PROPOSED ENVIROPARKS DEVELOPMENT
AT HIRWAUN, RHONDDA TAFF, SOUTH WALES

APPROPRIATE ASSESSMENT
STAGE 1: SCREENING

A Report submitted to Envisage

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This report was compiled by
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The contents of this report are the responsibility of Middlemarch Environmental Ltd.
It should be noted, that whilst every effort is made to meet the client's brief,
no site investigation can ensure complete assessment
or prediction of the natural environment

Contract Number C104641

April 2009

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1. INTRODUCTION

1.1 BACKGROUND

On behalf of Rhondda Cynon Taf County Borough Council and Brecon Beacons National Park Authority (the competent authorities), Envisage has instructed Middlemarch Environmental Ltd to carry out a screening of potential impacts associated with the proposed development of an Enviropark off Fifth Avenue, Hirwaun on certain European Protected Sites with a view to determining whether an Appropriate Assessment is needed for the scheme proposals under the Article 6 of European Council Directive 92/43/EEC of 21 May 1992 (the Habitats Directive) on the conservation of natural habitats and of wild fauna and flora.

Middlemarch Environmental Drawing C104641-01 in Appendix 1 shows the location of the proposed scheme.

A European Site is any classified Special Protection Area (SPA) and any Special Area of Conservation (SAC) from the point where the Commission and the Government agree the site as a Site of Community Importance (English Nature, 1997). Appropriate Assessment is required by law for projects and plans which might significantly affect European Sites. As a matter of Government policy, it is also required for potential SPAs, possible SACs (pSACs), candidate SACs (cSACs) and listed RAMSAR sites for the purpose of considering development proposals affecting them (PPS9, 2005).

The following definitions of European sites and their acronyms are taken from the Joint Nature Conservation Committee (JNCC) website (www.jncc.gov.uk/Protectedsites/)

> ***Special Areas of Conservation (SACs)*** *are strictly protected sites designated under the EC Habitats Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds). Of the Annex I habitat types, 78 are believed to occur in the UK. Of the Annex II species, 43 are native to, and normally resident in, the UK.*

On 8 December 2004, the European Commission formally adopted all candidate SACs in the Atlantic Biogeographical Region, which includes the UK, that had been submitted up to that date, as Sites of Community Importance (SCIs). The Habitats Directive gives Member States up to six years to formally designate their SCIs as SACs; within the UK, designation is devolved to the relevant administration in each country.

- *The National Assembly for Wales designated all SCIs in Wales as full SACs on 13 December 2004.*
- *The Scottish Executive designated all SCIs in Scotland as full SACs on 17 March 2005.*
- *Defra designated all SCIs in England (including Scottish and Welsh cross-border sites) as full SACs on 1 April 2005.*
- *Environment and Heritage Service received ministerial approval for the designation of all SCIs in Northern Ireland as full SACs on 16 May 2005.*

All other data apart from the site status remained unchanged from the date when each site had been last submitted to the EC.

***Special Protection Areas (SPAs)** are strictly protected sites classified in accordance with Article 4 of the EC Directive on the conservation of wild birds (79/409/EEC), also known as the Birds Directive, which came into force in April 1979. They are classified for rare and vulnerable birds, listed in Annex I to the Birds Directive, and for regularly occurring migratory species.*

In the UK, the first SPAs were identified and classified in the early to mid 1980s. Classification has since progressed and a regularly updated UK SPA Summary Table provides an overview of both the number of classified SPAs and those approved by Government that are currently in the process of being classified (these are known as potential SPAs, or pSPAs).

***Ramsar sites** are wetlands of international importance designated under the Ramsar Convention. Sites proposed for selection are advised by the UK statutory nature conservation agencies, or the relevant administration in the case of Overseas Territories and Crown Dependencies, co-ordinated through JNCC. In selecting*

> *sites, the relevant authorities are guided by the criteria set out in the Convention. The UK also has a national Ramsar Committee composed of experts who provide further advice.*

The European Sites considered for the present proposals (see Middlemarch Environmental Drawing C104641-01 in Appendix 1) are:

- Blaen Cynon SAC;
- Coedydd Nedd a Mellte SAC; and,
- Cwm Cadlan SAC.

SACs are designated in response to the UK government's obligations under European Council Directive 92/43/EEC of 21 May 1992 (the Habitats Directive) on the conservation of natural habitats and of wild fauna and flora.

SPAs are designated in response to the UK Government's obligations under European Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.

SACs and SPAs are part of the Natura 2000 network set up under Article 3 of the Habitats Directive.

Ramsar sites are designated under the International Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention, an intergovernmental treaty signed at Ramsar, Iran in 1971, as amended by the Protocol of 3.12.1982).

The starting point for this screening is the Habitats Directive itself, of which Articles 6(3) and 6(4) state:

> *"3. Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity*

of the site concerned and, if appropriate, after having obtained the opinion of the general public.

4. If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

Where the site concerned hosts a priority natural habitat type and/or a priority species the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest."

The plan or project does not have to be located within the designated area and the effects may be direct or indirect, temporary or permanent, beneficial or harmful to the site, or a combination of these. The Countryside Council for Wales will advise, on request, as to whether any particular plan or project may be likely to have a significant effect on any of these sites.

The Impacts Assessment Unit of Oxford Brookes University (2001) have made the point that from 'Managing Natura 2000 sites: The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (MN2000)' (Available: http://europa.eu.int/comm/environment/nature/home.htm), and from important cases and developing practice, it has become generally accepted that the assessment requirements of Article 6 establish a stage by stage approach. The stages proposed by the Oxford Brookes Guidance are:

Stage 1: Screening – the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant.

Stage 2: Appropriate Assessment – the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

Stage 3: Assessment of Alternative Solutions – the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site; and

Stage 4: Assessment where Adverse Impacts Remain – an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

The Oxford Brookes (2001) Guidance provides guidance for each stage of the assessment and each stage determines whether a further stage in the process is required. The present document represents Stage 1 in this process, i.e. Screening. The proposed development of the Enviropark at Hirwaun is not directly connected with or necessary to the management of the relevant Natura 2000 sites for nature conservation, therefore the purpose of this Screening is to determine whether the development is likely to have significant effects on any of the sites either alone and/or in combination with other projects or plans. It is emphasised that Middlemarch Environmental Ltd cannot know of all projects or plans proposed for the Hirwaun area, therefore the opinion of the strategic planning departments of Rhondda Cynon Taf County Borough Council and Brecon Beacons National Park Authority will be necessary to the validation of this screening. In addition, the Countryside Council for Wales (CCW) has acknowledged that, in view of its role as a statutory consultee, the country agencies are well placed to form an overview of plans and projects being dealt with by several competent (decision making) authorities and may be able to provide guidance on how best to progress a cooperative approach between competent authorities in determining a case. The opinions of CCW have therefore been sought in completing this screening.

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 (Oxford Brookes, 2001). The European Commission's Final Communication from the

Commission on the Precautionary Principle (CEC, 2000) states that the use of the precautionary principle presupposes:

- Identification of potentially negative effects resulting from a phenomenon, product or procedure; and/or,
- 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 the Oxford Brookes (2001) Guidance, this means that the emphasis for assessment should be on objectively demonstrating, with supporting evidence, at Stage 1: Screening, that there will be no significant effects on a Natura 2000 site.

With regard to the latter point, the European Commission (2000) provides relevant explanatory guidance 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' (PPS9 in 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**.**

Enfusion (2007) prepared the following report: '*Appropriate Assessment of the Rhondda Cynon Taf County Borough Council's Local Development Plan (2006-2021): Preferred Strategy - Screening Report*' for Rhondda Cynon Taf County Borough Council. This report identified four SAC's within 5km of the unitary authority's boundary: Blaen Cynon SAC, Coedydd Nedd y Mellte SAC, Cwm Cadlan SAC and Cardiff Beech Woods SAC. The study concludes that with respect to Coedydd Nedd y Mellte SAC and Cwm Cadlan SAC as they are outside of the Local Development Plan (LDP) boundary no direct effects from habitat loss will need to be considered, in addition Enfusion (2007) state that given the distance of the sites from areas of proposed development the risk from indirect impacts would appear negligible. A small section of Cardiff Beech Woods SAC occurs within the LDP boundary, but again Enfusion (2007) conclude that the potential direct and indirect impacts on the SAC from proposals included in the LDP would appear negligible. Enfusion (2007) go on to state that the potential for impacts at Blaen Cynon SAC represent the greatest level of uncertainty with respect to the LDP and further detail relating to the extent of the proposed developments would be required. A number of specific schemes are identified and discussed further in the report, but these do not include the Enviroparks site. However, potential changes in water table and the potential for indirect effects through changes in air quality (e.g. increases in NO_x levels which could alter the vegetation structure through deposition of nitrogen) are mentioned as factors to consider.

Conservation objectives for the SPAs considered in the study were provided by the Countryside Council for Wales.

This report has been developed in line with the following guidelines provided by CCW: *'Assessing Projects Under the Habitats Directive – Guidance for Competent Authorities'* (Tyldesley and Hoskin, 2008).

2. DESCRIPTION OF PROJECT

2.1 INTRODUCTION

The project is associated with a planning application by Enviroparks (Hirwaun) Ltd (EHL) for a waste recovery and energy production plant at Fifth Avenue on Hirwaun Industrial Estate, near Hirwaun in South Wales. The proposals are not directly connected with or necessary to the management of any Natura 2000 site.

The site location is indicated on Middlemarch Environmental Drawing C104641-01 (Appendix 1). A plan of the proposed scheme is included in Appendix 2.

The proposed development seeks planning permission for the following: development of a sustainable waste resource recovery and energy production park comprising 27,562 m^2 of buildings and structures, including a 10,240 m^2 building for use class B1/B2 use; process buildings; a gatehouse and weighbridge; a visitor centre and administration building; a 20 MW net capacity combined heat and power plant; with a 40 m ventilation stack; external anaerobic digestion; liquid and gas holding tanks; 30,352 m^2 of internal roads and hard standings; vehicular parking; external security lighting; 17,497 m^2 of landscaping; vehicular ingress and egress from Fifth and Ninth Avenues; and associated utilities infrastructure.

The proposed development has been designed to be in line with the following International, European and Welsh plans and policies. Further information is provided in the Planning Policy Statement that accompanies the planning application (Savills, 2008a).

- 1992 United Nations Framework Convention on Climate Change
- 1997 Kyoto Protocol on Climate Change
- Framework Directive on Waste – Council Directive 75/442/EEC as amended by Council Council Directive 91/156/EEC and adapted by Council Directive 96/350/EC.
- Landfill Directive – Council Directive 1999/31/EC
- European Climate Change Programme (ECCP) and the EU Emissions Trading Scheme (EU-ETS)
- Directive 2001/77/EC of the European Parliament and Council, 27th September 2001, on the promotion of electricity from renewable energy sources in the internal electricity market
- The UK Government Sustainable Development Strategy (2005)

- UK Climate Change Programme (2006)
- DTI Energy White Paper: Our energy future – creating a low carbon econoy, February 2003
- Energy Challenge DTI Energy Review, July 2006
- Meeting the energy challenge – Energy White Paper, May 2007
- UK Biomass Strategy 2007
- UK Renewable Energy Strategy (consultation 2008)
- Renewable Energy Route Map for Wales (2008)
- Wise about Waste: The National Waste Strategy for Wales (2002)
- Environment Strategy for Wales (2006)
- Wales Spatial Plan (2008)
- Planning Policy Wales (2002)
- Ministerial Interim Planning Policy Statements:
    - MIPPS 01/2005 – Planning for Renewable Energy
    - MIPPS 01/2008 – Planning for Good Design
- Technical Advice Notes:
    - TAN5 – Nature conservation and planning
    - TAN8 – Renewable energy
    - TAN12 – Design
    - TAN15 – Development and flood risk
    - TAN18 – Transport
    - TAN21 – Waste
- Mid Glamorgan (Rhondda Cynon Taff County Borough) Replacement Structure Plan 1991-2006 (adopted January 1999)
- Rhondda Cynon Taf (Cynon Valley) Local Plan (adopted January 2004)
- Brecon Beacons National Park Authority Local Plan (adopted May 1999)
- Brecon Beacons National Park Authority UDP (approved for development control purposes but not formally adopted)

The north-western section of the site falls within The Brecon Beacons National Park Authority Local Plan (1996-2006), which allocates the site for employment use. The south-eastern section of the site is allocated for employment use under the Rhondda Cynon Taf (Cynon Valley) Local Plan (adopted January 2004).

It is understood that the proposed development is to be built out in two phases:

- **Phase 1** comprising the construction to operations of the principle site activities.
- **Phase 2** comprising the development of the plasma gasifier facility.

The high energy occupier could come into either Phase 1 or Phase 2 depending on their requirements.

A programme for the proposed development has yet to be confirmed by Enviroparks (Hirwaun) Ltd.

2.2 EXISTING SITE AND SETTING

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 site is dominated by an area of flat, made ground, with incorporated drainage channels. It is understood that the area was previously built upon (within the last 100 years). This central area of the site is dominated by marshy grassland, however occasional gorse and planted scattered trees are present towards the edges of this habitat. This area was grazed by horses and thus the ground is subject to a high level of poaching from the horses hooves. 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 runs 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 runs 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).

CCW (Newberry, 2009) confirmed that the Natura 2000 sites for inclusion within this study are those within a 10 km radius of the proposed development site. These are listed in Table 2.3.

Table 2.3: European Sites within 10km of Proposed Enviropark at Hirwaun

European Site	Centred Grid Reference	Distance to Scheme
Blaen Cynon SAC	294600 206600	100 m east
Coedydd Nedd a Mellte SAC	291900 209300	1.8 km west north-west
Cwm Cadlan SAC	296100 209800	2.4 km north-east

Within the 10 km search radius requested by CCW there are a number of areas of national significance as Sites of Special Scientific Interest (SSSIs) (see Table 2.4).

Table 2.4: Summary of SSSI Sites Within 10 km of the Proposed Development Site

Site Name	Centred Grid Reference	Distance from Study Area
Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI	291963 209323	1.5 km north
Cwm Gwrelych and Nant Llynfach Streams SSSI	290552 202121	3.5 km south-west
Craig-y-Llyn SSSI	291766 203223	3.6 km south south-west
Bryn Bwch SSSI	292056 210947	4.2 km north north-west
Caeau Nant-y-Llechau SSSI	290178 210332	4.8 km north-west
Gweunedd Dyffern Nedd SSSI	291466 211553	4.8 km north north-west
Bryncarnau Grasslands Llwyncoed SSSI	299833 206502	5.5 km east
Blaenrhondda Road Cutting SSSI	293072 200784	5.5 km south
Blaen Nedd SSSI	291639 213639	6.1 km north north-west
Ogof Ffynnon Ddu Pant Mawr SSSI	288138 215120	7.0 km north north-west
Caeau Ton-y-Fildre SSSI	286271 210738	7.9 km north-west
Penmoelallt SSSI	301713 209502	8.1 km east north-east
Mynydd Ty-Isaf Rhondda SSSI	292851 196797	8.3 km south
Plas-y-Gors SSSI	292106 215519	8.4 km n. north-west
Daren Fach SSSI	301914 210477	8.5 km north-east
Cwm Glo SSSI	303248 205630	8.8 km east
Waun Ton-y-Spyddaden SSSI	286404 212193	8.8 km north-west
Gorsllwyn Onllwyn SSSI	285408 210752	9.0 km north-west
Cwm Taf Fechan Woodlands SSSI	303945 208684	9.2 km east north-east
Nant Llech	283867 212245	9.7 km north north-west

2.3 THE PROPOSAL

The proposal is illustrated by the PRC Proposed Site Plan (Job No: 8016, Drawing: 003 Rev: G) in Appendix 2. The details of the present proposals are summarised in Table 2.4.

Table 2.4: Details of Present Proposals (continued)

Parameter	Details
Size of scheme	The scheme includes the development of 8.5 ha of land.
Area	The scheme will create the following: • 27,562 m^2 of buildings and structures including a 10,240 m^2 building for use class B1/B2; process buildings; a gatehouse and weighbridge; a visitor centre and administration building; a 20 MW net capacity combined heat and power plant; with a 40 m ventilation stack; external anaerobic digestion; liquid and gas holding tanks. • 30,352 m^2 of internal roads and hard standings; vehicular parking; external security lighting. • 17,497 m^2 of landscaping; vehicular ingress and egress from Fifth and Ninth Avenues; and associated utilities infrastructure.
Landtake	Existing and required permanent landtake is approximately 8.5 ha.
Excavation	Details of excavation and 'cut and fill' works are yet to be confirmed.
Piling	Details of piling requirments are yet to be confirmed.
Duration of Construction and Operation	The construction programme has yet to be confirmed. It is anticipated that the ground works element of the construction will take approximately 18 months to complete. Disruption due to construction will be minimised by: • Contractual Working Constraints, e.g. on storage of materials, limitation of noise, working hours, avoidance of sensitive areas, prevention of dust and pollution to water courses, identification of suitable haul routes. • Optimising balance of earthworks within the contract to minimise import and export of materials. • Materials recycling where feasible. • Engineering design and sequence of operations to minimise traffic disruption. • Monitoring of noise, vibration and dust within the contract period.

Table 2.4 (cont.): Details of Present Proposals

Parameter	Details
Drainage	The potential effects on water resources during the construction process are likely to include: • Water demand for construction activities and domestic use by the contractor (anticipated to be low). • Generation of domestic foul effluent by contractors. • A risk of pollution of run-off and groundwater due to construction activities. Actions taken to mitigate for these potential impacts include: o Surface water drainage will be controlled by appropriate SuDS which will incorporate attenuation measures on site, where required. Discharge arrangements will be agreed with the Environment Agency or, in the case of discharges to sewer, Dwr Cymru Welsh Water. o All liquids and solids of a potentially hazardous nature (for example diesel fuel, oils, solvents) will be stored on surfaced areas, with bunding, to the satisfaction of the Environment Agency Wales. o Provision of storage and attenuation facilities to avoid flooding. o Avoidance of direct or indirect impacts on water resources where possible. • As the land is currently often waterlogged due to poor drainage, conversion of much of the site to hardstanding with controlled drainage will reduce the quantity of water flowing to surface waters and draining to ground water thereby reducing the flooding potential of down stream or down gradient sources. • The only proposed releases from the site are: o surface water run-off from the landscaped area; o overflow of clean run-off from the SUDS scheme; o or the discharge of domestic and treated process effluent to sewer. • Provision of a series of balancing ponds to provide attenuation and water quality improvement.
Lighting	The site will operate 24 hours a day, 7 days a week and at all times between dawn and dusk there will be a requirement to light parts of the development to allow safe access to working areas. Final details of the lighting strategy have not yet been formalised, however, it is understood that the lighting would be designed such that there would not be any significant spillage of light from the development or light pollution. The general measures and requirements for the lighting would be as follows: • Some areas such as roadways would need to lit all the time. This is likely to include lighting mounted on columns 6 m high, directed towards the ground. Any other areas requiring lighting are likely to utilise the same lighting. • To facilitate movement between buildings at night lighting could be on light switches. • Based on the preliminary lighting design, the light levels at the site boundary are anticipated to be 10lux, equivalent to a barely sufficient level to walk in. The proposed landscape planting at the edges of the site would reduce this even further. • Lighting would be designed in accordance with BREEAM recommendations to achieve a lower level of brightness and minimise of avoid any reflection of light from ground services.

Table 2.4 (cont.): Details of Present Proposals

Parameter	Details
Air Quality	With respect to emissions to air the following key process that could have an impact on air quality are: • Releases from operational buildings, the preferred route for which is combustion air for the engines, thereby ensuring any odour is removed through combustion, however, any surplus which does not provide combustion air to the engines will be discharged to atmosphere, passing through carbon or biofilters to control the emission of odour; • Emissions from the gas and oil engines which create the electricity; • Emissions from the emergency flares; • Fugitive emissions from around the site; • Emissions from road transport; and, • Dust generated from construction activities. To ensure emissions to air are minimised during construction the following measures will be adopted: • Development of a Site Management Plan; • Undertake daily assessment of potential odour and other nuisances at site boundaries during construction; • Inform local businesses, residential and recreational facilities of any times when odour or other nuisance cannot be minimised; • Consideration of weather conditions prior to undertaking dusty works, possibly used damping down where necessary; • Sheeting raw materials or stock piles to control dust emissions; • The creation of hardcore/paved roadways around the site at the earliest opportunity; • Creation of a transport plan to identify routes and speed limits across the site; • Record and investigate any complaints of odour or other nuisance and report to the Local Authority. Mitigation for operational air quality impact is inheritant in the design of the facility and comprises a combination of abatement systems such as: • Negative pressure ventilation in potentially odourous areas, discharging via the engine air intake or through carbon and/or biofilters; • All operations which may have an impact on odour generation will be undertaken internally, and any movement of odourous materials will be in a container or sealed sack; • No external feedstock storage; • Frequent and regular observations of odour at given points to identify any processing or maintenance issues promptly; • An adequate stack height to promote effective dispersion; and, • Good ongoing management and housekeeping activities.

Table 2.4 (cont.): Details of Present Proposals

Parameter	Details
Noise	The proposed facility has the potential to impact on local noise receptors during construction and operation. With respect to noise the following measures will be adopted during construction: • A detailed Method Statement will be submitted once further details with respect to construction techcniques are known. • Reduction of noise to a minimum; • Maintain/replace exhaust silencers to ensure that they are effective; • Maintain plant regularly and ensure that noise abatement measures (e.g. covers) are fully operational and used correctly; • Confine construction activity to within a period agreed with the Local Authority; • Keep residents and the Local Authority informed of the proposed working schedule, where appropriate, including times and durations of any abnormally noisy activity that may cause concern; and, • Provide a helpline/contact number for members of the public who have complaints / concerns. During operation the following will be adopted: • Buildings will be fully enclosed and insulated as specified in the ES; • Increased cladding will be used where necessary to reduce noise; • All vehicle and personnel access doors will be closed when not in use and will be designed to minimise noise; • Main plant will be located and operated within the buildings; • Any refrigeration/air conditioning/extraction plant will be designed to meet noise criteria agreed with the Local Authority; and, • The building and operations will be designed to meet the Noise at Work Regulations.
Biodiversity Impact	The scheme will engender the loss of semi-improved and marshy grassland, bare ground, scattered scrub, scattered trees, tall ruderal vegetation and the diversion of ditch habitats. Impacts on habitat used by butterflies (not including the marsh fritillary), terrestrial phase amphibian habitat (not including great crested newts), reptile habitat, foraging bat habitat, and breeding bird habitat is anticipated. On-site mitigating habitat creation is proposed including the creation of new ponds and reedbeds, grassland, ditches, woodland, scattered trees, scrub and grassland habitats.

Table 2.4 (cont.): Details of Present Proposals

Parameter	Details
Landscape Impact	These will comprise both visual impact and the loss of or change to landscape features. Sources of visual impact include: • Site clearance and removal of some existing vegetation; • Site access and haulage routes using the existing road infrastructure; • Site remodelling including development platforms and balancing ponds; • Infilling existing ditches; • Fixed construction plant such as cranes; • Mobile construction plant such as excavators and lorries; • Disposal of material; • Stockpile and material storage area; • Protective hoardings; • Security and safety lighting; and, • The presence of tall partially constructed buildings. Mitigation measures will include: • Retention of existing habitats where possible; • Development of structural landscaping strategy for the development site to include creation of areas of open water, reedbed, grassland, woodland and scattered trees, native shrub and ornamental shrubs. • Species to be included within the structural landscaping area will be predominately of native origin.
Minimum Distance from a European Site	The proposed development site is located 100 m west of Blaen Cynon SAC.

2.4 PROJECTS AND PLANS TO BE CONSIDERED 'IN COMBINATION"

Following Tyldesley and Hoskin (2008) guidance, the local planning authorities (Rhondda Cynon Taf County Borough Council and Brecon Beacons National Park Authority) and the appropriate nature conservation body (Countryside Council for Wales) have been consulted to obtain their opinion as to whether the project may be likely to have a significant affect on any European Site either alone or in combination with other projects and plans.

An assessment of the potential schemes for consideration of 'in-combination' effects was completed during the ES process by Owen (2009). These studies did not identify any schemes which would need to be considered in terms of 'in-combination' effects on sensitive receptors (e.g. Natura 2000 sites).

Brecon Beacons National Park Authority confirmed to Envisage (Owen, 2009) that they were not aware of any schemes that should be considered 'in combination' with the proposed Enviropark development at Hirwaun.

Rhondda Cynon Taf County Borough Council stated that '*the Council does not keep any specific records relating to your request*' (Jones, 2009) and stated that the Council would be able to provide a list of projects with a planning history, but that this would not include details of whether the schemes were ever implemented.

No response was received from the Countryside Council for Wales with respect to potential 'in-combination' schemes that they would consider necessary to assess as part of this study.

Therefore, no 'in-combination' schemes have been considered during completion of this study.

3. DESCRIPTION OF NATURA 2000 SITES

Refer to Citations and descriptions of European Sites included in Appendix 3.

3.1 BLAEN CYNON SAC

The following information is taken from the UK SPA Description (Available at http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0030092) and the site citation 17-05-06 version 2.1 (refer to Appendix 3).

Country:	Wales
Unitary Authority:	Rhondda Cynon Taf
SAC status:	Designated SAC
Latitude:	51 44 54 N
Longitude:	03 31 41 W
SPA EU Code:	UK0030092
Area (ha):	66.83
Component SSSI/ASSIs*:	Cors Bryn-y-Gaer SSSI and Woodlands Park and Pontpren SSSI

*Site of Special Scientific Interest/Area of Special Scientific Interest.

Blaen Cynon SAC is an extensive complex of damp pastures and heath supporting the largest metapopulation of marsh fritillary on the southern edge of the Brecon Beacons National Park. The site is a lowland hilly site. The soils and geology are listed as including acidic, basic, clay, neutral, nutrient-poor, nurtrient-rich, peat, sandstone and sedimentary characteristics. The site supports a range of habitats, including marshy grassland, and flush and spring which are of particular importance as they provide habitat for marsh fritillary. Also present are areas of raised bog, species-rich neutral grassland, acid grassland and semi-natural broadleaved woodaland.

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 (see Table 3.1). 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.

Table 3.1: Annex II Species Present at Blaen Cynon SAC

Annex II Species	Population	Site Assessment			
	Resident	Population	Conservation	Isolation	Global
Euphydryas (Eurodryas, Hypodryas) aurinia	501-1000	B	B	B	B

In terms of vulnerability, the SAC citation identifies the following:

- The plant communities of Blaen Cynon are dependant on the maintenance of the hydrological regime and the continuation of traditional agricultural management.
- The marsh fritillary butterfly population is threatened in some parts by a lack of grazing, leading to scrub encroachment, and by inappropriate tree planting. Burning for agricultural purposes is also a major threat. Appropriate agricultural management could be achieved over the majority of the site through management agreements with landowners and occupiers.
- The site lies within the South Wales Coalfield on the fringes of an urban area, designated as cSAC which will help control threats from housing, opencast and other industrial development and pollution arising from such development in the immediate vicinity.

CCW (2008a) Core Management Plan for Blaen Cynon SAC includes the conservation objectives for this site. Each conservation objective consists of the following two elements: (1) vision for the feature; and, (2) performance indicators. In addition, an assessment of the condition of the feature and the proposed management requirements are given in Tables 3.2 to 3.8.

Table 3.2: Blaen Cynon SAC, Feature 1 Marsh Fritillary Butterfly

– Vision, Performance Indicators, Condition Assessment and Management Requirements

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
	Attribute	***Attribute rationale and other comments***	***Specified limits***		
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 10ha 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	**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. 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 *Lower limit:* in one year in six the number of larval webs is estimated to be 200 per hectare of Good Condition habitat.	The SAC only includes the core of the marsh fritillary habitat (and hence core of the metapopulation). There are likely to be other small areas of habitat outside the SAC boundary which are used by the butterfly only occasionally, but which likely contribute to the long-term success of the metapopulation. Efforts should be made to encourage better management of these areas of land through schemes such as Tir Gofal or through specific grazing projects. Counts of marsh fritillary larval webs have been undertaken regularly since 1999. Numbers of webs have not achieved the levels required by the performance indicators. Monitoring has also concluded that there is insufficient good and	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
	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	20 hectares of Available marshy grassland, including: 8 hectares of Good Condition marsh fritillary habitat Within Areas 1, 2, 3 and 4 50% of the vegetation meets the following criteria: Within a 50cm radius:		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
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.		larvae over winter communally amongst litter in such situations and the shelter provided by leaf litter and tussocks is considered to be important. Approximately 50ha 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. **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 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 **Definition of Suitable marshy grassland** Stands of grassland where *Succisa pratensis* is present at lower frequencies but still	*Molinia* is present *AND* The cover of *Succisa* is 10% or greater *AND* The vegetation height is between 10-20cm when measured using a Boorman's disc. **AND** The cover of *Juncus* spp. does not exceed 50%	available habitat. The assessment for both component SSSIs was that they were in **unfavourable** condition. Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI both failed due to insufficient good quality marsh fritillary habitat. In addition,counts of marsh fritillary larval webs have not reached the required 200 per hectare of available habitat. Balancing grazing across the site with the right livestock is the key to successful management for this species. It involves using cattle or horses, and avoiding sheep. It also needs the level of grazing right to create the tussocky structure the butterfly requires, whilst avoiding over or undergrazing. Scrub encroachment is also a factor at Woodland Park and Pontpren SSSI.	(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 SSSI, 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,

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
		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. [note: Available habitat is the total of Good Condition and Suitable habitat]			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.

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 will 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.

Table 3.3: Blaen Cynon, Feature 2: Marshy Grassland

– Vision, Performance Indicators, Condition Assessment and Management Requirements

Vision	Performance indicators for feature condition			Condition Assessment	Management Requirements
	Attribute	***Attribute rationale and other comments***	***Specified limits***		
SSSI feature - section to be completed.	**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. Extent of marshy grassland is defined by the amount of habitat required for marsh fritillaries SSSI feature - section to be completed.	Upper Limit: not needed Lower limit: 20 hectares of Available marshy grassland	**Unfavourable** – refer to Feature 1	SSSI feature - section yet to be completed.
	A2. Condition of the marshy grassland	The definition of good condition marshy grassland follows that given for the marsh fritillary habitat, as follows: **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	This section follows the operational limits for the marsh fritillary feature above: 8 hectares of Good Condition marsh fritillary habitat Within Areas 1, 2, 3 and 4 50% of the vegetation meets the following criteria: Within a 50cm radius: *Molinia* is present *AND* The cover of *Succisa* is		

Vision	Performance indicators for feature condition			Condition Assessment	Management Requirements
		no more than 10% of area. **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. [note: Available habitat is the total of Good Condition and Suitable habitat]	10% or greater *AND* The vegetation height is between 10-20cm when measured using a Boorman's disc. AND 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 - section to be completed.				
Other Factors to Consider: SSSI feature - section to be completed.					

Table 3.4: Blaen Cynon SAC, Feature 3: Flush and Spring

– Vision, Performance Indicators, Condition Assessment and Management Requirements

<table>
<tr><th rowspan="2">Vision</th><th colspan="3">Performance Indicators for Feature Condition</th><th rowspan="2">Condition Assessment</th><th rowspan="2">Management Requirements</th></tr>
<tr><th>Attribute</th><th>Attribute rationale and other comments</th><th>Specified limits</th></tr>
<tr><td rowspan="5">SSSI feature - section to be completed.</td><td>A1. Extent of flush and spring</td><td>Monitoring is likely to be a map-based exercise. The area of flush and spring 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.

Flush and spring is defined as: SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td><td rowspan="5">Unfavourable – refer to Feature 1</td><td rowspan="5">SSSI feature - section yet to be completed.</td></tr>
<tr><td>A2. Condition of the flush and spring</td><td>SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td></tr>
<tr><th colspan="3">Performance Indicators for Factors Affecting the Feature</th></tr>
<tr><th>Factor</th><th>Factor rationale and other comments</th><th>Operational Limits</th></tr>
<tr><td colspan="3">SSSI feature - section to be completed.</td></tr>
<tr><td colspan="6">Other Factors to Consider:
SSSI feature - section to be completed.</td></tr>
</table>

Table 3.5: Blaen Cynon SAC, Feature 4: Flush and Spring

– Vision, Performance Indicators, Condition Assessment and Management Requirements

<table>
<tr><th rowspan="2">Vision</th><th colspan="3">Performance Indicators for Feature Condition</th><th rowspan="2">Condition Assessment</th><th rowspan="2">Management Requirements</th></tr>
<tr><th>Attribute</th><th>Attribute rationale and other comments</th><th>Specified limits</th></tr>
<tr><td rowspan="5">SSSI feature - section to be completed.</td><td>A1. Extent of raised bog</td><td>Monitoring is likely to be a map-based exercise. The area of raised bog 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.

Raised bog is defined as:
SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td><td rowspan="5">Unfavourable – refer to Feature 1</td><td rowspan="5">SSSI feature - section yet to be completed.</td></tr>
<tr><td>A2. Condition of raised bog</td><td>SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td></tr>
<tr><th colspan="3">Performance Indicators for Factors Affecting the Feature</th></tr>
<tr><th>Factor</th><th>Factor rationale and other comments</th><th>Operational Limits</th></tr>
<tr><td colspan="3">SSSI feature - section to be completed.</td></tr>
<tr><td colspan="6">Other Factors to Consider:
SSSI feature - section to be completed.</td></tr>
</table>

Table 3.6: Blaen Cynon SAC, Feature 5: Species-Rish Neutral Grassland

– Vision, Performance Indicators, Condition Assessment and Management Requirements

<table>
<tr><th rowspan="2">Vision</th><th colspan="3">Performance Indicators for Feature Condition</th><th>Condition Assessment</th><th>Management Requirements</th></tr>
<tr><th>Attribute</th><th>Attribute rationale and other comments</th><th>Specified limits</th></tr>
<tr><td rowspan="5">SSSI feature - section to be completed.</td><td>A1. Extent of species-rich neutral grassland</td><td>Monitoring is likely to be a map-based exercise. The area of species-rich neutral 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.

Species-rich neutral grassland is defined as:
SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td><td rowspan="5">Unfavourable – refer to Feature 1</td><td rowspan="5">SSSI feature - section yet to be completed.</td></tr>
<tr><td>A2. Condition of species-rich neutral grassland</td><td>SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td></tr>
<tr><td colspan="3">Performance Indicators for Factors Affecting the Feature</td></tr>
<tr><td>Factor</td><td>Factor rationale and other comments</td><td>Operational Limits</td></tr>
<tr><td colspan="3">SSSI feature - section to be completed.</td></tr>
<tr><td colspan="6">Other Factors to Consider:
SSSI feature - section to be completed.</td></tr>
</table>

Table 3.7: Blaen Cynon SAC, Feature 6: Acid Grassland

– Vision, Performance Indicators, Condition Assessment and Management Requirements

<table>
<tr><th rowspan="2">Vision</th><th colspan="3">Performance Indicators for Feature Condition</th><th rowspan="2">Condition Assessment</th><th rowspan="2">Management Requirements</th></tr>
<tr><th>Attribute</th><th>Attribute rationale and other comments</th><th>Specified limits</th></tr>
<tr><td rowspan="5">SSSI feature - section to be completed.</td><td>A1. Extent of acid grassland</td><td>Monitoring is likely to be a map-based exercise. The area of acid 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.

Acid grassland is defined as: SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td><td rowspan="5">Unfavourable – refer to Feature 1</td><td rowspan="5">SSSI feature - section yet to be completed.</td></tr>
<tr><td>A2. Condition of acid grassland</td><td>SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td></tr>
<tr><th colspan="3">Performance Indicators for Factors Affecting the Feature</th></tr>
<tr><th>Factor</th><th>Factor rationale and other comments</th><th>Operational Limits</th></tr>
<tr><td colspan="3">SSSI feature - section to be completed.</td></tr>
<tr><td colspan="6">Other Factors to Consider:
SSSI feature - section to be completed.</td></tr>
</table>

Table 3.8: Blaen Cynon SAC, Feature 7: Semi-natural Broadleaved Woodland

– Vision, Performance Indicators, Condition Assessment and Management Requirements

<table>
<tr><th rowspan="2">Vision</th><th colspan="3">Performance Indicators for Feature Condition</th><th rowspan="2">Condition Assessment</th><th rowspan="2">Management Requirements</th></tr>
<tr><th>Attribute</th><th>Attribute rationale and other comments</th><th>Specified limits</th></tr>
<tr><td rowspan="5">SSSI feature - section to be completed.</td><td>A1. Extent of semi-natural broadleaved woodland</td><td>Monitoring is likely to be a map-based exercise. The area of semi-natural broadleaved woodland 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.

Semi-natural broadleaved woodland is defined as:
SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td><td rowspan="5">Unfavourable – refer to Feature 1</td><td rowspan="5">SSSI feature - section yet to be completed.</td></tr>
<tr><td>A2. Condition of semi-natural broadleaved woodland</td><td>SSSI feature - section to be completed.</td><td>SSSI feature - section to be completed.</td></tr>
<tr><th colspan="3">Performance Indicators for Factors Affecting the Feature</th></tr>
<tr><th>Factor</th><th>Factor rationale and other comments</th><th>Operational Limits</th></tr>
<tr><td colspan="3">SSSI feature - section to be completed.</td></tr>
<tr><td colspan="6">Other Factors to Consider:
SSSI feature - section to be completed.</td></tr>
</table>

3.2 COEDYDD NEDD A MELLTE SAC

The following information is taken from the UK SPA Description (Available at http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0030141) and the site citation 17-05-06 version 2.1 (refer to Appendix 3).

Country:	Wales
Unitary Authority:	Neath and Port Talbot / Rhondda Cynon Taf
SAC status:	Designated SAC
Latitude:	51 46 20 N
Longitude:	03 34 02 W
SPA EU Code:	UK0030141
Area (ha):	378.18
Component SSSI/ASSIs*:	Blaen Nedd SSSI and Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI

*Site of Special Scientific Interest/Area of Special Scientific Interest.

Coedydd Nedd a Mellte SAC comprises two SSSIs. Blaen Nedd SSSI includes the wooded valley of the rivers Nedd, Mellte, Pyrddin and Sychryd and their tributaries above Pontneddfechan which have an extensive and diverse range of semi-natural woodland types, important populations of flowering plants and outstanding assemblages of mosses, liverworts and lichens, in addition to a range of geological features. Blaen Nedd SSSI is situated in the upper valley of the Nedd Fechan and supports a wide variety of habitat types including oak and ash woodland, neutral grassland, calcareous grassland, limestone pavement, marshy grassland and wet dwarf-shrub heath. Geological features include a cave system and associated karst surface feature.

The soils and geology within Coedydd Nedd a Mellte SAC are listed as including acidic, alluvium, basic, clay, limestone, neutral, nutrient-poor, nurtrient-rich, peat and sandstone characteristics. Habitats within the site include:

Qualifying Habitats

This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting habitats of European importance listed on Annex I of the Directive (see Table 3.9).

Table 3.9: Annex I Habitats Present at Coedydd Nedd a Mellte SAC

Annex I habitat	Percentage Cover	Representivity	Relative surface	Conservation status	Global assessment
Tilio-Acerion forests of slopes, screes and ravines	4.8	C	C	B	C
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	46.4	B	C	B	B

The SAC citation states that with respect to *Tilio-Acerion* forests of slopes, screes and ravines the site is considered to support a significant presence and with respect to the Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles the site is considered to be one of the best areas in the United Kingdom.

In terms of vulnerability, the SAC citation identifies the following:

- The majority of the woodland is owned by the Forestry Commission and is ungrazed. However, stray livestock still gain access in places and could pose a threat to tree and scrub regeneration. Fencing against livestock would certainly be desirable in the areas currently subject to agricultural use. A combination of agri-environment schemes and management agreements offer the best mechanism for securing favourable management in these areas.
- Stands of planted conifers, beech and sycamore within the adjacent to the site are seeding into semi-natural woodland communities in places. The Forestry Commission has agreed to remove most of these species from the site itself, but seedlings may still invade from other areas and an ongoing control programme should be considered.
- The area contains waterfalls which are a great attraction to the public and significant erosion damage has been caused by pedestrians, horses and bicycles. An ongoing path repair programme has only been partially successful in addressing this problem and further restrictions on public access should be considered. Given the level of access to the site and surrounding plantations, there should be significant fire risk in prolonged dry periods.
- Airbourne acid and nutrient deposition may also be a problem, particularly for epiphytic lichens.

CCW (2008b) Core Management Plan for Coedydd Nedd a Mellte SAC includes the conservation objectives for this site. Each conservation objective consists of the following two elements: (1) vision for the feature; and, (2) performance indicators. In addition, an assessment

of the condition of the feature and the proposed management requirements are given in Tables 3.10 to 3.11.

Table 3.10: Coedydd Nedd a Mellte SAC , Feature 1 *Tilio-Acerion* forests of slopes, crees and ravines – Vision, Performance Indicators, Condition Assessment and Management Requirements

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
	Attribute	***Attribute rationale and other comments***	***Specified limits***		
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	**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). *Lower limit*: 18 ha	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 nonnative 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	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 nonnative 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.
	A2. Distribution	Should be present in the following units: Blaen Nedd: Units BN7, BN8, BN9. Dyffrynoedd Nedd a Mellte: DNM2, DNM4, DNM9, DNM11, DNM16	*Upper limit*: none *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% *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 *Lower limit:*90%		
	A5. Regeneration	To be met in at least 50% of significant gaps in canopy. Such gaps should be ecorded 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	*Upper limit:* None *Lower limit:* Presence of viable saplings at least 1.5m high within 10-15 years of gap appearing.		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
achievement of these conditions are under control.		sufficiently low. There should also be a note made of regeneration of non-native species like sycamore, beech or conifers.		and further investigation is required. Following some initial monitoring work in 2007, it appear that the main problem areas are in Units DNM4, DNM11 and Unit BN7.	
	A6. Woodland structure	To be met in at least 75% of samples over the site as a whole.	*Upper limit:* None *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 *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 *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. Typical ground covering species	*Upper limit:* None *Lower limit:* 80% of woodland ground cover in core areas should have 50 % cover of typical bryophytes (provisional).		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
		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.			
	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 nonnative species. Although some sycamore will be tolerated, it should not be allowed to become dominant over ash. A maximum of about 5% of nonnative trees and shrubs, including conifers, will be tolerated.	*Upper limits:* 5% cover of nonnative trees in the canopy. Sycamore - a limit AND: No invasive non-native shrubs in the understorey or shrub layer *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 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:* *Lower limit:*		
	F4. Access and visitor management and human	Poorly maintained footpaths, coupled with increasing visitor numbers have resulted in erosion problems in some areas.	*Upper limit:* X% (to be determined) bare ground due to human or animal induced activities.		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
	and grazing induced bare ground	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. 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.			
Other Factors to Consider: n/a					

Table 3.11: Coedydd Nedd a Mellte SAC, Feature 2: Old sessile oak woods with Ilex and Blechnum in the Britihs Isles – Vision, Performance Indicators, Condition Assessment and Management Requirements

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
	Attribute	***Attribute rationale and other comments***	***Specified limits***		
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	**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). *Lower limit*: 175 ha	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 nonnative 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.	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 nonnative 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
	A2. Distribution	Should be present in the following units: Blaen Nedd: Units BN7, BN8, BN9. Dyffrynoedd Nedd a Mellte: DNM3-11, DNM13-16	*Upper limit*: none *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% *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 *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	*Upper limit:* None *Lower limit:* Presence of viable saplings at least 1.5m high within 10-15 years of gap appearing.		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
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.		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 beech or conifers.		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.	arising from increasing numbers of visitors in the SAC and supporting SSSI.
	A6. Woodland structure	To be met in at least 75% of samples over the site as a whole.	*Upper limit:* None *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 *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). See also under A9 bryophytes.	*Upper limit:* None *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 *Lower limit:* 80% of woodland ground cover in core areas should have 50 % cover of typical bryophytes (provisional).		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
	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 kept under constant review.	*Upper limit*: grazing levels likely to be in the region of 0.1 LSU/ha/yr or less. *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 nonnative 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. AND: No rhododendron (or other invasive non-native shrubs) in the understorey or shrub layer *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	*Upper limit:* *Lower limit:*		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
		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.			
	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. 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	*Upper limit:* X% (to be determined) bare ground due to human or animal induced activities. *Lower limit:*		

Vision	Performance Indicators for Feature Condition			Condition Assessment	Management Requirements
		the site.			
Other Factors to Consider: n/a					

3.3 CWM CADLAN SAC

The following information is taken from the UK SPA Description (Available at http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0013585) and the site citation 17-05-06 version 2.1 (refer to Appendix 3).

Country:	Wales
Unitary Authority:	Rhondda Cynon Taf
SAC status:	Designated SAC
Latitude:	51 46 38 N
Longitude:	03 30 19 W
SPA EU Code:	UK0013585
Area (ha):	83.93
Component SSSI/ASSIs*:	Cwm Cadlan SSSI

*Site of Special Scientific Interest/Area of Special Scientific Interest.

Cwm Cadlan SAC is locted 4 km north of Hirwaun and contains the largest recorded example of 'Molinia meadows' in Wales. The typical form of purple moor-grass – meadow thistle fen-meadow is extensively developed and there are clearly displayed transitions to a range of associated habitats includeing base-rich flush and neutral grassland. The site also supposes an outstanding suite of flushed short-sedge mire communities on glacial drift. Communities referable to National Vegetation Classification M10 mire occur widely often in close association with flushed examples of M24 fen-meadow.

Cwm Cadlan SAC comprises of lowland valleys. The soils and geology are listed as including acidic, basic, clay, limestone, neutral, nutrient-poor, peat and sandstone characteristics.

Qualifying Habitats

This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting habitats of European importance listed on Annex I of the Directive (see Table 3.12).

Table 3.12: Annex I Habitats Present at Cwm Cadlan SAC

Annex I habitat	Percentage Cover	Representivity	Relative surface	Conservation status	Global assessment
Molinia meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caerueae*)	31.4	B	C	B	B
Alkaline fens	13.7	B	C	A	B

The SAC citation states that with respect to the *Molinia* meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caerueae*) the site is considered to be one of the best areas in the United Kingdom. It is also considered to be one of the best areas in the United Kingdom for alkaline fens.

In terms of vulnerability, the SAC citation identifies the following:

- The grasslands are dependant on the continuance of low intensity agricultural management with no, or minimal, use of agro-chemicals. Where necessary, agreements secure appropriate grazing levels and management.
- Base enrichment and moisture content are also important factors influencing the ecological character of the vegetation. This enrichment appears to derive from rising groundwater. Quarrying or other operations within the groundwater catchment may influence groundwater movements. The operation of an adjoining quarry is subject to a conditioned planning permission, including site investigation and monitoring that will constrain operations in order to safeguard grassland vegetation.

CCW (2008b) Core Management Plan for Cwm Cadlan SAC includes the conservation objectives for this site. Each conservation objective consists of the following two elements: (1) vision for the feature; and, (2) performance indicators. In addition, an assessment of the condition of the feature and the proposed management requirements are given in Tables 3.13 to 3.14.

Table 3.13: Cwm Cadlan SAC, Features 1 and 3: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils and other non-SAC marshy grassland habitat – Vision, Performance Indicators, Condition Assessment and Management Requirements

Vision for Feature 1	**Performance Indicators for Feature Condition (Features 1 and 3)**			**Condition Assessment**	**Management Requirements**
	Attribute	***Attribute rationale and other comments***	***Specified limits***		
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	**A1.** Extent and distribution of marshy grassland	Extent is based on ground surveys (1991/1998 & 1999) and aerial photographs.	*Upper limit*: N/A, constrained by hydrology. *Lower limit*: 42 ha, of which 26 ha is fen-meadow (these figures represent the extent indicated by the most recent vegetation surveys). Located in units 1-9 on map in management plan	The conservation status of these features within the site is considered to be **Unfavourable** (2007). Assessment carried out in 2004 indicated that the condition of both was: **Unfavourable, no change.** White clover, at a low cover and frequency, may be a natural component of the sward. In 2004, the cover and frequency of white clover was a little on the high side in some areas, which detracts somewhat from the quality of the stands of fen-meadow. Part of the site, until purchased by CCW, had been quite heavily grazed by sheep - sometimes throughout the year. Current management by CCW (Unit 1) has returned the grazing to a more cattle-based state and other areas are now in favourable	**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. 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
	A2. Habitat quality	For the purposes of assessment against these criteria the main fen-meadow areas have been defined for all site units	*Upper limit*: 100% of the vegetation meets the criteria listed below. *Lower limits*: In each of the fenmeadow areas shown on the map in the management plan, at least 75% of the vegetation meets the definition listed below for fen-meadow. AND: 75% of the remaining marshy grassland meets the definition listed below for 'marshy grassland'.		
	Definition of fen-meadow: In any 0.5m radius, purple moor-grass and at least 4 out of the following are				

<table>
<tr><th>Vision for Feature 1</th><th colspan="3">Performance Indicators for Feature Condition (Features 1 and 3)</th><th>Condition Assessment</th><th>Management Requirements</th></tr>
<tr><td>invertebrates and birds to have a sparse scattering of shrubs or trees.
• All factors affecting the achievement of these conditions are under control.</td><td colspan="3">present: quaking grass; tawny sedge; flea sedge; bog pimpernel; meadow thistle; devil's-bit scabious; marsh valerian.
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;
and the cover of tall rushes does not exceed 33%;
and cover of purple moor-grass does not exceed 66%;
and the cover of vegetation litter does not exceed 25%;
and the cover of bare ground does not exceed 5%;
and scrub/woody species are largely absent.</td><td rowspan="4">management (units 2, 6 & 7) that should ensure that the quality of the more modified swards recover. Unit 4 is only occasionally grazed and this has resulted in some of the vegetation being rather tussocky.

Overall the factors affecting the feature appear to be largely under control, apart from continuing uncertainty over the impacts of drainage and quarrying and the need for more a suitable more grazing in some parts of the site. Common standards monitoring reports for 2004 are presented in the management plan. Detailed monitoring reports considering possible changes to vegetation and hydrology as a result of quarry dewatering are also held by CCW.</td><td rowspan="4">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. 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 buildup 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 objectives. 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</td></tr>
<tr><td></td><td colspan="3">Definition marshy grassland:
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:
The various marshy grassland stands generally reflect the NVC/vegetation types mapped during the vegetation surveys (see Annex). 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 This will need further work to better define the types present).
and in any 1m radius, the vegetation height is between 5 and 40 cm tall (excluding tall rushes and flower heads);
and the cover of vegetation litter does not exceed 25%;
and the cover of bare ground does not exceed 5%;
and scrub/woody species are largely absent.</td></tr>
<tr><td></td><td colspan="3">Performance Indicators for Factors Affecting the Feature</td></tr>
<tr><td></td><td>Factor</td><td>Factor rationale and other comments</td><td>Operational Limits</td></tr>
<tr><td></td><td>F1. Livestock grazing</td><td>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</td><td>Lower limits: The wetland areas will be subject to light summer grazing by cattle and/or ponies at least 4 in every 5 years.</td></tr>
</table>

Vision for Feature 1	Performance Indicators for Feature Condition (Features 1 and 3)			Condition Assessment	Management Requirements
		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.	*Upper limits:* No significant grazing utside the growing season or heavy grazing at any time during the summer. 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).		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. 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
	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. Infilling some of the many ditches at the site is likely to lead to re-wetting of some marshy grassland. Dewatering of the adjacent	*Upper limit:* No new drainage ditches to be installed within the open meadow areas of the site. NB. It is not possible to set more specific pending a fuller understanding of current situation and habitat requirements. 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. Monitoring of the quarry dewatering should give an early indication that the dewatering is		

Vision for Feature 1	Performance Indicators for Feature Condition (Features 1 and 3)			Condition Assessment	Management Requirements
		quarry has potential to affect the hydrology of the site.	affecting the site.		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, fenmeadow 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
	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. Scrub and woodland is also a natural component of such wetland complexes and enhances the site both biologically and visually, therefore older wellestablished stands will be retained.	The maximum area of mature dense wet woodland will be 6.5ha (extent in 1999). Scattered scrub will be tolerated within the following limits: *Lower limits:* Scattered scrub present in defined locations. *Upper limits:* No scrub covering area greater than 5m x 5m within stands mapped as marshy grassland.		
	F.5. Atmospheric pollution	The alkaline fen may be the more sensitive vegetation type present see Table 3.17 below.	-		

Vision for Feature 1	Performance Indicators for Feature Condition (Features 1 and 3)			Condition Assessment	Management Requirements
					watercourses have dried-up continue, then floristic changes are likely to occur. **Other marshy grassland** Non- SAC marshy grassland mainly comprises rush and purple moor-grass dominated vegetation and tall-herb fen. Management 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.
Other Factors to Consider: n/a					

Table 3.14: Cwm Cadlan SAC, Features 1 and 3: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils and other non-SAC marshy grassland habitat – Vision, Performance Indicators, Condition Assessment and Management Requirements

Vision for Feature 1	**Performance Indicators for Feature Condition (Features 1 and 3)**			**Condition Assessment**	**Management Requirements**
	Attribute	***Attribute rationale and other comments***	***Specified limits***		
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 fenmeadow. • 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	**A1.** Extent and distribution	Extent is based on ground surveys and 2006 aerial photographs.	*Upper limit*: N/A, constrained by hydrology. *Lower limit*: 11 ha. Located in Units 1-4, 6-9 (NB - some of the quarry monitoring is carried out in small stands in Unit 1 L7 - here the alkaline fen occurs mainly as small runnels too small to map individually.	The conservation status of this feature within the site is considered to be **Unfavourable** (2007). Assessment carried out in 2004 indicated that feature condition was: **Unfavourable, recovering**. Some alkaline fen has been modified by past attempts at drainage resulting in a few stands, which are rather dry and somewhat intermediate to fen-meadow. It is also possible that some stands of fenmeadow were derived from alkaline fen. Part of the site, until purchased by CCW, had been quite heavily grazed by sheep - sometimes throughout the year. Current management by CCW (Unit 1) has returned the grazing there to a more cattle-based regime and	**Grazing** These areas will be subject to the same grazing regime as the marshy grassland (see Table 13.15) 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
	A2. Habitat quality	For the purposes of assessment against these criteria the main areas of alkaline fen have been identified (see management plan maps).	*Upper limit*: 100% of the vegetation meets the criteria listed below. *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: In any 0.5m radius, the vegetation height is between 5 and 20 cm tall; 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; and, the cover of 'brown' mosses (see above) is over 10%; and, the cover of creeping buttercup, lesser spearwort and white clover does				

<table>
<tr><th>Vision for Feature 1</th><th colspan="3">Performance Indicators for Feature Condition (Features 1 and 3)</th><th>Condition Assessment</th><th>Management Requirements</th></tr>
<tr><td rowspan="5">achievement of these conditions are under control.</td><td colspan="3">not exceed 10%.
and the cover of tall rushes and purple moor-grass does not exceed 33%;
and there is no discernable cover of vegetation litter - less than 10%;
and the cover of bare ground does not exceed 5%;
and scrub/woody species are largely absent.</td><td rowspan="5">sympathetic management elsewhere (units 2, 6 & 7) should ensure that the quality stands are maintained. Some areas are slightly undergrazed or partially affected by past tree planting. Removal of some planted trees has been ndertaken and the remaining trees should be removed with the next few years (Unit 8). Under-grazing for a year or two is probably not detrimental to the quality of the fen, but is something that needs addressing (Unit 4). Overall, the factors affecting the feature are still not quite under control, although the habitat is recovering, hence the unfavourable status assessment for 2007.</td><td rowspan="5">other attributes. See also Table 13.15.

Drainage
See Table 13.16.

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.</td></tr>
<tr><td colspan="3">Performance Indicators for Factors Affecting the Feature</td></tr>
<tr><td>Factor</td><td>Factor rationale and other comments</td><td>Operational Limits</td></tr>
<tr><td>F1. Grazing</td><td>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.</td><td>See details in Table 13.15.</td></tr>
<tr><td>F2. Drainage</td><td>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</td><td>See details in Table 13.15.</td></tr>
</table>

Vision for Feature 1	Performance Indicators for Feature Condition (Features 1 and 3)			Condition Assessment	Management Requirements
		some former alkaline fen areas. Dewatering of the adjacent quarry has potential to affect the hydrology of the site.			
	F3. Adjacent land use	See details in Table 13.15.	See details in Table 13.15.		
	F.4. Scrub encroachment	See details in Table 13.15.	See details in Table 13.15.		
	F.5. 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). Its 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.		
Other Factors to Consider: n/a					

4. CONSULTATION WITH THE COUNTRYSIDE COUNCIL FOR WALES

During the consultation process associated with the planning application, which provided consultees with a copy of the Environmental Statement, the Countryside Council for Wales (Evans, 2009) stated that:

> *"Our main concerns relate to the possible adverse impacts of the proposed development on the features of the European designated sites within 15km, in particular with respect to:*
>
> - *Hydrological issues including site drainage, abstraction and release of any existing land contamination causing pollution, and the potential impact of these issues on Blaen Cynon SAC and its under-pinning SSSI (Cors Bryn y Gaer SSSI and Woodland Park and Pontpren SSSI) during construction and operation.*
> - *Aerial emissions causing pollution to Blaen Cynon SAC, Coedydd Nedd a Mellte SAC, Cwm Cadlan SAC…during operation of the development."*

In addition, during the same consultation process the Environment Agency Wales (Servini, 2009) stated that:

> *"The increased atmospheric pollution in the close proximity of the Blaen Cynon SAC would have an adverse impact on the SAC vegetation and therefore the Marsh Fritillary SAC feature. Air pollution assessments have been undertakem as part of the Environment Agency Review of Consent projects, looking at the effects of Environment Agency consents and other non-Environment Agency consents in combination. The Blaen Cynon SAC air pollution assessment found that atmospheric pollution was already having an adverse impact upon the SAC. Further increases in acidic and nutrient deposition could cause changes in vegetation composition. The rare species such as Succia pratensis, which the butterfly is dependant upon, will be pushed out by more common species such as common grasses, causing a decline in overall diversity."*

In response to this, the model was re-run to cover a 15km radius from the site and a 5km radius from the site with specific information developed for sites of nature conservation importance (SSSIs and SACs). During a meeting with CCW and the Environment Agency Wales (EAW) it was agreed that the radius from the site that should be considered should be 10km rather than

15km as CCW stated in their letter. This included Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC. Details of the results of this modelling on these sites are presented in Section 7 and 8 respectively.

Further to discussions with CCW (Newberry, 2009) and correspondence received from Brecon Beasons National Park Authority (Canney, 2009) the sites to be considered in this report are summarized in Table 4.1.

Table 4.1: Summary of European Sites Considered in this Screening Report

European Site	Summary of Qualifying Interest	Aspects of Vulnerability Relevant to Proposed Development at Hirwaun
Blaen Cynon SAC	Marsh fritillary butterflies	Loss of nearby habitat, water quality, water flow, traffic and construction noise, air pollution and artificial lighting.
Coedydd Nedd a Mellte SAC	*Tilio-Acerion* forests and old sessile oak wood habitats	Water quality, water flow, air pollution
Cwym Cadlan SAC	*Molinia* meadows and alkaline fen habitats	Water quality, water flow, air pollution

Correspondence from CCW (Barter, 2009) dated 3rd April 2009 to Brecon Beacons National Park Authority (BBNPA) included information with respect to the requirements of CCW in terms of assessing the potential impacts of the proposal on marsh fritillary's at Blaen Cynon SAC in term of air pollution. She stated that consideration will need to be given in two stages: the first being the most likely effects on the site vegetation and the second being the the effect on habitat condition for marsh fritillary, taking into account other factors such as any affect on ability to manage the vegetation to achieve the appropriate structure and food plant *Succisa pratensis* abundance / condition.

Barter (2009) states that the draft Conservtaion Objectives set Performance Indicators (PI's) on necessary area of "Good" and "Suitable" vegetation habitat. These are defined in the Core Management plan (see Section 3.1) and the current extent of these area are mapped. The areas required in the PI's are part of the overall habitat area considered necessary for a viable population of marsh fritillary. CCW state that the vegetation contributing to the Performance Indicators can be split into 3 broad categories each of which is relatively equal in contribution of area to the PIs:

- Base-poor flushed vegetation (including NVC[1] M6d);
- Relatively dry *Molinia*-dominated marshy grassland on thin organic soils (NVC M25); and,
- Mesophytic grassland (NVC MG5c).

Further details on these habitat types and the potential effects of air pollution on the habitats is given in Section 4.3.2.

On 16th April 2009 correspondence was sent from Canney (2009) who stated that CCW (Barter, 2009) have concluded that there will be no hydrological impacts on Blaen Cynon SAC as a result of the proposed development assuming that they receive written confirmation that

> *"no deeper drainage or abstraction is proposed other than that of foundations, other construction works, and installation and operation of foul and surface water drainage. If confirmed, CCW have stated that they are not of a view that impact to statutorily designated sites is likely as a consequence of changes to hydrology and would withdraw their request that hydrology is included within the scope of further investigations on impact. Further, CCW request, that if an Appropriate Assessment is undertaken by the applicant then it should include under air pollution impacts, the cumulative effects of any increased traffic emissions, to include additional nitrogen, arising from the proposal."*

Consultation with CCW has taken place since the scoping of the Environmental Impact Assessment and throughout the Appropriate Assessment.

[1] NVC = National Vegetation Classification. See Rodwell (1991 et seq) for details.

5. POTENTIAL EFFECTS ON BLAEN CYNON SAC

MN2000 makes it clear that where a project is likely to have significant effects on a Natura 2000 site it is also likely that both an Article 6 assessment and an EIA, in accordance with Directive 85/337/EEC and 91/11/EC, will be necessary (Oxford Brookes, 2001).

5.1 POTENTIAL EFFECTS

Using the guidelines produced by Oxford Brookes (2001) the likely changes to a European Site may arise as a result of:

- Reduction of habitat area;
- Disturbance to key species;
- Habitat or species fragmentation;
- Reduction in species density;
- Changes in key indicators of conservation value (water quality etc); and,
- Climate change.

Blaen Cynon SAC is in close proximity to the proposed development site. The present proposals will require no landtake from this European Site nor will they affect the boundary of the site. However, qualifying species from the European Site may be using the proposed development site from the nearby SAC and therefore there may be impacts from this. These direct impacts can be summarised as:

- Loss of habitat supporting qualifying species; and,
- Disturbance to species using the European Site from construction and operation.

In addition there may be indirect impacts from the proposed development on the European Site. Foreseen effects would relate to the following:

- Hydrological changes;
- Air quality changes;
- Light pollution;
- Construction noise; and,
- Traffic use during the operational phase of development.

The possibilities of any of these facets of the scheme exerting a significant ecological effect on any of the qualifying features of Blaen Cynon SAC are discussed below.

5.2 DIRECT EFFECTS

5.2.1 Loss of Habitat

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 (100 m away) the effects of habitat loss at the proposed development site are discussed below.

Habitats

No habitats are listed under Annex I as being qualifying features of the SAC site.

Flora

No floral species are listed under Annex I as being qualifying features of the SAC site.

Invertebrates

The marsh fritiallary butterfly *Euphdryas aurinia* is listed as a qualifying feature under Annex II as being a species that are a primary reason for selection of this site. No other invertebrates are listed as SAC qualifying features.

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 Assesment

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 proposed development site is covered in rush-dominated marshy grassland. The site was subject to heavy grazing and therefore the sward was short inbetween 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 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 porposed 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.

As marsh fritiallary butterflies have been shown to be absent from the proposed development site it can be concluded that the loss of habitat within the Application Site will not result in a direct significant impact on the integrity of this qualifying feature of Blaen Cynon SAC.

Birds

No bird species are listed under Annex II as being qualifying features of the SAC site and therefore there can be no significant direct impact on any SAC qualifying features from the proposed development.

Mammals

No plant species are listed under Annex II as being qualifying features of the SAC site and therefore there can be no significant direct impact on any SAC qualifying features from the proposed development.

5.2.2 Disturbance

This section assesses whether the proposed development at the site will cause a direct disturbance to marsh fritillary individuals during either the consutuction 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 sedentary, rarely flying more than only 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 consutruction or operational disturbance, it can be concluded that disturbance will not result in a direct significant impact on the integrity of this qualifying feature of Blaen Cynon SAC.

5.3 INDIRECT EFFECTS

5.3.1 Hydrological Changes

The Environment Statement (Savills, 2008) provides information with respect to the existing hydrological situation and the potential hydrological impacts associated with the proposed development. This information is summarised below.

The site is located over Lower Coal Measures which are classified as a minor aquifer of variable permeability. The two main surface water features of the site are the small stream that intersects the north-western corner of the site and flows along the western boundary, currently taking the surface water run-off from the site. The second feature is the Penderyn Reservoir to the north of the site. This is an Impounding Reservoir, which has no catchment of its own but relies on the inputs from three streams and a pumped main. There is an overflow from the dam into the stream that extends through the proposed development site.

The site is crossed by drainage channels, although between these the site stands very wet during the winter months. There is a stream extending along the northern boundary of the site which flows in a westerly direction before flowing in a southerly direction along the western boundary. The Environmental Statement identifies that of all the designated nature conservation sites within a 5 km radius of the proposed development site, Blaen Cynon SAC is the only one with any potential to be impacted upon by the proposed development due to the lowland bog habitats within the site being dependant on surface water and groundwater. Groundwater contour plots suggest that groundwater movement is to the south-west, which will remain unchanged as a result of the proposed development works. As a result of the inclusion of a drainage system within the site it is anticipated that the contribution of rainwater to the groundwater beneath the site will reduce and thus the overall groundwater levels down gradient of the site will be reduced. However, the ES concludes that the proposed development site is not in hydraulic continuity with any of the designated nature conservation sites (including Blaen Cynon SAC) and the gradient of groundwater flow is to the south-west, whereas Blaen Cynon SAC is located to the north and east of the proposed development site.

At the time of preparing the full Environmental Statement, monitoring and reporting of a major intrusive investigation at the site was on-going, and thus only incomplete data was available for incorporation into the ES. The final report has now been completed and Envisage (2009) presents a summary of the findings of the report. The main conclusions with regard to the potential for impacts to groundwater from changes in the hydrological conditions or the disturbance of contamination at the site can be summarised as follows.

- Concentrations of contaminants which have Soil Guideline Values or Soil Screening Levels did not exceed their respective guideline values, and thus are not considered to pose a risk of contamination to site users or off site receptors.

- It is unlikely that there will be a risk of PAH contamination to site users or off site receptors.

- Soil samples from one trial pit suggested that one small area of the site has evidence of elevated hydrocarbon concentrations. Although the report identified that none of the Soil Screening Levels for aromatic or aliphatic fractions of the carbon bands were exceeded and thus no actual risk was considered to be present, some remediation could be undertaken to

ensure the removal of this hydrocarbon contamination, thereby removing any risk to controlled waters. Enviroparks intend to ensure that a suitable removal and remediation strategy is prepared for this small patch of contamination.

- Levels of copper, nickel and zinc encountered in soil samples were not considered high enough to inhibit plant growth.

- Comparison of the groundwater analysis results indicated that the groundwater underlying the site is relatively uncontaminated, with many of the results being below the level of detection. The majority of the contaminants in the analysed groundwater were considered to pose no risk to human health, surface waters, or groundwaters outside of the site. The report identified that in some areas, levels of benzo(a)pyrene and total petroleum hydrocarbons within the groundwater samples exceeded the maximum admissible concentrations for drinking water quality.

- The overall assessment of land and groundwater quality at the site suggested that based on the available evidence, the site may be developed without the need for remediation to remove risks to human health.

<u>During Construction</u>

The ES identifies that there are potential hydrological risks from construction works at the site. Construction sites can impact on watercourses through the release of pollution directly to surface waters or indirectly to groundwaters. A site management plan will be implemented and will consider the potential for water pollution. Mitigation measures will include the installation of earth bunds, the use of other bunding and spill protection, emergency response equipment and the early laying of hardstanding areas.

Further to the ES, and in response to consultations with CCW. Envisage (2009) confirm that the only subsurface works to be undertaken at the site consist of standard foundations, excavations, the provision of sub-surface rooms, and below surface drainage and utility runs. Envisage (2009) stated that Enviroparks have confirmed that ground and water disturbance will only occur during construction and will be limited to the site area. Where necessary, surveys will be

undertaken to determine the relevant dewatering rate of the work area to ensure that wider areas are not affected, and appropriate piling techniques will be applied. Subsurface works will be temporary, being restricted to the construction period only, and there is no requirement or intention for the site to abstract water from the ground.

During Operation

The ES identified that the proposed development will result in the conversion of much of the site to impermeable hardstanding. The drainage scheme design includes for the surface water from the building roofs to be collected and stored in tanks for use in the process. Surface water from the site surfaces will be directed to the sustainable drainage scheme holding pond, passing through interceptors en-route to remove any oils or grease collected from the site roadways. This will ensure protection of groundwater sources from any potential pollution impacts, and purpose built drainage and treatment systems will control the release of any surface water run-off or effluent. The remainder of the land will be landscaped and will include a large water storage feature by way of a water holding pond running along much of the southern boundary of the site. The surface water from the site will outfall into the current system of watercourses which flow south-west from the site and will not have any foreeable effect on the hydrology of Blaen Cynon SAC.

In conclusion, 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. In terms of groundwater, the hydrological studies completed to date show 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.

Thus, it can be concluded that the the present proposals will not result in any significant adverse impact on the integrity of Blaen Cynon SAC as a result of hydrological issues.

5.3.2 Air Quality

The Open Univerity (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 directly threatened by atmospheric pollution.

The Open Univeristy (no date) states that although uplands are more susceptible to atmospheric deposition of nitrogen, the effects can be seen in lowland areas too. Nitrogen deposition and the consequent eutrophication of ecosystems are now regarded as one of the most important causes of decline in plant species in the Netherlands. They present Figure 5.1 which shows how the number of grassland species of conservation interest in south Holland declines as the nitrogen load increases. The maximum percentage of species (approximately 95%) is possible at a nitrogen load of about 6 kg N ha^{-1} yr^{-1}. At loads higher than 10 kg N ha^{-1} yr^{-1} the number of species declines due to eutrophication effects, and below 5 kg ha^{-1} yr^{-1}nitrogen may be too limiting for a few species.

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.

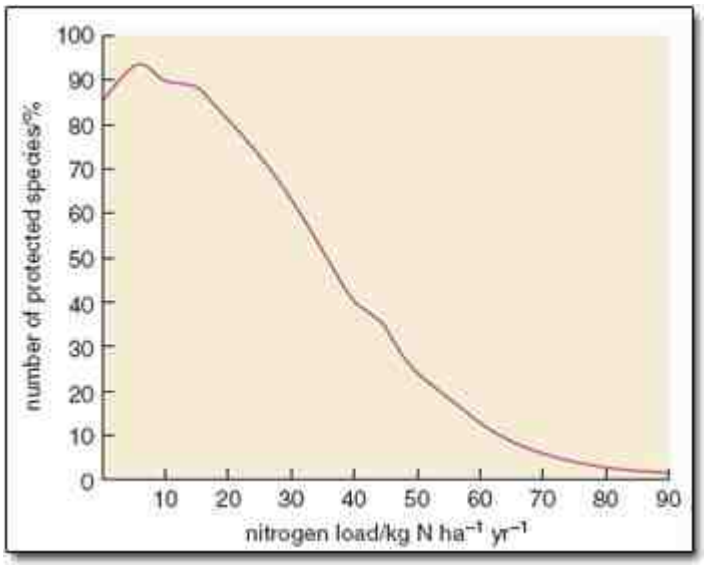


Figure 5.1: Relationship Between Potential Number of Protected Grassland Species in Grassland and Nitrogen Load in South Holland (from: Open University, no date)

Ascough (2005) studied the effects of acid deposition on species composition at Askham Bog Nature Reserve, York. This upland bog site is classified as a *Salix cinerea-Betula pubescens-Phragmites australis* woodland (NVC Code: W2) and the study aimed to assess changes in air pollution on the species composition at the site. Ascough (2005) states that at such upland bog sites under natural low levels of deposition productivity is limited by nitrogen availability (Aerts et al., 1992, cited by Ascough, 2005) due to the water-logged, anaerobic and acidic conditions which suppress mineralization and nitrification of the peat layer (Malmer et al., 2003, cited by Ascough, 2005) and therefore the main source of mineral input into raised ombrotrophic mires is the atmosphere, making them susceptible to any effects of elevated nitrogen deposition.

The author 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. Deposition levels of 5 kg N ha^{-2} yr^{-1} or higher are sufficient to significantly increase the N concentration in *Sphagnum* mosses, liverworts and shallow rooted vascular plants (Nordbakken *et al*., 2003, cited by Ascough, 2005) and would lead to undesirable changes in species composition and increased risk of desiccation of ombrotrophic mires (Tomassen et al., 2003, cited by Ascough, 2005) and levels of 12 kg N ha^{-2} yr^{-1} are sufficient to severely inhibit the growth of *Sphagnum* (Hogg et al., 1995, cited by Ascough).

Ascough (2005) cites a study by Lee and Caporn (1993) which shows the difficulties in determining critical loads for nitrogen deposition and stresses the need for more long-term perturbation experiments to mimic deposition processes. The authors conclude that the importance of nitrogen as a plant nutrient strongly suggests that there is no threshold below which an enhanced atmospheric nitrogen deposition will not influence ecological processes and that there may be a continuum of change induced in response to different rates of atmospheric deposition. Ascough (2005) states that Bobbink et al (2002), assign a critical load of 5-10 kg N ha^{-1} yr^{-1} for bog ecosystems, in their report and suggest that precipitation is an important factor when assigning critical loads; with drier areas (such like Askham Bog in the north-east of England) being more sensitive to nitrogen inputs than wetter areas (such as the north-west of England).

In her study Ascough (2005) considered the potential effect of increases in deposited nitrogen on the dominance of *Sphagnum* and *Molinia* within the site. She states that *Sphagnum* has an appreciable capacity to sequester deposited nitrogen, but at deposition levels of 18 kg N ha^{-2} yr^{-1} the living *Sphagnum* layer becomes saturated (Lamers et al., 2000, cited by Ascough, 2005) and nitrogen becomes available to vascular plants (Heijmens et al., 2002). The study shows that the deposition at the Askham Bog exceeded 18 kg N ha^{-2} yr^{-1}; and she states that this increased nutrient availability in the soil would favour the growth of *Molinia* and put the *Sphagnum* species at a competitive disadvantage.

APIS (no date) states that although there have been several reviews of acidification of the natural environment by anthropogenic sources of S and N, to date there have been relatively few attempts to quantify the specific damage to designated protected sites in Britain, nor to relate this to emission sources (Pearce, 1993, cited by APIS, no date). However, APIS (no date) conclude that despite difficulties (such as lack of reliable historical data, difficulties in identifying individual causes of change, restricted extent of field surveys and uncertainties involved in extrapolation) in proving conclusively the ecological effects of air pollutants, the weight of evidence suggests that enhanced S and N deposition is causing damage to a wide variety of habitats, communities and species in Britain (Press et al., 1986, cited by APIS, no date).
CCW (Barter, 2009) identified three key habitats within Blaen Cynon SAC which are of importance to the marsh fritillary butterfly.

<u>Base-poor flushed vegetation</u>
This includes NVC Habitat M6d: *Carex echinata-Sphagnum recurvum/auriculatum* mire, *Juncus acutiflorus* sub-community. This habitat is an acid, species-poor mire defined by the sharp-flowered rush *Juncus acutiflorus* recorded within it and typically occurring as small stands among other mire communities, grassland and heaths and sometimes with swamp and spring vegetation (Elkington et al, 2001). The soils beneath these habitat flushes are deep, wet and usually peaty with irrigating water that is acid with a pH between 4.4 and 5.7 (Averis et al, 2004).

Barter (2009) states that within Blaen Cynon SAC this habitat is presently relatively open in structure and rich in *Succisa*. She identified that *Molinia caerulea* and *Juncus acutiflorus* are the most likely species to benefit from increased nutrient deposition likely resulting in a increase in

the plant's height and density which may lead to shading of *Succisa* leaves and reduced recruitment from seed with light supporession and less open ground for germination.

Relatively dry *Molinia*-dominated marshy grassland on thin organic soils

This 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) states that *Molinia caerulea* are the species within this habitat most likely to benfit 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, identify that there may be some positive effect from increased nutrient deposition, and states 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.

WHO (2000) state that the effects of nitrogen enrichment on mesotrophic fens (such as the habitats detailed above) have been intensively studied in the Netherlands (Verhoeven and Smitz, 1991; Koerselman and Verhoeven, 1992, both cited by WHO, 2000) where many are of these habitats are managed as hay meadows with removal of the plant material. WHO (2000) state that a considerable increase of tall graminoids (grasses or *Carex* spp.) with a somewhat higher potential growth rate has been observed after experimental nitrogen addition in three Dutch fen ecosystems *(*Verhoeven and Smitz, 1991; Vermeer, 1986, both cited by WHO, 2000), causing a significant decrease in the diversity of the subordinate plant species. In one site, with a long history of hay-making, it has been shown that phosphorus deficiency was also a major factor in the productivity of the system, since much of this element was removed with the hay (Verhoeven and Smitz, 1991; Koerselman and Verhoeven, 1992, both cited by WHO, 2000). WHO (2000) state that using the results of fertilization trials and nutrient budget studies in these fen ecosystems carried out by (Koerselman and Verhoeven, 1992; Koerselman, 1986, both cited by WHO, 2000), with their relatively closed nitrogen cycle, it seems reasonable to establish a critical nitrogen load of 20–35 ha^{-1} yr^{-1}, based on the nitrogen output for usual management. In some fen ecosystems the critical nitrogen load based on the change in diversity may be substantially higher, because of the limitation of productivity by phosphorus (Verhoeven and Smitz, 1991; Egloff, 1987, both cited by WHO, 2000). Although it should be noted that, in this situation, the risks of nitrogen losses to surface water or groundwater will increase.

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. Table 5.1 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.

EAW (no date) state that the effects of pollutants on individual habitats and species are not always fully understood, therefore it is not always possible to conclude with absolute certainty that an exceedance is occurring or not. Where levels of deposition are below the most sensitive minimum critical loads it can be concluded that there is no adverse effect on features as a precautionary approach has been taken when setting the critical loads. Where deposition falls within the critical load range it is concluded that there is a possibility of an exceedance, as due to

site specific circumstances that often remain unknown, and the nature of the science of air pollution and its effects of habitats and species, an exceedance cannot be concluded with absolute certainty. Where deposition falls at the top end of the critical load range, or exceeds maximum critical load it is concluded that there is a high likelihood of exceedance. Again, without knowing site specific information EAW (no date) cannot conclude with absolute certainty. Table 5.2 provides a summary of the levels determined in the EAW (no date) report and the potential implications for Blaen Cynon SAC.

Table 5.1: Summary of Air Quality Effects on Grassland at Blaen Cynon SAC

(after EAW, no date)

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 deposition	The butterfly species relies on the presence of Devil's-bit scabious, on which the larvae feed. An increase in 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.	
Acidication	Whilst in the larval stage the marsh fritillary feeds only on Devils-bit scabious, which is 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.

Table 5.2: Summary of Air Pollution Level at Blaen Cynon SAC (continues)

(after EAW, no date)

Pollutant	Current Level	2010 Predicted Levels
Nitrogen dioxide (NO_2)	A critical level of NO_2 has not been set.	The study concludes that current NO_2 concentrations are not high enough at Blaen Cynon to be having an adverse effect on the integrity of the site. Predicted future concentrations indicate that concentrations are falling and will continue to fall.
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.	The predicted level for 2010 is 9.89 μg/m^3, below the critical level. Predicted future concentrations indicate that concentrations are falling and will continue to fall.
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.	There are currently no predictions for 2010. It is expected that concentrations will reduce further below those of 2005 due to National and European action to reduce this pollutant. It is likely that SO2 levels will continue to decline, thus no future threats are perceived.
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.	There are no 2010 predicted levels for ammonia. Reductions in future levels will be dependent on action to reduce emissions from agriculture.
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.	No information presented with respect to 2010 predicted levels.
Nutrient nitrogen	The data shows that nutrient nitrogen exceeds the minimum critical load but is just below the maximum critical load for marsh fritillary.	The model predicts that nutrient nitrogen will have decreased, but will still be above the minimum critical load for marsh fritillary.
Acid deposition	The data shows that acid deposition exceeds both the minimum and maximum critical loads for marsh fritillary.	The model predicts that acid deposition will have decreased, but will still be above both the minimum and maximum critical load for marsh fritillary.

Within the original Environmental Statement (Savills, 2008), information on an air dispersion modelling exercise was included. This modelled two proposed stack heights, and had informed the design of the site through full consideration of the contributions to the Air Quality Objectives and other air quality standards. The model considered both the process contribution (PC), i.e. the contribution which the process would have on the relevant air quality standards as a stand alone source, and the overall predicted environmental concentration (PEC) which considers the impact of the site in combination with other sources of pollution. In this instance, the current background data was taken to provide information on the present effects of other sources, be they natural, industrial or from transportation sources (Envisage, 2009).

Envisgae (2009) state that the modelling report presented as part of the Environmental Statement included information on the anticipated emissions to atmosphere from the site, meteorological conditions, the local terrain, the effects of site buildings and local surface roughness. Additionally, two separate stack heights were modelled, at 35 m and 40 m above ground level. The subsequent planning application included a 40 m high stack. However what was not apparent from the modelling report is the additional information which has been considered within the exercises. In order to fully inform the design process, modelling had considered not only differing stack heights, but also different stack locations, varying temperatures and velocities of the discharge gases, and the ability of off site buildings to affect plume dispersion. Although these models were run, they were not reported in an effort to ensure the report remained concise, and either because their effect was negligible, and / or because they did not form part of the final design.

Envisage (2009) identify that the fuel to be fired in the engines is highly processed before reaching the engine house, having passed through the Enviroparks system prior to this point with the sole purpose of creating an optimal fuel for combustion and thus energy production. Data on emissions was provided by the Enviroparks team engineers, and is almost independent of the variability of feedstock because the waste can be managed at every step of the process to create a high quality fuel. The data provided for use within the modelling exercises was considered to represent a worst case scenario for the engines whilst firing. Additionally, the model assumed that operation of all of the engines would be continuous throughout the year, and thus will naturally be an overestimate of emissions to atmosphere for a site which will require some maintenance and shutdown time.

Whilst the contribution of the process is a key element for consideration, Envisage (2009) state that it must be remembered that any impact from the site will contribute to current levels of pollution and will not act alone. Therefore it is important to consider the effect of the development in combination with any other impacts in the vicinity of the sensitive receptors. During the preparation of the initial Environmental Statement, an assessment was made of potential developments within the Local Authorities which may have a combined effect with the proposed Enviroparks site. It was deemed that there was nothing either passing through planning, or having received planning permission within sufficient proximity to the site and within the previous five years, that was likely to have any impact. Thus the available background concentrations and the changes to traffic flows in the area were applied as the only in combination effects. At the time of preparing their report, Envisage (2009) had not been able to fully consult the latest planning applications, although correspondence has been progressed with BBNPA, RCT and neighbouring Neath Port Talbot Local Authorities. Whilst information to date suggests that there are unlikely to be any planning applications or recent permissions which will require considering in combination with emissions from the proposed Enviroparks site, further work is still required to confirm that this is the case. Confirmation of any in-combination effects which have been taken into account will be provided within the final report. Within this report, the only in-combination effects which have been taken into consideration remain as the background levels of pollutants and projected traffic increases.

The output from the original model presented in the ES (Savills, 2008) was designed around a 3 km by 3 km grid with the proposed Enviropark site at the centre. This grid area covered Blaen Cynon SAC. The results from the model concluded that with a stack height of 40 m all pollutant concentrations, including those which incorporate a background concentration, are within the Air Quality Objective, Environmental Quality Standard, National Object or Environmental Assessment Level assigned to them.

Key assumptions were made during the original modelling exercises as follows:

- All of the NO_x was assumed to be NO_2, which has since been accepted as an over estimate.
- The modelling had included all of the stacks, but for a robust, and worst case approach had not combined these (which in this instance, improves dispersion and results in lower concentrations at ground level).

- No deposition rate had been applied to any pollutant, with gases instead being noted as "reactive" or "un-reactive", as no more comprehensive data was available at the time.

In response to the concerns from CCW and the Environment Agency Wales, the modelling was re-run in accordance with a strategy agreed with CCW during a meeting of 10th March 2009. New information therefore included in the modelling is as follows:

- Assessment of the deposition of nutrient nitrogen has been determined by multiplying the deposition concentration of NO_x (as NO_2) by 0.3043 to reduce the oxides of nitrogen to nutrient nitrogen.
- Deposition rates for NO_2 and SO_2 have been obtained and therefore the assessment has become much more specific and accurate.
- Assessment of acid deposition is calculated in accordance with information presented on the APIS website (www.apis.ac.uk), with two key differences: dry deposition rates only are included in the acid deposition rates presented as wet deposition is not appropriate for inclusion in this instance; and, as information on non-marine based cations is not available for this site, this factor has not been removed from the acid deposition calculations. See Envisage (2009) report for more details of the assumptions made.
- The flues have been combined which enables more account to be taken of the benefits of temperature and velocity interactions. Models have also been run which remove this combined effect, as one of the flues was set to only run about 50% of the time, however it is believed that this will run on a par with the other flues, and of course, if one flue is taken off line, that reduces the emissions, as well as removing the beneficial effect that any interaction can give. Therefore it is considered that the combined flue model is the most reasonable modelling scenario.

Information with respect to additional air quality assessments and models that have been completed for the site are from Envisage (2009). Full details of a modelling competed are provided in the Envisage report and are summaried below.

The tables presented below include the results from the modelling and calculation exercises for Blaen Cynon SAC. As a screening tool, the following standard criteria have been applied to the results to assess their significance:

- If the long term process contribution (PC) to ground level concentrations or deposition rates is less than 1% of the assessment level for any pollutant, the impact of that pollutant is likely to be insignificant.

- If the short term process contribution (PC) to ground level concentrations of deposition rates is less than 10% of the assessment level for any pollutant, the impact of that pollutant is likely to be insignificant.

- If the combination of the long term contribution to ground level concentrations or deposition rates, plus the background (known in combination as the predicted environmental concentration (PEC)) exceeds 70% of the assessment level for any pollutant, it is unlikely to have an insignificant effect, and therefore requires further, detailed modelling work (as already undertaken in this case).

The criteria used to determine whether a concentration can be considered to be insignificant consider that:

- As the proposed 1% long term criterion for process contributions is two orders of magnitude below the assessment level which represents the maximum acceptable concentration for the protection of the environment, a substantial safety factor has been built in. Even if the existing ambient quality in an area meant that a benchmark was already at risk due to releases from other sources, a contribution from the process of less that 1% (which is in itself likely to be an overestimate) would be only a small proportion of the total.

- The criterion for screening short-term emissions that are unlikely to lead to significant environmental impacts is proposed as 10% of the relevant short-term benchmark. The assumption is that for short term releases, differences in spatial and temporal conditions mean that the process contributions themselves are more likely to dominate and not the ambient environmental concentrations. If a maximum error factor of 10 is assumed for the estimation of short-term contributions, it suggested that those emissions below 10% of the short term EAL are unlikely to lead to breaches of a short-term benchmark. That said, short term exceedences of gases are unlikely to have a significant effect on ecosystems, as evidenced by

the lack of short term objectives for NO_2 or SO_2, when considering the protection of vegetation.

- For long-term releases the risk of breaching an assessment level is usually dominated by the background concentration rather than the process contribution, and hence the need to consider the predicted environmental concentration. Where analysis of ambient environmental quality for air indicates that the background level is already high for a substance released from the installation, there is a risk that the additional contribution from an individual installation may result in a breach of an environmental benchmark. Concentrations may be considered to be high where the predicted environmental concentration is 70% or more of the appropriate environmental benchmark or where an Air Quality Management Plan is in place for a particular substance. This criterion is based on a possible margin of error in monitoring background data in the region of ±50%.

Therefore the criteria for assessing process contributions are considered to represent a point beneath which, the effect of contributions to ground level concentrations will be insignificant. They do not represent the point at which concentrations necessarily become significant, particularly when considering the substantial safety margins which are factored into the insignificance thresholds. Conversley, predicted environmental concentrations above 70% of the assessment level will likely have a significant effect. Where the reported process contribution or predicted environmental concentration cannot be screened as insignificant in the following tables, these figures are marked in bold.

Table 5.3 presents a worst case for NO_2 and SO_2 process concentrations in air at Blaen Cynon SAC. This means that, all of the emissions of oxides of nitrogen (NO_x) are assumed to be nitrogen dioxide (NO_2), and no effects of deposition, which would have the effect of reducing the concentration of the pollutants in air, have been considered.

Table 5.3: Process Contribution of Oxides of Nitrogen and Sulphur Dioxide at Blaen Cynon SAC

Receptor	Oxides of Nitrogen as NO_2				Sulphur Dioxide			
	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})
Blaen Cynon SAC	4.0328	**13.44**	42.85	**21.42**	0.6460	**3.23**	6.7287	1.92

Table 5.3 shows that the percentage of objective for nitrogen as NO_2 and sulphur diodixe both exceed the 1% insignificance criteria. In addition, the percentage of hourly average exceeds the 10% insignificance criteria for oxides of nitrogen as NO_2.

Table 5.4 shows a comparison of the result of total oxides of nitrogen versus modelling with NO_x chemistry. Details on the chemistry modelling used is provided in Envisage (2009).

Table 5.4: Comparison of Results for Total Oxides of Nitrogen Release Versus Modelling with NO_x Chemistry at Blaen Cynon SAC

Receptor	Total Oxides of Nitrogen as NO_2				Nitrogen Dioxide Only (NO_x Chemistry)			
	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})
Blaen Cynon SAC	4.0328	**13.44**	42.85	**21.42**	2.8230	**9.41**	25.30	**12.65**

Table 5.4 shows that the percentage of objective for nitrogen as NO_2 and sulphur dioxide both exceed the 1% insignificance criteria. In addition, the percentage of hourly average exceeds the 10% insignificance criteria for both oxides of nitrogen as NO_2 and sulphur dioxide.

Tables 5.5 and 5.6 show the predicted environmental concentration (PEC) of oxides of nitrogen as NO_2 and sulphur dioxide repsectvely.

Table 5.5: Predicted Environmental Concentration of Oxides of Nitrogen as NO_2 at Blaen Cynon SAC Modelling with NO_x Chemistry

Receptor	Annual Average ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Hourly Average (99.79 percentile) ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Short Term Objective (200 ug m^{-3})
Blaen Cynon SAC	4.0328	11.8	15.83	52.78	42.85	11.8	54.65	27.32

Table 5.6: Predicted Environmental Concentration of Sulphur Dioxide at Blaen Cynon SAC

Receptor	Annual Average ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (20 ug m^{-3})	Hourly Average (99.73 percentile) ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Short Term Objective (350 ug m^{-3})
Blaen Cynon SAC	0.6460	2	2.65	13.23	6.7287	2	8.73	2.49

Table 5.7 shows the dry deposition of predicted nitrogen at Blaen Cynon SAC. It should be noted that with respect to this table, the current background concentration at Blaen Cynon SAC is already above the lower critical load (where available), and is also above the upper critical load (see Environment Agency data in Table 5.2).

Envisage (2009) state that information on critical loads and background concentrations is taken from the UK Air Pollution Information Service (APIS) website and from data provided by CCW (Barter, 2009). Data on the nitrogen deposition background is produced using a combination of measurement and modelling techniques. Data is measured across the country and is interpolated with consideration to meteorological conditions. The nearest measurement site to the proposed Enviroparks facility is situated approximately 16 km north north-east, at Crai Reservoir. The background levels reported here represent a 3 year average value (2003 – 2005) and have been mapped at a 5 km resolution.

Table 5.7 assumes that all NO_x is deposited as NO_2, and the resultant nitrogen is fully available for uptake by the ecosystems. This will therefore by a gross overestimate of the NO_2 deposition. The actual NO_2 release from the engines identified for use at the Enviroparks facility equates to 30 % or less of the total NO_x release.

Table 5.7: Predicted Nitrogen Deposition at Blaen Cynon SAC

Receptor	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO_2 Deposition ug $N/m^2/s$	Predicted NO_2 Deposition kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load	Current Background kg N/Ha/yr
Wet and dry deposition							
Blaen Cynon SAC	Wet, acidic marshy grassland	23.8	15 – 25	0.0741	7.11	**47.43**	**28.46**
	Marsh fritillary; alkaline fen and reedbed (poor fen)	23.8	10-20	0.0741	7.11	**71.14**	**35.57**
	Raised bog	23.8	5-10	0.0741	7.11	**142.28**	**71.14**
	Marshy grassland; alkaline fen and reedbed (poor fen)	23.8	10-20	0.0741	7.11	**71.14**	**35.57**
	Flush and spring; alkaline fen and reedbed (poor fen)	23.8	10-20	0.0741	7.11	**71.14**	**35.57**
	Species-rich unimproved grassland; hay meadow	23.8	20-30	0.0741	7.11	**35.57**	**23.71**
Dry deposition only							
Blaen Cynon SAC	Wet, acidic marshy grassland	23.8	15 – 25	0.0631	6.05	**40.36**	**24.21**
	Marsh fritillary; alkaline fen and reedbed (poor fen)	23.8	10-20	0.0631	6.05	**60.54**	**30.27**
	Raised bog	23.8	5-10	0.0631	6.05	**121.07**	**60.54**
	Marshy grassland; alkaline fen and reedbed (poor fen)	23.8	10-20	0.0631	6.05	**60.54**	**30.27**
	Flush and spring; alkaline fen and reedbed (poor fen)	23.8	10-20	0.0631	6.05	**60.54**	**30.27**
	Species-rich unimproved grassland; hay meadow	23.8	20-30	0.0631	6.05	**30.27**	**20.18**

Table 5.7 shows that when considering the effects of dry deposition of nitrogen at Blaen Cynon SAC the results exceed the insignificance threshold when compared against the lower critical load and the higher critical load. This is applicable depending on the critical load utilised, be it based on the data from the Environment Agency (no date) or from CCW (Barter, 2009). Newberry (2009) stated that the most vulverable of the habitats was raised bog and this is reflected by its lower critical load and therefore correspondingly, the highest percentages above the lower and higher critical loads.

When considering the effects of total deposition, the effect on Blaen Cynon SAC could not be screened as insignificant when compared to the lower or higher critical load, and seven of these also exceeded the threshold for significance when compared to the upper critical load. Table 5.7 also presents the result for wet and dry deposition and shows that the contribution of wet deposition to the total is much less significant than the contribution of dry deposition.

Envisage (2009) state that Laxen and Marner (2005) confirm that it is 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 identified an assumption of 50% NO_2 in NO_x release as being a robust approach. Laxen and Marner (2005) did not consider wet deposition in their study as it was not considered necessary. Using data from their study Envisage (2009) re-ran model for Blaen Cynon SAC to incorporate the information and combine the stacks within the proposed development. Table 5.8 presents nitrogen deposition data for Blaen Cynon SAC, with full consideration of the points detailed above and in the Envisage (2009) report.

Table 5.8: Predicted Nitrogen Deposition at Blaen Cynon SAC

Applying the Laxen and Marner (2005) Methodologies and Combining Flues

Receptor	Principal Habitat	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO_2 Deposition ug $N/m^2/s$	Predicted NO_2 Deposition kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load
Wet and dry deposition							
Blaen Cynon SAC	Wet, acidic marshy grassland	23.8	15-25	0.006862	0.66	**4.39**	**2.63**
	Marsh fritillary; alkaline fen and reedbed (poor fen)	23.8	10-20	0.006862	0.66	**6.59**	**3.29**
	Raised bog	23.8	5-10	0.006862	0.66	**13.17**	**6.59**
	Marshy grassland; alkaline fen and reedbed (poor fen)	23.8	10-20	0.006862	0.66	**6.59**	**3.29**
	Flush and spring; alkaline fen and reedbed (poor fen)	23.8	10-20	0.006862	0.66	**6.59**	**3.29**
	Species-rich unimproved grassland; hay meadow	23.8	20-30	0.006862	0.66	**3.29**	**2.20**
Dry deposition only							
Blaen Cynon SAC	Wet, acidic marshy grassland	23.8	15-25	0.002017	0.19	**1.29**	0.77
	Marsh fritillary; alkaline fen and reedbed (poor fen)	23.8	10-20	0.002017	0.19	**1.94**	0.97
	Raised bog	23.8	5-10	0.002017	0.19	**3.87**	**1.94**
	Marshy grassland; alkaline fen and reedbed (poor fen)	23.8	10-20	0.002017	0.19	**1.94**	0.97
	Flush and spring; alkaline fen and reedbed (poor fen)	23.8	10-20	0.002017	0.19	**1.94**	0.97
	Species-rich unimproved grassland; hay meadow	23.8	20-30	0.002017	0.19	0.97	0.65

Table 5.8 shows that when using the Lexan and Marner (2005) methodologies the percentage of dry deposition slightly exceeds the 1% insignificance criteria for the lower ciritical load, but only exceeds the 1% insignificance criteria for the higher critical load for raised bog habitats.

It was recognised that as the sensitive sites cover a much larger area than the single point specified by the grid reference detailed for each, the maximum predicted level of deposition of nitrogen at Blaen Cynon SAC was assessed across the whole site and also off site. Details of these calculations are presented in Envisage (2009). Through completing this assessment, Envisage (2009) conclude that although areas of the sensitive receptors will experience higher and lower concentrations than those identified in Table 5.8 as the approximate centre points of the receptors, the dry nitrogen deposition rate detailed for Blaen Cynon SAC in Table 5.8 will provide a deposition rate that can be considered reasonably average for the contribution of nutrient nitrogen to the whole site.

Table 5.9 shows the predicted acid deposition at Blaen Cynon SAC and identifies that the levels will be above the 1% of the critical load and 70% of the PEC insignificance criteria and therefore cannot be considered to be insignificant.

Table 5.8: Predicted Acid Deposition at Blaen Cynon SAC

Receptor	Current Background kg eq/Ha/yr	Critical Load kg eq/Ha/yr	Predicted SO_2 Deposition Kg eq/Ha/yr	Predicted NO_2 Deposition Kg eq/Ha/yr	Total Process Contribution to Deposition kg eq/Ha/yr	PC Percentage of Critical Load	PC + Background Percentage of Critical Load
Dry deposition only							
Blaen Cynon SAC	2.2	0.35	0.03807	0.01383	0.05189	**14.83**	**643.3983275**

Consideration was given to running models to consider total deposition (dry and wet deposition) for SO_2, as SO_2 is more soluble than NO_x, however, information subsequently provided by CERC confirmed that the deposition characteristics recommended by the Environment Agency need only consider significant releases of SO_3 and / or H_2SO_4, neither of which are relevant here. Hence data for wet deposition of SO_2 are not reported here. A dry deposition rate of 0.1 m s^{-1} was identified for SO_2. A subsequent figure of 0.12 m s^{-1} has been identified as the Environment Agency's recommended rate, however as no information is available on the concentrations of non-marine based sources of cations (Ca and Mg), which would be subtracted from the calculated rate of deposition of N and S, the results present in Table 5.10 for dry deposition

present a worst case assessment. Table 5.10 shows that the maximum predicted acid deposition at Blaen Cynon SAC and shows that the levels will be above the 1% of the critical load and 70% of the PEC insignificance criteria and therefore cannot be considered to be insignificant.

Table 5.10: Maximum Predicted Acid Deposition at Blaen Cynon SAC

Receptor	Current Background kg eq/Ha/yr	Critical Load kg eq/Ha/yr	Predicted SO_2 Deposition Kg eq/Ha/yr	Predicted NO_2 Deposition Kg eq/Ha/yr	Total Process Contribution to Deposition kg eq/Ha/yr	PC Percentage of Critical Load	PC + Background Percentage of Critical Load
Dry deposition only							
Blaen Cynon SAC	2.2	0.35	0.09855	0.03565	0.13420	**38.65**	**666.91**

Although the contribution of acid deposition cannot be ruled as insignificant at Blaen Cynon SAC when compared to the critical load, the process contribution is negligible when compared to the background concentrations believed to be present at the site.

Envisage (2009) states that Information on critical loads and background concentrations have been taken from the APIS website (www.apis.ac.uk). Data on the acid deposition background is produced using a combination of measurement and modelling techniques. Data is measured across the country and is interpolated with consideration to meteorological conditions. The nearest measurement site to the proposed Enviroparks facility is situated approximately 16 km north, north east, at Crai Reservoir. The background levels reported here represent a 3 year average value (2003 – 2005) and have been mapped at a 5 km resolution. In many cases the critical loads and levels applied do not vary spatially, but are linked to a specific habitat type. This process of using nationally available mapped data and habitat specific values is subject to a series of uncertainties. These include:

- Maps of pollutant concentration and deposition are mostly available at a 5 km grid resolution. For many pollutants there is real sub-grid variability which is not revealed in the 1 km or 5 km averages. The uncertainties are particularly large for the concentrations of primary pollutants e.g. NH_3, NO_X and SO_2.
- The critical loads data for acidity are linked to mapped soils data. The critical load is based on the dominant soil type in a 1km grid square and may not represent small areas of a square which may be more or less sensitive.

- The habitat specific critical loads and levels data are only available for a limited number of habitat types. In this case the most similar habitat is assigned to the habitat being considered. There are, therefore, uncertainties in both the best estimates of the critical loads and levels and in the assignment of habitats.

Envisage (2009) state that the process contribution to acid deposition at Blaen Cynon could not be considered insignificant, equating to 14.83% of the critical load (Table 5.9). When considering the maximum predicted deposition across the larger modelled grid, the maximum recorded concentration resulted in a deposition rate representing 38.65% of the critical load (Table 5.10). The report concludes however, that the current stated background for the site is 2.2 kg eq/Ha/year, against a critical load of 0.35 kg eq/Ha/year. The current background acid deposition rate therefore represents almost 630% of the critical load, and by comparison, the potential process contribution of 643% from the proposed Enviroparks site is negligible.

Consideration was also given to the potential effects of increased traffic movements on the concentrations of pollutants at the site. The Design Manual for Roads and Bridges calculation had been applied within the Transport Assessment of the Environmental Statement (Savills, 2008), however the contribution to deposition rates of NO_2 have also been calculated here. Table 5.11 demonstrates 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.

Table 5.11: Percentage Contribution to Critical Loads at Blaen Cynon SAC, With and Without the Increased Traffic of the Development

Percentage Contribution	Nitrogen Deposition at Identified Grid Reference for SAC		Maximum Recorded Nitrogen Deposition		Acid Deposition at Grid Receptor for SAC	Maximum Recorded Acid Deposition
	Lower Critical Load	Higher Critical Load	Lower Critical Load	Higher Critical Load	Lower Critical Load	Higher Critical Load
Industrial Emissions	**1.29**	0.77	**3.33**	**2.00**	**14.83**	**38.65**
Industrial and Traffic Emissions	**1.30**	0.78	**3.34**	**2.00**	**14.86**	**38.68**

Tables 5.12 to 5.15 show the process contribution and predicted environmental concentration of particulates, carbon monoxide and VOCs at Blaen Cynon SAC. Table 5.12 shows that with respect to VOCs the levels are higher than the 1% insignificance criteria for benzene. VOCs are compared against the AQO for benzene, but in reality will comprise more species than benzene alone, and therefore are not directly comparable in an assessment of insignificance. It is anticipated that benzene will comprise approximately 1% of the total VOCs. Envisage (2009) state that the AQO for benzene reduces to 5 ug m^{-3} on 31st December 2010. Application of this AQO results in a process contribution of VOCs of 5.0615% of the annual objective. This would result in a process contribution of benzene of approximately 0.05% of the annual objective and is therefore insignificant. The predicted environmental concentration of VOCs at Blaen Cynon represents 10.123% of the benzene future annual objective, or an estimated PEC of benzene of 0.1%. Therefore Envisage (2009) state that the benzene PEC at Blaen Cynon SAC can be considered to be insignificant.

Table 5.12: Process Contribution of Particulates, Carbon Monoxide and VOCs at Blaen Cynon SAC

Receptor	Particulates				Carbon Monoxide		VOCs	
	Annual Average ug m^{-3}	Percentage of Long Term Objective (40 ug m^{-3})	24 Hourly Average (90.41 percentile) ug m^{-3}	Percentage of Short Term Objective (50 ug m^{-3})	8 Hour Average mg m^{-3}	Percentage of Objective (10 mg m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Benzene Objective (16.25 ug m^{-3})
Blaen Cynon SAC	0.2674	0.67	0.789	1.58	0.00177	0.0177	0.2531	**1.56**

Table 5.13: Predicted Environmental Concentration of Particulates at Blaen Cynon SAC

Receptor	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (40 ug m^{-3})	24 Hourly Average (90.41 percentile) ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of 24 Hourly Average (50 ug m^{-3})
Blaen Cynon SAC	0.2674	15.37	15.63	39.09	0.789	15.37	16.16	32.31

Table 5.14: Predicted Environmental Concentration of Deposited Dust at Blaen Cynon SAC

Receptor	Level of Dry Deposited Dust ug/m^2/s	Level of Dry Deposited Dust mg/m_2/day	Critical Load of Deposited Dust mg/m^2/day	Percentage of Critical Load	Level of Total Deposited Dust ug/m^2/s	Level of Total Deposited Dust mg/m_2/day	Critical Load of Deposited Dust mg/m^2/day	Percentage of Critical Load
Blaen Cynon SAC	0.01228	1.0606	1,000	0.01061	0.01305	1.127917	1,000	0.01128

Table 5.15: Predicted Environmental Concentration of Carbon Monoxide and VOCs at Blaen Cynon SAC

Receptor	Carbon Monoxide				VOCs			
	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (10 mg m^{-3})	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Benzene Objective (16.25 ug m^{-3})
Blaen Cynon SAC	0.00177	0.00177	0.0035	0.035	0.2531	0.253	0.51	3.11

Tables 5.16 and 5.17 shows the process contributions of heavy metals, hydrogen chloride and hydrogen fluoride at Blaen Cynon SAC.

Table 5.16: Process Contribution of Heavy Metals at Blaen Cynon SAC

Recep-tor	Mercury		Arsenic		Cadmium	
	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.25 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.006 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.005 ug m^{-3})
Blaen Cynon SAC	0.000451	0.1804	0.004509	**8.35**	0.000451	**4.5095**

Table 5.17: Process Contribution of Hydrogen Chloride and Hydrogen Fluoride at Blaen Cynon SAC

Recep-tor	Hydrogen Chloride		Hydrogen Fluoride	
	Annual Average ug m^{-3}	Percentage of Long Term Objective (20 ug m^{-3})	Maximum Hourly Concentration ug m^{-3}	Percentage of Short Term Objective (250 ug m^{-3})
Blaen Cynon SAC	0.0902	0.4509	0.1554	0.0622

Envisage (2009) state that in Table 5.16 the annual average of arsenic represents the total emission of antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium. Hence the reported percentage of the objective represents 1/9th the actual percentage of the annual average over the arsenic objective. Similarly, cadmium and thallium were modelled together and thus the annual average represents the total emission of both species, whereas the percentage has been divided by two to represent the percentage of the annual average over the arsenic objective. Table 5.16 shows that at Blaen Cynon SAC the process contributions of mercury, hydrogen chloride and hydrogen fluoride can be ruled as insignificant as the percentage contributions are less than 1%. However, Table 5.16 also shows that both arsenic and cadmium cannot be ruled as insignificant as the percentage contributions are above 1%.

Table 5.18 considers annual average contributions at Blaen Cynon SAC given the fact that at this site arsenic and cadmium cannot be ruled as insignificant. Envisage (2009) states that as these two species have the lowest target values, where these can be ruled as insignificant, all similar modelled species can also be ruled as insignificant.

Envisage (2009) state that the long term annual average of Volatile Organic Compounds (VOCs), arsenic, cadmium and nickel could not be screened as insignificant at the Blaen Cynon SAC. The process contribution (PC) of total VOCs was compared to the single species air quality objective (AQO) for benzene, and is therefore not directly comparable. The PC for VOCs represents 1.5574% of the current AQO for benzene and 5.0615% of the future limit (31st December 2010). As the total VOC emission will comprise a significant number of species, and benzene will likely make up approximately 1% of the total, it is reasonable to screen VOCs / benzene as insignificant.

Table 5.18: Assessment of Other Modelled Metals Against their Respective Target Values or Environmental Assessment Levels at Blaen Cynon SAC

Species	Total Annual Average at Blaen Cynon SAC ug m^{-3}	Annual Average of Individual Species at Blaen Cynon SAC ug m^{-3}	Target Value / EAL	Percentage of Target Value / EAL
Antimony	0.004509	0.00050	5 µg m^{-3}	0.010
Lead	0.004509	0.00050	0.25 µg m^{-3}	0.200
Chromium	0.004509	0.00050	0.1 µg m^{-3}	0.501
Cobalt	0.004509	0.00050	0.2 µg m^{-3}	0.251
Copper	0.004509	0.00050	10 µg m^{-3}	0.005
Manganese	0.004509	0.00050	1 µg m^{-3}	0.050
Nickel	0.004509	0.00050	0.020 µg m^{-3}	**2.505**
Vanadium	0.004509	0.00050	5 µg m^{-3}	0.010
Thallium	0.000451	0.000225	1 µg m^{-3}	0.02255

Table 5.19: Assessment of Deposition Rates of Metals and Fluoride Against Maximum Deposition Rates for Soils

Species	Deposited Rate at Blaen Cynon mg m^{-2} day	Maximum Deposition Rate mg m^{-2} day	Percentage of Maximum Deposition Rate
Fluoride	0.011684	2.1	0.56
Arsenic	0.000042	0.02	0.21
Chromium	0.000042	1.5	0.003
Copper	0.000042	0.25	0.02
Lead	0.000042	1.1	0.004
Mercury	0.000037	0.004	0.94
Nickel	0.000042	0.11	0.04

The maximum deposition rate (MDR) is the quantity of pollutant which can be added to the soil daily over 50 years before the selected soil quality criteria is exceeded. MDRs are not available for all species.

The Envisage (2009) report concludes that the process contributions (long and / or short term) of particulates, carbon monoxide, hydrogen chloride, hydrogen fluoride, antimony, lead, chromium, cobalt, copper, manganese, vanadium and thallium, were sufficiently low to screen each of these pollutants as insignificant.

4.3.3 Light Pollution

With respect to light pollution from the completed development, none of the qualifying features within Blaen Cynon SAC will be affected by light pollution. Marsh fritillary butterflies do not fly at night and therefore will not be affected by any light pollution from the site. That said the

the lighting strategy would be designed such that there would not be any significant spillage of light from the development or light pollution.

The site will operate 24 hours a day, 7 days a week and at all times between dawn and dusk there will be a requirement to light parts of the development to allow safe access to working areas. Final details of the lighting strategy have not yet been formalised, however, it is understood that the lighting would be designed but the general measures and requirements for the lighting would be as follows:

- Some areas such as roadways would need to lit all the time. This is likely to include lighting mounted on columns 6 m high, directed towards the ground. Any other areas requiring lighting are likely to utilise the same lighting.
- To facilitate movement between buildings at night lighting could be on light switches.
- Based on the preliminary lighting design the light levels at the site boundary are anticipated to be 10lux, equivalent to a barely sufficient level to walk in. The proposed landscape planting at the edges of the site would reduce this even further.
- Lighting would be designed in accordance with BREEAM recommendations to achieve a lower level of brightness and minimise of avoid any reflection of light from ground services.

5.4 SUMMARY OF POTENTIAL EFFECTS ON BLAEN CYNON SAC

Table 5.20 summarises the potential impacts of the present proposals on the qualifying features of the Blaen Cynon SAC.

Table 5.20: Summary of Potential Impacts of the Present Proposals on Qualifying Features of Blaen Cynon SAC (continues)

European Site Affected	Potential Project Hazard	Consequence for Qualifying Features	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Blaen Cynon SAC Shortest distance to scheme: 100 m east	Loss of habitats within proposed development plots	Loss of habitat not being used by qualifying species but close to European Site	Negligible permanent, irreversible	Negligible	Surveys have shown that the site does not support any of the Qualifying Features listed on the SAC.
	Disturbance from construction to qualifying butterfly species	Disturbance to butterflies using European Site which may discourage breeding or require the butterflies to look for alternative sites	Negligible permanent, irreversible	Negligible	There is no evidence that construction activitites 100 m from the European Site will have significant impact on the use of the European Site by marsh fritillary.
	Disturbance from operation to qualifying butterfly species	Disturbance to butterflies using European Site which may discourage breeding or require the butterflies to look for alternative sites	Negligible permanent, irreversible	Negligible	There is no evidence that operation activitites 100 m from the European Site will have significant impact on the use of the European Site by marsh fritillary.

Table 5.20 (cont.): Summary of Potential Impacts of the Present Proposals on Qualifying Features of Blaen Cynon SAC

European Site Affected	Potential Project Hazard	Consequence for Qualifying Features	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Blaen Cynon SAC Shortest distance to scheme: 100 m east	Deleterious change to surface water within European Site	Effect on integrity of marshy grassland habitat within European Site	Major negative, potentially permanent, possibly reversible	Negligible as surface water changes will not effect European Site's hydrology	The proposed development site and the European Site are not hydrologically linked through surface water systems.
	Deleterious change to groundwater within European Site	Effect on integrity of marshy grassland habitat within European Site	Major negative, potentially permanent, possibly reversible	Negligible as groundwater changes will not effect European Site's hydrology	The groundwater gradient extends in a south-west direction away from the European Site which is located to the north and east.
	Changes to air quality	Loss of qualifying features and site's ecological integrity.	Major negative, potentially permanent, possibly reversible.	Negligible with appropriate measures designed into the system.	Although some air pollutants cannot be screened as insignificant, the contribution of these pollutants to background concentrations is within the AQO guidelines and considered to be negligible in terms of the potential effect on the integrity of qualifying features.
	Light pollution	None. Light pollution will not impact on any of the Qualifying Features.	Negligible, potentially permanent, possibly reversible.	Negligible	Lighting strategy designed to minimise light pollution to landscaping buffer around edge of site.

6. POTENTIAL EFFECTS ON COEDYDD NEDD A MELLTE SAC

MN2000 makes it clear that where a project is likely to have significant effects on a Natura 2000 site it is also likely that both an Article 6 assessment and an EIA, in accordance with Directive 85/337/EEC and 91/11/EC, will be necessary (Oxford Brookes, 2001).

6.1 POTENTIAL EFFECTS

Using the guidelines produced by Oxford Brookes (2001) the likely changes to a European Site may arise as a result of:

- Reduction of habitat area;
- Disturbance to key species;
- Habitat or species fragmentation;
- Reduction in species density;
- Changes in key indicators of conservation value (water quality etc); and,
- Climate change.

Coedydd Nedd a Mellte SAC is located 1.8 km west north-west of the proposed development site. The present proposals will require no landtake from Coedydd Nedd a Mellte SAC nor will they affect the boundary of the site. Given the distance from the proposed development to the SAC it can be concluded that there would be no direct impacts on the SAC as a result of the proposed development.

It is recognised, however, that there may be indirect impacts from the proposed development on Coedydd Nedd a Mellte SAC. Foreseen effects could relate to the following:

- Hydrological changes; and,
- Air quality changes;

The possibility of either of these facets of the scheme exerting a significant ecological effect on any of the qualifying features of Coedydd Nedd a Mellte SAC are assessed below.

6.2 DIRECT EFFECTS

Given the distance from the proposed development to the SAC it can be concluded that there would be no direct effects on the SAC as a result of the proposed development.

6.3 INDIRECT EFFECTS

6.3.1 Hydrological Changes

Given the location of Coedydd Nedd a Mellte SAC 1.8 km west north-west 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 Coedydd Nedd a Mellte SAC as a result of hydrological changes brought about by the proposed development.

6.3.2 Air Quality

The habitats within Coedydd Nedd a Mellte SAC correspond to the following NVC habitats:

W10e *Quercus robur – Pteridium aqualinium – Rubus fruticosus* woodland

This woodland is characteristic of base-poor brown soils throughout the temperate lowlands of southern Britain. The woodland rarely occurs on limestones or calcareous superficial desosits, nor on soils derived from more pervious acidic deposits. The woodland is characteristic of soils with a superficial pH of 4 and 5.5 but which sow a great variety of textures and of water and humus regimes (Rodwell, 1991).

W11 *Quercus petraea – Betula Pubescens – Oxalis acetosella* woodland

The woodland is typically a community of moist buyt free-drainaing and quite base-poor soils in the cooler and wetter north-west of Britain. Grazing by stock and deer contributes greatly to the character of the field layer and hinders regeneration. It is characteristic of substrates that are neither markedly calcareous nor strongly acidic (Rodwell, 1991).

W16b *Quercus* spp. – *Betula* spp. – *Deschampsia flexuosa* woodland, *Vaccinium myrtillus* – *Dryopteris dilatata* sub-community

These woodlands are confined to very acid and oligotrophic soils in the southern lowlands of Britain and the upland fringes of the Pennines. The community occupies one extreme among loland soils, being limited to lime-free profiles with a superficial pH that is rarely above 4. This sub-community has a poorly-developed understorey, a reflection of the fact that they are often open to sheep and deer (Rodwell, 1991).

W17 *Quercus petraea – Betula pubescens – Dicranum majus* woodland

This is a community of very acid and often shallow and fragmentary soils in the cooler and wetter north-west of Britain. The soils are typically lime-free with a surface pH generally below 4 (Rodwell, 1991).

W8 *Fraximus excelsior – Acer campestre – Mercurialis perennis* woodland

This woodland is typically a community of calcareous mull oisls in the warm and dry lowlands of southern Britain. The woodland occurs on soils derived from a wide variety of more calcareous parent materials, most common over sedimentary limestones, shales and clays and superficial deposits such as glacial drift. Surface pH of the soils under the community can be reduced to 4.5 or less, base-rich conditions are usually maintained below. Where the influence of parent material is more dominant the profiles can be base-rich and calcareous throughout, with surface pH between 6 and 7 or more (Rodwell, 1991). The community compostion reflects this by the stone representation of woodland plants tolerant of more base-rich conditions.

W9 *Fraxinus excelsior – Sorbus aucuparia – Mercurialis perennis* woodland

This woodland is characteristic of permanently moist brown soils derived from calcareous bedrocks and superficials in the sub-montane climate of north-west Britain (Rodwell, 1991).

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, continues high inputs of nitrogen produce negative effects on tree growth (Chaplin, 1980, cited by WHO, 2000). Wellburn (1988, cited by WHO, 2000) states that 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 have important assemblages of epiphytic lichens. WHO (2000) state that a a survey in central Netherlands concluded that between 1958 and 1981 when nitrogen input increased from 20 k ha^{-1} $year^{-1}$ to 40 k ha^{-1} $year^{-1}$ all ichens 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 onserved in these high pH (6.9) stands which show that at this location, with an ambient depsotion of 15-20 k ha^{-1} $year^{-1}$ a distinct effect of increasing nitrogen availability could be detected in the vegetation (Thimonier, 1994).

To assess the potential effect of air pollution from the proposed development site on the habitats within Coedydd Nedd a Mellte SAC additional assessment work has been completed with respect to air quality for Coedydd Nedd a Mellte SAC in accordance with the information presented for Blaen Cynon SAC in Section 5.3.2. Where the reported process contribution or predicted environmental concentration cannot be screened as insignificant in the following tables, these figures are marked in bold.

Table 6.1 presents a worst case for NO_2 and SO_2 process concentrations in air at Coedydd Nedd a Mellte SAC. Tables 6.2 and 6.3 present the predicted environmental concentrations of oxides of nitrogen and suphur dioxide respectively.

Table 6.1: Process Contribution of Oxides of Nitrogen and Sulphur Dioxide at Coedydd Nedd a Mellte SAC

Receptor	Oxides of Nitrogen as NO_2				Sulphur Dioxide			
	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.1524	0.51	7.72	3.86	0.0245	0.12	1.1361	0.32

Table 6.2: Predicted Environmental Concentration of Total Oxides of Nitrogen as NO_2 at Coedydd Nedd a Mellte SAC Modelling with NO_x Chemistry

Receptor	Annual Average ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Hourly Average (99.79 percentile) ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Short Term Objective (200 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.1524	8	8.15	27.17	7.72	8	15.72	7.86

Table 6.3: Predicted Environmental Concentration of Sulphur Dioxide at Coedydd Nedd a Mellte SAC

Receptor	Annual Average ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (20 ug m^{-3})	Hourly Average (99.73 percentile) ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Short Term Objective (350 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.0245	2	2.02	10.12	1.1361	2	3.14	0.90

Tables 6.1 to 6.3 show that the potential effects of oxides of nitrogen and sulphur dioxide at at Coedydd Nedd a Mellte SAC can be screened as insignificant.

Table 6.4 shows the predicted nitrogen deposition at Coedydd Nedd a Mellte SAC which shows that the nitrogen deposition is above the 1% insignificance criteria for both the lower and the higher cirital load.

Envisage (2009) state that information on critical loads and background concentrations is taken from the UK Air Pollution Information Service (APIS) website and from data provided by CCW (Barter, 2009). Data on the nitrogen deposition background is produced using a combination of measurement and modelling techniques. Data is measured across the country and is interpolated with consideration to meteorological conditions. The nearest measurement site to the proposed Enviroparks facility is situated approximately 16 km north north-east, at Crai Reservoir. The background levels reported here represent a 3 year average value (2003 – 2005) and have been mapped at a 5 km resolution.

Table 6.4: Predicted Nitrogen Deposition at Coedydd Nedd a Mellte SAC

Receptor	Principal Habitat	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO_2 Deposition ug/m2/s	Deposited Concentration kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load
Dry and wet deposition							
Coedydd Nedd a Mellte SAC	Oak woodland	37.4	10 – 15	0.0031	0.29	**2.94**	**1.96**
	Old sessile; oak woodland	37.4	10 – 15	0.0031	0.29	**2.94**	**1.96**
	Tilio-Acerion; ash woodland	37.4	10 – 15	0.0031	0.29	**2.94**	**1.96**
Dry deposition only							
Coedydd Nedd a Mellte SAC	Oak woodland	37.4	10 – 15	0.0025	0.24	**2.38**	**1.59**
	Old sessile; oak woodland	37.4	10 – 15	0.0025	0.24	**2.38**	**1.59**
	Tilio-Acerion; ash woodland	37.4	10 – 15	0.0025	0.24	**2.38**	**1.59**

As detailed for Blaen Cynon SAC in Section 5.3.2 Table 6.4 shows that the levels cannot be screened as insignificant and therefore the model was re-run using Laxen and Marner (2005) methodologies and the results are shown in Table 6.5.

Table 6.5: Predicted Nitrogen Deposition at Coedydd Nedd a Mellte SAC

Applying the Laxen and Marner (2005) Methodologies and Combining Flues

Receptor	Principal Habitat	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO_2 Deposition ug $N/m^2/s$	Predicted NO_2 Deposition kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load
Dry deposition only							
Coedydd Nedd a Mellte SAC	Oak woodland	37.4	10 – 15	0.000104	0.01	0.10	0.07
	Old sessile; oak woodland	37.4	10 – 15	0.000104	0.01	0.10	0.07
	Tilio-Acerion; ash woodland	37.4	10 – 15	0.000104	0.01	0.10	0.07

Table 6.5 clearly shows that the percentage of both the lower and higher critical loads with respect to nitrogen deposition at Coedydd Nedd a Mellte SAC are below 1% and can therefore be considered to be insignificant.

Table 6.6 presents the result of the predicted acid deposition at Coedydd Nedd a Mellte SAC which clearly shows that the percentage the critical load with respect to acid deposition at Coedydd Nedd a Mellte SAC is below 1% and can therefore be considered to be insignificant, although the PEC is higher than the 70% significant level.

Table 6.6: Predicted Acid Deposition at Coedydd Nedd a Mellte SAC

Receptor	Current Background kg eq/Ha/yr	Critical Load kg eq/Ha/yr	Predicted SO_2 Deposition Kg eq/Ha/yr	Predicted NO_2 Deposition Kg eq/Ha/yr	Total Process Contribution to Deposition kg eq/Ha/yr	PC Percentage of Critical Load	PC + Background Percentage of Critical Load
Dry deposition only							
Coedydd Nedd a Mellte SAC	3.25	2.22	0.00190	0.00071	0.00261	0.12	**146.5140886**

Tables 6.7 to 6.10 present the process contribution and predicted environmental concentration respectively of particulates, carbon monoxide and VOCs at Coedydd Nedd a Mellte SAC and shows that these can be screened as insignificant as they are below the 1% insignificance criteria.

Table 6.7: Process Contribution of Particulates, Carbon Monoxide and VOCs at Coedydd Nedd a Mellte SAC

Receptor	Particulates				Carbon Monoxide		VOCs	
	Annual Average ug m^{-3}	Percentage of Objective (40 ug m^{-3})	24 Hourly Average (90.41 percentile) ug m^{-3}	Percentage of Hourly Average (50 ug m^{-3})	8 Hour Average mg m^{-3}	Percentage of Objective (10 mg m^{-3})	Annual Average ug m^{-3}	Percentage of Benzene Objective (16.25 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.0104	0.03	0.037	0.07	0.00007	0.0007	0.0099	0.06

Table 6.8: Predicted Environmental Concentration of Particulates at Coedydd Nedd a Mellte SAC

Receptor	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (40 ug m^{-3})	24 Hourly Average (90.41 percentile) ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of 24 Hourly Average (50 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.0104	14.49	14.50	36.24	0.037	14.49	14.52	29.05

Table 6.9: Predicted Environmental Concentration of Deposited Dust at Coedydd Nedd a Mellte SAC

Receptor	Level of Dry Deposited Dust ug/m^2/s	Level of Dry Deposited Dust mg/m_2/day	Critical Load of Deposited Dust mg/m^2/day	Percentage of Critical Load	Level of Total Deposited Dust ug/m^2/s	Level of Total Deposited Dust mg/m_2/day	Critical Load of Deposited Dust mg/m^2/day	Percentage of Critical Load
Coedydd Nedd a Mellte SAC	0.00053	0.0455	1,000	0.00046	0.00056	0.048706	1,000	0.00049

Table 6.10: Predicted Environmental Concentration of Carbon Monoxide and VOCs at Coedydd Nedd a Mellte SAC

Receptor	Carbon Monoxide				VOCs			
	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (10 mg m^{-3})	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Benzene Objective (16.25 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.00007	0.00014	0.0002	0.002	0.0099	0.020	0.03	0.18

In Tables 6.11 and 6.12 the process contribution of heavy metals, hydrogen chloride and hydrogen fluoride at Coedydd Nedd a Mellte SAC are shown. Given the data in the tables it can be concluded that the effects from these will be insignificant.

Table 6.11: Process Contribution of Heavy Metals at Coedydd Nedd a Mellte SAC

Receptor	Mercury		Arsenic		Cadmium	
	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.25 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.006 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.005 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.000018	0.0071	0.000177	0.33	0.000018	0.1770

Table 6.12: Process Contribution of Hydrogen Chloride and Hydrogen Fluoride at Coedydd Nedd a Mellte SAC

Receptor	Hydrogen Chloride		Hydrogen Fluoride	
	Annual Average ug m^{-3}	Percentage of Long Term Objective (20 ug m^{-3})	Maximum Hourly Concentration ug m^{-3}	Percentage of Short Term Objective (250 ug m^{-3})
Coedydd Nedd a Mellte SAC	0.0035	0.0177	0.0253	0.0101

6.4 SUMMARY OF POTENTIAL EFFECTS ON COEDYDD NEDD A MELLTE SAC

Table 6.13 summarises the potential impacts of the present proposals on the qualifying features of Coedydd Nedd a Mellte SAC.

Table 6.13: Summary of Potential Impacts of the Present Proposals on Qualifying Features of Coedydd Nedd a Mellte SAC

European Site Affected	Potential Project Hazard	Consequence for Qualifying Features	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Coedydd Nedd a Mellte SAC Shortest distance to scheme: 1.1 km west north-west	Deleterious change to water quality and quantity available to SAC	Loss of qualifying features and site's ecological integrity.	Major negative, potentially permanent, possibly reversible.	Negligible.	The proposed development site and the SAC are not hydrologically connected and therefore changes to the hydrology of the site will not effect the SAC.
	Deleterious change to air quality	Delaterious change to qualifying features and site's ecological integrity.	Major negative, potentially permanent, possibly reversible.	Negligible with appropriate measures in place.	The potential contributions from air pollution to the current background levels are below the 1% level and therefore can be deemed to be insignificant.

7. POTENTIAL EFFECTS ON CWM CADLAN SAC

7.1 POTENTIAL EFFECTS

Using the guidelines produced by Oxford Brookes (2001) the likely changes to a European Site may arise as a result of:

- Reduction of habitat area;
- Disturbance to key species;
- Habitat or species fragmentation;
- Reduction in species density;
- Changes in key indicators of conservation value (water quality etc); and,
- Climate change.

Cwm Cadlan SAC considered in this chapter is located 2.4 km north-east of the proposed development site. The present proposals will require no landtake from Cwm Cadlan SAC nor will they affect the boundary of the site. Given the distance from the proposed development to the SAC it can be concluded that there would be no direct impacts on the SAC as a result of the proposed development.

It is recognised, however, that there may be indirect impacts from the proposed development on Cwm Cadlan SAC. Foreseen effects could relate to the following:

- Hydrological changes; and,
- Air quality changes;

The possibility of either of these facets of the scheme exerting a significant ecological effect on any of the qualifying features of Cwm Cadlan SAC are assessed below.

7.2 DIRECT EFFECTS

Given the distance from the proposed development to the SAC it can be concluded that there would be no direct effects on the SAC as a result of the proposed development.

7.3 INDIRECT EFFECTS

7.3.1 Hydrological Changes

Given the location of Cwm Cadlan SAC 2.4 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.

7.3.2 Air Quality

The habitats within Cwm Cadlan SAC correspond to the following NVC habitats:

M24 *Molinia caerulea – Cirsium disectum* fen-meadow

This is a community of moist to fairly dry peats and peaty mineral soils which are circumneutral, generally having a pH within the range 5-6.5. It can be found in association with both soligenous and topogenous mires, typically marking out the better-drained fringes of bogs and fens, or the margins of wet hollows and flushes. This community is widespread through the lowland south of Britain but has become increasingly local with changes in agricultural practice (Elkington et al, 2001).

Although climate and soil together both influence the floristics of this community it is essentially a secondary vegetation type, derived from a variety of wetland vegetation types and maintained by mowing or grazing. In the absence of any kind of treatment all the stands of the community would probably progress to scrub or woodland (Elkington et al, 2001).

M26 *Molinia Caerulea – Crepis dissectum* mire

This is a very local community of moist, moderately base-rich and calcareous peats and peaty mineral soils. This community is an apparently stable component of topogenous sequences around open waters and mires, but where it occurs on flushed slopes, grazing often maintains the community and prevents progression of the community to scrub or woodland (Elkington et al, 2001).

M9 *Carex rostrata – Calliergon cuspidatum / giganteum* mire

This community is characteristic of soft, spongy peats kept permanently moist by at least moderately base-rich and calcareous waters. Waters and substrates always have a pH above 5 and usually above 6. It is commonest in wetter parts of topogenous mires in hollows or old peatworkings, but also around springs, laggs of raised mires and mowing marshes (Elkington et al, 2001).

M10 *Carex dioica – Pinguicula vulgaris* mire

This community is typically a soligenous mire of mineral soils and shallow peats kept very wet by base-rich, calcareous and oligotrophic waters. The pH of flushing waters is high, usually between 5.5 and 7.0 or sometimes higher, and the composition of this community is one of the most calcicolous of British mires. It is found in small stands, often associated with spring and rill vegetation, within grasslands and more occasionally in ombrogenous mires and around topogenous mires (Elkington et al, 2001).

M13 *Schoenus nigricans – Juncus subnodulosus* mire

This community is confined to peat or mineral soils, in and around lowland mires irrigated by base-rich, highly calcareous, and oligotrophic waters. It is often found below springs and seepage lines and on flushed margins of valley mires, but also extends into topogenous basins provided there is close contact with waters draining from lime-rich substrates. The flushing waters typically have pH between 6.5 and 8. The structure and floristics of this community are often influenced by grazing and some stands have been affected by mowing and burning (Elkington et al, 2001).

Information with respect to the potential effect of air pollution on wetland habitats similar to those outlined above is present in Section 5.3.2 with respect to Blaen Cynon SAC and is therefore not repeated here.

To assess the potential effect of air pollution from the proposed development site on the habitats within Cwm Cadlan SAC additional assessment work has been completed with respect to air quality for Cwm Cadlan SAC in accordance with the information presented for Blaen Cynon SAC in Section 5.3.2. Where the reported process contribution or predicted environmental

concentration cannot be screened as insignificant in the following tables, these figures are marked in bold.

Table 7.1 presents a worst case for NO_2 and SO_2 process concentrations in air at Cwm Cadlan SAC. Tables 7.2 and 7.3 present the predicted environmental concentrations of oxides of nitrogen and suphur dioxide respectively.

Table 7.1: Process Contribution of Oxides of Nitrogen and Sulphur Dioxide at Cwm Cadlan SAC

Receptor	Oxides of Nitrogen as NO_2				Sulphur Dioxide			
	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})
Cwm Cadlan SAC	0.0980	0.33	4.48	2.24	0.0157	0.08	0.6576	0.19

Table7.2: Predicted Environmental Concentration of Total Oxides of Nitrogen as NO_2 at Cwm Cadlan SAC Modelling with NO_x Chemistry

Receptor	Annual Average ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (30 ug m^{-3})	Hourly Average (99.79 percentile) ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Short Term Objective (200 ug m^{-3})
Cwm Cadlan SAC	0.0980	8.3	8.40	27.99	4.48	8.3	12.78	6.39

Table 7.3: Predicted Environmental Concentration of Sulphur Dioxide at Cwm Cadlan SAC

Receptor	Annual Average ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (20 ug m^{-3})	Hourly Average (99.73 percentile) ug m^{-3}	Background Conc. ug m^{-3}	PEC ug m^{-3}	Percentage of Short Term Objective (350 ug m^{-3})
Cwm Cadlan SAC	0.0157	1.3	1.32	6.58	0.6576	1.3	1.96	0.56

Tables 7.1 to 7.3 show that the potential effects of oxides of nitrogen and sulphur dioxide at Cwm Cadlan SAC can be screened as insignificant.

Table 7.4 shows the predicted nitrogen deposition at Coedydd Nedd a Mellte SAC which shows that the nitrogen deposition is above the 1% insignificance criteria for both the lower and the higher cirital load.

Envisage (2009) state that information on critical loads and background concentrations is taken from the UK Air Pollution Information Service (APIS) website and from data provided by CCW (Barter, 2009). Data on the nitrogen deposition background is produced using a combination of measurement and modelling techniques. Data is measured across the country and is interpolated with consideration to meteorological conditions. The nearest measurement site to the proposed Enviroparks facility is situated approximately 16 km north north-east, at Crai Reservoir. The background levels reported here represent a 3 year average value (2003 – 2005) and have been mapped at a 5 km resolution.

As detailed for Blaen Cynon SAC in Section 5.3 the model was re-run using Laxen and Marner (2005) methodologies and the results are shown in Table 7.5. Table 7.5 clearly shows that the percentage of both the lower and higher critical loads with respect to nitrogen deposition at Cwm Cadlan SAC are below 1% and can therefore be considered to be insignificant.

Table 7.4: Predicted Nitrogen Deposition at Cwm Cadlan SAC

Receptor	Principal Habitat	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO_2 Deposition ug/m2/s	Deposited Concentration kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load
Dry and wet deposition							
Cwm Cadlan SAC	Molina; alkaline fen and reedbed (poor fen)	27.9	10 – 20	0.0021	0.20	**2.03**	**1.02**
	Marshy acid grassland	27.9	15-35	0.0021	0.20	**1.36**	0.58
	Alkaline fen and reedbed	27.9	15-25	0.0021	0.20	**1.36**	0.81
	Unimproved grassland; hay meadow	27.9	20-30	0.0021	0.20	**1.02**	0.68
	Flush and spring; alkaline fen and reedbed (poor fen)	27.9	10-20	0.0021	0.20	**2.03**	**1.02**
Dry deposition only							
Cwm Cadlan SAC	Molina; alkaline fen and reedbed (poor fen)	27.9	10 – 20	0.0018	0.17	**1.72**	0.86
	Marshy acid grassland	27.9	15-35	0.0018	0.17	**1.14**	0.49
	Alkaline fen and reedbed	27.9	15-25	0.0018	0.17	**1.14**	0.69
	Unimproved grassland; hay meadow	27.9	20-30	0.0018	0.17	0.86	0.57
	Flush and spring; alkaline fen and reedbed (poor fen)	27.9	10-20	0.0018	0.17	**1.72**	0.86

Table 7.5: Predicted Nitrogen Deposition at Cwm Cadlan SAC

Applying the Laxen and Marner (2005) Methodologies and Combining Flues

Receptor	Principal Habitat	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO_2 Deposition ug/m2/s	Deposited Concentration kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load
Dry deposition only							
Cwm Cadlan SAC	Molina; alkaline fen and reedbed (poor fen)	27.9	10 – 20	0.000068	0.01	0.07	0.03
	Marshy acid grassland	27.9	15-35	0.000068	0.01	0.04	0.02
	Alkaline fen and reedbed	27.9	15-25	0.000068	0.01	0.04	0.03
	Unimproved grassland; hay meadow	27.9	20-30	0.000068	0.01	0.03	0.02
	Flush and spring; alkaline fen and reedbed (poor fen)	27.9	10-20	0.000068	0.01	0.07	0.03

Table 7.6 presents the result of the predicted acid deposition at Cwm Cadlan SAC which clearly shows that the percentage the critical load with respect to acid deposition at Cwm Cadlan SAC is below 1% and can therefore be considered to be insignificant.

Table 7.6: Predicted Acid Deposition at Cwm Cadlan SAC

Receptor	Current Background kg eq/Ha/yr	Critical Load kg eq/Ha/yr	Predicted SO_2 Deposition Kg eq/Ha/yr	Predicted NO_2 Deposition Kg eq/Ha/yr	Total Process Contribution to Deposition kg eq/Ha/yr	PC Percentage of Critical Load	PC + Background Percentage of Critical Load
Dry deposition only							
Cwm Cadlan SAC	2.52	4	0.00126	0.00047	0.00172	0.04	**63.04308363**

Tables 7.7 to 7.10 present the process contribution and predicted environmental concentration respectively of particulates, carbon monoxide and VOCs at Cwm Cadlan SAC and shows that these can be screened as insignificant as they are below the 1% insignificance criteria.

Table 7.7: Process Contribution of Particulates, Carbon Monoxide and VOCs at Cwm Cadlan SAC

Receptor	Particulates				Carbon Monoxide		VOCs	
	Annual Average ug m^{-3}	Percentage of Objective (40 ug m^{-3})	24 Hourly Average (90.41 percentile) ug m^{-3}	Percentage of Hourly Average (50 ug m^{-3})	8 Hour Average mg m^{-3}	Percentage of Objective (10 mg m^{-3})	Annual Average ug m^{-3}	Percentage of Benzene Objective (16.25 ug m^{-3})
Cwm Cadlan SAC	0.0067	0.02	0.022	0.04	0.00004	0.0004	0.0064	0.04

Table 7.8: Predicted Environmental Concentration of Particulates at Cwm Cadlan SAC

Receptor	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (40 ug m^{-3})	24 Hourly Average (90.41 percentile) ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of 24 Hourly Average (50 ug m^{-3})
Cwm Cadlan SAC	0.0067	16.99	17.00	42.50	0.022	16.99	17.02	34.03

Table 7.9: Predicted Environmental Concentration of Deposited Dust at Cwm Cadlan SAC

Receptor	Level of Dry Deposited Dust ug/m^2/s	Level of Dry Deposited Dust mg/m_2/day	Critical Load of Deposited Dust mg/m^2/day	Percentage of Critical Load	Level of Total Deposited Dust ug/m^2/s	Level of Total Deposited Dust mg/m_2/day	Critical Load of Deposited Dust mg/m^2/day	Percentage of Critical Load
Cwm Cadlan SAC	0.00048	0.0414	1,000	0.00041	0.00049	0.042505	1,000	0.00043

Table 7.10: Predicted Environmental Concentration of Carbon Monoxide and VOCs at Cwm Cadlan SAC

Receptor	Carbon Monoxide				VOCs			
	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Objective (10 mg m^{-3})	Annual Average ug m^{-3}	Background Concentration ug m^{-3}	PEC ug m^{-3}	Percentage of Long Term Benzene Objective (16.25 ug m^{-3})
Cwm Cadlan SAC	0.00004	0.00013	0.0002	0.002	0.0064	0.019	0.03	0.16

In Tables 7.11 and 7.12 the process contribution of heavy metals, hydrogen chloride and hydrogen fluoride at Cwm Cadlan SAC are shown. Given the data in the table it can be concluded that the effects from these will be insignificant.

Table 7.11: Process Contribution of Heavy Metals at Cwm Cadlan SAC

Receptor	Mercury		Arsenic		Cadmium	
	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.25 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.006 ug m^{-3})	Annual Average ug m^{-3}	Percentage of Long Term Objective (0.005 ug m^{-3})
Cwm Cadlan SAC	0.000011	0.0046	0.000114	0.21	0.000011	0.1139

Table 7.12: Process Contribution of Hydrogen Chloride and Hydrogen Fluoride at Cwm Cadlan SAC

Receptor	Hydrogen Chloride		Hydrogen Fluoride	
	Annual Average ug m^{-3}	Percentage of Long Term Objective (20 ug m^{-3})	Maximum Hourly Concentration ug m^{-3}	Percentage of Short Term Objective (250 ug m^{-3})
Cwm Cadlan SAC	0.0023	0.0114	0.0201	0.0080

7.4 SUMMARY OF POTENTIAL EFFECTS ON CWM CADLAN SAC

Table 7.13 summarises the potential impacts of the present proposals on the qualifying features of Cwm Cadlan SAC.

Table 7.13: Summary of Potential Impacts of the Present Proposals on Qualifying Features of Cwm Cadlan SAC

European Site Affected	Potential Project Hazard	Consequence for Qualifying Features	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Cwm Cadlan SAC Shortest distance to scheme: 2.3 km north-east	Deleterious change to water quality and quantity available to SAC	Loss of qualifying features and site's ecological integrity.	Major negative, potentially permanent, possibly reversible.	Negligible.	The proposed development site and the SAC are not hydrologically connected and therefore changes to the hydrology of the site will not effect the SAC.
	Deleterious change to air quality	Delaterious change to qualifying features and site's ecological integrity.	Major negative, potentially permanent, possibly reversible.	Negligible with appropriate measures in place.	The potential contributions from air pollution to the current background levels are below the 1% level and therefore can be deemed to be insignificant.

8. ASSESSMENT OF SIGNIFICANCE OF ANY EFFECTS ON THE NATURA 2000 SITES – THE INTEGRITY TEST

The term 'likely significant effect' is in this context, any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects (English Nature, 1999).

The assessment of the potential adverse impact of a proposed development scheme on a European Site can be considered with respect to both direct and indirect impacts. Given the distance to Blaen Cynon SAC from the proposed development site it can be concluded that there would potentially be some direct impacts on qualifying features of the Blaen Cynon SAC from loss of habitat which is outside of the European Site area but still continuous with the site. However, Chapter 5 shows that with respect to the qualifying features of the European Site and the habitats within the proposed development site these habitats are not in continuity and the habitats within the development site are not the same as those listed as important with respect to the SAC, particularly given the presence of made ground at the site and its historical land uses, and therefore the loss of habitat within the development site will have no significant effect on the integrity of Blaen Cynon SAC. The current state of scientific understanding does not consider that disturbance during construction or operation will have any direct effect on the marsh firitillary qualifying features of the SAC and therefore it can also be considered that there will be no significant effect on the integrity of the SAC from disturbance.

In terms of indirect effects on Blaen Cynon SAC Chapter 5 discusses the following aspects: hydrology, air quality and light pollution.

As none of the qualifying features associated with Blaen Cynon SAC will be effected by significant changes in hydrology, and the dewatering of the site associated with the construction of the park will be carried out in accordance with a Site Management Plan which will be developed to minimise the amounts of de-watering required, it can be concluded that there will be no significant effect on the integrity of the SAC from hydrological changes as a result of the proposed development.

With respect to air pollution, a comprehensive set of modelling was completed as part of the Environmental Impact Assessment, and in accordance with a request for additional information from CCW and the Environment Agency Wales additional modelling was also completed by Envisage (2009). The information provided below is a summary of the results of the modelling (from Envisage, 2009).

When oxides of nitrogen (NO_x) were modelled together, with no consideration for the potential chemical reaction of the emissions in the atmosphere, the process contribution (PC) could not be considered insignificant at Blaen Cynon SAC. When applying calculations for the chemistry of the NO_x emission, the PC at Blaen Cynon SAC could still not be screened as insignificant as either a short or a long term average.

The process contribution of sulphur dioxide as a long term annual average was also unable to be screened as insignificant at Blaen Cynon SAC, although the short term PC can be considered insignificant.

When considering the deposition of nutrient nitrogen at the SACs, an initial assessment considered all of the NO_x as NO_2, and did not take into account the potential effects of combining flues which are located in close proximity to one another. This demonstrated that the process contribution to total deposition could equate to 47.43% of the lower critical load, or 28.46% of the upper critical load for *Molina caerulea* meadows. That said, the application of other feature descriptions, particularly raised bogs, demonstrated that the contribution to critical loads could be higher in some more sensitive locations around the site.

A study undertaken by Laxen and Marner (2005) identified that NO_2 could reasonably be modelled at 50% of the emitted NO_x concentration, and deposition of NO could be ignored, as could wet deposition. Re-running the model to take these factors into account and to combine the flue discharges reduces the percentage contribution of nutrient Nitrogen deposition dramatically, and results in a deposition rate representing 1.29% of the lower critical load, or 0.77% of the upper critical load for *Molina caerulea* meadows. Again, other more sensitive features are seen receive a higher contribution to their specific critical loads.

When considering the maximum predicted deposition across the larger modelled grid, the maximum recorded concentration resulted in a deposition rate representing 3.33% of the lower critical load and 2.0% of the upper critical load. This location was considered to lie within Blaen Cynon SAC, but would represent an area of no more that 100 m^2, with all other concentrations being below this.

Envisage (2009) state that if the National Objective for the protection of vegetation for nitrogen dioxide (30 ug m^{-3}) were experienced at Blaen Cynon SAC, the applied deposition rate would result in 4.61 kg N/ha/year being deposited at the site. This represents 30.71% of the lower critical load (when considering the loading for wet acidic grassland), or 18.43% of the higher critical load for the same feature. Therefore, the predicted emissions from the proposed Enviroparks site are much less significant at the Blaen Cynon SAC than the potential impact of the nationally accepted Objective for the protection of vegetation. Levels of nitrogen dioxide in air could reasonably be experienced anywhere in the UK up to the 30 ug m^{-3} level as an annual mean with no question as to the quality of the air when considering the health of humans or vegetation.

Acid deposition has been assessed as a combination of sulphur and nitrogen dry deposition, to provide a molar equivalent of potential acidity resulting from the deposition of these two species. The calculation should remove the concentrations of non-marine based sources of cations, however this has been ignored as no information is available for this study. The calculation assumes that all nitrogen deposition is acidifying, however in practice, a fraction of the nitrogen deposition may be accumulated by the ecosystem resulting in actual acidification being less than the figures presented. Hence, the results can be considered to represent an overestimate of the likely acid deposition from the process.

The process contribution to acid deposition at Blaen Cynon SAC could not be considered insignificant, equating to 14.83% of the critical load. When considering the maximum predicted deposition across the larger modelled grid, the maximum recorded concentration resulted in a deposition rate representing 38.34% of the critical load. That said, the current stated background for the site is 2.2 kg eq/Ha/year, against a critical load of 0.35 kg eq/Ha/year. The current background acid deposition rate therefore represents almost 630% of the critical load, and by

comparison, the potential process contribution from the proposed Enviroparks site is negligible at 643% of the critical load.

Envisage (2009) concludes that if the National Objective for the protection of vegetation for sulphur dioxide (20 ug m^{-3}), coupled with the National Objective for the protection of vegetation for nitrogen dioxide (30 ug m^{-3}) were experienced at Blaen Cynon SAC, the applied deposition rate would result in 2.3 keq/ha/year acid deposition at the site. This is slightly higher than the current stated background level (2.2 keq/ha/yr) and would equate to a predicted environmental concentration representing 657.16 % of the critical load for the site. The process contribution for the proposed Enviroparks site is well below this figure, although with the currently available background concentrations, the PEC can be slightly higher in places, representing 667.22% of the critical load at the highest point. The results at the central grid reference for the site, which can be considered a reasonable average deposition value across the site, equates to a PEC 643.40% of the critical load. Levels of sulphur dioxide and nitrogen dioxide in air could reasonably be experienced anywhere in the UK up to the National Objectives with no question as to the quality of the air when considering the health of humans or vegetation.

Consideration has been given to the likely contribution of traffic emissions to the nutrient nitrogen and acid deposition. The increase in emissions was seen to be minimal and the percentage contribution of the critical loads was less than 0.05% in all cases.

Although the predicted deposition of nutrient nitrogen and acidifying species from the proposed development onto sensitive receptors in the area represents only a proportion of the critical load for the sites, Blaen Cynon SAC already exceeds its higher critical load, and thus any additional contribution could exacerbate these exceedences. However, the Core Management Plan for Blaen Cynon SAC states that "*The current status of the feature overall is unfavourable. The principal reasons for this are inappropriate grazing, scrub invasion, inappropriate tree planting and past agricultural improvements in the management units*". The likely implication of the potential impact from the proposed site is therefore questionable, as it appears that more significant issues are the cause of the current status of the site, over which the proposed development would have no control. Whilst the predicted process contributions of nutrient nitrogen and acid deposition cannot be ruled out as being insignificant (i.e. less than 1 % of the

critical load), they can be considered to represent a minor contribution to the current deposition rates and status of the site.

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 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, as acid deposition is unlikely to have any significant effect due to the buffering capacity of the land (Environment Agency, no date), however no information has been found as to the location of the differing soil types within the SAC.

As part of an Air Pollution Assessment for Blaen Cynon the Environment Agency (no date) recorded the stated rate of nutrient nitrogen and acid deposition (amongst others) at the Blaen Cynon SAC site from various websites and databases. Modelling has then been used to calculate the percentage of the minimum critical load, attributable to regulated sources. This source apportionment indicates that for nutrient nitrogen deposition, the percentage contribution of regulated sources increases with time, likely due to the effects of increased energy consumption, however for acid deposition, the percentage contribution of regulated sources reduces with time, other sources becoming increasingly dominant.

The long term annual average of volatile organic compounds (VOCs), arsenic, cadmium and nickel could not be screened as insignificant at the Blaen Cynon SAC. The process contribution (PC) of total VOCs was compared to the single species air quality objective (AQO) for benzene, and is therefore not directly comparable. The PC for VOCs represents 1.5574% of the current AQO for benzene and 5.0615% of the future limit (31st December 2010). As the total VOC emission will comprise a significant number of species, and Benzene will likely make up approximately 1% of the total, it is reasonable to screen VOCs / benzene as insignificant.

The process contributions (long and / or short term) of carbon monoxide, hydrogen chloride, hydrogen fluoride, antimony, lead, chromium, cobalt, copper, manganese, vanadium and

thallium, were sufficiently low to screen each of these pollutants as insignificant at Blaen Cynon SAC.

It should be noted that if an emission is *not* screened out using the 1% insignificance criteria test, it does not necessarily follow that it will have a *significant effect*, or that it will result in an unacceptable environmental risk.

Where background concentrations were available with respect to air quality levels, none of the predicted environmental concentrations for the pollutants exceeded the 70% threshold of significance for air quality (note this does not apply to deposition rates).

As the modelling works have identified that the process contributions of some pollutants (NO_x - as NO_2, SO_2, particulates, CO and VOCs) cannot be screened as insignificant, further research was carried out with respect to published data on air pollution impacts on biodiversity and the likely impact of the pollutants detailed above on marsh fritillary habitat, and the larval foodplant *Succisa pratensis* in particular.

It is recognised in the UK that there are few systems for effectively monitoring the effects of air pollution on biodiversity (Morecroft et al, 2005; Morecroft et al, 2006). Morecroft et al (2006) identify that there is a gap between wide-scale but relatively superficial monitoring programmes (e.g. UK Environmental Change Network, ICP Forests Level 2 programme, Acid Waters Monitoring Network) and very detailed but geographically restricted programmes (e.g. condition assessments at designated sites). The authors state that '*the impacts of climate change and air pollution are particularly difficult to identify with a high degree of confidence. One of the main reasons for this is that climate and air pollution are rarely measured at sites where biodiversity is monitored so potential relationships can only be assessed by using interpolated data*'. Their report proposed the establishment of a network of conservation sites, spanning the widest possible range of air pollution conditiond and predicted climate changes, where aspects of biodiversity could be monitored alongside climate and air pollution. It was recommended that between 40 and 90 sites within the UK be established for a new network of monitoring to encompass the following aspects:

- climate;

- air pollution – wet deposition (pH, ammonium, sulphate), ammonian concentration (diffusion tubes) and total nitrogen deposition (combination of measuresments / mapped data);
- soil chemistry and physical description characteristics;
- vegetation composition;
- butterflies;
- birds;
- satellite remoate sensing of phenology; and,
- site management.

Although Morecroft et al (2006) suggest that a flexible approach to the habitats included is advocated, they state that priorty for inclusion should be given to acid grasslands, dwarf shrub heath, broadleaved mixed and yew woodland; calcareous grassland, bogs; montane habitats and neutral grassland. It is not known whether there has been any progress with establishing the networks of monitoring sites as recommended in this study.

Morecroft et al (2005) suggest that monitoring of air pollution impacts requires evidence of the cause of changes as well as their detection. A first step would be to examine whether changes in vegetation, soils or indeed animal populations are consistent with the predictions of theory or models or with the results of manipulative experiments. So for example in the case of vegetation responses to nitrogen deposition, an increase in proportion of nitrogen demanding species, as indicated by Ellenberg values (modified by M.O. Hill for use in the UK; Hill et al, 2000, cited by Morecroft et al, 2005) would be consistent with an impact of atmospheric deposition. However, by itself this is not sufficient as changes may result from another factor, such as management or climate, with any similarity to air pollution impacts purely coincidental.

The condition of statutorily designated nature conservation sites is currently assessed using the Common Standards Monitoring procedure which focuses on ‘interest features’ for which the site has been designated. The condition of the interest features is assessed and a category assigned (ranging from ‘favourable-maintained’ to ‘destroyed’). In addition, threats occurring on, or near, the site which may be driving features into unfavourable condition or preventing them from achieving favourable condition are recorded. Similarly, management measures are also recorded if they may result in improvements to the condition of features or maintain them in favourable condition.

With respect to Blaen Cynon SAC, the Core Management Plan (see Section 3.1) states that

> "*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…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."*

Desk-based research was carried out to identify whether any other studies associated with marsh fritiallary specifically or *Succisa pratensis* and the impacts of air pollution has been completed.

In a study from the Jura in Switzerland by Venterink and Vittoz (2008) *Succisa pratensis* was recorded in small quanitities (<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 paried 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.

They highlight 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 avaibale 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 outcompleted 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 kg N ha^{-1} $year^{-1}$. 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 result 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) highlights that although the proposed development may result in an increase in deposition from some pullutants, there are not likely to be any significant

adverse effect on the maintained presence of *S. pratensis* within Blaen Cynon SAC as a result of slightly elevated nutrient deposition within the site. Thus, it can be concluded that there would be no significant effect on the marsh fritillary habitat from changes to air pollution from the proposed development and it appears 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, over which the proposed development would have no control. Whilst the predicted process contributions of nutrient nitrogen and acid deposition cannot be ruled out as being insignificant (i.e. less than 1% of the critical load), they can be considered to represent a minor contribution to the current background deposition rates.

As none of the qualifying features associated with Blaen Cynon SAC will be effected by light pollution, and the scheme has been designed to minimise light pollution outside of the proposed development site boundaries, it can be concluded that there will be no significant effect on the integrity of the SAC from light pollution.

Chapter 6 has shown that with respect to Coedydd Nedd a Mellte SAC, there are no forseen direct effects on the integrity of the SAC as a result of effects on qualifying features from the proposed development. In terms of indirect effects, the SAC and proposed development site are not hydrologically connected and therefore it can be concluded that there will be no significant effect on the integrity of the SAC as a result of hydrological changes. Air quality modelling for a range of different potential pollutants has shown that the contributions of the operation of the the completed Enviroparks development to air pollution can be considered to be insignificant as the process contribution is less than 1% of the critical load. Thus it can be concluded that there would be no significant effect on the integrity of the SAC as a result of air pollution.

Chapter 7 has shown that with respect to Cwm Cadlan SAC, there are no forseen direct effects on the integrity of the SAC as a result of effects on qualifying features from the proposed development. In terms of indirect effects, the SAC and proposed development site are not hydrologically connected and therefore it can be concluded that there will be no significant effect on the integrity of the SAC as a result of hydrological changes. Air quality modelling for a range of different potential pollutants has shown that the contributions of the operation of the completed Enviroparks development to air pollution can be considered to be insignificant as the

process contribution is less than 1% of the critical load. Thus it can be concluded that there would be no significant effect on the integrity of the SAC as a result of air pollution.

The key significance indicators for potential impacts of the present proposals on Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC are summarised in Tables 8.1 to 8.3 respectively.

Table 8.1: Table of Key Significance Indicators – Blaen Cynon SAC

European Site / Significant Effect	Blaen Cynon SAC
Loss of habitat area	No loss of habitat within European Site. Some loss of habitat close to the European Site which is not continuous to the European Site and does not supports any qualifying features of European Site.
Fragmentation	None. The proposed development site is not situated between different sections of the SAC.
Disturbance: duration or permanence, distance from site	Construction disturbance as close as 100 m away from the European Site. It is not anticipated that the qualifying features of the European Site will be affected by disturbance.
Changes to populations of qualifying species	Air pollution modelling has identified that the process may contribute to not insignificant amounts of NO_x as NO_2, SO_2, particulates, CO and VOCs which, if significant could result in detrimental changes to the vegetation communities within the site. Studies (Jongejans et al, 2006) have shown that the larval foodplant of marsh fritillary butterflies *Succisa pratensis* can increase in size as a result of increased nutrient inputs and will complete successfully with *Molinea caerulea* in high nutrient conditions. Therefore it can be concluded that given the high background levels of the pollants under consideration and the small increases in these levels that would be attributable to the proposed development, combined with the the current status of the qualifying features as unfavourable as a result predominately of inappropriate grazing, scrub encroachment, tree planting and past agricultural use, it is not considered that the process contributions will have a significant impact on the integrity of the qualifying features.
Water resources	No change anticipated, although there may be short-term insignificant effects on small areas from dewatering whilst construction takes place. No long-term significant effects identified.
Water quality	New pollution attenuation measures to be included in scheme.
Air quality	Although some of the pollutants (NO_x as NO_2, SO_2, particulates, CO and VOCs) considered can be screened as insignificant when considering the process contribution to the critical load, where background concentrations were available, none of the predicted environmental concentrations (PEC) for the pollutants exceeded the 70% threshold of significance. Therefore, the PEC of NO_x (as NO_2), SO_2, particulates, CO and VOCs can be considered unlikely to have a significant effect on the integrity of Blaen Cynon SAC.
Noise	No significant change assuming that noise control strategy is implemented during construction.
Light pollution	No significant change assuming that lighting strategy is implemented.

Table 8.2: Table of Key Significance Indicators - Coedydd Nedd a Mellte SAC

European Site / Significant Effect	Coedydd Nedd a Mellte SAC
Loss of habitat area	No loss of habitat within European Site.
Fragmentation	None
Disturbance: duration or permanence, distance from site	No disturbance.
Changes to populations of qualifying species	None anticipated.
Water resources	No change anticipated as sites are not hydrologically connected.
Water quality	No change anticipated as sites are not hydrologically connected.
Air quality	No change as modelling work has shown that the process contributions to air quality are less than 1% of the critical load and can therefore be considered to be insignificant. Air quality background concentrations area already above critical levels within the area.
Noise	No foreseeable impact.
Light pollution	No foreseeable impact.

Table 8.3: Table of Key Significance Indicators – Cwm Cadlan SAC

European Site / Significant Effect	Cwm Cadlan SAC
Loss of habitat area	No loss of habitat within European Site.
Fragmentation	None
Disturbance: duration or permanence, distance from site	No disturbance.
Changes to populations of qualifying species	None anticipated.
Water resources	No change anticipated as sites are not hydrologically connected.
Water quality	No change anticipated as sites are not hydrologically connected.
Air quality	No change as modelling work has shown that the process contributions to air quality are less than 1% of the critical load and can therefore be considered to be insignificant. Air quality background concentrations are already above critical levels within the area.
Noise	No foreseeable impact.
Light pollution	No foreseeable impact.

9. POTENTIAL PLANNING CONDITIONS AND OBLIGATIONS

To be completed after consultation with Brecon Beacons National Park Authority, Rhondda Cynon Taf County Borough Council, Countryside Council for Wales and Environment Agency Wales.

10. MONITORING

To be completed after consultation with Brecon Beacons National Park Authority, Rhondda Cynon Taf County Borough Council, Countryside Council for Wales and Environment Agency Wales.

11. CONCLUSION

It can be objectively concluded that the proposed Enviroparks development at Hirwaun, Rhondda Taff, South Wales is not likely to engender significant environmental effects on the integrity of any Natura 2000 site. This is a consequence of the nature of the scheme and the design of the mitigation measures (air pollution control measures) that have been put into place during development of the scheme.

The integrity of a 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 (MN2000, para. 4.6(3)).

It is apparent that when considering the conservation objectives of Blaen Cynon SAC that the proposed Enviroparks development would not have any long-term adverse significant adverse effect on any of the habitats or species listed. There will be no direct habitat loss as a result if the proposals and no significant effects from changes to the hydrology of the SAC during construction or operation. Air pollution modelling has identified that the process may contribute to not insignificant amounts of NO_x (as NO_2), SO_2, particulates, CO and VOCs which, if significant could result in detrimental changes to the vegetation communities within the site. Studies (Jongejans et al, 2006) have shown that the larval foodplant of marsh fritillary butterflies *Succisa pratensis* can increase in size as a result of increased nutrient inputs and will compete successfully with *Molinea caerulea* in higher nutrient conditions, although they also conclude that the density of the species within an area could decrease with nutrient enrichment.

Although not all pollutants emitted to air from the proposed Enviroparks facility at Hirwaun can be considered to have an insignificant effect on the quality of air or potential effects on vegetation in the vicinity of Blaen Cynon SAC, the predicted environmental concentrations of pollutants in air (where calculable) remain below the 70% threshold of significance, and can therefore be considered unlikely to have a significant effect.

Where the process contribution exceeded the insignificance threshold of less than 1% of the long term assessment level, exceedences of specific substances at Blaen Cynon SAC (e.g. NO_2 as opposed to total NO_x as NO_2) were often below 5% of the assessment level, and always below 10% of the assessment level. Therefore although not all pollutants can be considered

insignificant, they can still be considered to represent a small contribution to the overall assessment level.

It is considered that as the current background concentrations of both nutrient nitrogen and acid deposition are above the lower critical loads for Blaen Cynon SAC, and the predicted process contribution represents a small proportion of this, the impact from the proposed Enviroparks site cannot be considered significant in relation to the current unfavourable status of the site, which requires better, more balanced grazing management as a priority. This is particularly apparent when considering the contribution of the site to the predicted environmental concentration of acid deposition, where the current background deposition rate is already believed to be approximately 630% of the critical load. Therefore, although the process contributions cannot be screened as insignificant, they are considered to contribute a minor proportion of the total and thus are not considered to have a significant impact overall on the integrity of Blaen Cynon SAC and its conservation objectives.

With respect to Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC, there will be no direct impacts on either of these SAC sites from the proposed development. With respect to indirect effects, these sites are not hydrologically connected to the proposed development site and therefore there will not be any effect from potential hydrological changes at the development site. Air modelling has shown that process contributions from the proposed development are below 1% of the critical load and can therefore be considered to be insignificant. It can therefore be concluded that there will be no significant effect on the intergrity of these two SACs as a result of the proposed development.

No details of schemes which should be considered ‘in-combination’ with the proposed Enviroparks development were provided by the local planning authorities or the Countryside Council for Wales. Investigations by Envidage (Owen, 2009) did not identify any schemes which may have ‘in-combination’ effects.

Note – this section may be updated once Sections 9 and 10 are completed.

REFERENCES

Aerts, R., Wallen, B. and Malmer, N. (1992). 'Growth-limiting nutrients *Sphagnum*-dominated bogs subject to low and high atmospheric N supply'. *Journal of Ecology*. **80**. pp 131-140.

APIS. (no date). 'Acidification'. Air Pollution Information System Web Site. Accessed: 16-04-09. Available: http://www.apis.ac.uk/overview/issues/overview_acidification.htm

Ascough, L. H. (2005). 'The Effects of Acid Deposition om Species Composition at Askham Bog Nature Reserve'. Undergraduate Bioscience Research Report, Biolog-e, University of Leeds. Available: http://www.biolog-e.leeds.ac.uk.

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.

Billeter, R., Hooftman, D. A. P. and Diemer, M. (2003). 'Differential and Rrversible responces of common fen meadow species to adondonment'. *App. Veg. Sci* **63**. pp3-12.

Bobbink, R., Ashmore, M., Braun, S., Flückiger, W. and Van den Wyngaert, I. J. J. (2002). 'Empirical nitrogen critical loads for natural and semi-natural ecosystsems: 2002 update'. http://www.oekodata.com/pub/mapping/manual/nitrogen_background.pdf, Accessed by Ascough (2005) on 13th March 2004.

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.

Canney, D. (2009). *Pers. Comm.* Assistant Development Control Manager. Brecon Beacons National Park Authority, Brecon.

Chapin, F. S. (1980). 'The mineral nutrition of wild plants'. *Annual review of ecology and systematics*, **11**. pp 233–260.

EAW. (no date). 'Annex VII: Air Pollution Assessment - Blaen Cynon SAC'. A report provided by the Environment Agency Wales to Envisage.

Egloff, T. (1987). 'Gefährdet wirklich der Stickstoff (aus der Luft) die letzten Streuwiesen?' *Naturund Landschaft*, **62**. pp 476–478.

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. (2007). 'Appropriate Assessment of the Rhondda Cynon Taf County Borough Council's Local Development Plan (2006-2021): Preferred Strategy Screening Report'. A report by Enfusion for Rhondda Cynon Taf County Borough Council. January 2007.

English Nature. (1997) 'Habitat Regulations Guidance Note 1: The Appropriate Assessment (Regulation 48) The Conservation (Natural Habitats &c.) Regulations,1994'.

Envisage. (2009). 'Additional Information to Support and Environmental Impact Assessment – Enviroparks (Hirwaun) Ltd, Hirwaun Industrial Estate, Aberdare'. A draft report by Envisage for Enviroparks Hirwaun Ltd, April, 2009.

European Commission. (2000). 'Managing Natura 2000 Sites: The Provision of Article 6 of the 'Habitats' Directive 92/43/EEC'.

Evans. M. (2009). *Pers. Comm.* Regional Operations Co ordinator, South and East, Countryside Council for Wales, Cardiff.

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.

Heijmans, M. M. P. D., Klees, H., De Visser, W. and Berendse, F. (2002). 'Effects of increased nitrogen deposition on the distribution of N-15-labeled nitrogen between Sphagnum and vascular plants'. *Ecosystems*. **5**. pp 500-508.

Hogg, P., Squires, P. and Fitter, A. H. (1995). 'Acidification, nitrogen deposition and rapid vegetational change in a small valley in Yorkshire'. *Biological Conservation*. **71**. pp 143-153.

Hultin, E. and Torssell, K. (1964). 'Alkaloid-screening of Swedish plants'. *Phytochemistry* **4**. pp 425–433.

IEEM. (2006). *Guidelines for Ecological Impact Assessment in the United Kindom* . Institute of Ecology and Environmental Managers, Winchester.

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: 17/03/09. 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: 17/03/09. Available: http://www.jncc.gov.uk/protectedsites/sacselection/habitat.asp?FeatureIntCode=H9180

Jones, C. (2009). *Pers. Comm.* Planning Officer, Rhondda Cynon Taff Borough Council, Aberdare.

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.

Koerselman, W. (1990). 'Nitrogen, phosphorus and potassium mass balances for two small fens surrounded by heavily fertilized patures'. *Journal of ecology*. **78**. pp 428–442.

Koerselman, W. and Verhoeven, J.T.A. (1992) 'Nutrient dynamics in mires of various trophic status: nutrient inputs and outputs and the internal nutrient cycle'. IN: Verhoeven, J.T.A., ed. *Fens and bogs in the Netherlands: vegetation, history, nutrient dynamics and conservation*. Dordrecht, Kluwer, pp 397–432.

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.

Lamers, L. P. M., Bobbink, R. and Roelofs, J. G. M. (2000). 'Nitrogen filter fails in raised bogs'. *Global Change Biology*. **6**. pp 583-586.

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.

Lee, J. A. and Caporn, S. J. M. (1993). 'Problems in determining critical loads for nitrogen in semi natural vegetation in Britain'. IN: *Critical Loads: Concept and Applications*. pp 11-18 (eds. Horung, M. and Skeffington, R. A.), HMSO, London.

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.

Malmer, N., Albinsson, C., Svensson, B. M. and Wallen, B. (2003). 'Interferences between Sphagnum and vascular plants: effects on plant community structure and peat formation'. *OIKOS*. **100**, pp 469-482.

Morecroft, M. D., Cape, J. N., Parr, T. W., Brown, J. C., Caporn, S. J. M., Carroll, J. A., Emmett, B. A., Harmens, H., Hill, M. O., Lane, A. M. J., Leith, I. D., Mills, G. E., Reynolds, B., Sheppard, L. J., Smart, S. M. and Wolseley, P. A. (2005). 'Monitoring the impacts of air pollution (acidification, eutrophication and ground-level ozone) on terrestrial habitats in the UK: a scoping study'. Final Report to Department for Environment, Food and Rural Affairs, JNCC, Environment Agency, Environment and Heritage Service, English Nature (Ref: CPEA 20).

Morecroft, M. D., Sier, A. R. J., Elston, D. A., Nevison, I. M., Hall, J. R., Rennie, S. C. Parr, T. W. and Crick, H. Q. P. (2006). 'Targeted monitoring of air pollution and climate change impacts on biodiversity'. Final Report to Department for Environment, Food and Rural Affairs, Countryside Council for Wales and English Nature (Ref: CR0322).

Newberry. C. (2009). *Pers. Comm.* Conservation Officer. Coutryside Council for Wales, Cardiff.

Olde Venterink, H. and Vittoz, P. (2008). 'Biomass production of the last remaining fen with *Saxifraga hirculus* in Switzerland is controlled by nitrogen availability'. *Botanica Helvetica*. **118**. pp 165-174.

Open University. (no date). 'Effects of Eutrophication: effects on terrestrial vegetation' Available: http://openlearn.open.ac.uk/mod/resource/view.php?id=171953 Accessed: 06-04-09.

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.'

Owen. A. (2009). *Pers. Comm.* Environmental Consultant, Environmental Visage Ltd, Stonehouse.

Pearce F. (1993). 'How Britain hides its acid soil'. *New Scientist*. **137**. pp 29-33.

Press, M.C., Woodin, S.J. and Lee, J.A. (1986). 'The potential importance of an increased atmospheric nitrogen supply to the growth of ombrotrophic Sphagnum species. *New Phytologist*. **103**. pp 45-55.

Rodwell, J. S., (1991). *British Plant Communities: Volume 1 Woodlands and Scrub.* Cambridge University Press, Cambridge.

Rodwell J. S., (1991 et seq.). *British Plant Communities, Volumes 1- 5.* Cambridge University Press, Cambridge.

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. (2008a). 'Enviroparks Hirwaun – Planning Policy Statement'. A report produced for Enviroparks Hirwaun Ltd. October 2008.

Savills. (2008b). 'Enviroparks Hirwaun – Environmental Statement, Volume 1 Main Text'. A report produced for Enviroparks Hirwaun Ltd. October 2008.

Servini, C. (2009). *Pers. Comm.* Planning Liaison Officer 1, Environment Agency Wales, Pontypridd.

Thimonier, A. et al (1994). 'Simultaneous eutrophication and acidification of a forest in North-East France'. *New phytologist*, **126**. pp 533–539.

Tomassen, H. B. M., Smolders, A. J. P., Lamers, L. P. M. and Roelofs, J. G. M. (2003). 'Stimulated growth of Betula pubescens and Molinia caerulea on ombrotrophic bogs: role of high levels of atmospheric nitrogen deposition'. *Journal of Ecology*. **91**. 357-370.

Tyldesley, D. and Hoskin, R. (2008). *Assessing Projects Under the Habitats Directive: Guidance for Competent Authorities*. A report produced for the Countryside Council for Wales, Bangor.

Verhoeven, J.T.A. and Schmitz, M.B. (1991). 'Control of plant growth by nitrogen and phosphorus in mesotrophic fens'. *Biogeochemistry*. **12**. pp 135–148.

Vermeer, J.G. (1986). 'The effects of nutrients on shoot biomass and species composition of wetland and hayfield communities'. *Acta oecologica*. **7**. pp 31–41.

Wellburn, A. (1988). *Air pollution and acid rain*. Longman, Harlow.

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: Location Plan

APPENDIX 2: Plan of Proposed Scheme

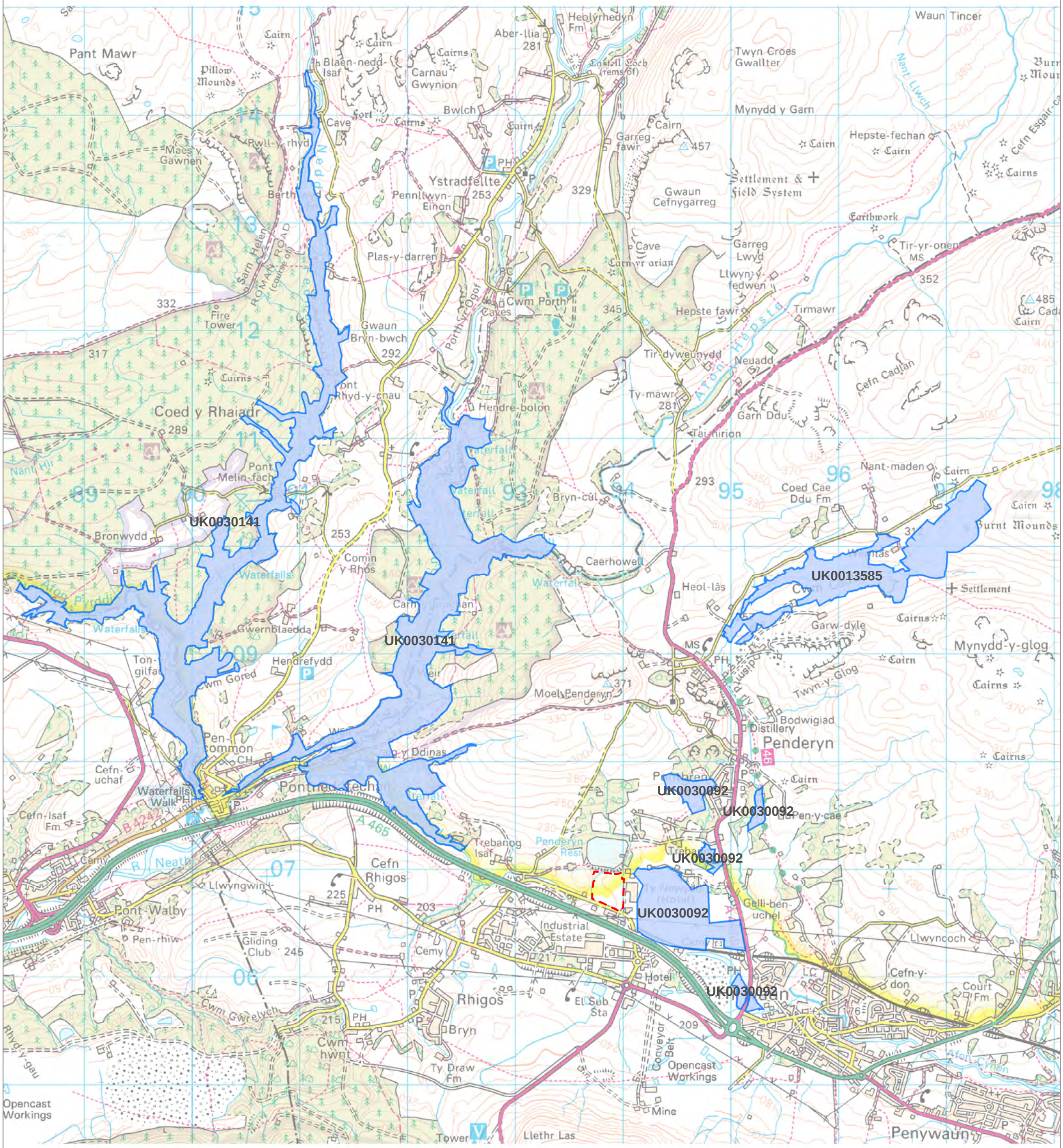
APPENDIX 3: Details and Plans of European sites

APPENDIX 4: Screening Matrix

APPENDIX 5: Significant Effects Report Matrix

APPENDIX 1

Location Plan



Legend

Proposed Development Site

SAC Site

Key to site names:

UK 0030092 - Blaen Cynon SAC
UK 0030141 - Coedydd Nedd a Nellte SAC
UK 0013585 - Cwm Cadlan SAC

Client: Environmental Visage Ltd	Project: Hirwaun Enviropark
Drawing: Special Areas of Conservation	Drawing Number: C104641-01
Revision: 00	Date: April 2009
Scale at A3: 1:35,000	Drawn By: SKS
Approved By: KR	Notes: -

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N

C104641-01

APPENDIX 2

Proposed Development Plans

Figured dimensions only are to be used. All dimensions to be checked onsite. Differences between drawings and between drawings and specification or bills of quantities to be reported to the PRC Group.

Revisions:	By:	Date:
A. AD TANK REMOVED, BUNDING AND POWER HOUSE REPOSITIONED	ME	JUNE 08
B. BUILDING ADDED, BIOMAX & ENGINE HOUSE EXTENDED, BUNDED AREA REDUCED, BUILDING POSITIONS ADJUSTED.	ME	SEPT 08
C. PLASMA ADDED, BUILDING WIDTHS AMENDED.	ME	SEPT 08
D. ROAD REALIGNED AND STACKS AMENDED	ME	OCT 08
E. CYCLE PARKING ADJUSTED	ME	OCT 08
F. PEDESTRIAN CROSSING ADDED, COACH BAY EXTENDED, VISIBILITY SPLAYS ADDED	ME	NOV 08
G. SECURITY FENCING HIGHLIGHTED, SIGNAGE ADDED	ME	MAY 09

KEY:

1. VISITORS CENTRE (791sqm GEA)
2. GATEHOUSE (103sqm GEA)
3. FUEL PREPERATION AREA (7717sqm GEA)
4. ENGINE HOUSE AREA (3277sqm GEA)
5. BIOMAX AREA (2944sqm GEA)
6. PROPOSED B2 HIGH ENERGY USE UNIT 10,240sqm (INC OFFICE CONTENT)
7. PYROLISIS (2490sqm GEA)
8. WATER TREATMENT PLANT

SITE APPLICATION AREA
TOTAL SITE AREA = 21.5 acres / 85,412 sqm

PROPOSED BUILDING
PROPOSED LANSCAPE BUFFER TO BBNP
GRASS
INDICATIVE LOCATION OF NEW TREES
SHRUBS & HEDGES
GREEN WALL WITH LOCAL STONE GABION BASE
ENVIROPARKS SIGN SET IN STONE GABION FILLED WITH LOCAL STONE
GRASSCRETE
TARMAC ROAD SURFACE
BRUSHED CONCRETE SURFACE
GANGWAY
CONCRETE PAVING SLABS
BLOCK PAVING TO PARKING
BLOCK PAVING TO PEDESTRIAN AREAS
LIGHT GREY BLOCK PAVING TO ROADS
POST & RAIL FENCE
2.4m HIGH SECURITY FENCE
3no. SECURE CYCLE SHELTER (10 CYCLE SPACES)
MAIN BUILDING ENTRANCE
GATE

NOTE:
TACTILE PAVING TO BE PROVIDED TO EITHER SIDE OF ALL ROAD CROSSINGS AND CHANGES OF LEVEL.

Client: enviroparks

Project: HIRWAUN INDUSTRIAL ESTATE

Drawing Title: PROPOSED SITE PLAN

Scale @ A0:	Project Co-Ordinator:	Date:
1:500	ME	SEPT 08

Job No:	Stage:	Drawing No.:	Rev:
8016	PL	003	G

Issue Status:
Construction ☐ Preliminary ☒
Information ☐ Approval ☐
Tender ☐

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PRC Group incorporating GIBA and WDL

APPENDIX 3

SAC Nature 2000 Forms

NATURA 2000

STANDARD DATA FORM

FOR SPECIAL PROTECTION AREAS (SPA)
FOR SITES ELIGIBLE FOR IDENTIFICATION AS SITES OF COMMUNITY IMPORTANCE (SCI)
AND
FOR SPECIAL AREAS OF CONSERVATION (SAC)

1. Site identification:

1.1 Type B **1.2 Site code** UK0030092

1.3 Compilation date 200012 **1.4 Update** 200301

1.5 Relationship with other Natura 2000 sites

1.6 Respondent(s) International Designations, JNCC, Peterborough

1.7 Site name **Blaen Cynon**

1.8 Site indication and designation classification dates

date site proposed as eligible as SCI	200012
date confirmed as SCI	200412
date site classified as SPA	
date site designated as SAC	200412

2. Site location:

2.1 Site centre location

longitude	**latitude**
03 31 41 W	51 44 54 N

2.2 Site area (ha) 66.83 **2.3 Site length (km)**

2.5 Administrative region

NUTS code	Region name	% cover
UK922	Mid Glamorgan	100.00%

2.6 Biogeographic region

Alpine	Atlantic	Boreal	Continental	Macaronesia	Mediterranean
	X				

3. Ecological information:

3.1 Annex I habitats

Habitat types present on the site and the site assessment for them:

Annex I habitat	% cover	Representativity	Relative surface	Conservation status	Global assessment
Northern Atlantic wet heaths with *Erica tetralix*	4	D			

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	1.9	D			
Alkaline fens	0.3	D			
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	3.7	D			

3.2 Annex II species

	Population				Site assessment			
	Resident	Migratory						
Species name		Breed	Winter	Stage	Population	Conservation	Isolation	Global
Euphydryas (Eurodryas, Hypodryas) aurinia	501-1000	-	-	-	B	B	B	**B**

4. Site description

4.1 General site character

Habitat classes	% cover
Marine areas. Sea inlets	
Tidal rivers. Estuaries. Mud flats. Sand flats. Lagoons (including saltwork basins)	
Salt marshes. Salt pastures. Salt steppes	
Coastal sand dunes. Sand beaches. Machair	
Shingle. Sea cliffs. Islets	
Inland water bodies (standing water, running water)	
Bogs. Marshes. Water fringed vegetation. Fens	27.6
Heath. Scrub. Maquis and garrigue. Phygrana	8.3
Dry grassland. Steppes	11.7
Humid grassland. Mesophile grassland	41.3
Alpine and sub-alpine grassland	
Improved grassland	5.5
Other arable land	
Broad-leaved deciduous woodland	3.9
Coniferous woodland	
Evergreen woodland	
Mixed woodland	
Non-forest areas cultivated with woody plants (including orchards, groves, vineyards, dehesas)	
Inland rocks. Screes. Sands. Permanent snow and ice	
Other land (including towns, villages, roads, waste places, mines, industrial sites)	1.7
Total habitat cover	**100%**

4.1 Other site characteristics

Soil & geology:

Acidic, Basic, Clay, Neutral, Nutrient-poor, Nutrient-rich, Peat, Sandstone, Sedimentary

Geomorphology & landscape:

Hilly, Lowland

4.2 Quality and importance

Euphydryas (*Eurodryas, Hypodryas*) *aurinia*

- for which this is considered to be one of the best areas in the United Kingdom.

4.3 Vulnerability

The plant communities of Blaen Cynon are dependent on maintenance of the hydrological regime and the continuation of traditional agricultural management.

The marsh fritillary butterfly population is threatened in some parts of the site by a lack of grazing, leading to scrub encroachment, and by inappropriate tree planting. Burning for agricultural purposes is also a major threat.

Appropriate agricultural management could be achieved over the majority of the site through management agreements with the owners and occupiers.

The site lies within the South Wales Coalfield on the fringes of an urban area, designated as cSAC, which will help control threats from housing, opencast or other industrial development and pollution arising from such development in the immediate vicinity.

5. Site protection status and relation with CORINE biotopes:

5.1 Designation types at national and regional level

Code	% cover
UK04 (SSSI/ASSI)	100.0

NATURA 2000

STANDARD DATA FORM

FOR SPECIAL PROTECTION AREAS (SPA)
FOR SITES ELIGIBLE FOR IDENTIFICATION AS SITES OF COMMUNITY IMPORTANCE (SCI)
AND
FOR SPECIAL AREAS OF CONSERVATION (SAC)

1. Site identification:

1.1 Type B

1.2 Site code UK0030141

1.3 Compilation date 200012

1.4 Update 200303

1.5 Relationship with other Natura 2000 sites

1.6 Respondent(s) International Designations, JNCC, Peterborough

1.7 Site name **Coedydd Nedd a Mellte**

1.8 Site indication and designation classification dates

date site proposed as eligible as SCI	200012
date confirmed as SCI	200412
date site classified as SPA	
date site designated as SAC	200412

2. Site location:

2.1 Site centre location

longitude	**latitude**
03 34 02 W	51 46 20 N

2.2 Site area (ha) 378.18

2.3 Site length (km)

2.5 Administrative region

NUTS code	Region name	% cover
UK922	Mid Glamorgan	25.29%
UK914	Powys	65.05%
UK924	West Glamorgan	9.66%

2.6 Biogeographic region

Alpine	Atlantic	Boreal	Continental	Macaronesia	Mediterranean
	X				

3. Ecological information:

3.1 Annex I habitats

Habitat types present on the site and the site assessment for them:

Annex I habitat	% cover	Representativity	Relative surface	Conservation status	Global assessment
Northern Atlantic wet heaths with *Erica tetralix*	0.2	D			
European dry heaths	1.1	D			
Calcareous rocky slopes with chasmophytic vegetation	0.9	D			
Tilio-Acerion forests of slopes, screes and ravines	4.8	C	C	B	**C**
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	46.4	B	C	B	**B**

3.2 Annex II species

		Population			Site assessment			
	Resident	Migratory						
Species name		Breed	Winter	Stage	Population	Conservation	Isolation	Global
Salmo salar	Present	-	-	-	D			
Cottus gobio	Present	-	-	-	D			

4. Site description

4.1 General site character

Habitat classes	% cover
Marine areas. Sea inlets	
Tidal rivers. Estuaries. Mud flats. Sand flats. Lagoons (including saltwork basins)	
Salt marshes. Salt pastures. Salt steppes	
Coastal sand dunes. Sand beaches. Machair	
Shingle. Sea cliffs. Islets	
Inland water bodies (standing water, running water)	2.6
Bogs. Marshes. Water fringed vegetation. Fens	
Heath. Scrub. Maquis and garrigue. Phygrana	8.5
Dry grassland. Steppes	7.4
Humid grassland. Mesophile grassland	1.0
Alpine and sub-alpine grassland	
Improved grassland	0.2
Other arable land	
Broad-leaved deciduous woodland	76.9
Coniferous woodland	2.1
Evergreen woodland	
Mixed woodland	
Non-forest areas cultivated with woody plants (including orchards, groves, vineyards, dehesas)	
Inland rocks. Screes. Sands. Permanent snow and ice	0.9
Other land (including towns, villages, roads, waste places, mines, industrial sites)	0.4
Total habitat cover	**100%**

4.1 Other site characteristics

Soil & geology:

Acidic, Alluvium, Basic, Clay, Limestone, Neutral, Nutrient-poor, Nutrient-rich, Peat, Sandstone, Sedimentary

Geomorphology & landscape:

Caves, Crags/ledges, Floodplain, Lowland, Slope, Valley

4.2 Quality and importance

Tilio-Acerion forests of slopes, screes and ravines

- for which the area is considered to support a significant presence.

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

- for which this is considered to be one of the best areas in the United Kingdom.

4.3 Vulnerability

The majority of the woodland is owned by the Forestry Commission and is ungrazed. However, stray livestock still gain access in places and could pose a threat to tree and shrub regeneration. Fencing against livestock would certainly be desirable in the areas currently subject to agricultural use. A combination of agri-environment schemes and management agreements offer the best mechanism for securing favourable management in these areas.

Stands of planted conifers, beech and sycamore within and adjacent to the site are seeding into semi-natural woodland communities in places. The Forestry Commission has agreed to remove most of these species from the site itself, but seedlings may still invade from other areas and an ongoing control programme should be considered.

The area contains waterfalls which are a great attraction to the public and significant erosion damage has been caused by pedestrians, horses and bicycles. An ongoing path repair programme has only been partially successful in addressing this problem and further restrictions on public access should be considered. Given the level of access to the site and surrounding plantations, there could be significant fire risk in prolonged dry periods.

Airborne acid and nutrient deposition may also be a problem, particularly for epiphytic lichens.

5. Site protection status and relation with CORINE biotopes:

5.1 Designation types at national and regional level

Code	% cover
UK04 (SSSI/ASSI)	100.0

NATURA 2000

STANDARD DATA FORM

FOR SPECIAL PROTECTION AREAS (SPA)
FOR SITES ELIGIBLE FOR IDENTIFICATION AS SITES OF COMMUNITY IMPORTANCE (SCI)
AND
FOR SPECIAL AREAS OF CONSERVATION (SAC)

1. Site identification:

1.1 Type B

1.2 Site code UK0013585

1.3 Compilation date 199506

1.4 Update 200210

1.5 Relationship with other Natura 2000 sites

1.6 Respondent(s) International Designations, JNCC, Peterborough

1.7 Site name **Cwm Cadlan**

1.8 Site indication and designation classification dates

date site proposed as eligible as SCI	199506
date confirmed as SCI	200412
date site classified as SPA	
date site designated as SAC	200412

2. Site location:

2.1 Site centre location

longitude	**latitude**
03 30 19 W	51 46 38 N

2.2 Site area (ha) 83.93

2.3 Site length (km)

2.5 Administrative region

NUTS code	Region name	% cover
UK922	Mid Glamorgan	100.00%

2.6 Biogeographic region

Alpine	Atlantic	Boreal	Continental	Macaronesia	Mediterranean
	X				

3. Ecological information:

3.1 Annex I habitats

Habitat types present on the site and the site assessment for them:

Annex I habitat	% cover	Representativity	Relative surface	Conservation status	Global assessment
Northern Atlantic wet heaths with *Erica tetralix*	4.89	D			

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	31.4	B	C	B	**B**
Alkaline fens	13.7	B	C	A	**B**

3.2 Annex II species

	Population				Site assessment			
	Resident	Migratory						
Species name		**Breed**	**Winter**	**Stage**	**Population**	**Conservation**	**Isolation**	**Global**
Coenagrion mercuriale	Present	-	-	-	D			

4. Site description

4.1 General site character

Habitat classes	**% cover**
Marine areas. Sea inlets	
Tidal rivers. Estuaries. Mud flats. Sand flats. Lagoons (including saltwork basins)	
Salt marshes. Salt pastures. Salt steppes	
Coastal sand dunes. Sand beaches. Machair	
Shingle. Sea cliffs. Islets	
Inland water bodies (standing water, running water)	
Bogs. Marshes. Water fringed vegetation. Fens	15.5
Heath. Scrub. Maquis and garrigue. Phygrana	5.0
Dry grassland. Steppes	2.3
Humid grassland. Mesophile grassland	52.4
Alpine and sub-alpine grassland	
Improved grassland	16.6
Other arable land	
Broad-leaved deciduous woodland	7.6
Coniferous woodland	
Evergreen woodland	
Mixed woodland	
Non-forest areas cultivated with woody plants (including orchards, groves, vineyards, dehesas)	
Inland rocks. Screes. Sands. Permanent snow and ice	
Other land (including towns, villages, roads, waste places, mines, industrial sites)	0.6
Total habitat cover	**100%**

4.1 Other site characteristics

Soil & geology:

Acidic, Basic, Clay, Limestone, Neutral, Nutrient-poor, Peat, Sandstone

Geomorphology & landscape:

Lowland, Valley

4.2 Quality and importance

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

- for which this is considered to be one of the best areas in the United Kingdom.

Alkaline fens

- for which this is considered to be one of the best areas in the United Kingdom.

4.3 Vulnerability

These grasslands are dependent on the continuance of low intensity agricultural management with no, or minimal, use of agro-chemicals. Where necessary, agreements secure appropriate grazing levels and management.

Base enrichment and moisture content are also important factors influencing the ecological character of the vegetation. This enrichment appears to derive from rising groundwater. Quarrying or other operations within the groundwater catchment may influence groundwater movements. The operation of an adjoining quarry is subject to a conditioned planning permission, site investigation and monitoring that will constrain operations in order to safeguard the grassland vegetation.

5. Site protection status and relation with CORINE biotopes:

5.1 Designation types at national and regional level

Code	% cover
UK04 (SSSI/ASSI)	100.0

APPENDIX 4

Screening Matrix

Screening Matrix

Brief Description of the project	The scheme will create the following: • 27,562 m^2 of buildings and structures including a 10,240 m^2 building for use class B1/B2; process buildings; a gatehouse and weighbridge; a visitor centre and administration building; a 20 MW net capacity combined heat and power plant; with a 40 m ventilation stack; external anaerobic digestion; liquid and gas holding tanks. • 30,352 m^2 of internal roads and hard standings; vehicular parking; external security lighting. • 17,497 m^2 of landscaping; vehicular ingress and egress from Fifth and Ninth Avenues; and associated utilities infrastructure.
Brief description of the Natura 2000 site	Three European Sites are considered in this report. These are: • Blaen Cynon SAC; • Coedydd Nedd a Mellte SAC; and, • Cwm Cadlan SAC. The nearest of these is 100 m east of the scheme.
Assessment Criteria	
Describe the individual elements of the project either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 site (s).	The elements of this project which alone or in combination could affect a Natura 2000 site are: • Disturbance on qualifying species using the European Site from construction works associated with the development proposals. • Local changes in hydrology from the proposed construction works • Air quality effects from operation of the proposed development. • Air quality effects from increased traffic associated with the development of the site. • Impacts from artificial lighting.

Describe any likely direct, indirect or secondary impacts of the project (either alone or in combination with other plans or projects) on the Natura 2000 site by virtue of: • **Size and scale;** • **Land-take;** • **Distance from Natura 2000 site or key features of the site;** • **Resource requirements (water abstraction etc);** • **Emission (disposal to land, water or air);** • **Excavation requirements;** • **Transportation requirements;** • **Duration of construction, operation, decommissioning etc;** • **Other.**	There are no likely direct effects on an European Site from the proposed scheme. The scheme may have indirect impacts on a European Site. Conceivable indirect impacts include those arising from: • Drainage (carriageway run-off) • Traffic exhaust emissions • Traffic noise • Artificial lighting
Describe any likely changes to the site arising as a result of: • **Reduction of habitat area;** • **Disturbance to key species;** • **Habitat or species fragmentation;** • **Reduction in species density; and/or,** • **Changes in key indicators of conservation value (water quality etc)**	There will be no direct loss of habitat either within the European Sites or being utilised by qualifying features from the European Sites. At Blaen Cynon SAC process contribution levels of NO_x (as NO_2), SO_2, particulates, CO and VOCs cannot be screened as insignificant. Increases in deposition of the above pollutants could result in a change in the composition of habitats which support the marsh fritillary butterfly (a qualifying feature). At Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC the levels of air pollutants have all been screened as insignificant.
Describe any likely impacts on the Natura 2000 site as a whole in terms of: • **Interference with the key relationships that define the structure of the site; and/or,** • **Interference with key relationships that define the function of the site.**	It is not anticipated that any of the sites will be significantly affected by these proposals
Provide indicators of significance as a result of the identification of effects set out above in terms of: • **Loss;** • **Fragmentation;** • **Disruption;** • **Disturbance; and/or,** • **Change to key elements of the site (e.g. water quality etc).**	There will be no loss, fragmentation or disruption to any European site as a result of the present proposals. Effects on water quality and quantity, impacts from air pollution and lighting will be avoided by adherence to best engineering practice.

Describe from the above those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts are not known.	To be determined through consultation with the Countryside Council for Wales.

APPENDIX 5

Report Matrix

Finding of No Significant Effects Report Matrix

Name of Project	**Proposed Enviroparks Development at Hirwaun**
Name and location of Natura 2000 site	Two European Sites are considered in this report. These are: • Blaen Cynon SAC; • Coedydd Nedd a Mellte SAC; and, • Cwm Cadlan SAC. The nearest of these is located 100 m east of the scheme. Species listed as qualifying features are not currently utilising the proposed development site.
Description of the Project	The scheme will create the following: • 27,562 m^2 of buildings and structures including a 10,240 m^2 building for use class B1/B2; process buildings; a gatehouse and weighbridge; a visitor centre and administration building; a 20 MW net capacity combined heat and power plant; with a 40 m ventilation stack; external anaerobic digestion; liquid and gas holding tanks. • 30,352 m^2 of internal roads and hard standings; vehicular parking; external security lighting. • 17,497 m^2 of landscaping; vehicular ingress and egress from Fifth and Ninth Avenues; and associated utilities infrastructure.
Is the project directly connected with or necessary to the management of the site? (povide details)	The project is not directly connected with or necessary to the management of any of the Natura 2000 sites.
Are there other projects or plans that together with the project being assessed could affect the site? (provide details)	No other projects or plans have been identified which will result in 'in-combination' effects on the integrity of the Natura 2000 sites.
The Assessment of Significance of Effects	
Describe how the project (alone or in combination) is likely to affect the Natura 2000 site.	The project is not likely to affect any of the European sites.
Explain why these affects are not considered significant.	This is because the proposed air pollution protection measures included in the scheme design have reduced the potential impacts on qualifying features to a level where they will not be considered to be significant.

The Assessment of Significance of Effects (cont.)	
List of agencies consulted: Provide contact name and telephone or e-mail address.	**Countryside Council for Wales (CCW):** Dr Carole Newberry (Conservation Officer, Vale and Valleys) Email: c.newberry@ccw.gov.uk Tel: 02920 772400 Gill Barter (Team Leader – Vale and Valleys) Email: g.barter@ccw.gov.uk Tel: 02920 772400 Khalid Aazem Email: k.aazem@ccw.gov.uk Tel: 01792 634 960 ext 4982
Response to consultation. CCW - Countryside Council for Wales EAW - Environment Agency Wales BBNPA – Brecon Beacons National Park Authority RCTBC – Rhondda Cynon Taff Borough Council	Consultation on original Environmental Statement provided by CCW on 20-01-09 and EAW on 12-02-09. Meeting with CCW and EAW on 10-03-09. Consultation letters to BBNPA from CCW dated 03-04-09 and EAW dated 30-03-09. Draft Version 1 of report produced in response to initial consultation responces and meeting agreements. Meeting with BBNPA, RCTBC, CCW and EAW on 26-04-09. Version 1 of report finalised after meeting with response to initial consultation responces and meeting agreements.

Data Collected to Carry out the Assessment			
Who carried out the assessment?	**Sources of Data**	**Level of assessment completed**	**Full results of the assessment may be accessed and viewed at:**
1. Brecon Beacons National Park Authority 2. Rhondda Cynon Taff Borough Council (Consultants: Environmental Visage Ltd and Middlemarch Environmental Ltd)	1. Countryside Council for Wales 2. Middlemarch Environmental Ltd Surveys (development land) 3. Environment Agency Wales	Stage 1 Screening	Time: TBC Dates: TBC Tel.: TBC Address: TBC

Overall Conclusions

Explain how the overall conclusion that there are No Significant Effects on this Natura 2000 site was arrived at.

It is considered that there is no need to carry out an appropriate assessment. This is a consequence of the nature of the scheme and the proposed air pollution control measures that have been put into place during development of the scheme.

MIDDLEMARCH ENVIRONMENTAL LTD

QUALITY ASSURANCE

TITLE: PROPOSED ENVIROPARKS DEVELOPMENT
AT HIRWAUN, RHONDDA TAFF, SOUTH WALES

APPROPRIATE ASSESSMENT
STAGE 1: SCREENING

A Report to Envisage

Contract Number: C104641
Report Number: RT-MME-104641
Revision Number: Version 1
Description: Final
Date: April 2009

Checked by:

James Calow
Principal Biodiversity Consultant

Approved by:

Dr Philip Fermor
Managing Director