insignificant, even at the closest point of the SAC to the Enviroparks scheme).

The Envisage (2017b) report and Chapter 9 Air Quality of the Environmental Statement Addendum (Savills, 2017) presents data from an original set of modelling which utilised a central point within Coedydd Nedd a Mellte SAC for the modelling based on emissions data being at IED levels (ie worst case scenario). The modelling was from grid reference 291900, 209300, which is located in the centre of the SAC, c.3km north-west of the Enviroparks site. Table 16 from the Envisage (2017b) report shows that based on this central grid reference the process contribution would be 0.42% as a percentage of the lower critical load in isolation, and 0.6% in-combination with the other projects outlined in Chapter 4.

Based on the data presented in Table 7.8, it can be concluded that the proposed development would not have a significant adverse effect on the integrity of the SAC based on the Enviroparks scheme alone. It should also be recognised, that even based on the earlier modelled data in Tables 7.5 and 7.7, the ~~Whilst it is accepted that the~~ nitrogen deposition at the closest point of Coedydd Nedd a Mellte SAC was predicted to only be slightly above the 1% screening level from the Enviroparks scheme alone when considering the worst case IED emissions data, based on consideration of the more likely long-term realistic modelling data from Table 7.7, the IAQM (2016) Position Statement, and the fact that the levels of nutrient deposition which are above 1% will not be experienced across that whole of the SAC (which totals 376.32 ha).

Tables 7.5 to 7.8 also present data associated with the 'in-combination' effect of the scheme when considered with the other projects outlined in Chapter 4. As identified in Section 6.4.3, the IAQM Position Statement (IAQM, 2016) concludes that the use of the 1% screening level for process contributions as a percentage of the critical load, was not designed to be used as a screening threshold for 'in-combination' assessments. However, it has not been able to source any guidance from the Environment Agency / Natural Resources Wales / Institute of Air Quality Management, with respect to a screening threshold for in-combination effects. Based on the data in Table 7.8, it is clear that the in-combination effects would be below the 1% screening level for schemes when considered alone, and as such it can be concluded that assuming that the additional technologies are implemented, then impacts can be screened as insignificant.

It is clear that based on the long-term realistic emissions data (Table 7.7), and the scenario which includes additional technology provisions (Table 7.8), the nitrogen deposition levels at the closest point of Coedydd Nedd a Mellte SAC to the Enviroparks development would be screened as insignificant. ~~Under the worst case scenario (Table 7.5) where the plant was operating at the IED emissions level at all times (an unrealistic situation), then the nitrogen deposition levels would be screened as insignificant across part of the SAC, but could not be screened out at the closest point.~~

When the Enviroparks scheme is considered in-combination with the other projects outlined in Chapter 4, there are no screening criteria which can be applied related to the process contribution as a percentage of

the critical loads, however, it is clear from the data in Table 7.8 that any in-combination effects would be below 1% of the critical load~~ 7.5 to 7.7 that the predicted environmental concentrations would all be above 70% of the lower, or the higher, critical loads, mainly as a result of the elevated background levels which are already above the critical load.~~

~~Further information is provided in Section 9.3.~~

7.4.4.2 Acid Deposition

Table 7.9 provides a summary of the worst case scenario modelled deposition rates using the IED emissions data for acid deposition at Coedydd Nedd a Mellte SAC taking the Enviroparks scheme only into account, and also when considering the effects in-combination with the other schemes identified in Chapter 4. Table 7.10 presents the worst case scenario modelled deposition rates using the IED emissions data when modelled using the Laxen and Marner (2005) assessment methods.

Table 7.11 presents the long-term realistic emissions data, applying the Laxen and Marner (2005) assessment method.

The critical load has been determined using data from APIS for Coedydd Nedd a Mellte SAC. The lower critical load used for acid deposition is comprised of the lowest critical load provided for N plus the lowest critical load provided for S. The higher critical load for acid deposition is calculated as the highest critical load provided for N plus the highest critical load provided for S.

| **Acid Deposition** | **Enviroparks Only** | **In-Combination** |
|---|---|---|
| Background levels (keq/ha/yr) | 2.254 | 2.254 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0464 | 0.0592 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.30 | 2.31 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 1.694 | 1.694 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **2.7%** | **3.5%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term % of higher Critical Load | **136%** | **136%** |
| Long-term PEC < 70 % of lower critical load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 15.708 | 15.708 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 0.3% | 0.4% |
| Long-term PC < 1 % of higher Critical Load? | Yes | - |
| % of higher Critical Load | 14.6% | 14.7% |
| PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 7.9: Modelled Acid Deposition Using IED Emission Levels Data at Coedydd Nedd a Mellte SAC**

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 2.254 | 2.254 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0434 | 0.0562 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.29 | 2.31 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 1.694 | 1.694 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **2.6%** | **3.3%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **135%** | **136%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 15.708 | 15.708 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 0.3% | 0.4% |
| Long-term PC < 1 % of higher Critical Load? | Yes | - |
| Long-term PEC as % of higher Critical Load | 14.6% | 14.7% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 7.10: Modelled Acid Deposition Using IED Emission Levels Data at Coedydd Nedd a Mellte SAC and Laxen and Marner (2006) Assessment Method**

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 2.254 | 2.254 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0434 | 0.0562 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.29 | 2.31 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 1.694 | 1.694 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **2.6%** | **3.3%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **135%** | **136%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 15.708 | 15.708 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 0.3% | 0.4% |
| Long-term PC < 1 % of higher Critical Load? | Yes | - |
| Long-term PEC as % of higher Critical Load | 14.6% | 14.7% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 7.11: Modelled Acid Deposition Using Long-Term Realistic Emissions Data at Coedydd Nedd a Mellte SAC and Laxen and Marner (2006) Assessment Method**

Table 7.12 provides the data modelled during August 2017 associated with the implementation of additional technologies, data at IED limits and 70% conversation of NOx to $NO_2$ and using updated APIS background data.

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 2.34 | 2.34 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0010 | 0.0112 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 2.341 | 2.3512 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 1.694 | 1.694 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.06% | 0.66% |
| Long-term PC < 1 % of lower Critical Load? | Yes | Yes |
| Long-term PEC as % of lower Critical Load | 138.2% | 138.8% |
| Long-term PEC < 70 % of lower Critical Load? | No | No |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 15.708 | 15.708 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 0.006% | 0.07% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 14.9% | 15.0% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 7.12: Modelled Acid Deposition Using Additional Technologies and IED Emissions Data at Coedydd Nedd a Mellte SAC and 70% Conversation of NOx to $NO_2$**

Tables 7.9 to 7.11 show that based on either the worst case scenario model, using the Laxen and Marner (2005) assessment method, or the long-term realistic emissions data model, the 1% screening threshold for process contribution as a percentage of the lower critical load for acid deposition will not be achieved and the effects of the scheme, in isolation cannot be considered insignificant at the closest point of the SAC to the development. The background acid deposition (2.254 keq/ha/yr in the original assessments, and updated to 2.34 keq/ha/yr in the August 2017 model) already significantly exceeds the lower critical load for Coedydd Nedd a Mellte SAC (1.694 keq/ha/yr) and as such the PEC as a percentage of the lower critical load is greater than the 70% screening threshold.

However, Table 7.12 shows that with the application of additional mitigating technologies and use of a 70% conversion of NOx to $NO_2$, the process contribution alone would be 0.06% of the lower critical load and as such can be considered insignificant.

When considering the in-combination data, ~~it a clear from~~ Tables 7.9 to 7.11 show that based on the previously modelled data, the process contribution will result in percentage increases of between 3.5% (worst case scenario) and 3.3% (long-term realistic data) of the lower critical load. With the additional technologies applied however, Table 7.12 shows that the in-combination effects would comprise 0.66% of the critical load, and as such the effects can be considered insignificant.

The higher critical load for Coedydd Nedd a Mellte SAC will not be exceeded as a result of the proposed development, either alone or in-combination with the other projects outlined in Chapter 4.

Kros et al (2016) developed a model associated with acid deposition and groundwater levels on habitat quality and plant species diversity in grassland, heathland and woodland habitats. These authors cite earlier studies which conclude that N deposition is the most important driver for biodiversity loss in northern temperate forests.

APIS concludes that the exceedance impacts on 'Tilio-Acerion forests of slopes, screes and ravines' and 'Old sessile oak woods with Ilex and Blechnum in the British Isles' from acid deposition could result in leaching which will cause a decrease in soil base saturation, increasing the availability of Al3+ ions. Mobilisation of Al3+ may cause toxicity to plants and mycorrhiza and acid deposition may cause a decline in tree vitality and changes in ground flora species composition. It may also have a direct effect on lower plants (bryophytes and lichens) and may cause increased susceptibility to pathogens and pests.

The 2009 sHRA Report (RT-MME-104641) concluded that with respect to acid deposition, the dry deposition acid deposition as a percentage of the critical load for Coedydd Nedd a Mellte SAC was 0.12%. As with the discussion associated with the nitrogen deposition in Section 7.4.4.1, it should be noted that this related to a modelled location in the centre of this large SAC, rather than the worst-case scenario that the current model data in Table 7.9 is based on.

The Environmental Statement Addendum (Savills, 2017) presented acid deposition data for Coedydd Nedd a Mellte SAC from a central grid reference (291900, 209300, c.3km north-west of the Enviroparks scheme). This modelled data shows that the process contribution as a percentage of the critical load was 0.53% in isolation, and 0.59% when considered in-combination with other projects. It is therefore evident that the worst-case scenario for acid deposition presented in Table 7.9 would not be experienced across the whole of this large SAC as the deposition would drop well below 1% within the central section of the site. However, based on the data presented in Table 7.12 showing the data when applying the additional technology now proposed, the 1% screening criteria, whether applied to the scheme alone or in-combination, would not be exceeded, and as such effects from the proposed development would be considered insignificant. ~~Given the relatively low exceedances above the 1% threshold critical load for acid deposition presented in Tables 7.8 to 7.10, both with the Enviroparks scheme in isolation and in-combination with other projects, further consideration will need to be given to the potential effects of the scheme on the integrity of the habitats within the whole SAC.~~

~~Further information is provided in Section 9.3.~~

7.4.4.3 Ammonia

Table 7.13 provides details of the modelled ammonia levels at Coedydd Nedd a Mellte SAC using data at IED emissions levels as a result of the Enviroparks development proposals. In-combination data is not provided as there are not any additional local impacts from the other schemes outlined in Chapter 4.

For Coedydd Nedd a Mellte SAC, a critical level of 3 is shown by APIS. However, for this assessment a critical level of 1 was used based on the guidance from GOV.UK in relation to critical levels for ammonia where lichens or bryophytes (including mosses, landworts and hornworts) were present.

| **Ammonia ($NH_3$)** | **Enviroparks Only** |
|---|---|
| Background Concentration (µg NH3/$m^3$ annual mean) | 0.64 |
| Annual Average Process Contribution (PC) NH3 (ug/$m^3$) | 0.0126 |
| Predicted Environmental Concentration (PEC) (µg NH3/$m^3$ annual mean) | 0.6526 |
| Long-Term Environmental Quality Standard<br>Critical Level (µg NH3/$m^3$ annual mean) | 1 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as a % of Critical Level | 1.3% |
| Long-term PC < 1 % of Critical Level? | No |
| Long-term PEC as a % of EQS | 65.26% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 7.13: Modelled Ammonia at Coedydd Nedd a Mellte SAC**

Table 7.13 shows that with the Enviroparks scheme in place, the critical level, above which significant effects on the SAC habitats from ammonia could be experienced, will not be exceeded and as such there is not considered to be any adverse effect on Coedydd Nedd a Mellte SAC as a result of ammonia pollution.

In addition, based on the initial screening assessment outlined above, Table 7.13 illustrates that whilst the long-term process contribution cannot be considered insignificant as it is above 1% of the long-term critical level, based on the additional screening criteria outlined in Section 6.4.3, the PEC for the Enviroparks development as a percentage of the critical level will be 65.26% (ie below 70%) and any effects can therefore be screened out.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including ammonia) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effect on Coedydd Nedd a Mellte SAC as a result of ammonia pollution from the proposed development. No additional in-combination effects are predicted as the other projects outlined in Chapter 4 will not result in an additional local impacts.

7.4.4.4 Oxides of Nitrogen

Table 7.14 provides details of the modelled annual mean oxides of nitrogen levels using IED emissions level data at Coedydd Nedd a Mellte SAC as a result of the Enviroparks development proposals and in-combination with the other schemes outlined in Chapter 4. Table 7.15 presents the short-term 24-hour mean data based on the same parameters.

The critical levels for NOx are detailed by APIS for Coedydd Nedd a Mellte SAC as:

- Annual mean - 30 µg/m$^3$ over a calendar year; and,
- 24 hour mean - 75 µg/m$^3$.

| Oxides of Nitrogen (NOx) | Enviroparks Only | In-Combination |
|---|---|---|
| Background Concentration NOx (ug/m$^3$) | 6.1720 | 6.1720 |
| Annual Average Oxides of Nitrogen Process Contribution (PC) (ug/m$^3$) | 0.2922 | 0.7179 |
| Predicted Environmental Concentration (ug/m$^3$ annual mean) | 6.464 | 6.890 |
| Long Term Environmental Quality Standard (EQS) Critical Level (µg NOx/m$^3$ annual mean) | 30 | 30 |
| Do background levels exceed the Critical Level? | No | No |
| Do PEC levels exceed the Critical Level? | No | No |
| Long-term PC as a % of Critical Level | 0.97% | 2.4% |
| Long-term PC < 1 % of Critical Level? | Yes | No |
| Long-term Predicted Environmental Concentration (PEC) % of Critical Level | 21.55% | 22.97% |
| Long-term PEC < 70 % of Critical Level? | Yes | Yes |

**Table 7.14: Modelled Annual Mean Oxides of Nitrogen Using IED Emissions Levels Data at Coedydd Nedd a Mellte SAC**

| Oxides of Nitrogen (NOx) | Enviroparks Only | In-Combination |
|---|---|---|
| Background Concentration NOx (ug/m$^3$) | 6.1720 | 6.1720 |
| 24-Hour Average Oxides of Nitrogen Process Contribution (ug/m$^3$) | 0.2896 | 0.6934 |
| Short Term Environmental Quality Standard (EQS) Critical Level (µg NOx/m$^3$ 24-hour mean) | 75 | 75 |
| Do background levels exceed the Critical Level? | No | No |
| Do PEC levels exceed the Critical Level? | No | No |
| Short-Term PC as % of Critical Level | 0.39% | 0.92% |
| Short-term PC < 10 %? | Yes | Yes |

**Table 7.15: Modelled 24-Hour Mean Oxides of Nitrogen Using IED Emissions Levels Data at Coedydd Nedd a Mellte SAC**

Table 7.14 shows that the Enviroparks development on its own will not result in a long-term process contribution (PC) that exceeds the critical level for NOx and as a such the levels of NOx will remain at a level at which there would be no adverse effects of the habitats within Coedydd Nedd a Mellte SAC.

Table 7.14 shows that the Enviroparks scheme will result in long-term NOx pollution which is below 1% of the critical level, and as such can be screened as insignificant.

However, as Table 7.14 illustrates, with the Enviroparks development in place the long-term PEC NOx levels will be less than 70% of the critical level, both alone and in-combination with other projects.

Table 7.15 shows that when considering short-term NOx, the process contribution will not result in an exceedance of the short-term critical level and as such no effects are predicted. Based on the short-term careening process detailed in Section 6.3.4, Table 7.15 also shows that the process contribution is less than 10% of the short-term critical level, both alone and in-combination with other projects, and as such the short-term effects can be screened as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including oxides of nitrogen) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effect on the integrity of Coedydd Nedd a Mellte SAC from the Enviroparks scheme, either alone or in-combination, as a result of oxides of nitrogen.

7.4.4.5 Sulphur Dioxide

Table 7.16 provides details of the modelled sulphur dioxide levels at Coedydd Nedd a Mellte SAC, using IED limits emissions data, as a result of the Enviroparks development proposals, and in-combination with the other schemes outlined in Chapter 4.

The critical level for sulphur dioxide at Coedydd Nedd a Mellte SAC used in the assessment was 10 µg $SO_2/m^3$ annual mean.

| **Sulphur Dioxide ($SO_2$)** | **Enviroparks Only** | **In-Combination** |
|---|---|---|
| Background Concentration (ug/$m^3$) | 2.48 | 2.48 |
| Annual Average Process Contribution (PC) $SO_2$ (ug/$m^3$) | 0.0648 | 0.0818 |
| Predicted Environmental Concentration (µg $SO_2/m^3$ annual mean) | 2.5448 | 2.5618 |
| Long Term Environmental Quality Standard (EQS) Critical Level (µg $SO_2/m^3$ annual mean) | 10 | 10 |
| Do background levels exceed the Critical Level? | No | No |
| Do PEC levels exceed the Critical Level? | No | No |
| Long-Term PC as % of Critical Level | 0.6% | 0.8% |
| Long-term PC < 1 %? | Yes | Yes |
| Long-term PEC as % of Critical Level | 25.4% | 25.6% |
| Long-term PEC < 70 %? | Yes | Yes |

**Table 7.16: Modelled Sulphur Dioxide Using IED Emissions Levels Data at Coedydd Nedd a Mellte SAC**

As detailed in Table 7.16, the long-term PEC will be below the critical level for sulphur dioxide with the Enviroparks scheme in place, and when the scheme is considered in-combination with the other projects outlined in Chapter 4. As such, the proposed development is not considered to have an adverse effect on Coedydd Nedd a Mellte SAC as a result of sulphur dioxide pollution.

Table 7.16 also shows that the long-term process contribution as a percentage of the critical level is below 1%, and the long-term predicted environmental concentrations will be less than 70% of the critical level and as such the effects are also considered insignificant using this additional screening criteria.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including sulphur dioxide) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

Thus it can be concluded that the proposed development, either alone or in-combination with other projects, will not result in any adverse effects on Coedydd Nedd a Mellte SAC via this pathway.

7.4.4.6 Metals

The GOV.UK guidance on 'Air Emissions Risk Assessment for your Environmental Permit' highlights a requirement to calculation the process contribution for substance deposition and consider the impact they have when absorbed by soil and leaves (known as deposition).

For the Environmental Statement Addendum works (Savills, 2017), deposition of metals was modelled as part of the air quality assessment. The model has provided the output shown in Table 7.17 for cadmium and thallium and Table 7.18 for heavy metals. There are no in-combination affects from the projects outlined in Chapter 4.

| Cadmium and Thallium | Enviroparks Only |
|---|---|
| Background Concentration (ug/m$^3$) | 0.155 |
| Annual Average Process Contribution (PC) Cd (ug/m$^3$) | 0.0788 |
| Predicted Environmental Concentration (PEC) (µg Cd/m$^3$ annual mean) | 0.2338 |
| Long Term Environmental Quality Standard (EQS)<br>Critical Level | 5 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-Term Process Contribution % of EQS | 1.6% |
| PC < 1 % of EQS? | No |
| Long-Term Predicted Environmental Concentration % of EQS | 4.68% |
| PEC < 70 % of EQS? | Yes |

**Table 7.17: Modelled Cadmium and Thallium Using IED Emissions Levels Data at Coedydd Nedd a Mellte SAC**

| Heavy Metals | Enviroparks Only |
|---|---|
| Background Concentration (ug/m$^3$) | 0.00643 |
| Annual Average Heavy Metals Process Contribution (PC) (ug/m$^3$) | 0.000732 |
| Predicted Environmental Concentration (PEC) (µg Heavy Metals/m$^3$ annual mean) | 0.007162 |
| Long Term Environmental Quality Standard (EQS)<br>Critical Level | 0.25 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 0.29% |
| Long-term PC < 1 % of Critical Level? | Yes |
| Long-term PEC as % of Critical Level | 2.9% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 7.18: Modelled Heavy Metals Using IED Emissions Levels Data at Coedydd Nedd a Mellte SAC**

Tables 7.17 and 7.18 show that the critical levels for cadmium and thallium and heavy metals would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4 (no additional contributions from other projects are predicted). As such, the scheme will not result in an adverse impact on Coedydd Nedd a Mellte SAC from these pollutants.
Table 7.17 also illustrates that although the process contribution will be above 1% of the critical level for cadmium and thallium, the long-term predicted environmental concentrations will be less than 70% of the critical level and as such the affects can be screened as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including metals) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Coedydd Nedd a Mellte SAC as a result of pollution from cadmium and thallium, or heavy metals, either alone or in-combination with the other projects in Chapter 4.

7.4.4.7 Volatile Organic Compounds (VOC)
For the Environmental Statement Addendum works (Savills, 2017), volatile organic compounds (VOCs) as benzene were modelled as part of the air quality assessment. The model has provided the outputs shown in Table 7.19. There are no in-combination affects from the projects outlined in Chapter 4.

| Volatile Organic Compounds (VOC as benzene) | Enviroparks Only |
|---|---|
| Background Concentration VOC (ug/m$^3$) | 0.1936 |
| Annual Average Process Contribution (PC) VOC (ug/m$^3$) | 0.0147 |
| Predicted Environmental Concentration (PEC) (µg VOC/m$^3$ annual mean) | 0.2083 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 5 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 0.3% |
| Long-term PC < 1 % of Critical Level? | Yes |
| Long-term PEC as % of Critical Level | 4.2% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 7.19: Modelled Volatile Organic Compounds Using IED Emissions Levels Data at Coedydd Nedd a Mellte SAC**

Table 7.19 shows that the critical levels for VOCc as benzene would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4. As such, the scheme will not result in an adverse impact on Coedydd Nedd a Mellte SAC from these pollutants. Table 7.19 also illustrates that the process contribution is less than 1% of the critical level, and as such it would be possible to screen out any effects as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including VOCs) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Coedydd Nedd a Mellte SAC as a result of deposition from VOCs as benzene.

7.4.4.8 Polycyclic Aromatic Hydrocarbons (PAH)

Table 7.20 shows the modelled data for Polycyclic Aromatic Hydrocarbons (PAH) at Coedydd Nedd a Mellte SAC. There are no in-combination affects from the projects outlined in Chapter 4.

| Polycyclic Aromatic Hydrocarbons (PAH) | Enviroparks Only |
|---|---|
| Background Concentration PAH (ug/m$^3$) | 0.188 |
| Annual Average Process Contribution (PC) PAH (ug/m$^3$) | 0.0015 |
| Predicted Environmental Concentration (PEC) (µg PAH/m$^3$ annual mean) | 0.1895 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 1 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of EQS | 0.2% |
| Long-term PC < 1 % of EQS? | Yes |
| Long-term PEC as % of EQS | 19.0% |
| Long-term PEC < 70 % of EQS? | Yes |

**Table 7.20: Modelled Polycyclic Aromatic Hydrocarbons Using IED Emissions Levels Data at Coedydd Nedd a Mellte SAC**

Table 7.20 shows that the critical levels for PAH would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4 (no contributions from other projects are predicted for PAH). As such, the scheme will not result in an adverse impact on Coedydd Nedd a Mellte SAC SAC from these pollutants. Table 7.20 also illustrates that the process contribution is less than 1% of the critical level, and as such it would be possible to screen out any effects as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including PAH) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Coedydd Nedd a Mellte SAC as a result of deposition from PAH.

7.4.4.9 Traffic Considerations

Additional effects on traffic during construction and operation of the proposed development are considered in Section 6.4.3.10 for Blaen Cynon SAC. This section of the report shows that the impacts on traffic generated during construction and operation of the site on the air quality data presented above is insignificant and therefore need not be considered further.

No additional effects on Coedydd Nedd a Mellte SAC as a result of air pollution are therefore predicted from traffic generated by the development, during construction or operation, either alone or in-combination with other projects and plans.

# 8. CWM CADLAN SAC

## 8.1 QUALIFYING CRITERIA

The following information is taken from the Joint Nature Conservation Committee (JNCC) site description and accompanying Natura 2000 data sheet, both of which are available at:
http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013585

| | |
|---|---|
| **Country:** | Wales |
| **Unitary Authority:** | East Wales |
| **Centroid:** | SN961098 |
| **Latitude:** | 51.77722222 |
| **Longitude:** | -3.505277778 |
| **Site Code:** | UK0013585 |
| **Status:** | Designated Special Area of Conservation (SAC) |
| **Area (ha):** | 84.2 |

Cwm Cadlan SAC is situated approximately 1 km north-east of the village of Penderyn and about 4 km north of Hirwaun, near Aberdare. The site was notified in 2000 and incorporates the former Cwm Cadlan Grasslands SSSI and Glyn-Perfedd Meadow SSSI. The SAC interests are '*Molinia* meadows on calcareous, peaty or clayey silt-laden soils (*Molinion caeruleae*)' and 'Alkaline Fens'. Both these habitats are considered to be 'best areas in the United Kingdom'. Part of the site is owned by CCW and was declared a National Nature Reserve (NNR) in 2006.

### 8.1.1 SAC Qualifying Criteria

#### 8.1.1.1 Qualifying Habitats

The site contains the following Annex I habitats (Habitats Directive: 92/43/EEC) that are listed as primary reasons for selection:

**6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)**
Cwm Cadlan has the largest recorded example of *Molinia* meadows in Wales. The typical form of *Molinia caerulea – Cirsium dissectum* fen-meadow (M24b) is extensively developed, and there are clearly-displayed transitions to a range of associated habitats, including base-rich flush and neutral grassland. Globe-flower *Trollius europaeus* occurs in the *Molinia* meadows here towards the southern limit of its British distribution.

**7230 Alkaline fens**
Cwm Cadlan supports an outstanding suite of flushed short-sedge mire communities on glacial drift overlying Carboniferous limestone within the valley of the Nant Cadlan on the southern fringe of Brecon Beacons National Park. Communities referable to NVC type M10 *Carex dioica – Pinguicula vulgaris* mire occur widely, often in close association with flushed examples of purple moor-grass *Molinia caerulea* meadow (M24 *Molinia caerulea – Cirsium dissectum* fen-meadow), and characteristic species include common butterwort *Pinguicula vulgaris*, bog pimpernel *Anagallis tenella*, marsh arrowgrass *Triglochin palustris* and the moss *Campylium stellatum*. Other sedge-rich swards are also present which display floristic affinities to both M10 and M24; basophilous elements of this vegetation include tawny sedge *Carex hostiana*, flea sedge *Carex pulicaris* and quaking-grass *Briza media*

#### 8.1.1.2 Qualifying Species

The site does not support any Annex II species that are listed as primary reasons for selection.

Cwm Cadlan SAC comprises 10 no. management units, shown on the CCW Management Units plan in Appendix 3.

## 8.2 CONSERVATION OBJECTIVES

The CCW (2008c) Core Management Plan for Cwm Cadlan SAC includes the conservation objectives for designated features. Each conservation objective consists of the following two elements: vision for the feature; and, performance indicators. During a meeting on 9th May 2017 with Natural Resources Wales, it was confirmed that whilst an updated management plan for Cwm Cadlan SAC is currently being produced, this has not yet been published and therefore the 2008 plan is considered to represent the most up to date management plan for the site. It was also confirmed that up to date habitat surveys of this site were

completed in 2016 by NRW as part of a condition assessment survey, although the reports are not yet available.

### 8.2.1 SAC Feature: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- Fen-meadow will occupy at least 26 ha of a total area of marshy grassland habitat which itself will cover at least 42 ha.
- The remainder of the site will mainly consist of other semi-natural habitat, including alkaline fen.
- Typical fen-meadow plants will be common.
- Plants indicating agricultural modification or alteration to hydrology and drying of soils will be absent or present at only low cover.
- Although rushes are frequent, the more bulky species will not exceed 33% cover.
- Bare ground will generally not exceed 5% cover and vegetation litter 25%.
- Dense scrub will be largely absent from the fen-meadow, but it is probably desirable for invertebrates and birds to have a sparse scattering of shrubs or trees.
- All factors affecting the achievement of these conditions are under control.

The performance indicators for the condition of the feature and the factors affecting the feature are provided in Table 8.1. This table also encompasses the SSSI feature marshy grassland (non-SAC) with associated wet heath and acidic flushes (see Section 8.2.3).

| **Performance Indicators for Feature Condition** | | |
|---|---|---|
| ***Attribute*** | ***Attribute rationale and other comments*** | ***Specified limits*** |
| A1. Extent and distribution of marshy grassland | Extent is based on ground surveys (1991/1998 & 1999) and aerial photographs. For detailed rationale, see Annex of the CCW Core Management Plan (2008). | *Upper limit*: N/A, constrained byhydrology.<br>*Lower limit*: 42 ha, of which 26 ha is fen-meadow (these figures represent the extent indicated by the most recent vegetation surveys).<br>Located in units 1-9. |
| A2. Habitat quality | For the purposes of assessment against these criteria the main fen-meadow areas have been defined for all site units (see Annex for rationale and maps). | *Upper limit*: 100% of the vegetation meets the criteria listed below.<br>*Lower limits*: In each of the fen-meadow areas shown on the map (see Annex), at least 75% of the vegetation meets the definition listed below for fen-meadow<br>AND:<br>75% of the remaining marshy grassland meets the definition listed below for 'marshy grassland'. |
| **Definition of fen-meadow:**<br>In any 0.5m radius, purple moor-grass **and** at least 4 out of the following are present: quaking grass; tawny sedge; flea sedge; bog pimpernel; meadow thistle; devil's-bit scabious; marsh valerian.<br>**and** together the following species do not exceed 10%: creeping buttercup; common mouse-ear; crested dog's-tail; Yorkshire fog; creeping bent; ribwort plantain and white clover;<br>**and** the cover of tall rushes does not exceed 33%;<br>**and** cover of purple moor-grass does not exceed 66%;<br>**and** the cover of vegetation litter does not exceed 25%;<br>**and** the cover of bare ground does not exceed 5%;<br>**and** scrub/woody species are largely absent. | | |
| **Definition marshy grassland:**<br>As fen-meadow is mixed in with these other marshy grassland types, it is expected that focussing monitoring on the fen-meadow component should reflect quality of the other marshy grassland types:<br>The various marshy grassland stands generally reflect the NVC/vegetation types mapped during the vegetation surveys (see Annex of Core Management Plan). The marshy grassland is essentially pasture dominated by a mixture of purple moor-grass and rush spp. in varying proportions, with at least one of the following species present: common marsh bedstraw, fen bedstraw, greater bird's-foot trefoil, quaking grass, carnation sedge, flea sedge, tawny sedge, meadow thistle, devil's-bit scabious, marsh valerian……. (NB – CCW Core Management Plan states that this will need further work to better define the types present).<br>**and** in any 1m radius, the vegetation height is between 5 and 40 cm tall (excluding tall rushes and flower heads);<br>**and** the cover of vegetation litter does not exceed 25%;<br>**and** the cover of bare ground does not exceed 5%;<br>**and** scrub/woody species are largely absent. | | |

**Table 8.1: Performance Indicators for Cwm Cadlan SAC Feature**: *Molinia* **meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (continues)**

| **Performance Indicators for Factors Affecting the Feature** | | |
|---|---|---|
| ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| F1. Livestock grazing | The marshy grassland has been maintained through traditional farming practices. Without an appropriate grazing regime, the grassland would become rank and eventually turn to scrub and woodland. Light grazing by mainly cattle and ponies between April and November each year is essential in maintaining the marshy grassland and fen-meadow communities. | *Lower limits:* The wetland areas will be subject to light summer grazing by cattle and/or ponies at least 4 in every 5 years.<br>*Upper limits:* No significant grazing outside the growing season or heavy grazing at any time during the summer.<br>Light summer grazing is defined as - cattle and/or ponies at a rate of 0.4 LSU/ha/year for the period April to October. Heavy grazing is defined as greater than 1 LSU/ha/year (1 LSU is equivalent to a cow/horse, plus calf/foal). |
| F2. Drainage | The marshy grassland communities are strongly influenced by the quantity and base status of the groundwater. Reductions in the quality and quantity of the water in the springs and watercourses feeding the site may lead to a loss of marshy grassland or changes in species composition. Conversely, reduced/impeded drainage may lead to ground-water stagnation and a different change in species composition, e.g. increased abundance of rushes.<br><br>Infilling some of the many ditches at the site is likely to lead to re-wetting of some marshy grassland.<br><br>Dewatering of the adjacent quarry has potential to affect the hydrology of the site. | *Upper limit:* No new drainage ditches to be installed within the open meadow areas of the site.<br><br>NB. It is not possible to set more specific pending a fuller understanding of current situation and habitat requirements.<br><br>Rewetting could lead to a switch from marshy grassland to alkaline fen, which should be acceptable as this would be the more natural (and scarcer) community.<br><br>Monitoring of the quarry dewatering should give an early indication that the dewatering is affecting the site. |
| F3. Adjacent land use | Management of adjoining land has potential to affect the nutrient status of soils (some marshy grassland is at the base of slopes with the rest of the field managed as hay-meadow). | No limits set. Monitoring vegetation should indicate any changes. Much adjoining land is under sympathetic management, and so the risk of any adverse impact is low. |
| F.4 Scrub encroachment | Open wetland areas are prone to invasion by alder and willow scrub. Optimum grazing levels should help control spread of scrub, but occasionally active scrub eradication is necessary.<br><br>Scrub and woodland is also a natural component of such wetland complexes and enhances the site both biologically and visually, therefore older well-established stands will be retained. | The maximum area of mature dense wet woodland will be 6.5ha (extent in 1999).<br><br>Scattered scrub will be tolerated within the following limits:<br>*Lower limits:* Scattered scrub present in defined locations.<br>*Upper limits:* No scrub covering area greater than 5m x 5m within stands mapped as marshy grassland (see Annex of Core Management Plan). |
| F.5 Atmospheric pollution. | The alkaline fen may be the more sensitive vegetation type present. | See Section 8.2.2 below. |

**Table 8.1 (continued): Performance Indicators for Cwm Cadlan SAC Feature**: ***Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)**

### 8.2.2 SAC Feature: Alkaline Fen

The vision for this feature is for it to be in a favourable conservation status, where all of the following conditions are satisfied:

- Alkaline Fen will occupy about 11 ha or more.
- The remainder of the site will mainly consist of other semi-natural habitat including fen-meadow.
- Typical alkaline fen plants will be common.
- Plants indicating agricultural modification or alteration of hydrology and drying of soils will be absent or present only at low cover.
- Although rushes are frequent, the more bulky species will not exceed 33% cover.
- Bare ground will generally not exceed 5% cover and vegetation litter 10%.

- Scrub species will be largely absent from the alkaline fen.
- At selected springheads, water should flow in all but the most severe drought conditions.
- All factors affecting the achievement of these conditions are under control.

The performance indicators for the condition of the feature and the factors affecting the feature are provided in Table 8.2.

| **Performance Indicators for Feature Condition** | | |
|---|---|---|
| ***Attribute*** | ***Attribute rationale and other comments*** | ***Specified limits*** |
| A1. Extent and distribution | Extent is based on ground surveys and 2006 aerial photographs.<br><br>For detailed rationale, see Annex of the Core Management Plan (2008). | *Upper limit*: N/A, constrained by hydrology.<br>*Lower limit*: 11 ha.<br><br>Located in Units 1-4, 6-9 (NB - some of the quarry monitoring is carried out in small stands in Unit 1 L7 (see Annex of Core Management Plan) - here the alkaline fen occurs mainly as small runnels too small to map individually) |
| A2. Habitat quality | For the purposes of assessment against these criteria the main areas of alkaline fen have been identified (see maps in Annex of this plan).<br><br>For detailed rationale see Annex of the Core Management Plan (2008). | *Upper limit*: 100% of the vegetation meets the criteria listed below.<br>*Lower limits*: In each of the main areas of fen at least 75% of the vegetation meets the definition listed below. |
| **Definition of alkaline fen:**<br>In any 0.5m radius, the vegetation height is between 5 and 20 cm tall;<br>**And** at least 5 out of the following are present: tawny sedge; flea sedge; dioecious sedge; intermediate hook-moss *Drepanocladus cossonii*; yellow starry feather-moss *Campylium stellatum*; curled hookmoss *Palustriella commutata*; *m*arsh bryum *Bryum pseudotriquetrum*; maidenhair pocket-moss *Fissidens adianthoides*; bog pimpernel; marsh lousewort; common butterwort; quaking grass; water mint; marsh pennywort; marsh valerian and marsh arrowgrass;<br>**and,** the cover of 'brown' mosses (see above) is over 10%;<br>**and,** the cover of creeping buttercup, lesser spearwort and white clover does not exceed 10%.<br>**and** the cover of tall rushes and purple moor-grass does not exceed 33%;<br>**and** there is no discernable cover of vegetation litter - less than 10%;<br>**and** the cover of bare ground does not exceed 5%;<br>**and** scrub/woody species are largely absent. | | |
| **Performance Indicators for Factors Affecting the Feature** | | |
| ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| F1. Grazing | The alkaline fen has been maintained through traditional farming practices. Without an appropriate grazing regime, the sward would become rank and eventually turn to scrub and woodland. Light grazing by mainly cattle and ponies between April and November each year is essential in maintaining the habitat. | See Section 8.2.1 |
| F2. Drainage | The alkaline fen communities are strongly influenced by the quantity and base status of the groundwater. Reductions in the quality and quantity of the water in the springs and watercourses feeding the site may lead to a loss of alkaline fen or changes in species composition. Conversely, reduced/impeded drainage may lead to ground-water stagnation and a different change in species composition, e.g. increased abundance of rushes. Infilling some of the many ditches at the site is likely to lead to re-wetting of some former alkaline fen areas. Dewatering of the adjacent quarry has potential to affect the hydrology of the site. | See Section 8.2.1 |
| F3. Adjacent land use | See Section 8.2.1 | See Section 8.2.1 |
| F4. Scrub encroachment | See Section 8.2.1 | See Section 8.2.1 |

**Table 8.2: Performance Indicators for Cwm Cadlan SAC Feature**: **Alkaline Fen (continues)**

| **Performance Indicators for Factors Affecting the Feature** | | |
|---|---|---|
| ***Factor*** | ***Factor rationale and other comments*** | ***Operational Limits*** |
| F5. Atmospheric pollution. | Atmospheric deposition at this site has the potential to harm the alkaline fen feature. Dust deposition is likely to be high given the close proximity of Penderyn Quarry, and the absence of a published critical load for this pollutant against this habitat should be taken as indicating lack of impact. Atmospheric N deposition in this area is estimated at 21.8 kg N/ha/yr which lies above the lower critical load limit for this pollutant (15-35 kg N / ha / yr). It is likely that the critical load for N for M10 forms of alkaline fen is towards the lower end of this range. | Lower limits: None set – very low dust and N deposition regimes may be beneficial. Upper limits: Suggest 15 kg N / ha / year for N. None yet defined for dust – further advice needed. |

**Table 8.2 (continued): Performance Indicators for Cwm Cadlan SAC Feature**: **Alkaline Fen**

During the consultation process, Natural Resources Wales provided a plan showing the location of the Annex 1 Habitats within Cwm Cadlan SAC, based on 2016 SAC monitoring data. This plan, which is included in Appendix 3, shows that the habitats which are closest to the Enviroparks scheme include alkaline fens and M*olina* meadows, with *Molinia* meadow habitat mosaics located slightly further away from the Enviroparks scheme, but still within the western section of the site.

### 8.2.3 Additional SSSI Features

The SAC also supports the following three SSSI features, for which conservation objectives are provided in the Core Management Plan for the SAC:

- Marshy grassland (non-SAC) with associated wet heath and acidic flushes;
- Unimproved neutral grassland; and,
- Globeflower *Trollius europaeus*.

Conservation objectives for SSSI feature 'marshy grassland (non-SAC) with associated wet heath and acidic flushes' are included within Table 8.1.

The SSSI feature 'unimproved neutral grassland' corresponds to NVC type MG5. Most of this is present as small areas on better-drained ground within fields of mainly wet pasture. Conservation objectives for this feature have not yet been provided.

The SSSI feature 'Globeflower *Trollius europaeus*' is probably the largest population of this declining plant in south Wales, occurring mainly in stands of fen-meadow, alkaline fen and neutral grassland. Conservation objectives for this feature have not yet been provided.

## 8.3 VULNERABILITY OF THE SAC

The Core Management Plan (CCW, 2008c) includes an assessment of the conservation status of qualifying features and management requirements to maintain or restore each feature.

### 8.3.1 SAC Feature: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (and SSSI Feature marshy grassland (non-SAC) with associated wet heath and acidic flushes)

In 2007, the conservation status of these features was considered to be **unfavourable**. Assessment carried out in 2004 indicated that the condition of these features was **unfavourable, no change**. This was predominantly due to unsuitable grazing practices, and the Core Management Plan (2008c) states that there is continuing uncertainty over the impacts of drainage and quarrying.

Management requirements were provided for the following issues, for which further information is provided in Table 8.3:

- Grazing;
- Control of nutrient inputs;
- Scrub encroachment; and,
- Drainage.

| Issue contributing to Unfavourable Status of Feature | Explanation and Management Required |
|---|---|
| Grazing | The fen-meadow is mixed in with other marshy grassland and mire types, but each management unit is subjected to one prescription (excepting those areas that are mown for hay). Management should focus on maintaining or restoring the condition of the fen-meadow and therefore the condition of the remaining areas of marshy grassland will be of secondary importance, but it is likely that if management is suitable for the fen-meadow it should also benefit most other forms of marshy grassland.<br><br>Maintaining or restoring the marshy grassland should be attainable through the implementation of the present grazing regime and scrub control, with cattle producing the best sward structure. The site has been managed under a relatively light grazing regime in recent years. The present management is considered to be generally acceptable for recovery of modified stands in the long term, and site management will be reviewed periodically. Stocking rates should be guided by the values listed in the Lowland Grassland Handbook.<br><br>Some grazing earlier in the year and mowing to remove the ranker vegetation should help to encourage grazing in those areas of ranker grassland, control scrub development and reduce the build-up of any litter. Grazing levels need monitoring and management agreements adjusted if required. Monitoring structural elements (bare ground, litter) will identify any problems with the intensity of grazing management. Any excessive grazing pressure would be expected to increase the frequency and cover of bare ground and agricultural species. These are all covered by attributes in the feature objectives.<br><br>Stocking levels are dependant on the growth of vegetation, which may vary from year to year, but the agreed management policy allows for this. Cessation of cattle farming could affect the vegetation, as sheep are more selective grazers. |
| Control of nutrient inputs | There has been concern about fertilizer run-off from some adjacent improved fields causing localised nutrient enrichment. Any effects from agricultural run-off from adjacent fields will be identified through monitoring the quality of the vegetation under the feature objectives, looking for increases in the cover of perennial ryegrass and white clover and other indicator plants and reductions in the frequency of sedges and other plants of value. Management agreements on adjacent land will partly address this problem. |
| Scrub encroachment | Scrub developing within the areas of marshy grassland will on the whole be controlled, although the presence of a few scattered scrub and trees will benefit invertebrates and birds. The marshy grassland areas could be increased beyond the current extent by cutting back the scrub edges and is something that needs to be kept under review, should opportunities arise.<br><br>The established stands of alder and willow woodland should not be viewed unfavourably as they lend structure to the site and also provides habitat for invertebrates and birds, with the ground vegetation also containing plant species of note (e.g. meadow saxifrage) and the trees themselves supporting good moss and liverwort communities and uncommon lichens. In addition, some stands afford a refuge for colonies of globeflower. However, woodland and scrub should not encroach further into the unimproved grassland, in particular the communities of highest conservation value (alkaline fen, fen-meadow and neutral grassland). |
| Drainage | The networks of ditches throughout the SSSI have obviously affected the hydrology and vegetation. These ditches should be allowed to infill naturally (as some have already). Where possible, active restoration of the hydrology should be considered, although this may be difficult in some areas as there would be conflict with the monitoring associated with the quarrying activities. Should dewatering of Penderyn quarry affect the hydrology of the SSSI and/or if the recent run of very dry summers in which watercourses have dried-up continue, then floristic changes are likely to occur. |

**Table 8.3: Summary of Issues Contributing to Unfavourable Status of Feature and Management Required**

With respect to the non-SAC marshy grassland, which mainly comprises rush and purple moor-grass dominated vegetation and tall-herb fen, management of the SAC features should ensure that the non-SAC marshy grassland is kept in favourable condition. There may be a need from time to time to cut rushes where they have thickened up.

### 6.3.2 SAC Feature: Alkaline Fen

In 2007, the conservation status of this feature was considered to be **unfavourable**. Assessment carried out in 2004 indicated that the condition of this feature was **unfavourable, recovering**. This was predominantly due to modification of the habitat as a result of drainage, unsuitable grazing practices, and inappropriate tree planting.

Management requirements were provided for the following issues, for which further information is provided in Table 6.4:

- Grazing;
- Scrub encroachment;
- Drainage; and,
- Atmospheric deposition.

| Issue contributing to Unfavourable Status of Feature | Explanation and Management Required |
|---|---|
| Grazing | These areas will be subject to the same grazing regime as the marshy grassland (see Table 8.3 above) because they occur together in the same management units. Therefore it is considered inappropriate to specify specific grazing regimes for this habitat. Structural attributes will help to ensure that this habitat is grazed appropriately, so long as this is compatible with achieving the required condition for the marshy grassland. As the alkaline fen is some of the wettest habitat at the site, damage by overgrazing, e.g. excessive poaching, is likely to be readily observed. |
| Scrub encroachment | Scrub can be monitored by a simple inspection of the site; in most cases the limits should not be exceeded before those limits for other attributes. This and compliance with the management agreement can be determined while monitoring other attributes. See Table 8.3 above. |
| Drainage | See Table 8.3 above. |
| Atmospheric deposition | N deposition emanates from point and diffuse sources. Reductions in N emissions from the latter require ongoing policy reform and advice at national (Wales and UK) levels. Point source impacts need to be evaluated and minimised through RoC and the planning system. Dust deposition from the quarry should be minimised by standard good working practice. Dust deposition should be monitored by the quarry, and appropriate thresholds sought from the literature. Comparison of the two may reveal the need for modifications to working practice. |

**Table 8.4: Summary of Issues Contributing to Unfavourable Status of Feature and Management Required**

### 8.3.2 Current Threats to SAC

The Natura 2000 – Standard Data Form (2015c) states that the main threats to this SAC are:

High-rank threats:

- Air pollution, air-borne pollutants – both inside and outside of the SAC;

Medium-rank threats:

- Fertilisation - both inside and outside of the SAC;
- Grazing – inside of the SAC;
- Human induced changes in hydraulic conditions – both inside and outside of the SAC;
- Problematic native species – both inside and outside of the SAC;

Low-rank threats:

- Biocenotic evolution, succession – both inside and outside of the SAC.

## 8.4 Potential Effects on Cwm Cadlan SAC

This section of the report provides an assessment of the potential effects of the proposed development on the Cwn Cadlan SAC. The section has been structured to provide consideration of each of the likely pathways for impacts and the site's vulnerabilities as identified in Sections 8.2 and 8.3. Some of the identified 'risks' are identified from the 2008 Core Management Plan for the site (CCW, 2008c), and some are from the 2015 Natura 2000 Standard Data Form. Where there are overlaps between the 'risks' outlined in the two documents, these have been discussed together.

**DIRECT EFFECTS**

### 8.4.1 Fertilization / Grazing / Forest Plantation Management and Use

These risks are considered in the 2015 Natura 2000 Standard Data Form to be a high-rank risk to the SAC, from impacts both inside and outside of the SAC boundary.

The proposed development will have no impact on grazing or forest plantation management, therefore no likely significant effects are predicted on the SAC from this pathway, either alone or in-combination with other plans or projects.

### 8.4.2 Scrub Encroachment / Interspecific Floral Relations / Problematic Native Species

Cwm Cadlan SAC is located 2.48 km north of the proposed development site. Given the nature of the proposed development, and the distance between the proposed development site and the SAC it can be concluded that the proposed development will have no impact on scrub encroachment, interspecific floral relations or problematic native species and therefore no likely significant effects on the SAC from this pathway are predicted, either alone or in-combination with other projects or plans.

**INDIRECT EFFECTS**

### 8.4.3 Atmospheric Deposition / Air Pollution, Airborne Pollutants

This risk is considered in the 2015 Natura 2000 Standard Data Form to be a high-rank risk to the SAC, from impacts both inside and outside of the SAC boundary.

This section of the report provides modelling data associated with air quality changes as a result of the Enviroparks scheme, both alone and in-combination with other projects, on Cwm Cadlan SAC. The methodologies applied to the modelling works are as outlined in Section 6.4.3 and as such are not repeated here.

For Cwm Cadlan SAC, the modelling is based on the closest point of the SAC to the development site, located at grid reference 294970, 209125. This location is within SAC Management Unit 2 which contains both 'Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (H6410)' and 'Alkaline fens (H7230)' as key habitats (Core Management Plan, 2008c).

#### 8.4.3.1 Nutrient Nitrogen

Table 8.5 provides a summary of the modelled deposition rates using IED emissions limits for nutrient nitrogen at Cwm Cadlan SAC taking the Enviroparks scheme only into account, and also when considering the effects in-combination with the other schemes identified in Chapter 4. This data is considered to represent a worst case scenario, likely to be only experienced when the gasifiers are emitting at the limits of their permits. The data in Table 8.6 shows the results of modelling using the Laxen and Marner (2005) assessment method.

For Cwm Cadlan SAC, a lowest critical load of 15 was used as this is the lowest critical load identified by APIS (see http://www.apis.ac.uk/srcl/select-a-feature?site=UK0013585&SiteType=SAC&submit=Next t) which would be relevant to some of the habitats found within the SAC, and particularly those within Management Unit 2, closest to the Enviroparks development site. The higher critical load for this site used in the calculations was 25.

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 19.6 | 19.6 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.128 | 0.203 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 19.728 | 19.803 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.9% | 1.4% |
| Long-term PC < 1 % of lower Critical Load? | No | Yes (rounded down data) |
| Long-term PEC as % of lower Critical Load | **131.5%** | **132.0%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical Load (kg N/ha/yr) | 25 | 25 |
| Do background levels exceed the higher Critical Load? | No | No |
| Do PEC levels exceed the higher Critical Load? | No | No |
| Long-term PC as % of higher Critical Load | 0.5% | 0.8% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 78.9% | 79.2% |
| Long-term PEC < 70 % of higher Critical Load? | No | No |

**Table 8.5: Modelled Nutrient Nitrogen Deposition Using IED Limits Emissions Data at Cwm Cadlan SAC**

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 19.6 | 19.6 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.103 | 0.178 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 19.703 | 19.778 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the lower critical load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower critical load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.7% | 1.2% |
| Long-term PC < 1 % of lower Critical Load? | Yes | Yes (rounded down data) |
| Long-term PEC as % of lower Critical Load | 131.35% | 131.85% |
| Long-term PEC < 70 % of lower Critical Load? | No | No |
| **Higher Critical Load:** | | |
| Higher Critical Load (kg N/ha/yr) | 25 | 25 |
| Do background levels exceed the higher critical load? | No | No |
| Do PEC levels exceed the higher critical load? | No | No |
| Long-term PC as % of higher Critical Load | 0.5% | 0.8% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 78.9% | 79.2% |
| Long-term PEC < 70 % of higher Critical Load? | No | No |

**Table 8.6: Modelled Nutrient Nitrogen Deposition Using IED Limits Emissions Data at Cwm Cadlan SAC and Laxen and Marner (2005) Assessment Method**

Table 8.7 presents the data using the Laxen and Marner (2005) methodology and based on long-term realistic emissions data.

In response to the consultation response from NRW and further consultation with them during the planning process, additional modelling works were completed in August 2017 (see Envisage, 2017c). The data presented in Table 8.8 provides the modelled results taking into account the application of additional technologies, using IED emissions data, and a conversion of 70% NOx to $NO_2$. Table 8.8 also provides the updated background concentrations from APIS which were accessed in August 2017.

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 19.6 | 19.6 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.096 | 0.172 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 19.696 | 19.772 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the lower critical load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower critical load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.6% | 1.15% (rounded down data) |
| Long-term PC < 1 % of lower Critical Load? | Yes | Yes |
| Long-term PEC as % of lower Critical Load | 131.3% | 131.8% |
| Long-term PEC < 70 % of lower Critical Load? | No | No |
| **Higher Critical Load:** | | |
| Higher Critical Load (kg N/ha/yr) | 25 | 25 |
| Do background levels exceed the higher critical load? | No | No |
| Do PEC levels exceed the higher critical load? | No | No |
| Long-term PC as % of higher Critical Load | 0.4% | 0.7% |
| Long-term PC < 1 % of higher Critical Load? | Yes | - |
| Long-term PEC as % of higher Critical Load | 78.8% | 79.1% |
| Long-term PEC < 70 % of higher Critical Load? | No | No |

**Table 8.7: Modelled Nutrient Nitrogen Deposition Using Long-Term Realistic Emissions Data at Cwm Cadlan SAC and Laxen and Marner (2005) Assessment Method**

| Nutrient Nitrogen (N) | Enviroparks Only | In-Combination |
|---|---|---|
| Current Minimum Background (kg N/ha/yr) | 21.42 | 21.42 |
| Process Contribution (PC) Rate of Total Deposition as N (kg N/ha/yr) | 0.006 | 0.059 |
| Predicted Environmental Concentration (PEC) (kg N/ha/yr) | 21.426 | 21.479 |
| **Lower Critical Load:** | | |
| Lower Critical Load (kg N/ha/yr) | 15 | 15 |
| Do background levels exceed the lower critical load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower critical load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.04% | 0.4% |
| Long-term PC < 1 % of lower Critical Load? | Yes | Yes |
| Long-term PEC as % of lower Critical Load | 142.8% | 143.2% |
| Long-term PEC < 70 % of lower Critical Load? | No | No |
| **Higher Critical Load:** | | |
| Higher Critical Load (kg N/ha/yr) | 25 | 25 |
| Do background levels exceed the higher critical load? | No | No |
| Do PEC levels exceed the higher critical load? | No | No |
| Long-term PC as % of higher Critical Load | 0.024% | 0.24% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 85.7% | 85.7% |
| Long-term PEC < 70 % of higher Critical Load? | No | No |

**Table 8.8: Modelled Nutrient Nitrogen Deposition Using Additional Technologies and IED Limits Emissions Data at Cwm Cadlan SAC and 70% Conversion of NOx and $NO_2$**

Tables 8.5 to 8.8 show that the background concentrations of nutrient nitrogen within Cwm Cadlan SAC (19.6 kg N/ha/yr during the original assessments, updated to 21.42 kg N/ha/yr in the August 2017 modelling work) are already above the lower critical load (15 kg N/ha/yr) for the SAC habitats, although they do not exceed the higher critical load.

Alone, the proposed Enviroparks development will not result in a process contribution which is greater than 1% of the lower or the higher critical load, using either the worst case IED levels emissions data (Table 8.5), the Laxen and Marner (2005) model approach (Table 8.6), the long-term realistic emissions data model shown in Table 8.6, or the modelled data assuming the implementation of additional technologies, IED limits emissions data and 70% conversion of NOx to $NO_2$. As such any potential effects of nutrient deposition from the scheme alone can be screened out.

Tables 8.5 to 8.7 identify that the 'in-combination' process contributions, when based on the worst case scenario would be 1.2% of the lower critical load. However when the long-term realistic emissions data is modelled, the 'in-combination' process contributions would be 1.15%. When the emissions are modelled at IED limits, with the additional technology included, and a 70% conversion of NOx to NO2, the in-combination

effects are 0.4% of the critical load (see Table 8.8). As discussed in Section 6.3.4, the 1% screening threshold does not apply to consideration of the combined effects of a number of different projects, however, if the same screening criteria were used, then based on the additional technology option, the impacts of the scheme in-combination with other projects and plans would be considered insignificant.

Tables 8.5 to 8.8 show that even with the development in place and in-combination with other projects, the higher critical load for this site will not be exceeded. Capon et al (2016) state that the integrity of sites may be threatened at higher loads of long-term nitrogen deposition beyond the critical load range by graminoid domination and structural change. The proposed development will not result in levels of nitrogen deposition at Cwm Cadlan SAC which are above the higher critical load for the habitats and as such, it is not considered that the scheme would result in an adverse effect on the integrity of the SAC as a result of nitrogen deposition.

Based on the considerations above, it can be concluded that the Enviroparks scheme would not result in any adverse effects on Cwm Cadlan SAC as a result N deposition, either alone or in-combination with other projects.

8.4.3.2 Acid Deposition

Table 8.9 provides a summary of the modelled deposition rates for acid deposition using IED emissions limits at Cwm Cadlan SAC taking the Enviroparks scheme only into account, and also when considering the effects in-combination with the other schemes identified in Chapter 4. Table 8.10 presents the data using the Laxen and Marner (2005) assessment method.

The lower critical load has been determined using data from APIS for Cwm Cadlan SAC. The lower critical load used for acid deposition is comprised of the lowest critical load provided for N plus the lowest critical load provided for S. The higher critical load for acid deposition is calculated as the highest critical load provided for N plus the highest critical load provided for S.

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 1.86 | 1.86 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0279 | 0.0352 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 1.89 | 1.90 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 0.803 | 0.803 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **3.5%** | **4.4%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **235%** | **236%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 8.763 | 8.763 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.3% | 0.4% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 22% | 22% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 8.9: Modelled Acid Deposition Using IED Limits Emissions Data at Cwm Cadlan SAC**

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 1.86 | 1.86 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0262 | 0.0334 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 1.89 | 1.89 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 0.803 | 0.803 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **3.3%** | **4.2%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **235%** | **236%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 8.763 | 8.763 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.3% | 0.4% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 22% | 22% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 8.10: Modelled Acid Deposition Using IED Limits Emissions Data at Cwm Cadlan SAC and Laxen and Marner (2005) Assessment Method**

Table 8.11 presents the long-term realistic emissions data, applying the Laxen and Marner (2005) assessment method. The data presented in Table 8.12 provides the modelled results taking into account the application of additional technologies, using IED emissions data, and a conversion of 70% NOx to $NO_2$. Updated background concentration data from APIS is also utilised.

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 1.86 | 1.86 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0152 | 0.0225 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 1.88 | 1.88 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 0.803 | 0.803 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | **1.9%** | **2.8%** |
| Long-term PC < 1 % of lower Critical Load? | **No** | **No** |
| Long-term PEC as % of lower Critical Load | **234%** | **234%** |
| Long-term PEC < 70 % of lower Critical Load? | **No** | **No** |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 8.763 | 8.763 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.2% | 0.3% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 21% | 21% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 8.11: Modelled Acid Deposition Using Long-Term Realistic Emissions Data at Cwm Cadlan SAC and Laxen and Marner (2005) Assessment Method**

| Acid Deposition | Enviroparks Only | In-Combination |
|---|---|---|
| Background levels (keq/ha/yr) | 1.96 | 1.96 |
| Process Contribution (PC) Acid (keq/ha/yr) | 0.0006 | 0.0062 |
| Predicted Environmental Contribution (PEC) Acid (keq/ha/yr) | 1.9606 | 1.9662 |
| **Lower Critical Load:** | | |
| Lower Critical load (keq) | 0.803 | 0.803 |
| Do background levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the lower Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of lower Critical Load | 0.07% | 0.77% |
| Long-term PC < 1 % of lower Critical Load? | Yes | Yes |
| Long-term PEC as % of lower Critical Load | 244.2% | 244.9% |
| Long-term PEC < 70 % of lower Critical Load? | No | No |
| **Higher Critical Load:** | | |
| Higher Critical load (keq) | 8.763 | 8.763 |
| Do background levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Do PEC levels exceed the higher Critical Load? | **Yes** | **Yes** |
| Long-term PC as % of higher Critical Load | 0.007% | 0.07% |
| Long-term PC < 1 % of higher Critical Load? | Yes | Yes |
| Long-term PEC as % of higher Critical Load | 22.4% | 22.4% |
| Long-term PEC < 70 % of higher Critical Load? | Yes | Yes |

**Table 8.12: Modelled Acid Deposition Using Additional Technologies and IED Emissions Limits Data at Cwm Cadlan SAC and 70% Conversion of NOx to $NO_2$**

Tables 8.9 to 8.12 show that the lower critical load for acid deposition at Cwm Cadlan SAC is already exceeded due to background levels, although the higher critical level is not exceeded. Based on the worst-case scenario (Table 8.8), the process contribution as a percentage of the lower critical load would be 3.5%, although the long-term realistic emissions data model would conclude that this was more likely to be in the region of 1.9%. When applying the new technologies, using IED emissions limit data and a 70% conversion of NOx to NO2, Table 8.12 shows that the scheme alone would have a process contribution of just 0.07% of the critical load. Based on the IAQM (2016) screening thresholds, if the additional mitigating technologies were applied, then the effects of the proposed development alone could be screened as insignificant. ~~both of these figures (if 1.9% was rounded up to the nearest whole figure it would be 2%), would suggest that the effects could not be screened as insignificant.~~

APIS identifies that the alkaline fens with the SAC are not sensitive to acid deposition. However, for the Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) habitat exceedance impacts could result in leaching which will cause a decrease in soil base saturation, increasing the availability of Al3+ ions. The mobilisation of Al3+ may cause toxicity to plants and mycorrhiza and may have direct effect on lower plants (bryophytes and lichens). The mapped data from NRW regarding habitat distribution at the site (see Appendix 3) shows that both of these habitat types are present within the part of the SAC closest to the Enviroparks development site.

The 2009 sHRA report (RT-MME-104641) stated that with respect to acid deposition at this site:

> *"the result of the predicted acid deposition at Cwm Cadlan SAC…clearly shows that the percentage of the critical load with respect to acid deposition at Cwm Cadlan SAC is below 1% and can therefore be considered to be insignificant."*

With respect to in-combination impacts, the data in Tables 8.9 to 8.11 show that if a screening level of 1% was used for in-combination effects, the impacts of the scheme could not be ruled out. However, as identified in Table 8.12, with the application of additional mitigating technology and a 70% conversation of NOx to NO2, the in-combination effects would be below the screening level identified by IAQM (2016) for projects alone. As such, under this scenario, it is considered that the in-combination effects would be insignificant.

~~It is clear from the data presented in this section of the report however, that the changes to the proposed development, and using updated guidance from APIS in relation to critical loads, the potential effect of the proposed development from acid deposition at Cwm Cadlan SAC, both alone and in-combination with other projects, cannot be screened out completely.~~

The Environmental Statement Addendum (Savills, 2017) data for Cwm Cadlan SAC was modelled from a central point within the SAC at grid reference 296100, 209800, c.3.7km north north-east of the Enviroparks

development. This data showed acid deposition from the Enviroparks scheme as a percentage of the lower critical load was 3.5% based on IED limits emissions data, increasing to 4.4% when considered in-combination. The Cwm Cadlan SAC is 84.2 ha in size, and based on the data provided, the acid deposition may be experienced across much of the SAC. However, as has been shown in Table 8.12, it is possible to provide additional technologies within the scheme to ensure that any effects of acid deposition at Cwm Cadlan SAC can be screened as insignificant, both alone and in-combination with other projects and plans.

~~Given the relatively low exceedances above the 1% screening threshold of the lower critical load for acid deposition presented in Tables 8.8 to 8.10, both with the Enviroparks scheme in isolation and in-combination with other projects, further consideration will need to be given to the potential effects of the scheme on the integrity of the habitats within the whole SAC. It is considered likely that acid deposition would only potentially affect the on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) within the site as alkaline habitats are not sensitive to this pollution.~~

~~This is discussed further in Section 9.4.~~

8.4.3.3 Ammonia

Table 8.13 provides details of the modelled ammonia levels at Cwm Cadlan SAC using IED emissions limits data as a result of the Enviroparks development proposals. In-combination data is not provided as there are not any additional local impacts from the other schemes outlined in Chapter 4.

For Cwm Cadlan SAC, a critical level of 1 was used based on data provided by APIS for this SAC site.

| **Ammonia ($NH_3$)** | **Enviroparks Only** |
|---|---|
| Background Concentration (µg NH3/$m^3$ annual mean) | 0.64 |
| Annual Average Process Contribution (PC) NH3 (ug/$m^3$) | 0.0150 |
| Predicted Environmental Concentration (PEC) (µg NH3/$m^3$ annual mean) | 0.6550 |
| Long-Term Environmental Quality Standard<br>Critical Level (µg NH3/$m^3$ annual mean) | 1 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 1.5% |
| Long-term PC < 1 % of Critical Level? | No |
| Long-term PEC % of Critical Level | 65.50% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 8.13: Modelled Ammonia Using IED Limits Emissions Data at Cwm Cadlan SAC**

Table 8.13 shows that with the Enviroparks scheme in place, the critical level for ammonia at Cwm Cadlan SAC will not be exceeded and as such there will not be any adverse effects on the habitats as a result of ammonia pollution. Table 8.13 also shows that whilst the long-term process contribution cannot be considered insignificant as it is above 1% of the long-term critical level, the PEC for the Enviroparks development as a percentage of the critical level will be 65.50% and thus any effects can therefore be screened out.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including ammonia) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effect on Cwm Cadlan SAC as a result of ammonia pollution from the proposed development. No additional in-combination effects are predicted as the other projects outlined in Chapter 4 will not result in an additional local impacts.

8.4.3.4 Oxides of Nitrogen

Table 8.14 provides details of the modelled annual mean nitrogen oxide levels at Cwm Cadlan SAC as a result of the Enviroparks development proposals and in-combination with the other schemes outlined in Chapter 4. Table 8.15 presents the short-term 24-hour mean data based on the same parameters.

The critical levels for NOx are detailed by APIS for Cwm Cadlan SAC as:

- Annual mean - 30 µg/m$^3$ over a calendar year; and,
- 24 hour mean - 75 µg/m$^3$.

| Oxides of Nitrogen (NOx) | Enviroparks Only | In-Combination |
|---|---|---|
| Background Concentration (ug/m$^3$) | 8.4435 | 8.4435 |
| Annual Average Oxides of Nitrogen Process Contribution (PC) (ug/m$^3$) | 0.3456 | 0.8713 |
| Predicted Environmental Concentration (PEC) (ug/m$^3$ annual mean) | 8.789 | 9.315 |
| Long Term Environmental Quality Standard (EQS) Critical Level (µg NOx/m$^3$ annual mean) | 30 | 30 |
| Do background levels exceed the Critical Level? | No | No |
| Do PEC levels exceed the Critical Level? | No | No |
| Long-term PC as % of Critical Level | 1.2% | 2.9% |
| Long-term PC < 1 % of Critical Level? | See below | - |
| Long-Term PEC as % of EQS | 29.30% | 31.05% |
| Long-term PEC < 70 % of CL? | Yes | Yes |

**Table 8.14: Modelled Annual Mean Oxides of Nitrogen Using IED Limits Emissions Data at Cwm Cadlan SAC**

| Oxides of Nitrogen (NOx) | Enviroparks Only | In-Combination |
|---|---|---|
| Background Concentration (ug/m$^3$) | 8.4435 | 8.4435 |
| 24-Hour Average Oxides of Nitrogen Process Contribution (PC) (ug/m$^3$) | 0.3291 | 0.8227 |
| Short Term Environmental Quality Standard (EQS) Critical Level (µg NOx/m$^3$ 24-hour mean) | 75 | 75 |
| Do background levels exceed the Critical Level? | No | No |
| Do PEC levels exceed the Critical Level? | No | No |
| Short-term PC as % of EQS | 0.44% | 1.10% |
| Short-term PC < 10 %? | Yes | Yes |

**Table 8.15: Modelled 24-Hour Mean Oxides of Nitrogen Using IED Limits Emissions Data at Cwm Cadlan SAC**

Table 8.14 shows that under the worst-case scenario (ie with the in-combination effects considered), there will not be an exceedance of the long-term critical level at Cwm Cadlan SAC as a result of the development and as such the levels would remain below a point at which there could be any effects on the SAC habitats.

Table 8.14 shows that the Enviroparks development on its own will result in a long-term process contribution very slightly greater than 1%, although as discussed in Section 6.4.3, the levels are only very slightly over 1% and as such would be rounded down to 1% and therefore considered insignificant. Table 8.14 also illustrates that, with the Enviroparks development in place the long-term PEC NOx levels will be significantly less than 70% of the critical level, both alone and in-combination with other projects.

Table 8.15 shows that when considering short-term NOx, the critical level would not be exceeded with the Enviroparks scheme in place, either alone or in-combination with other projects. The process contribution is less than 10% of the short-term critical level, both alone and in-combination with other projects, and as such the short-term effects can be screened as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including oxides of nitrogen) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effect on the integrity of Cwm Cadlan SAC from the Enviroparks scheme, either alone or in-combination, as a result of oxides of nitrogen.

8.4.3.5 Sulphur Dioxide

Table 8.16 provides details of the modelled sulphur dioxide levels at Cwm Cadlan SAC as a result of the Enviroparks development proposals, and in-combination with the other schemes outlined in Chapter 4.

The critical level for sulphur dioxide at Cwm Cadlan SAC used in the assessment was 10 µg $SO_2$/m$^3$ annual mean.

| Sulphur Dioxide ($SO_2$) | Enviroparks Only | In-Combination |
|---|---|---|
| Background Concentration (ug/$m^3$) | 2.48 | 2.48 |
| Annual Average Process Contribution (PC) $SO_2$ (ug/$m^3$) | 0.0793 | 0.095 |
| Predicted Environmental Concentration (µg $SO_2$/$m^3$ annual mean) | 2.5593 | 2.575 |
| Long Term Environmental Quality Standard (EQS) Critical Level (µg $SO_2$/$m^3$ annual mean) | 10 | 10 |
| Do background levels exceed the Critical Level? | No | No |
| Do PEC levels exceed the Critical Level? | No | No |
| Long-Term PC as % of Critical Level | 0.8% | 0.95% |
| Long-term PC < 1 %? | Yes | Yes |
| Long-term PEC as % of Critical Level | 25.6% | 25.8% |
| Long-term PEC < 70 %? | Yes | Yes |

**Table 8.16: Modelled Sulphur Dioxide Using IED Emissions Levels Data at Cwm Cadlan SAC**

As detailed in Table 8.16, the long-term PEC will be below the critical level for sulphur dioxide with the Enviroparks scheme in place, and when the scheme is considered in-combination with the other projects outlined in Chapter 4. As such, the proposed development is not considered to have an adverse effect on Cwm Cadlan SAC as a result of sulphur dioxide pollution.

Table 8.16 also shows that the long-term process contribution as a percentage of the critical level is below 1%, and the long-term predicted environmental concentrations will be less than 70% of the critical level and as such the effects are also considered insignificant using this additional screening criteria.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including sulphur dioxide) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

Thus it can be concluded that the proposed development, either alone or in-combination with other projects, will not result in any adverse effects on Cwm Cadlan SAC via this pathway.

8.4.3.6 Metals

The GOV.UK guidance on 'Air Emissions Risk Assessment for your Environmental Permit' highlights a requirement to calculate the process contribution for substance deposition and consider the impact they have when absorbed by soil and leaves (known as deposition).

For the Environmental Statement Addendum works (Savills, 2017), deposition of metals was modelled as part of the air quality assessment. The model has provided the output shown in Table 8.17 for cadmium and thallium and Table 8.18 for heavy metals. There are no in-combination affects from the projects outlined in Chapter 4.

| Cadmium and Thallium | Enviroparks Only |
|---|---|
| Background Concentration (ug/$m^3$) | 0.155 |
| Annual Average Cd (ug/$m^3$) | 0.0921 |
| Predicted Environmental Concentration (µg Cd/$m^3$ annual mean) | 0.2471 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 5 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-Term PC as % of Critical level | 1.8% |
| PC < 1 % of EQS? | No |
| Long-Term Predicted Environmental Concentration % of EQS | 4.94% |
| PEC < 70 % of EQS? | Yes |

**Table 8.17: Modelled Cadmium and Thallium Using IED Emissions Levels Data at Cwm Cadlan SAC**

| Heavy Metals | Enviroparks Only |
|---|---|
| Background Concentration (ug/m$^3$) | 0.00643 |
| Annual Average Heavy Metals Process Contribution (PC) (ug/m$^3$) | 0.000855 |
| Predicted Environmental Concentration (PEC) (µg Heavy Metals/m$^3$ annual mean) | 0.007285 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 0.25 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 0.34% |
| Long-term PC < 1 % of Critical Level? | Yes |
| Long-term PEC as % of Critical Level | 2.9% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 8.18: Modelled Heavy Metals Using IED Emissions Levels Data at Cwm Cadlan SAC**

Tables 8.16 and 8.17 show that under the worst case scenario, there will not be an exceedance of the long-term critical levels for metals at Cwm Cadlan SAC as a result of the development and as such the levels would remain below a point at which there could be any effects on the SAC habitats.

Table 8.17 shows that although the first screening criteria of having a PC less than 1% of the environmental quality standard is not achieved for cadmium and thallium, it is possible to also conclude that the effects from cadmium and thallium would be insignificant due to the fact that the PEC is less than 70% of the critical level.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including metals) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Cwm Cadlan SAC as a result of deposition from cadmium and thallium or heavy metals.

8.4.3.7 Volatile Organic Compounds (VOC)

For the Environmental Statement Addendum works (Savills, 2017), volatile organic compounds (VOCs) as benzene were modelled as part of the air quality assessment. The model has provided the outputs shown in Table 8.19 for Cwm Cadlan SAC. There are no in-combination affects from the projects outlined in Chapter 4.

| Volatile Organic Compounds (VOC as benzene) | Enviroparks Only |
|---|---|
| Background Concentration VOC (ug/m$^3$) | 0.17828 |
| Annual Average Process Contribution (PC) VOC (ug/m$^3$) | 0.0172 |
| Predicted Environmental Concentration (PEC) (µg VOC/m$^3$ annual mean) | 0.19548 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 5 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of Critical Level | 0.3% |
| Long-term PC < 1 % of Critical Level? | Yes |
| Long-term PEC as % of Critical Level | 3.9% |
| Long-term PEC < 70 % of Critical Level? | Yes |

**Table 8.19: Modelled Volatile Organic Compounds Using IED Emissions Levels Data at Cwm Cadlan SAC**

Table 8.19 shows that the critical levels for VOCc as benzene would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4. As such, the scheme will not result in an adverse impact on Cwm Cadlan SAC from these pollutants. Table 8.19 also illustrates that the process contribution is less than 1% of the critical level, and as such it would be possible to screen out any effects as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process

contributions (including VOCs) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Cwm Cadlan SAC as a result of deposition from VOCs as benzene.

8.4.3.8 Polycyclic Aromatic Hydrocarbons (PAH)

Table 8.20 shows the modelled data for Polycyclic Aromatic Hydrocarbons (PAH) at Cwm Cadlan SAC. There are no in-combination affects from the projects outlined in Chapter 4.

| Polycyclic Aromatic Hydrocarbons (PAH) | Enviroparks Only |
|---|---|
| Background Concentration PAH (ug/m$^3$) | 0.188 |
| Annual Average Process Contribution (PC) PAH (ug/m$^3$) | 0.0017 |
| Predicted Environmental Concentration (PEC) (µg PAH/m$^3$ annual mean) | 0.1897 |
| Long Term Environmental Quality Standard (EQS) Critical Level | 1 |
| Do background levels exceed the Critical Level? | No |
| Do PEC levels exceed the Critical Level? | No |
| Long-term PC as % of EQS | 0.2% |
| Long-term PC < 1 % of EQS? | Yes |
| Long-term PEC as % of EQS | 19.0% |
| Long-term PEC < 70 % of EQS? | Yes |

**Table 8.20: Modelled Polycyclic Aromatic Hydrocarbons Using IED Emissions Levels Data at Cwm Cadlan SAC**

Table 8.20 shows that the critical levels for PAH would not be exceeded with the proposed development in place, either alone or in-combination with the other projects detailed in Chapter 4 (no contributions from other projects are predicted for PAH). As such, the scheme will not result in an adverse impact on Cwm Cadlan SAC from these pollutants. Table 8.20 also illustrates that the process contribution is less than 1% of the critical level, and as such it would be possible to screen out any effects as insignificant.

Envisage (Owen, 2017, *Pers. Comm.)* have confirmed that a comparison has been made between the Critical Levels assessment undertaken against the earlier modelled emissions, and the data now presented in the August 2017 Air Dispersion Modelling Assessment (Envisage, 2017c). All of the predicted process contributions (including PAH) reduce with the revised modelling work, and hence the previous screening assessment outlined above is considered to continue to provide a robust worst-case scenario as the process contributions can be screened out as insignificant.

It can therefore be concluded that there would be no adverse effects on Cwm Cadlan SAC as a result of deposition from PAH.

8.4.3.9 Traffic Considerations

Additional effects on traffic during construction and operation of the proposed development are considered in Section 6.4.3.10 for Blaen Cynon SAC. This section of the report shows that the impacts on traffic generated during construction and operation of the site on the air quality data presented above is insignificant and therefore need not be considered further.

No additional effects on Cwm Cadlan SAC as a result of air pollution are therefore predicted from traffic generated by the development, during construction or operation, either alone or in-combination with other projects and plans.

### 8.4.4 Human Induced Changes in Hydraulic Conditions

The 2009 sHRA assessment (Report RT-MME-104641) concluded that

> *"Given the location of Cwm Cadlan SAC 2.48 km north-east of the proposed Enviroparks development site and the fact that the two sites are not hydrologically linked by surface water or groundwater it is not anticipated that these will be any significant effect on the integrity of Cwm Cadlan SAC as a result of hydrological changes brought about by the proposed development."*

The current proposals do not result in any changes which would also this assessment, and as such it can be concluded that there no likely significant effects on the SAC from this pathway, either alone or in-combination with other plans or projects.

# 9. MITIGATION MEASURES

## 9.1 INTRODUCTION

This chapter sets out the proposed mitigation measures to ensure that any identified potential effects from the Enviroparks scheme, either alone or in-combination with the other projects outlined in Chapter 4, can be controlled.

## 9.2 BLAEN CYNON SAC

Chapter 6 has identified that the proposed Enviroparks development has the potential to impact on Blaen Cynon SAC via the following pathways:

- Indirect impacts on the SAC as a result of dust deposition during construction and operation of the Enviroparks site; and,
- Indirect impacts on the SAC as a result of increased nutrient nitrogen and acid deposition resulting in potential increased successional changes within the habitats the SAC which support marsh fritillary.

### 9.2.1 Dust Management Plan

In order to ensure that there are no effects on the SAC from dust generated by the Enviroparks scheme, Natural Resources Wales has identified that the following planning condition be imposed to ensure that suitable mitigation measures are put in place to control this potential impact:

Planning Condition - A condition can be imposed on any permission granted that a Dust Management Plan (covering both the construction and operational phases) be submitted and agreed with the LPA's prior to any development commencing.

With this planning condition in place, and the subsequent controls outlined in the Dust Management Plan implemented, it can be concluded that there would not be any residual adverse effects on Blaen Cynon SAC from dust generation.

### 9.2.2 Additional Technologies

The additional modelling work completed in August 2017 has shown that with the implementation of additional technologies, emissions from the Enviroparks scheme can be controlled to levels at which impacts are considered to be 'insignificant' when the process contributions are considered alone. As such, in order to screen out any adverse effects on Blaen Cynon SAC from process contributions, it will be important to implement the identified technologies (or any others which ensure that process contributions can be screened as insignificant), as part of the development. As it has now been shown that technologies are available which will reduce the emissions to an insignificant level, the competent authority can be confident that a technological solution is available, and that details of the technologies can be approved at Permitting Stage, which is assessed by Natural Resources Wales.

Planning Condition - A condition can be imposed on any permission granted that emissions from the scheme would be controlled via the Natural Resources Wales Permitting Process, and that a permit will not be granted unless it can be shown that the process contributions from the scheme would be at levels considered to be insignificant using the screening criteria available at the time of the Permit application.

### 9.2.3 Section 106 Agreement for Conservation Management

As set out in Section 6.4.3.1, in-combination effects from the proposed Enviroparks development and other projects and plans cannot be screened out in relation to nitrogen deposition and acid deposition at Blaen Cynon SAC, based on the same IAQM (2016) and Environment Agency screening criteria as applied to the scheme alone (there are no published screening criteria for in-combination effects) and NRW have confirmed (Baynon, 2017, *Pers. Comm.*) that they "*do not have a standard approach to considering high background levels or the issue of in combination effects*".

As the main contributing factor to the levels of nutrient nitrogen and acid deposition are the elevated background levels of nitrogen and acid within the local area, consideration has been given to ensuring that the proposed Enviroparks development does not result in a further reduction of the quality of the habitats associated with the SAC qualifying criteria, the marsh fritillary butterfly, and the mechanisms which might be available to achieve this.

As part of the assessment works for the 2008 planning application, an agreement was made with the local planning authorities, Countryside Council for Wales (now Natural Resources Wales, NRW) and Butterfly Conservation to provide funding for a Biodiversity Scheme which focussed on identifying opportunities for expanding the areas of habitat available to marsh fritillary butterfly within a 5km radius of the Enviroparks development site. Enviroparks (Wales) Limited duly made a financial contribution of £205,031 to conservation group Butterfly Conservation for the management of local grassland habitats. This budget has not been expended and, having regard to the distinction between environmental compensation and mitigation explained below, it is proposed that the uses of this fund could be redefined to serve the requirements of the current development proposal and this HRA.

The Biodiversity Scheme was designed as part of a mitigation, compensation and enhancement package associated with the development and was designed to provide an expansion to the areas of optimal habitat available for use by marsh fritillary butterflies within the project area. The scheme was set up to include three phases of work:

- Scheme Development Phase (Years 1-5): This phase would include liaison with local landowners within a 5km radius of the Enviroparks site, identifying opportunities for land to include within the Biodiversity Scheme, and producing a costed Habitat Management Plan for the study area detailing proposed habitat management works.
- Implementation Phase (Years 6-10): This phase would include implementation of the Habitat Management Plan with 3-year land management agreements to provide enhanced marsh fritillary habitat with local landowners
- Monitoring Phase (Years 11-15): This phase would assess the impact of the works using standard monitoring protocols for marshy grassland and key features. The monitoring works would provide data for feedback to landowners and opportunities for implementing additional works.

The requirements of the Biodiversity Scheme were set out in the Section 106 agreement associated with the 2010 Enviroparks planning permission. Schedules 11 and 12 from the Section 106 agreement are included in Appendix 4.

Sections 6.4.4.1 and 6.4.4.2 have identified that the proposed development~~, alone and~~ in-combination with other projects, could result in increased nitrogen and acid deposition at Blaen Cynon SAC, at a level at which its effects cannot be screened as insignificant (although it is reiterated that there are no published screening criteria for in-combination effects, and the main contributing factor is the already elevated background levels). Whilst the deposition is not considered to directly affect the marsh fritillary butterfly, it could affect the habitats on which this species relies and specifically the larval food plant of the butterfly, Devil's-bit scabious *Succisa pratensis*. It is clear from the research works that have been completed that the effects of nitrogen increases on Devil's-bit scabious *Succisa pratensis* are only marginally understood, however, studies have shown that in general, nitrogen deposition can result in an increase in nitrophilous species within a habitat, thus resulting in habitat change through loss of species that favour nutrient-poor conditions. With respect to acid deposition, a similar effect can be experienced (as acid deposition is largely comprised of nitrogen deposition) within those habitats that cannot buffer the acid through their base-status. It is understood from consultation with NRW that there is currently no monitoring data from Blaen Cynon SAC available which would identify whether the elevated background levels were actually having an adverse effect on the habitats and the marsh fritillary populations.

With respect to Natura 2000 sites and the mitigation proposed for Natura 2000 sites, recent case law has clarified the position with respect to the provision of mitigation measures to control potential impacts on Natura 2000 sites under the Habitats Regulations, in order to conclude that a scheme would have 'no likely significant effect' on a Natura 2000 site. As the only potential impacts are from in-combination effects and background concentrations are the main contributing factor to levels of nitrogen and acid deposition above the critical level, consideration should be given to the opportunities presented by the Enviroparks scheme to provide improvement of the habitat available for the marsh fritillary butterfly.

In 2014 the European Court of Justice heard a case entitled 'Briels vs Minister van Infrastructuur en Milieu' which focussed on the difference between providing 'mitigation' and 'compensation' associated with the proposed re-creation of *Molinia* meadows along the route of a proposed road scheme as part of the mitigation package. Of note, the *Molinia* meadows are a non-priority habitat, which are potentially re-creatable and the impact of the scheme was one of damage rather than loss.

The Summary – Judgement of the Court document associated with the case (CURIA, 2014) states the following:

*"The application of the precautionary principle in the context of the implementation of Article 6(3) of Directive 92/43 requires the competent national authority to assess the implications of the project for the Natura 2000 site concerned in view of the site's conservation objectives and taking into account the protective measures forming part of that project aimed at avoiding or reducing any direct adverse effects for the site, in order to ensure that it does not adversely affect the integrity of the site. However, protective measures provided for in a project which are aimed at compensating for the negative effects of the project on a Natura 2000 site cannot be taken into account in the assessment of the implications of the project provided for in Article 6(3).*

*This is the case of measures which, in a situation where the competent national authority has in fact found that a project is liable to have — potentially permanent — adverse effects on the protected habitat type on the Natura 2000 site concerned, provide for the future creation of an area of equal or greater size of that habitat type in another part of the site which will not be directly affected by the project.*

*Such measures are not aimed either at avoiding or reducing the significant adverse effects for that habitat type caused by the project; rather, they tend to compensate after the fact for those effects. They do not guarantee that the project will not adversely affect the integrity of the site within the meaning of Article 6(3) of Directive 92/43.*

*Furthermore, as a rule, any positive effects of a future creation of a new habitat which is aimed at compensating for the loss of area and quality of that same habitat type on a protected site, even where the new area will be bigger and of higher quality, are highly difficult to forecast with any degree of certainty and, in any event, will be visible only several years into the future. Consequently, they cannot be taken into account at the procedural stage provided for in Article 6(3) of Directive 92/43."*

The Chartered Institute of Ecology and Environmental Managers (CIEEM, 2016) define 'mitigation' and 'compensation' as follows:

**Mitigation:** Measures taken to avoid or reduce negative impacts. Measures may include: locating the development and its working areas and access routes away from areas of high ecological interest, or timing works to avoid sensitive periods.

**Compensation:** Measures taken to make up for the loss of, or permanent damage to, biological resources through the provision of replacement areas. Any replacement area should be similar to or, with appropriate management, have the ability to reproduce the ecological functions and conditions of those biological resources that have been lost or damaged.

In a recent case 'Wealden District Council v Secretary of State for Communities and Local Government and Knight Developments Limited (2016)', Mrs Justice Lang overturned a Planning Inspectors decision to grant planning permission for 103 homes. The scheme had shown that nitrogen deposition from traffic emissions could result in an adverse effect on the Ashdown Forest SAC.

A useful summary of the case is provided by Landmark Chambers (see http://www.landmarkchambers.co.uk/news.aspx?id=3830) which states that:

*"when concluding that the proposals would have no significant effect on the Ashdown Forest Special Area of Conservation ("SAC") pursuant to Regulation 61 of the Habitats Regulations, the Inspector had found that contributions towards a Strategic Access and Management and Monitoring Strategy ("SAMMS") would mitigate likely significant effects on the SAC arising from nitrogen deposition. The Council contended that this involved an error of fact, because SAMMS related to the mitigation of recreational impacts and not nitrogen deposition; and that the Inspector had failed in any event to have regard to evidence that proposed contributions to heathland management could not effectively mitigate any such effect.*

The Approved Judgement document produce by Mrs Justice Lang DBE states that:

*"As I have set out in my summary of the law…he could only properly exclude the risk of significant effects, in reliance upon mitigating proposals, if he was sure, on the basis of objective information, that there would be no significant harmful effects. A precautionary approach ought to have been adopted,"*

*"Here the Inspector mistakenly believed that heathland management to reduce nitrogen deposition was part of the SAMMS, and had been agreed with the Conservators. In fact there was no agreed heathland management scheme in existence, which was a highly relevant consideration which he failed to consider."*

Based on the recent case law set out above, it is clear that whilst an agreement for a Biodiversity Scheme was reached in 2010 as part of the previously issued planning application, and the measures which were agreed were designed to expand and enhance the availability of marsh fritillary habitat (the SAC qualifying feature), the Biodiversity Scheme would ~~actually~~ be considered as 'compensation' rather than 'mitigation', when considering the potential effects on Blaen Cynon SAC. ~~and therefore would not allow a conclusion of no 'Likely Significant Effect' on Blaen Cynon SAC to the reached~~.

However, as it has been shown that with the implementation of additional technologies, the process contributions from the Enviroparks scheme can be reduced to a level considered to be 'insignificant' and the in-combination effects are predominantly as a result of elevated background nitrogen and acid deposition levels, it is clear that implementation of the Biodiversity Scheme, whilst not dealing directly with the pathway of the elevated background nitrogen and acid deposition, would provide additional habitat for marsh fritillary, the SAC qualifying species, which is dependent on a meta-population conservation approach.

Consideration has also been given to the opportunities for the Enviroparks scheme to provide more 'direct' mitigation measures through additional management of the habitats within the SAC which are likely to experience elevated in-combination nitrogen and acid deposition due to the combination of the scheme with high background levels. NRW (Beynon, 2017, *Pers. Comm*.) provided the following information regarding the current management regime at Blaen Cynon SAC:

*"The Blaen Cynon SAC is managed by low intensity grazing with heavy livestock (cattle and horses). Summer grazing is preferred with animals mostly kept off the site in winter to prevent heavy poaching of the ground when conditions are very wet underfoot. The majority of the site (over three quarters of the land area) is in private ownership; the management of which is agreed through discussion between Natural Resources Wales (NRW) and the owner/occupier of the land in question.*

*There are formal Management Agreements in place between NRW and some of the landowners where NRW contribute financially to positive management of the habitats for which Blaen Cynon SAC and the two underpinning SSSI (Cors Bryn y Gaer and Woodland Park and Pontpren) are designated. The local conservation officer maintains a positive working relationship with all of the landowners / occupiers.*

*Some of the land is part of the Glastir Agri-Environment scheme and is subject to management in line with the relevant prescriptions stipulated under the Glastir Agreement in addition to the management requirements for the statutory protected sites. The Glastir scheme is run by Welsh Government.*

*NRW own and manage 2 fields amounting to a little under seven hectares and just over five and a half hectares of the site is owned by Rhondda Cynon Taff County Borough Council."*

If the pathway for in-combination effects on the habitats at Blaen Cynon SAC is increased nutrient levels leading to a reduction in the quantity of Devil's-bit scabious *Succisa pratensis*, the larval foodplant of the marshy fritillary butterfly, then a management regime which acts to remove nutrients from the habitats could be considered an available mitigation option for Blaen Cynon SAC.

Walker et al (2004a) carried out a review of techniques available for nutrient depletion when carrying out arable reversion from former arable land to species-rich grassland habitats and identified possible depletion techniques including:

- Grazing;
- Arable cropping;
- Hay and silage cropping;
- Use of chemicals and other materials;
- Inversion by ploughing; and,
- Topsoil removal.

With respect to grazing, which NRW identify is the current management technique used at the site, Walker et al (2004a) concluded that when using grazing as a stand-alone method for nutrient removal, very low levels of nutrient depletion from improved grassland swards were recorded and cutting and removal of a hay-crop with aftermath grazing (and sometimes also spring grazing) was generally more successful than either cutting or grazing alone. Hay-cutting and grazing together was shown to accelerate reductions in residual soil fertility as well as optimising conditions for the colonisation and establishment of target species.

Eades and Bruce (2003) cite a study by Wheeler, Money and Shaw (2002) which concluded that grazing is less effective than cropping for removing nutrients from an established fen system, and may even result in an increase in nutrient concentrations through dunging and disturbance. It is recognised that the habitats at Blaen Cynon SAC are not classified as fen habitats, but they are wetland and grassland habitats and as such may have some of the same properties.

Options for hay cropping at Blaen Cynon SAC could be considered as a management tool for reducing nutrient levels within the habitats. Marrs (1993) stated that hay cropping without fertilizers can reduce fertility of some soils very rapidly. Eades and Bruce (2003) identify that the variable nature of fen sites means that the effects may not always be as predicted, however, the removal of vegetation from a site can help to reduce the nutrient status in fen sites. Eades and Bruce (2003) concluded that cropping is one of the best techniques in regulating nutrient concentrations in existing fens, although it can be costly and the effects are generally slow to manifest themselves.

Walker et al (2004a) reviewed studies which had researched the nutrient depletion rates associated with the removal of hay from a site. They state that on formerly improved grassland swards, the reduction of soil nutrients through the removal of hay was likely to take many years. They cite Bakker (1987) who estimated that 1% of total phosphorous and exchangeable potassium and 2.5% of total nitrogen in the nutrient pool were removed annually by this method. The removal of two hay-crops per year was concluded to remove more nutrients compared with a single crop regime (Walker et al, 2004a).

The use of arable cropping, chemical controls, inversion by ploughing and topsoil removal as techniques to reduce the nutrient levels within Blaen Cynon SAC are not considered to be appropriate due to the potential adverse effects that these management works would have on the established habitats and the marsh fritillary butterfly.

Given the fact that there does not appear to any available monitoring data from Blaen Cynon SAC to confirm the actual measures effects of levels background of nitrogen and acid deposition at Blaen Cynon SAC which are above the lower critical load, it is clear that opportunities may exist to revise the Biodiversity Scheme to include additional management works involving implementation of the hay cut regime, to deal directly with the effects on elevated nitrogen and acid deposition at the site.

It is proposed that the Section 106 agreement for the scheme will be revised through a Deed of Variation and as such the following principles will need to be adopted as part of a revised Biodiversity Scheme ~~in order for the local authorities to conclude that there would be no 'Likely Significant Effect' on Blaen Cynon SAC~~:

- A programme of management works over and above those already agreed, and involving hay-cut techniques, within the SAC will need to be designed which specifically addresses the in-combination ~~adverse~~ effects from nitrogen and acid deposition at the site;
- The management works must be relied upon and deliverable, and as such the landowners of each SAC unit in which management works are required ~~which was potentially affected by increased nutrient nitrogen and acid deposition~~ would need to enter a legal agreement to allow the management works to take place;
- Management works as mitigation would likely need to be implemented prior to the effects from in-combination increased nitrogen and acid deposition being experienced within the SAC; and,
- The management works would need to take place in perpetuity unless it was shown that the nitrogen and acid deposition levels at the SAC has been reduced to a level at which they were considered to be insignificant. It is proposed that this management requirement would extend throughout the life of the Enviroparks scheme, and potentially beyond if it was shown that the in-combination effects on the habitats remained.

If the Section 106 agreement is varied to take the above into account and provide details of proposed management regime ~~to illustrate that it will directly mitigate for the effects of the nitrogen deposition~~, then it

should be possible to conclude that the scheme will be have 'No Likely Significant Effect' on Blaen Cynon SAC, ~~either alone or~~ in-combination with the other projects outlined in Chapter 4.

### 9.3 COEDYDD NEDD A MELLTE SAC

The modelling data shows that based on the implementation of additional technologies, use of the IED limits emissions data, and conversion of 70% NOx to $NO_2$, ~~long-term realistic emissions data,~~ at the closest point of the SAC to the Enviroparks development, the process contributions from the scheme can be considered insignificant, both alone and in-combination with other projects and plans outlined in Chapter 4.

As such, it will be important to implement the identified technologies (or any others which ensure that process contributions can be screened as insignificant), as part of the development. As it has now been shown that technologies are available which will reduce the emissions to an insignificant level, the competent authority can be confident that a technological solution is available, and that details of the technologies can be approved at Permitting Stage, which is assessed by Natural Resources Wales.

Planning Condition - A condition can be imposed on any permission granted that emissions from the scheme would be controlled via the Natural Resources Wales Permitting Process, and that a permit will not be granted unless it can be shown that the process contributions from the scheme would be at levels considered to be insignificant using the screening criteria available at the time of the Permit application.

~~However, there will be some increases in nutrient nitrogen deposition at parts of Coedydd Nedd a Mellte SAC as a result of the Enviroparks scheme when considered in-combination with other projects, which result in a higher level of deposition. As there is no screening criteria associated with in-combination effects, further consideration should be given to assessing the potential small increases in nitrogen deposition at part of the SAC site on the integrity of the whole SAC.~~

~~In order to ensure that the data from the long-term realistic emissions data can be relied upon once the scheme is operational, the following monitoring is proposed:~~

~~As a waste to energy producer, the Enviroparks (Wales) Limited installation will require an Environmental Permit to regulate its operations. This Permit will include emission limit values and monitoring and reporting requirements specified in line with the Industrial Emissions Directive detailed above. As such, the monitoring requirements of the process are:~~
~~(a) continuous measurements of the following substances: $NO_x$, CO, total dust, TOC, HCl, HF, $SO_2$;~~
~~(b) continuous measurements of the following process operation parameters: temperature near the inner wall or at another representative point of the combustion chamber as authorised by the competent authority, concentration of oxygen, pressure, temperature and water vapour content of the waste gas;~~
~~(c) at least two measurements per year of heavy metals and dioxins and furans; one measurement at least every 3 months shall, however, be carried out for the first 12 months of operation.~~

~~Hence with continuous monitoring requirements for Oxides of Nitrogen, Hydrogen Chloride and Sulphur Dioxide, all of which have been assumed to have a long-term release rate which is lower than the maximum emission limit value otherwise specified, it will be possible for Enviroparks (Wales) Limited to assess and report their long-term emissions as required to Natural Resources Wales, in order for the actual long-term contributions to nutrient Nitrogen and acid deposition to be confirmed once the site is fully operational. The continuous emissions monitoring system to be employed (the SICK MCS100FT) is a Fourier Transformer Infra-Red multi-component gas analyser which can analyse several additional species to those required by the Industrial Emissions Directive, including Ammonia. Hence, it will also be possible for levels of Ammonia to be monitored and recorded as required, and thus all of the contributory elements to the levels of nutrient Nitrogen and acid deposition can be assessed and confirmed.~~

~~By implementing this monitoring programme, NRW will have the opportunity to review actual data from the site. Should the long-term realistic levels which are predicted by regularly exceeded then, NRW will have the opportunity to require further mitigation at Coedydd Nedd a Mellte SAC associated with nutrient nitrogen deposition as a result of the development in isolation.~~

~~Using the long-term realistic emissions data, potential effects from acid deposition cannot be screened out, either alone or in-combination with other projects. The potential effects on the integrity of the SAC should be considered based on further mapping work to identify the extent of the SAC which may be subject to levels which cannot be screened as insignificant.~~

~~The 2009 sHRA Report (RT-MME-104641) concluded that the levels of deposition at Coedydd Nedd a Mellte SAC were insignificant and as such, the 2017 modelling data represents a change to the conclusions from the previous study.~~

~~Liaison with Natural Resources Wales should be carried out with respect to the likely significant adverse effects of nitrogen deposition on the integrity of Coedydd Nedd a Mellte SAC in-combination with other projects, and the predicted levels of acid deposition at the site. Discussions with NRW should focus on identifying mitigation options associated with the predicted deposition on this SAC.~~

### 9.4 CWM CADLAN SAC

The modelling data shows that based on the implementation of additional technologies, use of the IED limits emissions data, and conversion of 70% NOx to $NO_2$, any effects can ~~t here would some increases in acid deposition, which cannot~~ be screened as insignificant, across Cwm Cadlan SAC as a result of the Enviroparks scheme, both alone and in-combination with other projects.

However, it will be imperative to implement the identified technologies (or any others which ensure that process contributions can be screened as insignificant), as part of the development. As it has now been shown that technologies are available which will reduce the emissions to an insignificant level, the competent authority can be confident that a technological solution is available, and that details of the technologies can be approved at Permitting Stage, which is assessed by Natural Resources Wales.

Planning Condition - A condition can be imposed on any permission granted that emissions from the scheme would be controlled via the Natural Resources Wales Permitting Process, and that a permit will not be granted unless it can be shown that the process contributions from the scheme would be at levels considered to be insignificant using the screening criteria available at the time of the Permit application.

~~The 2009 sHRA Report (RT-MME-104641) concluded that the levels of acid deposition at Cwm Cadlan SAC were insignificant and as such, the 2017 modelling data represents a change to the conclusions from the previous study.~~

~~Liaison with Natural Resources Wales should be carried out with respect to identifying mitigation options associated with the deposition on this SAC.~~

# 10. CONCLUSIONS

In accordance with best practice guidance, a screening exercise has been undertaken to assess whether the proposed development is likely to result in Likely Significant Effects to the integrity of the Natura 2000 sites within proximity to the proposed development, comprising Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC.

The proposed Enviroparks scheme was granted planning permission in 2010, and a number of changes have been made to the scheme subsequently. A new planning application is required due to the proposed changes to the scheme, and updated assessment work has been completed to support this. This shadow Habitats Regulation Assessment: Stage 1 Screening report has been produced to consider the potential effects that the changes to the scheme will have in relation to Natura 2000 sites which are within 10km of the proposed development. This RevA version of the report provides an updated assessment further to consultation with Natural Resources Wales, further work by the project team regarding technologies available, and additional air quality modelling work.

The 2009 shadow Habitats Regulations Assessment report (RT-MME-104641) which was produced concluded that with the mitigation proposed at the time in place, the Enviroparks scheme would have no Likely Significant Effect on any of the Natura 2000 sites. A Biodiversity Scheme was agreed with Countryside Council for Wales and Rhondda Cynon Taf County Borough Council (RCT) and Brecon Beacons National Park Authority (BBNPA), and secured through a Section 106 agreement as part of a mitigation, compensation and enhancement package. It is understood that whilst Enviroparks have provided the agreed financial contribution associated with the Biodiversity Scheme, no works have been carried out on the Biodiversity Scheme by Butterfly Conservation.

The conservation objectives for each of the Natura 2000 sites considered in this report are associated with preserving the favourable conservation status of qualifying habitats and species. In 2008, CCW published Core Management Plans for all of the sites considered in this report, which describe known areas of vulnerability for these sites. These areas of vulnerability are all factors which could reduce the ability of the sites to meet their conservation objectives, therefore this assessment is focused on the ability of the proposed development to contribute to known areas of vulnerability. Since the original sHRA report was completed in 2009, new Natura 2000 – Standard Data Forms have been issued (in 2015) which also identify 'threats' to the specific Natura 2000 site. The assessment of the potential impacts of the development proposal have therefore been considered in accordance with these new data.

The Screening Report includes consideration of the in-combination effects of a number of committed projects within the local area, which have the potential to also have air quality impacts.

With respect to Blaen Cynon SAC, the assessment has shown that there are potentially effects from dust pollution of the SAC (given its proximity to the Enviroparks site) during construction. However, these potential effects can be controlled through development and implementation of a Dust Management Plan.

Air quality modelling has shown that, assuming that additional mitigating technologies are implemented as part of the plant's design, the effects of the scheme when considered alone would be considered insignificant for the air quality / air pollutants modelled which include nitrogen deposition, acid deposition, ammonia, nitrogen oxides, sulphur dioxide, metal, VOc, and PAH. When the scheme is considered in-combination with other projects and plans, levels ~~would not could result in deposition~~ at the closest point within Blaen Cynon SAC of nutrient nitrogen and acid deposition, would be at a ~~which are at a~~ level which cannot be considered insignificant (if the same screening criteria for process contributions were applied to the in-combination effects as no screening criteria is currently available for assessing in-combination effects). Increased nitrogen deposition is known to result in habitat changes within grassland habitats, where the increased nutrient levels can favour more nitrophilious species which can result in a loss of species-diversity. In accordance with the Habitats Regulations, it is important to recognise that the qualifying features of Blaen Cynon SAC are marsh fritillary *Euphydryas aurinia* as the site is considered to be one of the best areas for this butterfly in the United Kingdom. Therefore, any effects from changes in air pollution are considered indirect effects as they may impact plant species on which the marsh fritillary in its larval stage inhabit, but there are not considered to be any direct effects on the butterfly individuals. An effect would be considered to affect the favourable conservation status of marsh fritillary butterfly if increased nitrogen and acid deposition resulted in a reduction in the population of the larval food plant for the species (Devil's-bit scabious *Succisa pratensis*), or a significant change in the habitats such that they would no longer provide habitat suitable to support the butterfly species. The main contributing factor for the elevated levels of

nitrogen and acid deposition at the site are actually from background levels which are already above the lower critical loads identified by APIS for Blaen Cynon SAC. It is understood that no monitoring data is currently available to support a theory that increased background nitrogen and acid deposition at the site is having an adverse effect on the site's habitats and the marsh fritillary butterfly that the site is designated for.

The levels of nitrogen deposition and acid deposition at Blaen Cynon SAC which were presented in the 2009 sHRA are not directly comparable to the data presented in this report. This is due to the fact that the data in this report is from a grid reference closest to the Enviroparks development (as requested by Natural Resources Wales), rather than a central grid reference within the SAC (which was used in the 2009 assessment). The critical loads and critical levels have also been updated since 2009 by APIS and as such the current data is based on current guidance. However, that aside, it is clear from the data that the levels of predicted nitrogen deposition for the current scheme are showing a lower deposition rate than in the 2009 assessment. The acid deposition levels are relatively similar for the 2009 and the current modelled data. For the 2008 application, a Biodiversity Scheme was agreed with Countryside Council for Wales, RCT and BBNPA, and secured through a Section 106 agreement. This scheme was designed to provide compensatory marshy grassland habitat for marsh fritillary use within a 5km radius of the Enviroparks scheme as mitigation, compensation and enhancement for loss of habitat from the proposed development site and also any adverse effects on marsh fritillary populations within Blaen Cynon. Recent case law, published since 2009, has clarified the difference between 'compensation' and 'mitigation' with respect to the Habitats Directive and concluded that a conclusion of No Likely Significant Effect can only be reached where 'mitigation' is provided within an SAC which directly deals with the identified pathway to ensure that there is no adverse effect on the integrity of the SAC. It is therefore concluded that the Biodiversity Scheme which was agreed under the 2010 planning permission would not be considered to provide appropriate 'mitigation' associated with in-combination ~~the identified~~ effects from nitrogen and acid deposition. A review of the current management regime at Blaen Cynon SAC has been completed and consideration has been given to the management options available which would potentially reduce soil nutrients. The SAC site is currently managed through a range of different management agreements with Natural Resources Wales and is managed with low intensity grazing by heavy livestock. Published data suggests that grazing does not result in reductions in the nutrient status of a site, and may increase nutrient inputs through dunging and disturbance. However, hay cropping can be used to reduce nutrient nitrogen levels (although it is recognised that this is likely to be a slow process). In the absence of current guidelines from NRW on how to deal with schemes where there are already elevated background levels of pollutants and in-combination effects cannot be screened out using the screening criteria designed to assess the impact of schemes 'alone', the benefits of the already established Biodiversity Scheme to the conservation of the marsh fritillary butterfly (which should be conserved using a metapopulation approach) should be taken into account.

Guidelines have therefore been provided with respect to altering the Biodiversity Scheme, already agreed and contributed to, although not yet implemented, to ensure that it can be considered to provide improvements to the conservation of the mars fritillary butterfly, SAC qualifying species. ~~suitable mitigation for the scheme both alone and in-combination with other projects.~~

For Coedydd Nedd a Mellte SAC, it has been concluded that all of the ~~the majority of~~ potential effects on this SAC can be screened out assuming that the additional technologies are implemented as part of the project. It is recommended that this requirement be secured via a planning condition. ~~The levels of nutrient nitrogen deposition from the Enviroparks scheme alone can be screened out based on the long-term realistic emissions data modelling, although it is recognised that there will be some in-combination effects which it may not be possible to screen out. The modelling shows that acid deposition cannot currently be screened out, either alone or in-combination with other projects, and given the site's designation for ancient woodland habitats, there may be an adverse effect within parts of the SAC as a result of the Enviroparks scheme, mostly when considering the in-combination effect with other projects. Chapter 9 identifies that further detailed mapping should be carried out to determine the extent to which the SAC might be affected by levels of nitrogen and acid deposition, as it is clear from the data currently available that nutrient nitrogen deposition levels can be screened out across parts of the SAC site. Further consideration is therefore required to determine whether the effects are considered to significantly impact the integrity of the whole of this large SAC site. Consultation with Natural Resources Wales is suggested to agree data interpretation and, if necessary, identify possible mitigation options associated with adverse effects.~~

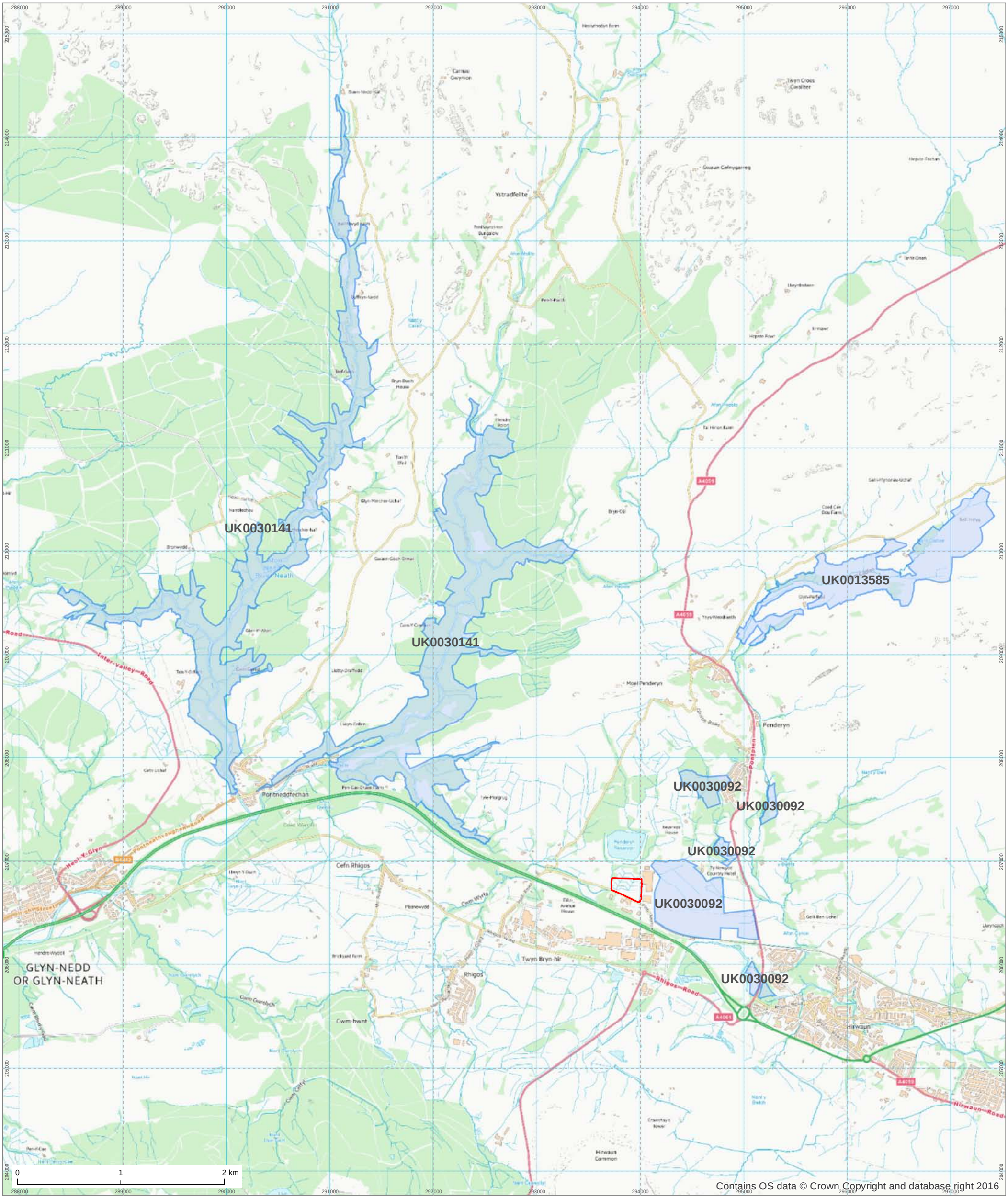
For Cwm Cadlan SAC, it has been concluded that all of the ~~majority of~~ potential effects on this SAC can be screened out assuming that the additional technologies are implemented as part of the project. It is recommended that this requirement be secured via a planning condition. ~~However, the levels of acid deposition cannot be screened out, and given the site's designation for grassland and fen habitats, there~~

~~may be an adverse effect within acid-sensitive habitats within the SAC as a result of the Enviroparks scheme, both alone and in-combination effect with other projects. Chapter 9 identifies that consultation with Natural Resources Wales is suggested with respect to identifying possible mitigation options associated with this effect.~~

Consideration has also been given in this Screening Report to the potential in-combination effects from the proposed development when considered with local energy generation projects and the Local Development Plans for Rhondda Cynon Taff County Borough Council and Brecon Beacons National Park Authority which could have an impact on the three SACs discussed in this report.

# 11. DRAWINGS

Middlemarch Environmental Ltd Drawing C124755-01 – Location of Natura 2000 Sites in Relation to Application Site




**Legend**

- Site boundary
- SAC Site

Key to site names:

UK 0030092 - Blaen Cynon SAC
UK 0030141 - Coedydd Nedd a Nellte SAC
UK 0013585 - Cwm Cadlan SAC

| | |
|---|---|
| Project | Hirwaun Enviroparks |
| Drawing | Special Areas of Conservation |
| Client | Envisage |
| Drawing Number | C124755-01 |
| Revision | 00 |
| Scale @ A3 | 1:35,000 |
| Date | April 2017 |
| Approved By | KR |
| Drawn By | SKS |

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C124755-01

## REFERENCES AND BIBLIOGRAPHY

Air Pollution Information System (Accessed: 2017). 'Site Relevant Critical Loads – Blaen Cynon SAC webpage' http://www.apis.ac.uk/srcl/select-a-feature?site=UK0030092&SiteType=SAC&submit=Next

Air Pollution Information System (Accessed: 2017). 'Site Relevant Critical Loads – Coedydd Nedd a Mellte SAC webpage' http://www.apis.ac.uk/srcl/select-a-feature?site=UK0030141&SiteType=SAC&submit=Next

Air Pollution Information System (Accessed: 2017). 'Site Relevant Critical Loads – Cwm Cadlan SAC webpage' http://www.apis.ac.uk/srcl/select-a-feature?site=UK0013585&SiteType=SAC&submit=Next

Ascough, L. H. (2005). 'The Effects of Acid Deposition on Species Composition at Askham Bog Nature Reserve'. Undergraduate Bioscience Research Report, Biolog-e, University of Leeds.

Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D. & Yeo, M. (2004). *An Illustrated Guide To British Upland Vegetation.* Joint Nature Conservation Committee, Peterborough.

Barter, G. (2009). *Pers. Comm.* Team Leader – Vale and Valleys, Countryside Council for Wales, Cardiff.

Baynon, G. (2017). *Pers. Comm.* Team Leader Development Planning, Natural Resources Wales.

Billeter, R., Hooftman, D. A. P. and Diemer, M. (2003). 'Differential and Reversible responses of common fen meadow species to abandonment'. *App. Veg. Sci* **63**. pp3-12.

Bűhler, C. and Schmid, B. (2001). 'The influence of management regime and altitude on the population structure of Succisa pratensis: implications for vegetation monitoring'. *J. Appl. Ecol.* **38**. pp 689–698.

Butterfly Conservation. (2008). 'Marsh Fritillary Factsheet'. Butterfly Conservation, Wareham.

Chapin, F. S. (1980). 'The mineral nutrition of wild plants'. *Annual review of ecology and systematics*, **11**. pp 233–260.

Chapman, C. (2017). 'The 1% threshold – where did it come from, and can it be justified?'. *The Habitats Regulations Assessment Journal*. **Issue 8**: June 2017. Published by DTA Publications. pp. 21-24.

Caporn, S., Field, C., Payne, R., Dise, N., Britton, A., Emmett, B., Jones, L., Phoenix, G. S., Power, S., Sheppard, L. and Stevens, C. (2016). *Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance*. Natural England Commissioned Reports, Number **210**.

CIEEM. (2016). Webpage – Glossary. Accessed: 2016. Available: http://www.cieem.net/glossary.

Countryside Council for Wales (2008a). *Core Management Plan Including Conservation Objectives for Blaen Cynon Special Area of Conservation (SAC).* 28th February 2008.

Countryside Council for Wales (2008b). *Core Management Plan Including Conservation Objectives for Coedydd Nedd a Mellte Special Area of Conservation (SAC)*. 1st March 2008.

Countryside Council for Wales (2008c). *Core Management Plan Including Conservation Objectives for Cwm Cadlan Special Area of Conservation (SAC)*. 1st March 2008.

CURIA (2014). 'Reports of Cases. Case C-521/12. T. C. Briels and Others v Minister van Infrastructuur en Milieu. Summary — Judgment of the Court (Second Chamber), 15 May 2014'.

DMRB. (2007). 'Design Manual for Roads and Bridges - Volume 11 Environment Assessment; Section 3 Environmental Assessment Techniques. Part 1 HA 207/07 Air Quality'. May 2007.

DTA Publications. (2013). 'The Habitat Regulations Assessment Handbook'. DTA Publications, Nottingham.

Eades, P. and Bruce, B. (2003). 'Chapter 6: Fens'. IN: Eades, P., Bardsley, L., Giles, N and Crofts, A. (2003). *The Wetland Restoration Manual*. The Wildlife Trusts, Newark.

Elkington, T., Dayton, N., Jackson, D. L. and Strachan, I. M. (2001). *National Vegetation Classification: Field guide to mires and heaths*. Joint Nature Conservation Committee, Peterborough.

Enfusion. (2009). 'Habitat Regulations Assessment (Appropriate Assessment) Report. Rhondda Cynon Taf County Borough Council. Draft Deposit Local Development Plan.' January 2009, Issue 01.

European Commission. (2000a). 'Final Communication from the Commission on the Precautionary Principle'.

European Commission. (2000b). 'Managing Natura 2000 Sites: The Provision of Article 6 of the 'Habitats' Directive 92/43/EEC'.

Environment Agency. (2014). 'AQTAG06 - Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air.' Status: Updated version, (Approved March 2014).

Envisage. (2017a). 'Addendum to an Atmospheric Dispersion Modelling Assessment of Proposed Emissions from Enviroparks Wales Ltd Hirwaun Industrial Estate Aberdare'.

Envisage. (2017b). 'Atmospheric Dispersion Modelling Assessment of Proposed Emissions from Enviroparks Wales Ltd, Hirwaun Industrial Estate, Aberdare.' Report Issue No: Issue 2, February 2017.

Envisage. (2017c). 'Atmospheric Dispersion Modelling Assessment of Proposed Emissions from Enviroparks Wales Ltd, Hirwaun Industrial Estate, Aberdare.' Report Issue 1, August 2017.

Fowles, A. P. (2009). *Pers. Comm.* Senior Invertebrate Ecologist, Countryside Council for Wales, Bangor, Wales.

Gowing, D. J. G., Tallowin, J. R. B., Dise, N. B. Goodyear, J., Dodd, M. E. and Lodge, R. J. (2002). 'A review of the ecology, hydrology and nutrient dynamics of floodplain meadows in England'. *English Nature Research Report No. 446*. English Nature, Peterborough.

Griffiths, H. (2017). *Pers. Comm.* Development Planning Advisor, Natural Resources Wales, Cardiff.

Hultin, E. and Torssell, K. (1964). 'Alkaloid-screening of Swedish plants'. *Phytochemistry* **4**. pp 425–433.

IAQM. (2016). 'Use of a Criterion for the Determination of an Insignificant Effect of Air Quality Impacts on Sensitive Habitats'. IAQM Position Statement, January 2016. Available: http://www.iaqm.co.uk/text/position_statements/aq_impacts_sensitive_habitats.pdf

IEEM. (2006). 'Guidelines for Ecological Impact in the United Kingdom'. Institute of Ecology and Environmental Management, Winchester.

Laxen, D. and Marner, B. (2005). 'An Assessment of Possible Air Quality Impacts on Vegetation from Processes Set Out in the Bournemouth, Dorset and Poole Waste Local Plan'. A report by Air Quality Consultants Ltd. April 2005.

Limpens, J., Berendse, F. and Klees, H. N. (2003). 'Deposition affects N availability in interstitial water, growth of Sphagnum and invasion of vascular plants in bog vegetation'. *New Phytologist*. **157**. pp 339-347.

Jefferson, R. G. and Pinches, C. E. (no date). 'The conservation of flood-plain meadows in Great Britain: an overview'. In *Fritillary 5*. Accessed: 16-04-09. Available: http://freespace.virgin.net/frances.watkins/fritillary/frit5.htm

JNCCa. (no date). 'Invertebrate Species – Arthropods: 1065 Marsh Fritillary Butterfly *Auphydryas (Eurodryas, Hypodryas) aurina*'. Accessed: 12-04-2017. Available: http://www.jncc.gov.uk/protectedsites/sacselection/species.asp?FeatureIntCode=S1065

JNCCb. (no date). 'Habitat Account – Forests: 9180 *Tilio-Acerion* forests of slopes, screes and ravines'. Accessed: 13-04-2017. Available: http://jncc.defra.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H9180

Jongejans, E., dr Kreen, H. and Berendse, F. (2006). 'The interplay between shifts in biomass allocation and costs of reporduction in four grassland perennials under simulated successional change'. *Oecologia*. **147**. pp369-387.

Konvičkam, M., Hula, V. and Fric, Z. (2003) 'Habitat of prehibernating larvae of the endangered butterfly Euphydryas aurinia (Lepidoptera, Nymphalidae): What can be learned from vegetation composition and architecture?' *Eur. J. Entomol.* **100**. pp 313–322.

Kros, J., Mol-Dijkstra, J. P., Wamelink, G. W. W., Reinds, G. P., van Hinsberg, A. and de Vries, W. (2016). 'Modelling Impacts of Acid Deposition and Groundwater Level on Habitat Quality and Plant Species Diversity'. *Ecological Processes*. **5**:22. Accessed: 18-04-2017. Available: https://ecologicalprocesses.springeropen.com/articles/10.1186/s13717-016-0066-0

Marrs, R. H. (1993). 'Soil fertility and nature conservation in Europe: theoretical considerations and practical management solutions'. *Advances in Ecological Research*. **24**. pp 241-300.

Meredith, C. (2017). *Pers. Comm.* Jacobs / Welsh Government contact for A465 Dualling Project.

Middlemarch Environmental Ltd. (2009). *Proposed Enviroparks Development at Hirwaun, Rhondda Taff, South Wales - Appropriate Assessment Stage 1: Screening*. Report RT-MME-104641. April 2009.

Open University. (no date). 'Effects of Eutrophication: effects on terrestrial vegetation' Available: http://www.open.edu/openlearn/science-maths-technology/science/environmental-science/eutrophication/content-section-2.4. Accessed: 12-04-2017.

Owen, A. (2017). *Pers. Comm.* Environmental Consultant, Environmental Visage Limited, Stroud.

Oxford Brookes University. (2001). 'Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC. European Commission DG Environment.'

Rodwell, J. S., (1992). *British Plant Communities: Volume 3 Grasslands and Montane Communities.* Cambridge University Press, Cambridge.

Saarinen, K., Jantunen, J. and Valtonen, A. (2005). 'Resumed forest grazing restored a population of Euphydryas aurinia (Lepidoptera: Nymphalidae) in SE Finland'. *Eur. J. Entomol.* **102**. pp 683–690.

Savills. (2017). 'Enviroparks Hirwaun – Environmental Statement Addendum'. February 2017.

The Planning Inspectorate. (2014). 'Report on the Implications for European Sites - Proposed Hirwaun Power Station.' An Examining Authority report prepared with the support of the Environmental Services Team, 21 October 2014.

Thimonier, A. et al (1994). 'Simultaneous eutrophication and acidification of a forest in North-East France'. *New phytologist*, **126**. pp 533–539.

TRA. (2013). 'Brecon Beacons National Park Local Development Plan - Final Sustainability Appraisal Report (incorporating Strategic Environmental Assessment)'. Final Project Report CPR1716, prepared for Brecon Beacons National Park Authority, November 2013.

Walker, K. J., Stevens, P. A., Stevens, D. P., Mountford, J. O., Manchester, S. J. and Pywell, R. F. (2004a). 'The restoration and re-creation of species-rich lowland grassland on land formerly managed for intensive agriculture in the UK'. *Biological Conservation*. **119**. pp 1-18.

Wellburn, A. (1988). *Air pollution and acid rain*. Longman, Harlow.

Wheeler, B.D., Money, R. P. and Shaw, S. C. (2002). 'Freshwater Wetlands'. IN: Perrow, M. R. and Davy, A. J. (2002). *Handbook of Ecological Restoration Vol.2: Restoration in Practice*. Cambridge University Press, Cambridge.

WHO. (2000). *Air Quality Guidelines – Second Edition. Chapter 14: effects of airborne nitrogen pollutants on vegetation: critical loads*. World Health Organisation. Regional Office for Europe, Copenhagen, Denmark.

# APPENDICES

Appendix 1: Countryside Council for Wales Drawings - Blaen Cynon SAC ~~Management Units~~

Appendix 2: Countryside Council for Wales Drawings - Coedydd Nedd a Mellte SAC ~~Management Units Master-map~~

Appendix 3: Countryside Council for Wales Drawing - Cwm Cadlan SAC ~~Management Units~~

Appendix 4: 2009 Section 106 Agreement – Part 3, Schedules 11 and 12

Appendix 5: Natural Resources Wales Consultation Letter, 22nd June 2017