PROPOSED ENVIROPARKS DEVELOPMENT AT HIRWAUN, RHONDDA TAFF, SOUTH WALES

ASSESSMENT OF POTENTIAL EFFECT ON SSSIs

A Report submitted to Envisage

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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

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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 (MEL) to carry out an assessment of the potential effect of the proposed development of an Enviropark off Fifth Avenue, Hirwaun on Sites of Special Scientific Interest (SSSIs) within a 10km radius of the proposed development site.

Middlemarch Environmental Drawing C105067-01 in Appendix 1 shows the location of the proposed scheme.

In April 2009 an 'Appropriate Assessment: Stage 1 Screening' report (MEL, 2009) was provided to Rhondda Cynon Taf County Borough Council and Brecon Beacons National Park Authority with respect to the potential effects associated with the development on the Blaen Cynon SAC, Coedydd Nedd a Mellte SAC and Cwm Cadlan SAC. As part of the consultation carried out during this process, the Countryside Council for Wales (Newberry, 2009) requested that a similar assessment will need to be carried out for SSSIs within a 10 km radius of the proposed development site. This report therefore provides the additional assessment requested by CCW.

The following information with respect to SSSIs are taken from the Joint Nature Conservation Committee (JNCC) website (www.jncc.gov.uk).

The JNCC is the forum through which the three country nature conservation agencies, the Countryside Council for Wales (CCW), Natural England (NE) and Scottish Natural Heritage (SNH), deliver their statutory responsibilities for Great Britain as a whole and internationally and is the statutory adviser to Government on UK and international nature conservation. Its work contributes to maintaining and enriching biological diversity, conserving geological features and sustaining natural systems. JNCC delivers the UK and international responsibilities of the four country nature conservation agencies - Council for Nature Conservation and the Countryside, the Countryside Council for Wales, Natural England and Scottish Natural Heritage. JNCC, working with the nature conservation agencies, is the focus for the guidelines for the selection of biological Sites of Special Scientific Interest (SSSIs).

The nature conservation agencies have a duty under the Wildlife and Countryside Act 1981, as amended, to notify any area of land which in their opinion is 'of special interest by reason of any of its flora, fauna, or geological or physiographical features'. Such areas are known as Sites of Special Scientific Interest (SSSIs). The notification is made to owners and occupiers, local planning authority and the Secretary of State, who may make representations or objections to the nature conservation agencies regarding the notification. Any representation or objection made must be considered by the nature conservation agencies before a decision is made by them to confirm the notification.

In 1989 the then Nature Conservancy Council published guidelines for the selection of biological SSSIs. Since 1991 JNCC has been the focus for the production and revision of the guidelines. The biological guidelines set out general principles upon which the nature conservation agencies reach judgements regarding special scientific interest. These principles are supplemented by details of wildlife habitat types and species groups.

> The Sites of Special Scientific Interest (SSSI) (England, Scotland and Wales) series has developed since 1949 as the national suite of sites providing statutory protection for the best examples of the UK's flora, fauna, or geological or physiographical features. These sites are also used to underpin other national and international nature conservation designations. Most SSSIs are privately-owned or managed; others are owned or managed by public bodies or non-government organisations. The SSSIs designation may extend into intertidal areas out to the jurisdictional limit of local authorities, generally Mean Low Water in England and Northern Ireland; Mean Low Water of Spring tides in Scotland. In Wales, the limit is Mean Low Water for SSSIs notified before 2002, and, for more recent notifications, the limit of Lowest Astronomical Tides, where the features of interest extend down to LAT. There is no provision for marine SSSIs beyond low water mark, although boundaries sometimes extend more widely within estuaries and other enclosed waters.
>
> Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs have been renotified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and the Nature

Conservation (Scotland) Act 2004.

The SSSIs considered for the present proposals include:

- Cors Bryn-y-Gaer SSSI
- Woodland Park and Pontpren SSSI
- Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI
- Cwm Cadlan SSSI
- Cwm Gwrelych and Nant Llynfach Streams SSSI
- Craig-y-Llyn SSSI
- Bryn Bwch SSSI
- Caeau Nant-y-Llechau SSSI
- Gweunedd Dyffern Nedd SSSI
- Bryncarnau Grasslands Llwyncoed SSSI
- Blaenrhondda Road Cutting SSSI
- Blaen Nedd SSSI
- Ogof Ffynnon Ddu Pant Mawr SSSI
- Caeau Ton-y-Fildre SSSI
- Penmoelallt SSSI
- Mynydd Ty-Isaf Rhondda SSSI
- Plas-y-Gors SSSI
- Daren Fach SSSI
- Cwm Glo SSSI
- Waun Ton-y-Spyddaden SSSI
- Gorsllwyn Onllwyn SSSI
- Cwm Taf Fechan Woodlands SSSI
- Nant Llech SSSI

Unlike SPA, SAC and Ramsar designations, the assessment of the potential impact on a SSSI are not required 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. However, in accordance with the principals outlined in Middlemarch Environmental Ltd Report RT-MME-

104641 (MEL, 2009) an assessment of the potential impacts on the SSSIs are presented in this report following the format established in the report detailed above.

Although not directly applicable to SSSI designated sites, the starting point for this assessment 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 proposed development at Hirwaun is not directly connected with or necessary to the management of any of the SSSIs identified above, therefore the purpose of this report is to determine whether the development is likely to have significant effects on the site either alone and/or in combination with other projects or plans. It is emphasised that Middlemarch Environmental 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.

Although not directly applicable to the SSSI designation, implicit in the Habitats Directive is the application of the **precautionary principle**, which requires that the conservation objectives of the site 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;
- 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, p14).

This means that the emphasis for assessment should be on objectively demonstrating, with supporting evidence, that there will be no significant effects on a SSSI 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 the citation. 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.

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**.**

Each SSSI unit is allocated a Condition Status during reviews of the SSSI carried out by Countryside Council for Wales (CCW). No information has currently been provided by CCW with respect to the Condition Status of the units for Bryncarnau Grasslands Llwyncoed SSSI. Information with respect to the Condition Status of Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI have been provided in the Blaen Cynon SAC Core Management Plan (CCW, 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 SSSI.

The site location is indicated on Middlemarch Environmental Drawing C105067-01 (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-eastern 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-western 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).

Table 2.1 includes details of the SSSIs that are present within a 10 km radius of the proposed Hirwaun Envioparks site.

Table 2.1: Summary of SSSI Sites Within 10 km of the Proposed Development Site

Site Name	Centred Grid Reference	Distance from Proposed Enviroparks Site
Cors Bryn-y-Gaer SSSI	294500 206500	100 m east
Woodlands Park and Pontpren SSSI	294600 207700 295200 207500 294800 207100	700 m north-east
Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI	291963 209323	1.5 km north
Cwm Cadlan SSSI	296100 209800	2.4 km north-east
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 SSSI	283867 212245	9.7 km north north-west

Envisage (2009) presented a summary of the SSSI features for each of the SSSIs included in Table 2.1 which are included below. For those SSSIs which cannot be screened out as having no effect from the proposed development additional information is provided in the following chapters.

Cors Bryn-y-Gaer SSSI

This site is of special interest for its lowland bog and for areas of soligenous flush, marshy grassland, dry neutral grassland and lowland acid grassland. These habitats occur in a complex with wet heath, swamp and semi-improved grassland. The site is also of special interest for the marsh fritillary butterfly *Eurdrysas aurinia*. The site is located immediately north-west of Hirwaun and south of the Brecon Beacons National Park. Cors Bryn-y-Gaer is situated at the

northern edge of the South Wales Coalfield, on glacial boulder clay, with areas of deep peat on lower ground. Several small watercourses and springs are associated with the site, which is in the catchment of the Afon Cynon.

Many of the plant communities are closely juxtaposed, with well displayed transitions between them. The nationally scarce marsh fritillary butterfly is accosiated with marshy grassland, in which is larval food plant, devil's bit scabious, is frequent and widespread. Cors Byrn-y-Gaer also supports a population of cruet collar moss *Splachnum ampullaceum*, a nationally declining species, scarce in south Wales. The moss occurs mainly in lowland wet pastures, where is grows on decaying cattle and sheep dung.

Cors Bryn-y-Gaer SSSI forms part of Blaen Cynon Special Area of Conservation (SAC).

Woodland Park and Pontpren SSSI

Woodland Park and Pontpren SSSI is of special interest for the marsh fritillary butterfly *Eurdrysas aurinia*. Additional special interest is provided by its mixture of habitat types, including marshy grassland, dry acid and neutral grassland, heathland and woodland, which add to the ecologist and diversity interest of the site and which also provide food and shelter necessary for the survival of the marsh fritillary butterfly.

The site consists of three separate blocks of land, approximately 1 km south of the village of Penderyn. Drainage is impeded across most of the site.

Woodland Park and Pontpren SSSI forms part of Blaen Cynon Special Area of Conservation (SAC).

Cwm Cadlan SAC/SSSI

Cwm Cadlan consists of calcium-rich springwater-fed fens. These are wetland areas that are supplied with base-rich ground water. The water level is permanently high. The vegetation of these fens varies but is usually composed of low-growing sedges, rushes, herbs and mosses, which may include black bog-rush *Schoenus nigricans*, dioecious sedge *Carex dioica* and common butterwort *Pinguicula vulgaris*. Many plants that are rare or scarce in the UK occur in base-rich fens.

The site also includes purple moor-grass meadows. These are wet meadows containing a species-rich mixture of grasses (especially purple moor-grass *Molinia caerulea*), sedges, herbs and mosses. These meadows are usually traditionally maintained by grazing.

Dyffrenoedd Nedd a Mellte a Moel Penderyn SSSI

Dyffrynnoedd Nedd a Mellte a Moel Penderyn SSSI is of special interest for its extensive and diverse semi-natural woodland, important populations of several flowering plants and supporting outstanding assemblages of mosses, liverworts and lichens. The site includes a range of geological features, well-exposed in the cliffs and rocky river beds. These include exposures at Moel Penderyn, Craig y Ddinas and Bwa Maen and geomorphological features within parts of the valleys of the Hepste and Mellte are also of special interest.

This site includes the wooded valleys of the rivers Nedd and Mellte, and their tributaries above Pontneddfechan, as they pass through a millstone grit and limestone plateau, and Moel Penderyn, which lies to the east. The plateau lies at about 300 m, the rivers having eroded deep, narrow valleys with gorges, river cliffs, block scree and waterfalls.

This site forms part of Coedd Nedd a Mellte SAC.

Cwm Gwrelych and Nant Llynfach Streams SSSI

The best sequence of Westphalian (Carboniferous) rocks in the South Wales Coalfield. About 500 metres of strata are exposed, representing a more or less complete section through the Westphalian A, Westphalian B and lower Westphalian C.

Craig-y-Llyn SSSI

Two north-east-facing hollows cut by Pleistocene ice or snow in the edge of the Pennant Sandstone Plateau. The high cliffs, ravines and flushes support many montane species including *Sedum rosea, Hymenophyllum wilsonii, Lycopodium selago* on the cliffs and the moss *Andrea rupstris* on flat boulders on the plateau. In Llyn Fach occur *Lobelia dortmanna, Isoetes lacustrisis* and *Sparganium angustifolium* in its southernmost locality. Analysis of the pollen preserved in Ffos Cenglau has yielded data on the post-glacial sequence of woodland types in South Wales.

Bryn Bwch SSSI

Bryn-Bwch is of special interest for its extensive area of fen-meadow, with associated mire, wet heath and wet woodland communities. The fen-meadow community, which is characterised by the presence of meadow thistle *Cirsium dissectum*, is a scarce and localised vegetation type in England and Wales.

Caeau Nant-y-Llechau SSSI

This is the largest area of traditional unimproved hay meadow known in Brecknock. The collection of gently sloping, south-east facing fields on the upper valley side of the Nedd support a wealth of plant species. Developed on boulder clay overlying millstone grit, flushed in part by springs and drained by a number of well wooded streams, the varying topography is reflected in the diverse flora, with over 110 species of higher plants recorded from the grassland areas.

Gweunedd Dyffern Nedd SSSI

Gweunydd Dyffryn Nedd is of special interest for its extensive areas of damp pasture and wet heath, including a type of fen meadow vegetation that has a restricted distribution in England and Wales. Large areas of this type of vegetation are now rare because of drainage and agricultural changes.

Bryncarnau Grasslands Llwyncoed SSSI

Bryncarnau Grasslands are situated on a west-facing hillside at the head of the Cynon Valley, to the north of Aberdare. They range from 270 to 320m in altitude, and are bounded by small tributaries of the River Cynon which, towards the western end of the site, occupy deeply incised wooded valleys. The soils are derived from boulder clay over Coal Measures. The site represents a particularly good example of a gradation from lowland mesotrophic grassland to pasture of a more upland character. A range of plant communities are present and these include 2 of very high nature conservation value. A number of plants which are rare in the Glamorgans occur here.

Blaenrhondda Road Cutting SSSI

This is the best available section of the flood-plain facies of the Carboniferous Rhondda Beds. It shows, fining upwards, cycles of sandstones and shales, and includes a thin coal, probably the Daren Rhesfyn Seam. Some of the sedimentary channels are of particular interest in that they

are side-filled. The variety of flood-plain and backswamp conditions represented in this section are significantly different from the Rhondda Beds as seen in South Wales, where deltaic sandstones usually predominate; this makes the site of great importance for understanding the late Westphalian history of the South Wales Coalfield.

Blaen Nedd SSSI

Blaen Nedd is of special interest for its underground cave system and associated karst (classic limestone landscape) surface features, its oak and ash woodland, neutral grassland, calcareous grassland, limestone pavement, marshy grassland, wet dwarf-shrub heath and associated semi-natural habitats.

The site is situated in the upper valley of the Nedd Fechan, approximately 1 km west of the village of Ystradfellte. It consists of a series of contiguous enclosures rising eastwards and north-eastwards from the river towards the lower flanks of Fan Nedd. Altitude ranges from 240-390 m. The geology consists of Dinantian ('Carboniferous Limestone') and Namurian ('Millstone Grit') strata. Soils are mainly surface-water gleys and brown earths. Where limestone lies close to the surface, shallow lithomorphic soils have developed and in depressions and over grits, peats have formed.

This site forms part of Coedd Nedd a Mellte SAC.

Ogof Ffynnon Ddu Pant Mawr SSSI

Known as the cave of the black spring, Ogof Ffynnon Ddu is Britain's third longest cave as well as being its deepest at 308 m deep.

Caeau Ton-y-Fildre SSSI

This site, comprising two unimproved herb-rich pastures, lies on the north bank of Nant y Bryn.

The westernmost field, dominated by sharp-flowered rush *Juncus acutiflorus*, supports a wide range of species characteristic of damp, flushed peaty pasture, including globeflower *Trollius europaeus*, meadow thistle *Cirsium dissectum*, whorled caraway *Carum verticillatum* and marsh arrowgrass *Triglochin palustris*.

The eastern pasture lies on a steeper slope with wet flushes and springs interspersed between drier grassland. Notable species here include greater butterfly-orchid *Platanthera chlorantha*, saw-wort *Serratula tinctoria*, dyer's greenweed *Genista tinctora* and petty whin *G. anglica*. Small patches of alder *Alnus glutinosa* add diversity to this part of the site, which explains the high species diversity, with over 100 species of flowering plants and ferns having been recorded to date. The area also appears to be attractive to invertebrates, with butterfly species in particular being well represented on this sheltered south-facing slope. These two pastures have been selected as good representative examples of the many species-rich pastures still remaining in this valley in 1981.

Penmoelallt SSSI

A mixed woodland of ash, oak, wych elm and small-leaved lime overlying Carboniferous Limestone. The rare Ley's whitebeam grows on a small escarpment within the wood.

Mynydd Ty-Isaf Rhondda SSSI

The cliffs and crags of the glacial corries at the head of the Rhondda Fawr Valley reach a height of 558 metres and dominate the landscape within the boundary of the Mynydd Ty Isaf Site of Special Scientific Interest. The three cliff systems formed during the erosion of the corries include Tarren Saerbren, Graig Fawr and Graig Fach. The Pennant Sandstone strata exposed in the corrie cliff systems, and also underlying the rest of the Mid Glamorgan uplands, supports a range of vegetation types including *Calluna* dominated heath, *Vaccinium myrtillus* heath, a range of species poor grasslands, bracken-dominated slopes and fern-rich screes and rock outcrops. Recently planted coniferous trees occupy much of Cwm Saerbren and some cliff top land.

The Pennant Sandstone crags are of particular interest as they support a number of arctic-alpine and other plant species of local distribution in Wales. The parsley fern *Cryptogramma crispa* occurs here at what is thought to be one of its most southerly British stations. Other ferns growing on crags within the SSSI include beech fern *Phegopteris connectilis*, mountain fern *Oreopteris limbosperma*, broad buckler fern *Dryopteris dilatata*, lady fern *Athyriurn filix-femina* and brittle bladder fern *Cystopteris fragilis*.

Plas-y-Gors SSSI

This is an example of an unusual type of mire habitat of particular interest for the range of wetland plant communities which has developed on the peat. The site is situated at an altitude of about 395 metres and lies in a shallow, water-filled depression in the Old Red Sandstone on the south-facing slopes of Fan Nedd. It receives water from a number of springs.

Close to the spring heads, flushes dominated by brown-coloured mosses such as *Cratoneuron commutatum*, *Scorpidium scorpioides* and *Drepanocladus revolvens* occur. In pools and seepage areas dioecious sedge *Carex dioica* is found in some abundance, together with the insectivorous plants, round-leaved sundew *Drosera rotundifolia* and common butterwort *Pinguicula vulgaris*. Scattered stems of common reed *Phragmites australis* grow throughout this area and the presence of marsh arrowgrass *Triglochin palustris* and few-flowered spike-rush *Eleocharis quinqueflora* provides additional interest. Between these areas, flushed with nutrients from the springs, are hummocks of acidic peat supporting a different range of plant species. Here heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix* and hare's-tail cottongrass *Eriophorum vaginatum* are abundant. Amongst the hummocks are peat-bottomed pools with bogbean *Menyanthes trifoliata* and bog pondweed *Potamogeton polygonifolius*.

Daren Fach SSSI

The site consists of an open scrub on low limestone cliffs with screes and woodland on the gentler slopes. The latter are dominated by ash inter-mixed with wych elm together with a well developed understorey of hazel and hawthorn. Field maple is present and a group of small-leaved lime lies at the northern end. The primary interest lies in a concentration of *Sorbus spp*. on the southern end of the Darren Fach crags. This is the type locality for the rare Ley's Whitebeam *Sorbus leyana*. Several shrubs of *S. leyana* together with a specimen of *S. rupicola* grow in association with ash, yew and holly.

Cwm Glo SSSI

Cwm Glo is of special interest for its wet pastures and species-rich neutral grassland, and for the association of these habitats with others including acid grassland and wet heath.

Waun Ton-y-Spydddaden SSSI

A series of small, unimproved, herb-rich hay meadows lying on a very gentle slope. The site demonstrates well the effects of traditional management on the moorland vegetation to be found on the better soils in this part of Wales.

Gorsllwyn Onllwyn SSSI

This site contains a range of peat-depositing vegetation communities which has developed on a col between the Pyrddin and Dulais valleys. These peatlands are surrounded by an area of acidic grassland. Peat deposition has been sufficiently great in part of the Neath Port Talbot portion of the site to form a dome shaped mass of peat above the general water table of the site. Such a feature is known as a raised mire. There are very few other examples of this formation known in mid and south Wales. Unfortunately, regular burning and grazing of the site has grossly modified its surface vegetation.

Much of this mire drains north into an area dominated by common reed *Phragmites australis*. The spectacular development of clumps of greater tussock-sedge *Carex paniculata*, in many cases over one metre high, amongst the common reed, affords drier sites for the establishment of willow species *Salix spp*., and willow carr now covers most of the area bordering the main east-flowing drainage stream. A range of woodland species including royal fern *Osmunda regalis* occurs beneath the tree canopy.

Peat has not completely infilled the area. In some parts, the vegetation has grown as floating lawns over water. The more nutrient-rich sites support an extremely diverse flora with up to 28 species recorded in an area of 4 square metres.

Cwm Taf Fechan Woodlands SSSI

Where the partially wooded valley of the Taf Fechan crosses the north crop Carboniferous Limestone. Mixed deciduous woodlands cover steep slopes and spoil from quarries with one of the few Glamorgan stations for *Gymnocarpium robertianum*. There are interesting plant communities in flushes around tufa springs and luxuriant growths of bryophytes in the splash zone of the river.

Nant Llech SSSI

The Nant Llech Isaf and the Nant Llech Pellaf combine at Blaen-Llech to form the Nant Llech. In its short dash to join the Afon Tawe near Ynyswen it leaps over the Farewell Rock to provide the highest waterfall in Fforest Fawr Geopark and indeed one of the highest in South Wales. The Henrhyd Falls occur where this band of resistant sandstone is faulted against easily eroded mudstones.

The information above has been used to determine the most appropriate habitat type as listed on the APIS website, in order to identify the critical loads of nutrient Nitrogen and acid deposition for the site. Due to the limited number of habitat types detailed on the APIS website, an element of estimation or best fit has had to be applied to some sites.

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 2.2.

Table 2.2: 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 2.2 (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 2.2 (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 2.2 (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 2.2 (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 for the assessment of the effects of projects on Natura 2000 sites, 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 SSSI 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. SSSIs).

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. POTENTIAL EFFECTS ON THE SSSIs – INITIAL SCREENING

3.1 POTENTIAL EFFECTS

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). Using the guidelines produced by Oxford Brookes (2001) the likely changes to a European Site may arise as a result of the following. This can also be applied to an assessment of the effects on a SSSI:

- 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.

Likely direct effects on nearby SSSIs can be summarised as:

- Loss of habitat supporting species listed on the SSSI citation; and,
- Disturbance to species using the SSSI from construction and operation.

In addition there may be indirect effects from the proposed development on a SSSI. Foreseen effects would relate to the following:

- Hydrological changes;
- Air quality changes;
- Light pollution; 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 features listed on the SSSI citations are discussed below.

3.2 DIRECT EFFECTS

3.2.1 Loss of Habitat

The likely direct effects from loss of habitat used by features listed on the SSSI citation is only likely to apply to those SSSIs that are within close proximity (within 1 km) of the proposed development site. These include:

- Cors Bryn-y-Gaer SSSI; and,
- Woodland Park and Pontpren SSSI.

Further details of the potential effect from loss of habitat on these SSSIs are given in Sections 4 and 5 respectively.

It is not anticipated that there will be any significant effect from loss of habitat within the proposed development site on any of the other SSSIs included in this assessment.

3.2.2 Disturbance

The likely direct effects from loss of habitat used by features listed on the SSSI citation is only likely to apply to those SSSIs that are within close proximity (within 0.5 km) of the proposed development site. These include:

- Cors Bryn-y-Gaer SSSI.

Further details of the potential effect from disturbance on this SSSI is given in Section 4.

It is not anticipated that there will be any significant effect from disturbance within the proposed development site on any of the other SSSIs included in this assessment.

3.3 INDIRECT EFFECTS

3.3.1 Hydrological Changes

Hydrological changes within the proposed development site as a result of development could result in changes to groundwater or surfacewater supplies to the habitats within the SSSIs. The Environment Statement (ES) (Savills, 2008b) 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 (which comprises of Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI) 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. Further details of the potential effects from hydrological changes on Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI are provided in Sections 4 and 5 respectively.

3.3.2 Air Pollution

To assess the potential effects of the operation of the proposed development on air pollution at each of the SSSIs included in this assessment Envisage (2009) carried out air quality assessments and models. Full details of the modelling competed are provided in the Envisage report and are summaried below.

Within the original Environmental Statement (Savills, 2008b), 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).

Envisage (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 fully consulted the latest planning applications, and carried out correspondence with BBNPA, RCT and neighbouring Neath Port Talbot Local Authorities. These consultations have identified that there are no planning applications or recent permissions which will require considering in combination with emissions from the proposed Enviroparks site. Therefore, 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, 2008b) 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 on 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.

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 tables presented below include the results from the modelling and calculation exercises for the SSSIs. 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 3.1 presents a worst case for NO_2 and SO_2 process concentrations in air at the SSSIs. 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 3.1 shows that the percentage of both the long-term and short-term objective for nitrogen as NO_2 exceeds the 1% insignificance criteria for Blaen Cynon SAC (comprising Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI) and Cwm Gwrelych and Nant Llynfach Streams SSSI. At Craig-y-Llyn SSSI the percentage of the short-term objective for nitrogen as NO_2 exceeds the 1% insignificance criteria. At Blaen Cynon SAC (comprising Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI) the short-term objective for sulphur dioxide exceeds the 1% insignificance criteria.

Table 3.1: Process Contribution of Oxides of Nitrogen and Sulphur Dioxide at SSSIs

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 Short 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 Short 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
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.1534	0.51	7.76	3.88	0.0246	0.12	1.1819	0.34
Cwm Cadlan**	0.0980	0.33	4.48	2.24	0.0157	0.08	0.6576	0.19
Cwm Gwrelych and Nant Llynfach Streams	0.3782	**1.26**	27.50	**13.75**	0.0605	0.30	4.2508	1.21
Craig-y-Llyn	0.1869	0.62	33.15	**16.58**	0.0299	0.15	4.1597	1.19
Bryn Bwch	0.0775	0.26	3.91	1.96	0.0125	0.06	0.6016	0.17
Caeau Nant-y-Llechau	0.0765	0.25	4.10	2.05	0.0123	0.06	0.6228	0.18
Gweunedd Dyffern Nedd	0.0637	0.21	3.34	1.67	0.0102	0.05	0.5042	0.14
Bryncarnau Grasslands Llwyncoed	0.2902	0.97	5.55	2.77	0.0466	0.23	0.8841	0.25
Blaenrhondda Road Cutting	0.0697	0.23	5.45	2.72	0.0112	0.06	0.8469	0.24
Blaen Nedd	0.0462	0.15	2.87	1.43	0.0074	0.04	0.4066	0.12
Ogof Ffynnon Ddu Pant Mawr	0.0335	0.11	2.08	1.04	0.0054	0.03	0.2983	0.09
Caeau Ton-y-Fildre	0.0445	0.15	3.15	1.58	0.0071	0.04	0.4837	0.14
Penmoelallt	0.1148	0.38	3.29	1.64	0.0184	0.09	0.5032	0.14
Mynydd Ty-Isaf Rhondda	0.0391	0.13	3.06	1.53	0.0063	0.03	0.4544	0.13
Plas-y-Gors	0.0307	0.10	2.23	1.12	0.0049	0.02	0.3120	0.09
Daren Fach	0.0864	0.29	2.66	1.33	0.0139	0.07	0.4110	0.12
Cwm Glo	0.1773	0.59	3.83	1.91	0.0285	0.14	0.5816	0.17
Waun Ton-y-Spyddaden	0.0395	0.13	2.97	1.48	0.0063	0.03	0.4430	0.13
Gorsllwyn Onllwyn	0.0420	0.14	3.01	1.51	0.0067	0.03	0.4344	0.12
Cwm Taf Fechan Woodlands	0.1087	0.36	2.82	1.41	0.0175	0.09	0.4386	0.13
Nant Llech	0.0319	0.11	2.28	1.14	0.0051	0.03	0.3458	0.10

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI
** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.2 shows a comparison of the result of total oxides of nitrogen versus modelling with NO_x chemistry for the sites discussed above. Details on the chemistry modelling used are provided in Envisage (2009).

Table 3.2: Comparison of Results for Total Oxides of Nitrogen Release Versus Modelling with NO_x Chemistry

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 Short 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 Short 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**
Cwm Gwrelych and Nant Llynfach Streams	0.3782	**1.26**	27.50	**13.75**	0.2647	0.88	11.95	5.97
Craig-y-Llyn	0.1869	0.62	33.15	**16.58**	0.1308	0.44	11.36	5.68

Table 3.2 shows that the percentage of objective for nitrogen as NO_2 and sulphur dioxide both exceed the 1% insignificance criteria at Blaen Cynon SAC (comprising Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI) and Cwm Gwrelych and Nant Llynfach Streams SSSI. In addition, the percentage of short-term objective exceeds the 10% insignificance criteria for both oxides of nitrogen as NO_2 and sulphur dioxide at Blaen Cynon SAC (comprising Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI). At Craigy-Llyn SSSI the percentage of short-term objective exceeds the 10% insignificance criteria.

Tables 3.3 and 3.4 show the predicted environmental concentration (PEC) of oxides of nitrogen as NO_2 and sulphur dioxide respectively.

Table 3.3: Predicted Environmental Concentration of Oxides of Nitrogen as NO_2 at SSSIs 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
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.1534	8	8.15	27.18	7.76	8	15.76	7.88
Cwm Cadlan**	0.0980	8.3	8.40	27.99	4.48	8.3	12.78	6.39
Cwm Gwrelych and Nant Llynfach Streams	0.3782	8.5	8.88	29.59	27.50	8.5	36.00	18.00
Craig-y-Llyn	0.1869	8.9	9.09	30.29	33.15	8.9	42.05	21.03
Bryn Bwch	0.0775	7.8	7.88	26.26	3.91	7.8	11.71	5.86
Caeau Nant-y-Llechau	0.0765	7.8	7.88	26.25	4.10	7.8	11.90	5.95
Gweunedd Dyffern Nedd	0.0637	7.7	7.76	25.88	3.34	7.7	11.04	5.52
Bryncarnau Grasslands Llwyncoed	0.2902	10.3	10.59	35.30	5.55	10.3	15.85	7.92
Blaenrhondda Road Cutting	0.0697	9.3	9.37	31.23	5.45	9.3	14.75	7.37
Blaen Nedd	0.0462	7.4	7.45	24.82	2.87	7.4	10.27	5.13
Ogof Ffynnon Ddu Pant Mawr	0.0335	7	7.03	23.45	2.08	7	9.08	4.54
Caeau Ton-y-Fildre	0.0445	8	8.04	26.82	3.15	8	11.15	5.58
Penmoelallt	0.1148	9.3	9.41	31.38	3.29	9.3	12.59	6.29
Mynydd Ty-Isaf Rhondda	0.0391	9.8	9.84	32.80	3.06	9.8	12.86	6.43
Plas-y-Gors	0.0307	7.2	7.23	24.10	2.23	7.2	9.43	4.72
Daren Fach	0.0864	9	9.09	30.29	2.66	9	11.66	5.83
Cwm Glo	0.1773	13.3	13.48	44.92	3.83	13.3	17.13	8.56
Waun Ton-y-Spyddaden	0.0395	7.5	7.54	25.13	2.97	7.5	10.47	5.23
Gorsllwyn Onllwyn	0.0420	8.1	8.14	27.14	3.01	8.1	11.11	5.56
Cwm Taf Fechan Woodlands	0.1087	13	13.11	43.70	2.82	13	15.82	7.91
Nant Llech	0.0319	8.2	8.23	27.44	2.28	8.2	10.48	5.24

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI
** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.4: Predicted Environmental Concentration of Sulphur Dioxide at SSSIs

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
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.0246	2	2.02	10.12	1.1819	2	3.18	0.91
Cwm Cadlan**	0.0157	1.3	1.32	6.58	0.6576	1.3	1.96	0.56
Cwm Gwrelych and Nant Llynfach Streams	0.0605	2	2.06	10.30	4.2508	2	6.25	1.79
Craig-y-Llyn	0.0299	1.4	1.43	7.15	4.1597	1.4	5.56	1.59
Bryn Bwch	0.0125	0.9	0.91	4.56	0.6016	0.9	1.50	0.43
Caeau Nant-y-Llechau	0.0123	0.9	0.91	4.56	0.6228	0.9	1.52	0.44
Gweunedd Dyffern Nedd	0.0102	0.9	0.91	4.55	0.5042	0.9	1.40	0.40
Bryncarnau Grasslands Llwyncoed	0.0466	1.3	1.35	6.73	0.8841	1.3	2.18	0.62
Blaenrhondda Road Cutting	0.0112	1.4	1.41	7.06	0.8469	1.4	2.25	0.64
Blaen Nedd	0.0074	0.9	0.91	4.54	0.4066	0.9	1.31	0.37
Ogof Ffynnon Ddu Pant Mawr	0.0054	1	1.01	5.03	0.2983	1	1.30	0.37
Caeau Ton-y-Fildre	0.0071	1	1.01	5.04	0.4837	1	1.48	0.42
Penmoelallt	0.0184	2.8	2.82	14.09	0.5032	2.8	3.30	0.94
Mynydd Ty-Isaf Rhondda	0.0063	1.6	1.61	8.03	0.4544	1.6	2.05	0.59
Plas-y-Gors	0.0049	1.1	1.10	5.52	0.3120	1.1	1.41	0.40
Daren Fach	0.0139	1	1.01	5.07	0.4110	1	1.41	0.40
Cwm Glo	0.0285	2.8	2.83	14.14	0.5816	2.8	3.38	0.97
Waun Ton-y-Spyddaden	0.0063	1	1.01	5.03	0.4430	1	1.44	0.41
Gorsllwyn Onllwyn	0.0067	1	1.01	5.03	0.4344	1	1.43	0.41
Cwm Taf Fechan Woodlands	0.0175	2.8	2.82	14.09	0.4386	2.8	3.24	0.93
Nant Llech	0.0051	1.6	1.61	8.03	0.3458	1.6	1.95	0.56

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI

** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.5 shows the dry deposition rate of predicted nitrogen at the SSSIs. 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 3.5 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 3.5: Predicted Nitrogen Deposition at SSSIs (continues)

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
Dry deposition only							
Blaen Cynon SAC*	Wet, acidic marshy grassland	23.8	15 – 25	0.0631	6.05	**40.36**	**24.21**
* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI	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 3.5 (cont.): Predicted Nitrogen Deposition at SSSIs

Receptor	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO2 Deposition ug N/m2/s	Predicted NO2 Deposition kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load	Current Background kg N/Ha/yr
Dry deposition only							
Dyffrynoedd Nedd a Mellte a Moel Penderyn	Oak woodland (deciduous)	37.4	10 - 15	0.0025	0.24	**2.41**	**1.21**
Cwm Cadlan**	Molina; alkaline fen and reedbed (poor fen)	27.9	10 – 20	0.0018	0.17	**1.72**	0.86
** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI	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
Cwm Gwrelych and Nant Llynfach Streams	Shingle, rock and cliff	23.8	10-15	0.0030	0.29	**2.90**	**1.45**
Craig-y-Llyn	Shingle, rock and cliff	24.8	10-15	0.0009	0.08	0.85	0.42
Bryn Bwch	Mountain rich fen	19.2	15-25	0.0012	0.12	**1.17**	0.58
Caeau Nant-y-Llechau	Unimproved hay meadow	19.2	20-30	0.0011	0.10	**1.02**	0.51
Gweunedd Dyffern Nedd	Mountain rich fen	19.2	15-25	0.0010	0.09	0.92	0.46
Bryncarnau Grasslands Llwyncoed	Wet, acidic grassland (Molina)	27.9	15-25	0.0036	0.35	**3.47**	**1.74**
Blaenrhondda Road Cutting	Shingle, rock and cliff	24.8	10-15	0.0008	0.07	0.73	0.37
Blaen Nedd	Limestone Pavement	19.2	15-25	0.0006	0.06	0.62	0.31
Ogof Ffynnon Ddu Pant Mawr	Shingle, rock and cliff	20.9	10-15	0.0004	0.04	0.42	0.21
Caeau Ton-y-Fildre	Unimproved hay meadow	19.9	20-30	0.0005	0.05	0.48	0.24
Penmoelallt	Ash Woodland (deciduous)	44.8	10-15	0.0017	0.17	**1.66**	0.83
Mynydd Ty-Isaf Rhondda	Shingle, rock and cliff	23.2	10-15	0.0004	0.03	0.35	0.17
Plas-y-Gors	Raised/ blanket bog	20.9	5-10	0.0004	0.04	0.41	0.20

Table 3.5 (cont.): Predicted Nitrogen Deposition at SSSIs

Receptor	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO2 Deposition ug N/m2/s	Predicted NO2 Deposition kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load	Current Background kg N/Ha/yr
Daren Fach	Shingle, rock and cliff	22.5	10-15	0.0013	0.13	**1.27**	0.64
Cwm Glo	Wet, acidic grassland (Molina)	28	15-25	0.0018	0.17	**1.71**	0.86
Waun Ton-y-Spyddaden	Unimproved hay meadow	19.9	20-30	0.0004	0.04	0.43	0.21
Gorsllwyn Onllwyn	Wet, acidic grassland (Heath Meadows)	19.9	10-20	0.0005	0.04	0.44	0.22
Cwm Taf Fechan Woodlands	Oak woodland (deciduous)	44.8	10-15	0.0014	0.14	**1.38**	0.69
Nant Llech	Shingle, rock and cliff	21.1	10-15	0.0003	0.03	0.31	0.16

Table 3.5 shows that when considering the effects of dry deposition of nitrogen at the SSSIs the results exceed the insignificance threshold when compared against the lower critical load and the higher critical load at the following sites: Cors Bryn-y-Gaer SSSI, Woodland Park and Pontpren SSSI, Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI, Cwm Gwrelych and Nant Llynfach Streams SSSI, and, Bryncarnau Grasslands Llwyncoed SSSI.

Table 3.5 also shows that when considering the effects of dry deposition of nitrogen at the SSSIs the results exceed the insignificance threshold when compared against the higher critical load at the following sites: Cwm Cadlan SSSI, Bryn Bwch SSSI, Caeau Nant-y-Llechau SSSI, Penmoelallt SSSI, Daren Fach SSSI, Cwm Glo SSSI and Cwm Taf Fechan Woodlands SSSI.

When considering the effects of total deposition, the effect on the SSSIs included above could not be screened as insignificant when compared to the lower or higher critical load. Table 3.6 presents the results 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.

Table 3.6: Predicted Nitrogen Deposition at SSSIs (continues)

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* * This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI	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**
Dyffrynoedd Nedd a Mellte a Moel Penderyn Cwm Cadlan** ** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI	Oak woodland (deciduous)	37.4	10 - 15	0.0031	0.30	**2.99**	**1.49**
	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**

Table 3.6 (cont.): Predicted Nitrogen Deposition at SSSIs

Receptor	Current Background kg N/Ha/yr	Critical Load Range kg N/Ha/yr	Predicted NO2 Deposition ug N/m2/s	Predicted NO2 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							
Cwm Gwrelych and Nant Llynfach Streams	Shingle, rock and cliff	23.8	10-15	0.0037	0.35	**3.52**	**1.76**
Craig-y-Llyn	Shingle, rock and cliff	24.8	10-15	0.0011	0.10	**1.03**	0.51
Bryn Bwch	Mountain rich fen	19.2	15-25	0.0016	0.15	**1.52**	0.76
Caeau Nant-y-Llechau	Unimproved hay meadow	19.2	20-30	0.0013	0.13	**1.26**	0.63
Gweunedd Dyffern Nedd	Mountain rich fen	19.2	15-25	0.0013	0.12	**1.23**	0.61
Bryncarnau Grasslands Llwyncoed	Wet, acidic grassland (Molina)	27.9	15-25	0.0015	0.14	**1.43**	0.71
Blaenrhondda Road Cutting	Shingle, rock and cliff	24.8	10-15	0.0045	0.43	**4.32**	**2.16**
Blaen Nedd	Limestone Pavement	19.2	15-25	0.0009	0.08	0.84	0.42
Ogof Ffynnon Ddu Pant Mawr	Shingle, rock and cliff	20.9	10-15	0.0008	0.08	0.80	0.40
Caeau Ton-y-Fildre	Unimproved hay meadow	19.9	20-30	0.0006	0.05	0.54	0.27
Penmoelallt	Ash Woodland (deciduous)	44.8	10-15	0.0006	0.06	0.62	0.31
Mynydd Ty-Isaf Rhondda	Shingle, rock and cliff	23.2	10-15	0.0023	0.22	**2.18**	**1.09**
Plas-y-Gors	Raised/ blanket bog	20.9	5-10	0.0004	0.04	0.40	0.20
Daren Fach	Shingle, rock and cliff	22.5	10-15	0.0005	0.05	0.52	0.26
Cwm Glo	Wet, acidic grassland (Molina)	28	15-25	0.0018	0.17	**1.69**	0.85
Waun Ton-y-Spyddaden	Unimproved hay meadow	19.9	20-30	0.0022	0.22	**2.15**	**1.08**
Gorsllwyn Onllwyn	Wet, acidic grassland (Heath Meadows)	19.9	10-20	0.0006	0.05	0.54	0.27
Cwm Taf Fechan Woodlands	Oak woodland (deciduous)	44.8	10-15	0.0006	0.06	0.56	0.28
Nant Llech	Shingle, rock and cliff	21.1	10-15	0.0019	0.18	**1.79**	0.89

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 the SSSIs to incorporate the information and combine the stacks within the proposed development. Table 3.7 presents nitrogen deposition data for the SSSIs, with full consideration of the points detailed above and in the Envisage (2009) report.

Table 3.7: Predicted Nitrogen Deposition at SSSIs

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

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							
Blaen Cynon SAC * This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI	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
Dyffrynoedd Nedd a Mellte a Moel Penderyn	Oak woodland (deciduous)	37.4	10 - 15	0.000105	0.01	0.10	0.05
Cwm Cadlan** ** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI	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

Table 3.7 (cont.): Predicted Nitrogen Deposition at SSSIs

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							
Cwm Cadlan** ** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI	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
Cwm Gwrelych and Nant Llynfach Streams	Shingle, rock and cliff	23.8	10-15	0.000153	0.01	0.15	0.07
Craig-y-Llyn	Shingle, rock and cliff	24.8	10-15	0.000063	0.01	0.06	0.03
Bryn Bwch	Mountain rich fen	19.2	15-25	0.000053	0.01	0.05	0.03
Caeau Nant-y-Llechau	Unimproved hay meadow	19.2	20-30	0.000049	0.00	0.05	0.02
Gweunedd Dyffern Nedd	Mountain rich fen	19.2	15-25	0.000043	0.00	0.04	0.02
Bryncarnau Grasslands Llwyncoed	Wet, acidic grassland (Molina)	27.9	15-25	0.000192	0.02	0.18	0.09
Blaenrhondda Road Cutting	Shingle, rock and cliff	24.8	10-15	0.000043	0.00	0.04	0.02
Blaen Nedd	Limestone Pavement	19.2	15-25	0.000032	0.00	0.03	0.02
Ogof Ffynnon Ddu Pant Mawr	Shingle, rock and cliff	20.9	10-15	0.000023	0.00	0.02	0.01
Caeau Ton-y-Fildre	Unimproved hay meadow	19.9	20-30	0.000028	0.00	0.03	0.01
Penmoelallt	Ash Woodland (deciduous)	44.8	10-15	0.000081	0.01	0.08	0.04
Mynydd Ty-Isaf Rhondda	Shingle, rock and cliff	23.2	10-15	0.000023	0.00	0.02	0.01
Plas-y-Gors	Raised/ blanket bog	20.9	5-10	0.000021	0.00	0.02	0.01
Daren Fach	Shingle, rock and cliff	22.5	10-15	0.000062	0.01	0.06	0.03
Cwm Glo	Wet, acidic grassland (Molina)	28	15-25	0.000110	0.01	0.11	0.05
Waun Ton-y-Spyddaden	Unimproved hay meadow	19.9	20-30	0.000024	0.00	0.02	0.01
Gorsllwyn Onllwyn	Wet, acidic grassland (Heath Meadows)	19.9	10-20	0.000026	0.00	0.03	0.01

Table 3.7 (cont.): Predicted Nitrogen Deposition at SSSIs

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 NO2 Deposition ug N/m2/s	Predicted NO2 Deposition kg N/Ha/yr	Percentage of Lower Critical Load	Percentage of Higher Critical Load
Cwm Taf Fechan Woodlands	Oak woodland (deciduous)	44.8	10-15	0.000074	0.01	0.07	0.04
Nant Llech	Shingle, rock and cliff	21.1	10-15	0.000019	0.00	0.02	0.01

Table 3.7 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 at Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI (data from Blaen Cynon SAC), but only exceeds the 1% insignificance criteria for the higher critical load for raised bog habitats.

Table 3.7 clearly shows that when using the Lexan and Marner (2005) methodologies the percentage of dry deposition does not exceeds the 1% insignificance criteria for either the lower or the higher ciritical load at any of the other SSSIs included in the study.

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 (which includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI) 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 3.7 as the approximate centre points of the receptors, the dry nitrogen deposition rate detailed for Blaen Cynon SAC in Table 3.7 will provide a deposition rate that can be considered reasonably average for the contribution of nutrient nitrogen to the whole site.

Table 3.8 shows the predicted acid deposition at the SSSIs and identifies that the levels at Blaen Cynon SAC (which includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI) and Bryncarnau Grasslands Llwyncoed SSSI will be above the 1% of the critical load and and therefore cannot be considered to be insignificant.

Table 3.8: Predicted Acid Deposition at SSSIs (continued)

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**
Dyffrynoed d Nedd a Mellte a Moel Penderyn	3.25	2.22	0.00192	0.00072	0.00263	0.12	**146.5150462**
Cwm Cadlan**	2.52	4	0.00126	0.00047	0.00172	0.04	**63.04308363**
Cwm Gwrelych and Nant Llynfach Streams	No Data	No Data	0.00251	0.00105	0.00357	N/A	**N/A**
Craig-y-Llyn	2.27	0.78	0.00094	0.00043	0.00138	0.18	**291.2020281**
Bryn Bwch	1.71	1.5	0.00095	0.00036	0.00131	0.09	**114.0875116**
Caeau Nant-y-Llechau	1.71	0.35	0.00087	0.00034	0.00121	0.35	**488.9181733**
Gweunedd Dyffern Nedd	1.71	1.5	0.00077	0.00030	0.00106	0.07	**114.0709315**
Bryncarnau Grasslands Llwyncoed	2.52	0.35	0.00323	0.00131	0.00455	**1.30**	**721.298661**
Blaenrhond da Road Cutting	2.27	0.1	0.00069	0.00029	0.00098	0.98	**2270.979507**
Blaen Nedd	1.71	0.35	0.00054	0.00022	0.00076	0.22	**488.7881841**
Ogof Ffynnon Ddu Pant Mawr	1.89	0.35	0.00039	0.00016	0.00055	0.16	**540.1584361**
Caeau Ton-y-Fildre	1.8	0.35	0.00044	0.00019	0.00063	0.18	**514.4667588**
Penmoelallt	3.91	2.36	0.00140	0.00055	0.00196	0.08	**165.7608327**
Mynydd Ty-Isaf Rhondda	2.12	0.1	0.00035	0.00016	0.00051	0.51	**2120.508862**
Plas-y-Gors	1.89	0.35	0.00036	0.00014	0.00050	0.14	**540.1438861**
Daren Fach	2.01	0.75	0.00107	0.00042	0.00150	0.20	**268.1995696**
Cwm Glo	2.59	0.35	0.00173	0.00075	0.00248	0.71	**740.7081327**

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI

** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.8 (cont.): Predicted Acid Deposition at SSSIs

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
Waun Ton-y-Spyddaden	1.8	0.35	0.00040	0.00017	0.00056	0.16	**514.4469351**
Gorsllwyn Onllwyn	1.8	0.35	0.00041	0.00018	0.00059	0.17	**514.4547827**
Cwm Taf Fechan Woodlands	3.91	1.44	0.00124	0.00051	0.00175	0.12	**271.6495799**
Nant Llech	1.93	1.5	0.00030	0.00013	0.00043	0.03	**128.6953866**

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 3.8 for dry deposition present a worst case assessment.

Tables 3.9 to 3.12 show the process contribution and predicted environmental concentration of particulates, carbon monoxide and Volatile Organic Compounds (VOCs) at the SSSIs.

Table 3.9 shows that with respect to VOCs the levels are below the 1% insignificance criteria for all apart from benzene at Blaen Cynon SAC (which includes Cors Bryn-y-Gaer SSSI, and Woodlands Park and Pontpren SSSI). 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 SAC (and therefore Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI) 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 (and therefore Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI) can be considered to be insignificant.

Tables 3.13 and 3.14 show the process contributions of heavy metals, hydrogen chloride and hydrogen fluoride at the SSSIs.

Table 3.9: Process Contribution of Particulates, Carbon Monoxide and VOCs at SSSIs

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**
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.0104	0.03	0.039	0.08	0.00007	0.0007	0.0099	0.06
Cwm Cadlan**	0.0067	0.02	0.022	0.04	0.00004	0.0004	0.0064	0.04
Cwm Gwrelych and Nant Llynfach Streams	0.0249	0.06	0.078	0.16	0.00017	0.0017	0.0236	0.15
Craig-y-Llyn	0.0123	0.03	0.027	0.05	0.00008	0.0008	0.0116	0.07
Bryn Bwch	0.0053	0.01	0.018	0.04	0.00003	0.0003	0.0050	0.03
Caeau Nant-y-Llechau	0.0052	0.01	0.017	0.03	0.00003	0.0003	0.0049	0.03
Gweunedd Dyffern Nedd	0.0043	0.01	0.016	0.03	0.00003	0.0003	0.0041	0.03
Bryncarnau Grasslands Llwyncoed	0.0197	0.05	0.062	0.12	0.00013	0.0013	0.0188	0.12
Blaenrhondda Road Cutting	0.0047	0.01	0.011	0.02	0.00003	0.0003	0.0045	0.03
Blaen Nedd	0.0031	0.01	0.011	0.02	0.00002	0.0002	0.0030	0.02
Ogof Ffynnon Ddu Pant Mawr	0.0023	0.01	0.008	0.02	0.00002	0.0002	0.0022	0.01
Caeau Ton-y-Fildre	0.0030	0.01	0.012	0.02	0.00002	0.0002	0.0029	0.02
Penmoelallt	0.0078	0.02	0.022	0.04	0.00005	0.0005	0.0075	0.05
Mynydd Ty-Isaf Rhondda	0.0026	0.01	0.008	0.02	0.00002	0.0002	0.0025	0.02
Plas-y-Gors	0.0021	0.01	0.008	0.02	0.00001	0.0001	0.0020	0.01
Daren Fach	0.0059	0.01	0.017	0.03	0.00004	0.0004	0.0056	0.03
Cwm Glo	0.0120	0.03	0.038	0.08	0.00008	0.0008	0.0115	0.07
Waun Ton-y-Spyddaden	0.0027	0.01	0.009	0.02	0.00002	0.0002	0.0025	0.02
Gorsllwyn Onllwyn	0.0028	0.01	0.010	0.02	0.00002	0.0002	0.0027	0.02
Cwm Taf Fechan Woodlands	0.0074	0.02	0.022	0.04	0.00005	0.0005	0.0071	0.04
Nant Llech	0.0022	0.01	0.009	0.02	0.00001	0.0001	0.0020	0.01

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI

** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.10: Predicted Environmental Concentration of Particulates at SSSIs

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
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.0104	14.49	14.50	36.24	0.039	14.49	14.52	29.05
Cwm Cadlan	0.0067	16.99	17.00	42.50	0.022	16.99	17.02	34.03
Cwm Gwrelych and Nant Llynfach Streams	0.0249	14.48	14.50	36.25	0.078	14.48	14.55	29.11
Craig-y-Llyn	0.0123	14.42	14.43	36.07	0.027	14.42	14.44	28.89
Bryn Bwch	0.0053	14.00	14.00	35.01	0.018	14.00	14.02	28.03
Caeau Nant-y-Llechau	0.0052	14.33	14.34	35.84	0.017	14.33	14.35	28.70
Gweunedd Dyffern Nedd	0.0043	13.91	13.92	34.80	0.016	13.91	13.93	27.86
Bryncarnau Grasslands Llwyncoed	0.0197	14.64	14.66	36.66	0.062	14.64	14.71	29.41
Blaenrhondda Road Cutting	0.0047	14.51	14.52	36.29	0.011	14.51	14.52	29.05
Blaen Nedd	0.0031	13.79	13.79	34.47	0.011	13.79	13.80	27.59
Ogof Ffynnon Ddu Pant Mawr	0.0023	13.99	14.00	34.99	0.008	13.99	14.00	28.00
Caeau Ton-y-Fildre	0.0030	14.55	14.55	36.38	0.012	14.55	14.56	29.12
Penmoelallt	0.0078	14.40	14.40	36.01	0.022	14.40	14.42	28.84
Mynydd Ty-Isaf Rhondda	0.0026	14.67	14.67	36.68	0.008	14.67	14.68	29.35
Plas-y-Gors	0.0021	13.59	13.59	33.98	0.008	13.59	13.60	27.20
Daren Fach	0.0059	14.40	14.40	36.00	0.017	14.40	14.41	28.83
Cwm Glo	0.0120	14.96	14.97	37.43	0.038	14.96	15.00	29.99
Waun Ton-y-Spyddaden	0.0027	14.60	14.60	36.50	0.009	14.60	14.61	29.21
Gorsllwyn Onllwyn	0.0028	14.77	14.77	36.92	0.010	14.77	14.78	29.55
Cwm Taf Fechan Woodlands	0.0074	15.78	15.79	39.47	0.022	15.78	15.80	31.61
Nant Llech	0.0022	15.03	15.03	37.57	0.009	15.03	15.03	30.07

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI

** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.11: Predicted Environmental Concentration of Deposited Dust at SSSIs

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
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.00054	0.0467	1,000	0.00047	0.00058	0.049981	1,000	0.00050
Cwm Cadlan**	0.00048	0.0414	1,000	0.00041	0.00049	0.042505	1,000	0.00043
Cwm Gwrelych and Nant Llynfach Streams	0.00051	0.0444	1,000	0.00044	0.00055	0.047915	1,000	0.00048
Craig-y-Llyn	0.00013	0.0115	1,000	0.00011	0.00014	0.012493	1,000	0.00012
Bryn Bwch	0.00025	0.0218	1,000	0.00022	0.00027	0.023585	1,000	0.00024
Caeau Nant-y-Llechau	0.00019	0.0166	1,000	0.00017	0.00021	0.017936	1,000	0.00018
Gweunedd Dyffern Nedd	0.00019	0.0163	1,000	0.00016	0.00021	0.017922	1,000	0.00018
Bryncarnau Grasslands Llwyncoed	0.00057	0.0495	1,000	0.00050	0.00063	0.054483	1,000	0.00054
Blaenrhondda Road Cutting	0.00010	0.0087	1,000	0.00009	0.00011	0.009277	1,000	0.00009
Blaen Nedd	0.00012	0.0100	1,000	0.00010	0.00013	0.010881	1,000	0.00011
Ogof Ffynnon Ddu Pant Mawr	0.00007	0.0060	1,000	0.00006	0.00008	0.006589	1,000	0.00007
Caeau Ton-y-Fildre	0.00007	0.0063	1,000	0.00006	0.00008	0.006916	1,000	0.00007
Penmoelallt	0.00033	0.0287	1,000	0.00029	0.00036	0.031255	1,000	0.00031
Mynydd Ty-Isaf Rhondda	0.00004	0.0038	1,000	0.00004	0.00005	0.004041	1,000	0.00004
Plas-y-Gors	0.00007	0.0064	1,000	0.00006	0.00008	0.006891	1,000	0.00007
Daren Fach	0.00026	0.0225	1,000	0.00022	0.00028	0.024456	1,000	0.00024
Cwm Glo	0.00024	0.0210	1,000	0.00021	0.00027	0.023508	1,000	0.00024
Waun Ton-y-Spyddaden	0.00007	0.0057	1,000	0.00006	0.00007	0.006238	1,000	0.00006
Gorsllwyn Onllwyn	0.00006	0.0055	1,000	0.00006	0.00007	0.006062	1,000	0.00006
Cwm Taf Fechan Woodlands	0.00024	0.0210	1,000	0.00021	0.00027	0.023023	1,000	0.00023
Nant Llech	0.00004	0.0039	1,000	0.00004	0.00005	0.004322	1,000	0.00004

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI
** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.12: Predicted Environmental Concentration of Carbon Monoxide and VOCs at SSSIs

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
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.00007	0.00027	0.0003	0.003	0.0099	0.040	0.05	0.31
Cwm Cadlan**	0.00004	0.00013	0.0002	0.002	0.0064	0.019	0.03	0.16
Cwm Gwrelych and Nant Llynfach Streams	0.00017	0.00085	0.0010	0.010	0.0236	0.118	0.14	0.87
Craig-y-Llyn	0.00008	0.00051	0.0006	0.006	0.0116	0.069	0.08	0.50
Bryn Bwch	0.00003	0.00024	0.0003	0.003	0.0050	0.035	0.04	0.25
Caeau Nant-y-Llechau	0.00003	0.00027	0.0003	0.003	0.0049	0.040	0.04	0.27
Gweunedd Dyffern Nedd	0.00003	0.00026	0.0003	0.003	0.0041	0.037	0.04	0.25
Bryncarnau Grasslands Llwyncoed	0.00013	0.00126	0.0014	0.014	0.0188	0.188	0.21	1.27
Blaenrhondda Road Cutting	0.00003	0.00036	0.0004	0.004	0.0045	0.049	0.05	0.33
Blaen Nedd	0.00002	0.00024	0.0003	0.003	0.0030	0.036	0.04	0.24
Ogof Ffynnon Ddu Pant Mawr	0.00002	0.00020	0.0002	0.002	0.0022	0.028	0.03	0.19
Caeau Ton-y-Fildre	0.00002	0.00027	0.0003	0.003	0.0029	0.040	0.04	0.26
Penmoelallt	0.00005	0.00074	0.0008	0.008	0.0075	0.112	0.12	0.74
Mynydd Ty-Isaf Rhondda	0.00002	0.00030	0.0003	0.003	0.0025	0.040	0.04	0.26
Plas-y-Gors	0.00001	0.00023	0.0002	0.002	0.0020	0.034	0.04	0.22
Daren Fach	0.00004	0.00067	0.0007	0.007	0.0056	0.101	0.11	0.66
Cwm Glo	0.00008	0.00146	0.0015	0.015	0.0115	0.218	0.23	1.41
Waun Ton-y-Spyddaden	0.00002	0.00035	0.0004	0.004	0.0025	0.051	0.05	0.33
Gorsllwyn Onllwyn	0.00002	0.00039	0.0004	0.004	0.0027	0.057	0.06	0.37
Cwm Taf Fechan Woodlands	0.00005	0.00103	0.0011	0.011	0.0071	0.155	0.16	1.00
Nant Llech	0.00001	0.00032	0.0003	0.003	0.0020	0.047	0.05	0.30

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI

** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.13: Process Contribution of Heavy Metals at the SSSIs

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})
Blaen Cynon SAC*	0.000451	0.1804	0.004509	**8.35**	0.000451	**4.5095**
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.000018	0.0071	0.000178	0.33	0.000018	0.1781
Cwm Cadlan**	0.000011	0.0046	0.000114	0.21	0.000011	0.1139
Cwm Gwrelych and Nant Llynfach Streams	0.000042	0.0167	0.000418	0.77	0.000042	0.4179
Craig-y-Llyn	0.000020	0.0081	0.000203	0.38	0.000020	0.2029
Bryn Bwch	0.000009	0.0036	0.000090	0.17	0.000009	0.0899
Caeau Nant-y-Llechau	0.000009	0.0035	0.000089	0.16	0.000009	0.0887
Gweunedd Dyffern Nedd	0.000007	0.0030	0.000074	0.14	0.000007	0.0738
Bryncarnau Grasslands Llwyncoed	0.000034	0.0135	0.000337	0.62	0.000034	0.3371
Blaenrhondda Road Cutting	0.000008	0.0032	0.000080	0.15	0.000008	0.0802
Blaen Nedd	0.000005	0.0021	0.000054	0.10	0.000005	0.0537
Ogof Ffynnon Ddu Pant Mawr	0.000004	0.0016	0.000039	0.07	0.000004	0.0391
Caeau Ton-y-Fildre	0.000005	0.0021	0.000051	0.10	0.000005	0.0513
Penmoelallt	0.000013	0.0054	0.000134	0.25	0.000013	0.1340
Mynydd Ty-Isaf Rhondda	0.000004	0.0018	0.000045	0.08	0.000004	0.0450
Plas-y-Gors	0.000004	0.0014	0.000036	0.07	0.000004	0.0357
Daren Fach	0.000010	0.0040	0.000101	0.19	0.000010	0.1009
Cwm Glo	0.000021	0.0082	0.000205	0.38	0.000021	0.2054
Waun Ton-y-Spyddaden	0.000005	0.0018	0.000046	0.08	0.000005	0.0456
Gorsllwyn Onllwyn	0.000005	0.0019	0.000048	0.09	0.000005	0.0485
Cwm Taf Fechan Woodlands	0.000013	0.0051	0.000127	0.24	0.000013	0.1269
Nant Llech	0.000004	0.0015	0.000037	0.07	0.000004	0.0367

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI
** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Table 3.14: Process Contribution of Hydrogen Chloride and Hydrogen Fluoride at SSSIs

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})
Blaen Cynon SAC*	0.0902	0.4509	0.1554	0.0622
Dyffrynoedd Nedd a Mellte a Moel Penderyn	0.0036	0.0178	0.0247	0.0099
Cwm Cadlan	0.0023	0.0114	0.0201	0.0080
Cwm Gwrelych and Nant Llynfach Streams	0.0084	0.0418	0.0663	0.0265
Craig-y-Llyn	0.0041	0.0203	0.0950	0.0380
Bryn Bwch	0.0018	0.0090	0.0193	0.0077
Caeau Nant-y-Llechau	0.0018	0.0089	0.0188	0.0075
Gweunedd Dyffern Nedd	0.0015	0.0074	0.0173	0.0069
Bryncarnau Grasslands Llwyncoed	0.0067	0.0337	0.0208	0.0083
Blaenrhondda Road Cutting	0.0016	0.0080	0.0245	0.0098
Blaen Nedd	0.0011	0.0054	0.0121	0.0048
Ogof Ffynnon Ddu Pant Mawr	0.0008	0.0039	0.0083	0.0033
Caeau Ton-y-Fildre	0.0010	0.0051	0.0142	0.0057
Penmoelallt	0.0027	0.0134	0.0127	0.0051
Mynydd Ty-Isaf Rhondda	0.0009	0.0045	0.0171	0.0068
Plas-y-Gors	0.0007	0.0036	0.0106	0.0042
Daren Fach	0.0020	0.0101	0.0119	0.0048
Cwm Glo	0.0041	0.0205	0.0140	0.0056
Waun Ton-y-Spyddaden	0.0009	0.0046	0.0166	0.0066
Gorsllwyn Onllwyn	0.0010	0.0048	0.0158	0.0063
Cwm Taf Fechan Woodlands	0.0025	0.0127	0.0117	0.0047
Nant Llech	0.0007	0.0037	0.0106	0.0042

* This includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI
** Data produced for Cwm Cadlan SAC, but also applicable to Cwm Cadlan SSSI

Envisage (2009) state that in Table 3.13 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 $1/9^{th}$ 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 3.13 shows that at Blaen Cynon SAC (which includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI) 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 3.13 also shows that both arsenic and cadmium cannot be ruled as insignificant as the percentage contributions are above 1%.

Table 3.15 considers annual average contributions at Blaen Cynon SAC (which includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI) 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 (which includes Cors Bryn-y-Gaer SSSI, and Woodlands Park and Pontpren SSSI). 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 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.

Table 3.15: Assessment of Other Modelled Metals Against their Respective Target Values or Environmental Assessment Levels at Blaen Cynon SAC (which includes Cors Bryn-y-Gaer SSSI, and Woodlands Park and Pontpren SSSI)

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

Species	Deposited Rate at Blaen Cynon SAC* 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

* which includes Cors Bryn-y-Gaer SSSI, and Woodland Park and Pontpren SSSI

The information presented in Table 3.1 to 3.16 show that the potential effects on the SSSIs from air pollution from the proposed Enviopark at Hirwaun can be screened as insignificant at the following SSSIs:

- Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI;
- Cwm Cadlan SSSI;
- Cwm Gwrelych and Nant Llynfach Streams SSSI;
- Craig-y-Llyn SSSI;
- Bryn Bwch SSSI;
- Caeau Nant-y-Llechau SSSI;
- Gweunedd Dyffern Nedd SSSI;
- Blaenrhondda Road Cutting SSSI;
- Blaen Nedd SSSI;

- Ogof Ffynnon Ddu Pant Mawr SSSI;
- Caeau Ton-y-Fildre SSSI;
- Penmoelallt SSSI;
- Mynydd Ty-Isaf Rhondda SSSI;
- Plas-y-Gors SSSI;
- Daren Fach SSSI;
- Cwm Glo SSSI;
- Waun Ton-y-Spyddaden SSSI;
- Gorsllwyn Onllwyn SSSI;
- Cwm Taf Fechan Woodlands SSSI; and,
- Nant Llech SSSI.

However, the results show that the potential effects from air pollution cannot be screened as insignificant at the following sites (although this does not mean that the effects are significant):

- Cors Bryn-y-Gaer SSSI;
- Woodland Park and Pontpren SSSI; and.
- Bryncarnau Grasslands Llwyncoed SSSI.

Therefore additional information with respect to these sites is presented in Sections 4, 5 and 6 respectively.

3.3.3 Light Pollution

The likely indirect effect from light pollution on features listed on the SSSI criteria is only likely to apply to those SSSIs that are within close proximity (within 0.5 km) of the proposed development site. These include:

- Cors Bryn-y-Gaer SSSI.

Further details of the potential effects from light pollution on this SSSI is given in Section 4.

It is not anticipated that there will be any significant effect from light pollution within the proposed development site on any of the other SSSIs included in this assessment.

3.3.4 Increased Traffic Use

The likely indirect effects from increased traffic use during operation of the Enviropark on features listed on the SSSI criteria is only likely to apply to those SSSIs that are within close proximity (within 0.5 km) of the roads that will be utilised by traffic. These include:

- Cors Bryn-y-Gaer SSSI.

Further details of the potential effect from disturbance on this SSSI is given in Section 4.

It is not anticipated that there will be any significant effect from increased traffic use within the proposed development site on any of the other SSSIs included in this assessment.

4. POTENTIAL EFFECTS ON CORS BRYN-Y-GAER SSSI

Refer to SSSI Citations included in Appendix 3. The location of Cors Bryn-y-Gaer SSSI is shown on Middlemarch Environmental Ltd Drawing C105067-01 in Appendix 1.

4.1 CORS BRYN-Y-GAER SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

The following information is taken from the Cors Bryn-y-Gaer SSSI citation which is included in Appendix 3.

National Grid Reference:	SN 945 065
Area:	52.1 ha
Ordnance Survey Sheets:	1:50,000: 160
	1:10,000: SN 90NE; SN 90NW
Date Notified:	2002

This site is of special interest for its lowland bog and for areas of soligenous flush, marshy grassland, dry neutral grassland and lowland acid grassland. These habitats occur in a complex with wet heath, swamp and semi-improved grassland. The site is also of special interest for the marsh fritillary butterfly *Eurdrysas aurinia*. The site is located immediately north-west of Hirwaun and south of the Brecon Beacons National Park. Cors Bryn-y-Gaer is situated at the northern edge of the South Wales Coalfield, on glacial boulder clay, with areas of deep peat on lower ground. Several small watercourses and springs are associated with the site, which is in the catchment of the Afon Cynon.

Many of the plant communities are closely juxtaposed, with well displayed transitions between them. The nationally scarce marsh fritillary butterfly is accosiated with marshy grassland, in which is larval food plant, devil's bit scabious, is frequent and widespread. Cors Byrn-y-Gaer also supports a population of cruet collar moss *Splachnum ampullaceum*, a nationally declining species, scarce in south Wales. The moss occurs mainly in lowland wet pastures, where is grows on decaying cattle and sheep dung.

The SSSI contains the following habitats: lowland raised bog, acidic soligenous flush, fen, marshy grassland, dry neutral grassland, lowland acid grassland, wet heath, swamp and semi-improved grassland (lowland meadow).

The SSSI citation identified the plant species detailed in Table 4.1.

Table 4.1: Plant Species Listed within the Cors Bryn-y-Gaer SSSI Citation

Habitat	Species	Notes
Lowland raised bog	Bog moss *Sphagnum cuspidatum*	No additional information
	Deergrass *Trichophorum cespitosum*	No additional information
	Hare's cottongrass *Eriophorum vaginatum*	No additional information
	Round-leaved sundrew *Drosera rotundifolia*	No additional information
	Cross-leaved heath *Erica tetralix*	More abundant in drier areas
	Bog moss species *Sphagnum*	Greater range in drier areas
	Common cottongrass *Eriophorum augustifolium*	Frequent in wettest areas
Acidic soligenous flush	Sharp-flowered ruch *Juncus acutiflorus*	Dominant species
	Purple moor-grass *Molinia caerulea*	Associated species
	Heath wood-rush *Luzula multiflora*	Associated species
	Tormentil *Potentilla erecta*	Associated species
	Carnation sedge *Carex panacea*	Abundant in sedge-rich flushes
	Bog asphodel *Narthecium ossifragum*	Frequent in sedge-rich flushes
	Common cottongrass *Eriophorum augustifolium*	Occurs locally in sedge-rich flushes
Marshy grassland	Purple-moor grass *Molinia caerulea*	Dominant species
	Sheep's fescue *Festuca ovina*	No additional information
	Tormentil *Potentilla erecta*	No additional information
	Heath rush *Juncus squarrosus*	Frequent in heathy places
	Cross-leaved heath *Erica tetralix*	Occasional in heathy places
	Sweet vernal grass *Anthoxanthum oderatum*	Prominent in more grassy areas
	Heath grass *Danthonia decumbens*	Prominent in more grassy areas
	Meadow thisle *Cirsium dissectum*	Present in small less acidic patches
	Soft rush *Juncus effusus*	Dominant in rush-dominant areas
	Sharp-flowered rush *Juncus acutiflorus*	Present in rush-dominant areas
	Marsh bedstraw *Galium palustre*	Frequent associated species in rush-dominant areas
	Devil's-bit scabious *Succisa pratensis*	
	Greater bird's-foot trefoil *Lotus pedunclulatus*	
Neutral grassland	Common bent *Agrostis capillaris*	Characteristic of grassland
	Red fescue *Festuca rubra*	Characteristic of grassland
	Crested dog's-tail *Cynosurus cristatus*	Characteristic of grassland
	Common knapweed *Centaurea nigra*	No additional information
	Common bird's-foot trefoil *Lotus corniculatus*	No additional information
Extensive acid grassland	Sheep's fescue *Festuca ovina*	Frequent
	Common bird's-foot trefoil *Lotus corniculatus*	Frequent
Lowland wet pastures	Cruet collar mosss *Splachnum ampullaceum*	A population growing on decaying cattle and sheep dung.

Table 4.2 lists the fauna species noted within the SSSI citation.

Table 4.2: Fauna Species Listed within the Cors Bryn-y-Gaer SSSI Citation

Species	Notes
Marsh fritillary butterfly *Eurdrysas aurinia*	Cors Bryn-y-Gaer SSSI and Woodland and Pontpren SSSI support one of the largest metapopulations of marsh fritillary in South Wales.

CCW (2008a) Core Management Plan for Blaen Cynon SAC includes the conservation objectives for the SAC site which includes Cors Bryn-y-Gaer SSSI. 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 4.3 to 4.9. It is apparent from the data presented in these tables that the conservation objectives for the SSSI features have yet to be determined.

Table 4.3: 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 4.4: 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 4.5: 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 4.6: 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 4.7: 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 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="6">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="6">Unfavourable – refer to Feature 1</td><td rowspan="6">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><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 4.8: 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="6">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="6">Unfavourable – refer to Feature 1</td><td rowspan="6">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 4.9: Blaen Cynon SAC, Feature 7: Semi-natural Broadleaved Woodland

– 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 semi-natural broadleaved woodland	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.	SSSI feature - section to be completed.	**Unfavourable** – refer to Feature 1	SSSI feature - section yet to be completed.
	A2. Condition of semi-natural broadleaved woodland	SSSI feature - section to be completed.	SSSI feature - section to be completed.		
	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.					

4.2 DIRECT EFFECTS

In accordance with the information presented in the initial screening in Section 3, this section provides a discussion of the different potential direct effects on Cors Bryn-y-Gaer SSSI from the proposed Enviroparks development.

4.2.1 Loss of Habitat

The proposed development will not require any landtake from the SSSI nor will it affect the boundary of the site. However, given the proximity of Cors Bryn-y-Gaer SSSI to the proposed development site (100 m away) the effects of habitat loss at the proposed development site are discussed below.

Habitats

Table 4.10 shows the habitat types listed on the SSSI citation and whether these were present on the proposed development site.

Table 4.10: Summary of Cors Bryn-y-Gaer SSSI Habitats Present within the Enviroparks Site

Habitats Listed on SSSI Citation	Habitat Present within Enviroparks Site?	Notes
Acidic soligenous flush	×	-
Dry neutral grassland	×	-
Fen	×	-
Lowland acid grassland	×	-
Lowland raised bog	×	-
Marshy grassland	✓	Dominant habitat within Envioparks site
Semi-improved grassland	✓	Small area in south-eastern corner
Swamp	×	-
Wet heath	×	-

Table 4.10 shows that within the proposed development site two habitats listed on the SSSI citation are present: marshy grassland; and, semi-improved grassland.

The marshy grassland recorded on the Enviroparks site was flat and has developed over made-ground with impeded drainage, despite the presence of concrete drainage channels. The site is grazed by horses and the grassland was heavily poached by hooves in some areas. The habitat comprised hard rush *Juncus inflexus* and soft rush *Juncus effusus* patches with short grassland with occasional small tussocks of tufted hair grass *Deschampsia caespitosa* and other infrequent grass species.

A small patch of semi-improved grassland was noted in the south-eastern corner of the proposed Enviroparks site. This habitat was dominated by tufted hair-grass and cock's-foot *Dactylis glomerata* grasses with black knapweed *Centaurea nigra* and common bird's-foot trefoil *Lotus corniculatus* recorded.

Although the habitats are classified as the same habitats as those listed within the SSSI, it can be seen that there is no habitat continuity between the habitats within the SSSI and those on the within the proposed development site due to the presence of industrial units and a water treatment works between the SSSI and the proposed development site. The habitats within the Enviroparks site occur on made ground, and, although they contain some of the same species as those within the SSSI, they cannot be considered to be supporting the habitats within the SSSI. Given the distance and the dispersion barriers (industrial units and water treatment works) between the SSSI and the proposed development site it can be considered that there will be no effect on the integrity of the habitats within the SSSI as a result of the loss of habitats from the proposed development site.

Flora

As it has been identified above that the only habitats present within both the SSSI and the proposed development site are marshy grassland and semi-improved neutral grassland, Table 4.11 provides a summary of the species listed within the SSSI citation associated with these habitats and the records of these species on the proposed development site.

Table 4.11 shows that within the proposed development site some of the same species listed within the SSSI citation were recorded within the proposed development site. None of the species noted in Table 4.11 are local Biodivesrity Action Plan species and none are considered to be locally important in Powys and Brecon Beacons (see Middlemarch Environmental Ltd Report RT-MME-101917, Sep 2008 for more details).

Given the distance and the dispersion barriers (industrial units and water treatment works) between the SSSI and the proposed development site it can be considered that the habitats within the proposed development site are unlikely to be acting as a seed source or buffer for the habitats within the SSSI and therefore it can be considered that there will be no effect on the integrity of the species listed within the SSSI citation as a result the proposed development.

Table 4.11: Summary of SSSI Floral Species Present wihtin the Envioparks Site

Habitat	Species	Species Recorded within Enviroparks Site?	Notes
Marshy grassland	Purple-moor grass *Molinia caerulea*	✖	-
	Sheep's fescue *Festuca ovina*	✖	-
	Tormentil *Potentilla erecta*	✖	-
	Heath rush *Juncus squarrosus*	✖	-
	Cross-leaved heath *Erica tetralix*	✖	-
	Sweet vernal grass *Anthoxanthum oderatum*	✓	Infrequent species within site
	Heath grass *Danthonia decumbens*	✖	-
	Meadow thisle *Cirsium dissectum*	✓	Recorded within site
	Soft rush *Juncus effusus*	✓	Dominant species within site
	Sharp-flowered rush *Juncus acutiflorus*	✖	-
	Marsh bedstraw *Galium palustre*	✖	-
	Devil's-bit scabious *Succisa pratensis*	✖	-
	Greater bird's-foot trefoil *Lotus pedunclulatus*	✓	Dominant within some areas
Neutral grassland	Common bent *Agrostis capillaris*	✓	Recorded within site
	Red fescue *Festuca rubra*	✓	Recorded within site
	Crested dog's-tail *Cynosurus cristatus*	✓	Recorded within site
	Common knapweed *Centaurea nigra*	✖	-
	Common bird's-foot trefoil *Lotus corniculatus*	✖	-
Lowland wet pastures	Cruet collar mosss *Splachnum ampullaceum*	✖	-

It should be noted that Table 4.11 shows that Cruet collar moss *Splachnum ampullaceum* which was specifically listed on the SSSI citation as having a population within the SSSI was not recorded on the proposed development site.

Invertebrates

The marsh fritillary butterfly *Euphdryas aurinia* is listed on the SSSI citation as being a species that are a primary reason for selection of this site.

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 on the SSSI citation.

Mammals

No plant species are listed on the SSSI citation.

4.2.2 Disturbance

This section assesses whether the proposed development at the site will cause a direct disturbance to marsh fritillary individuals (the only faunal species listed on the SSSI citation) 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 species listed on Cors Bryn-y-Gaer SSSI citation.

4.3 INDIRECT EFFECTS

In accordance with the information presented in the initial screening in Section 3, this section provides a discussion of the different potential indirect effects on Cors Bryn-y-Gaer SSSI from the proposed Enviroparks development.

4.3.1 Hydrological Changes

The Environment Statement (Savills, 2008b) provides information with respect to the existing hydrological situation and the potential hydrological impacts associated with the proposed development. 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 Cors Bryn-y-Gaer SSSI.

In conclusion, the proposed development site is not hydrologically connected to Cors Bryn-y-Gaer SSSI 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 Cors Bryn-y-Gaer SSSI. 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 Cors Bryn-y-Gaer SSSI 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 Cors Bryn-y-Gaer SSSI as a result of hydrological issues.

4.3.2 Air Quality

Section 3 identified that with respect to some of the potential air pollutants, not all could be screened as insignificant with respect to Blaen Cynon SAC, which includes Cors Bryn-y-Gaer SSSI. Therefore additional information with respect to air pollution is given below.

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

The Open University (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 4.1 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.

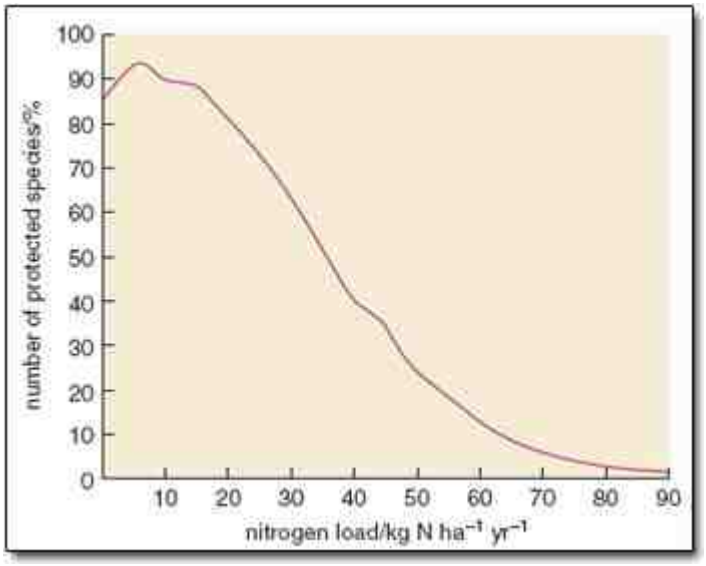

Figure 4.1: Relationship Between Potential Number of Protected Grassland Species in Grassland and Nitrogen Load in South Holland (from: Open University, no date)

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 and which occur within Cors Bryn-y-Gaer SSSI.

Base-poor flushed vegetation

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) stated that *Molinia caerulea* are the species within this habitat most likely to benefit from increase nutrient deposition, although she does identify that there may be other factors such as soil moisture content that may restrict the growth potential. She does however, 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), which covers the Cors Bryn-y Gaer SSSI site. This document states that the habitats within Blaen Cynon SAC are comprised of acid, neutral and calcareous grassland types, all of which may be supporting the marsh fritillary and are listed on the SSSI citation. Table 4.12 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, which is also listed on the Cors Bryn-y-Gaer SSSI citation.

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 4.13 provides a summary of the levels determined in the EAW (no date) report and the potential implications for Blaen Cynon SAC which includes Cors Bryn-y-Gaer SSSI.

Table 4.12: 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 4.13: 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.

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 which includes Cors Bryn-y-Gaer SSSI. When applying calculations for the chemistry of the NO_x emission, the PC at Blaen Cynon SAC which includes Cors Bryn-y-Gaer SSSI, 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 which includes Cors Bryn-y-Gaer SSSI, although the short term PC can be considered insignificant.

When considering the deposition of nutrient nitrogen at the SSSIs, 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.

The 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 predicted to 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 cannot be confirmed to lie within Cors Bryn-y-Gaer SSSI), 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 (which includes Cors Bryn-y-Gaer SSSI), 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 Blaen Cynon SAC (which includes Cors Bryn-y-Gaer SSSI), 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, which includes Cors Bryn-y-Gaer SSSI, 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) conclude 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 (which includes Cors Bryn-y-Gaer SSSI), 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 (PEC) 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, and therefore Cors Bryn-y-Gaer SSSI, already exceeds its higher critical load, and thus any additional contribution could exacerbate these exceedences. However, the Core Management Plan for Blaen Cynon SAC, which includes Cors Bryn-y-Gaer SSSI, 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.

The grasslands within Cors Bryn-y-Gaer SSSI are 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 SSSI.

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, which includes Cors Bryn-y-Gaer SSSI, 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, which includes Cors Bryn-y-Gaer SSSI. 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 which includes Cors Bryn-y-Gaer SSSI.

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, which includes Cors Bryn-y-Gaer SSSI, the Core Management Plan 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 available for use by marsh fritillary butterflies.

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

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

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

Jongejans et al (2006) carried out garden experiments over three years (2000 – 2003) to test whether perennial herbs, when faced with the risk of being out-competed by succession, either increase their biomass allocation to flowers or invest more in vegetative growth. This included growing *Succisa pratensis*, *Hypochaeris radicata*, *Cirsium dissectum* and *Centaurea jacae* in amongst a tall tussock-forming grass *Molinia caerulea* as this may successionally replace them in their natural habitat. Nutrient enrichment was applied to half of the plants at an equivalent application of 120 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 Cors Bryn-y-Gaer SSSI 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.

4.3.3 Light Pollution

With respect to light pollution from the completed development, none of the features listed on the SSSI criteria for Cors Bryn-y-Gaer SSSI 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 be 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.

As none of the features listed on the Cors Bryn-y-Gaer SSSI citation 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.

4.3.4 Increased Traffic Use

Consideration was also given to the potential effects of increased traffic movements on the concentrations of pollutants at Blaen Cynon SAC, which includes Cors Bryn-y-Gaer SSSI. The Design Manual for Roads and Bridges calculation had been applied within the Transport Assessment of the Environmental Statement (Savills, 2008b), however the contribution to deposition rates of NO_2 have also been calculated here. Table 4.14 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 4.14: Percentage Contribution to Critical Loads at Blaen Cynon SAC, which includes Cors Bryn-y-Gaer SSSI, 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**

4.4 SUMMARY OF POTENTIAL EFFECTS ON BLAEN CYNON SAC

Table 4.15 summarises the potential impacts of the present proposals on the features listed on the Cors Bryn-y-Gaer SSSI citation.

Table 4.15: Summary of Potential Impacts of the Present Proposals on Features Listed on the Cors Bryn-y-Gaer SSSI Citation (continues)

SSSI Site	Potential Project Hazard	Consequence for Features Listed on SSSI Citation	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Cors Bryn-y-Gaer SSSI Shortest distance to scheme: 100 m east	Loss of habitats listed on SSSI citation within proposed development plot	Loss of habitat outside of SSSI but classified as the same habitat.	Negligible permanent, irreversible	Negligible	Distance and dispersion barriers between SSSI and proposed development site mean that the habitats within the development site are unlikely to be acting as a seed source or buffer to the habitats within the SSSI.
	Loss of floral species listed on SSSI citation within proposed development plot	Loss of floral species outside of SSSI but listed on the SSSI citation.	Negligible permanent, irreversible	Negligible	Distance and dispersion barriers between SSSI and proposed development site mean that the species within the development site are unlikely to be acting as a seed source or buffer to species within the SSSI.
	Loss of faunal species listed on SSSI citation within proposed development plot	Loss of habitat not being used by species listed on the SSSI citation but close to the SSSI	Negligible permanent, irreversible	Negligible	Surveys have shown that the site does not support faunal species listed on the SSSI citation.
	Disturbance from construction to marsh fritillary butterfly species	Disturbance to butterflies using the SSSI 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 SSSI will have significant impact on the use of the SSSI by marsh fritillary.

Table 4.15 (cont.): Summary of Potential Impacts of the Present Proposals on Features Listed on the Cors Bryn-y-Gaer SSSI Citation

SSSI Site	Potential Project Hazard	Consequence for Features Listed on SSSI Citation	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Cors Bryn-y-Gaer SSSI Shortest distance to scheme: 100 m east	Disturbance from operation to marsh fritillary butterfly species	Disturbance to butterflies using SSSI 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 SSSI will have significant impact on the use of the SSSI by marsh fritillary.
	Deleterious change to surface water within SSSI	Effect on integrity of marshy grassland habitat within SSSI	Major negative, potentially permanent, possibly reversible	Negligible as surface water changes will not effect SSSI's hydrology	The proposed development site and the SSSI are not hydrologically linked through surface water systems.
	Deleterious change to groundwater within SSSI	Effect on integrity of wetland / marshy grassland habitats within SSSI	Major negative, potentially permanent, possibly reversible	Negligible as groundwater changes will not effect SSSI's hydrology	The groundwater gradient extends in a south-west direction away from the SSSI which is located to the east.
	Changes to air quality	Loss of features listed on the SSSI citation 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 features listed on the SSSI.
	Light pollution	None. Light pollution will not impact on any of the features listed on the SSSI citation.	Negligible, potentially permanent, possibly reversible.	Negligible	Lighting strategy designed to minimise light pollution to landscaping buffer around edge of site.

5. POTENTIAL EFFECTS ON WOODLAND PARK AND PONTPREN SSSI

Refer to Citations included in Appendix 3. The location of Woodland Park and Pontpren SSSI is shown on Middlemarch Environmental Ltd Drawing C105067-01 in Appendix 1.

5.1 WOODLAND PARK AND PONTPREN SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

The following information is taken from the Woodland Park and Pontpren SSSI citation which is included in Appendix 3.

National Grid Reference:	SN 946 077, SN 952 075, SN 948 071
Area:	14.5 ha
Ordnance Survey Sheets:	1:50,000: 160
	1:10,000: SN 90NW, SN 90NE
Date Notified:	2000, 2002

Woodland Park and Pontpren SSSI is of special interest for the marsh fritillary butterfly *Eurdrysas aurinia*. Additional special interest is provided by its mixture of habitat types, including marshy grassland, dry acid and neutral grassland, heathland and woodland, which add to the ecology and diversity interest of the site and which also provide food and shelter necessary for the survival of the marsh fritillary butterfly.

The site consists of three separate blocks of land, approximately 1 km south of the village of Penderyn. Drainage is impeded across most of the site.

The SSSI contains the following habitats: marshy grassland, dry acid and neutral heathland, and broadleaved woodland.

The SSSI citation identified the plant species detailed in Table 5.1.

Table 5.1: Plant Species Listed within the Woodland Park and Pontpren SSSI Citation

Habitat	Species	Notes
Purple moor-grass dominated communities	Wild angelica *Angelica sylvestris*	Present in southern block
	Sheep's fescue *Festuca ovina*	Scattered in grassier stands
	Sweet vernal grass *Anthoxanthum oderatum*	Scattered in grassier stands
	Small sedges *Carex sp.*	Scattered in grassier stands
	Tormentil *Potentilla erecta*	Scattered in grassier stands
	Cross-leaved heath *Erica tetralix*	Present in heathier areas
	Bog mosses *Sphagnum sp.*	Present in heathier areas
Fen meadow	Meadow thisle *Cirsium dissectum*	Abundant
	Tawny sedge *Carex hostiana*	Scattered
	Flea sedge *Carex pulicaris*	Scattered
	Bryophyte *Bryum pseudotriquetrum*	Local in base-rich flushes
	Brophyte *Campylium stellatum*	Local in base-rich flushes
Marshy grassland	Sharp-flowered rush *Juncus acutiflorus*	High covering
	Soft rush *Juncus effusus*	Occurs in two of the blocks
	Meadowsweet *Filipendula ulmaria*	Occurs in tall-herb fen areas
	Tufted hair grass *Deschampsia cespoitosa*	Occurs in tall-herb fen areas
Acid grassland	Common bent *Agrostis caipillaris*	Characteristic of habitat
	Sheep's fescue *Festuca ovina*	Characteristic of habitat
	Heath bedstraw *Galium saxatile*	Characteristic of habitat
	Tormentil *Potentilla erecta*	Characteristic of habitat
Neutral grassland	Crested dog's-tail *Cynosurus cristatus*	Common species
	Common bird's-foot trefoil *Lotus corniculatus*	Common species
	Red clover *Trifolium repens*	Common species
Wet and dry pasture	Devil's-bit scabious *Succisa pratensis*	Widespread and abundant
Broadleaved woodland	Alder *Alnus glutinosa*	Main species
	Willow *Salix sp.*	Main species
	Oak *Quercus sp.*	Common on more free-draining soil
	Birch *Betula sp.*	Common on more free-draining soil

Table 5.2 lists the fauna species noted within the SSSI citation.

Table 5.2: Fauna Species Listed within the Woodland and Pontpren SSSI Citation

Species	Notes
Marsh fritillary butterfly *Eurdrysas aurinia*	Woodland and Pontpren SSSI and Cors Bryn-y-Gaer support one of the largest metapopulations of marsh fritillary in South Wales.

CCW (2008) Core Management Plan for Blaen Cynon SAC includes the conservation objectives for the SAC site which includes Woodland Park and Pontpren SSSI. These data are presented in Section 4.1: Cors Bryn-y-Gaer SSSI.

5.2 DIRECT EFFECTS

In accordance with the information presented in the initial screening in Section 3, this section provides a discussion of the different potential direct effects on Woodland Park and Pontpren SSSI from the proposed Enviroparks development.

5.2.1 Loss of Habitat

The proposed development will not require any landtake from the SSSI nor will it affect the boundary of the site. However, given the proximity of Woodland Park and Pontpren SSSI to the proposed development site (700 m away) the effects of habitat loss at the proposed development site are discussed below.

Habitats

Table 5.2 shows the habitat types listed on the SSSI citation and whether these were present on the proposed development site.

Table 5.2: Summary of Woodland Park and Pontpren SSSI Habitats Present within the Enviroparks Site

Habitats Listed on SSSI Citation	Habitat Present within Enviroparks Site?	Notes
Dry neutral grassland	×	-
Fen meadow	×	-
Lowland acid grassland	×	-
Broadleaved woodland	✓	Planted woodland area on site
Marshy grassland	✓	Dominant habitat within Envioparks site

Table 5.2 shows that within the proposed development site two habitats listed on the SSSI citation are present: broadleaved woodland; and, marshy grassland.

The broadleaved woodland identified within the proposed development site was situated along the northern edge of the site and contained young to semi-mature willow and occasional birch trees that appear to have been planted. Occasional gorse was noted within the understorey which was predominately semi-improved neutral grassland.

The marshy grassland recorded on the Envioparks site was flat and has developed over made-ground with impeded drainage, despite the presence of concrete drainage channels. The site is grazed by horses and the grassland was heavily poached by hooves in some areas. The habitat

comprised hard rush *Juncus inflexus* and soft rush *Juncus effusus* patches with short grassland with occasional small tussocks of tufted hair grass *Deschampsia caespitosa* and other infrequent grass species.

Although the habitats are classified as the same habitats as those listed within the SSSI, it can be seen that there is no habitat continuity between the habitats within the SSSI and those within the proposed development site due to the presence of industrial units, a water treatment works and a reservoir between the SSSI and the proposed development site. The habitats within the Enviroparks site occur on made ground, and, although they contain some of the same habitst as those within the SSSI, they cannot be considered to be supporting the habitats within the SSSI. Given the distance and the dispersion barriers (industrial units, water treatment works and reservoir) between the SSSI and the proposed development site it can be considered that there will be no effect on the integrity of the habitats within the SSSI as a result of the loss of habitats from the proposed development site.

Flora

As it has been identified above that the only habitats present within both the Woodland Park and Pontpren SSSI and the proposed development site are marshy grassland and broadleaved woodland. Table 5.3 provides a summary of the species listed within the SSSI citation associated with these habitats and the records of these species on the proposed development site.

Table 5.3 shows that within the proposed development site some of the same species listed within the SSSI citation were recorded within the proposed development site. None of the species noted in Table 5.3 are local Biodivesrity Action Plan species and none are considered to be locally important in Powys and Brecon Beacons (see Middlemarch Environmental Ltd Report RT-MME-101917, Sep 2008 for more details).

Given the distance and the dispersion barriers (industrial units and water treatment works) between the SSSI and the proposed development site it can be considered that the habitats within the proposed development site are unlikely to be acting as a seed source or buffer for the species within the SSSI and therefore it can be considered that there will be no effect on the integrity of the species listed within the SSSI citation as a result of the proposed development.

Table 5.3: Summary of Woodland Park and Pontpren SSSI Floral Species Present within the Enviroparks Site

Habitat	Species	Species Recorded within Enviroparks Site?	Notes
Broadleaved woodland	Alder *Alnus glutinosa*	✖	-
	Willow *Salix sp.*	✓	Semi-mature planted willows present on site
	Oak *Quercus sp.*	✖	-
	Birch *Betula sp.*	✓	Semi-mature occasional planted birch present on site
Marshy grassland	Sharp-flowered rush *Juncus acutiflorus*	✖	-
	Soft rush *Juncus effuses*	✓	Dominant species on site
	Meadowsweet *Filipendula ulmaria*	✓	Frequent adjacent to stream
	Tufted hair grass *Deschampsia cespoitosa*	✓	Small tussocks of species

Invertebrates

The marsh fritiallary butterfly *Euphdryas aurinia* is listed on the SSSI criteria. Details of the assessment of the potential effects of the proposed development on marsh fritillaries is given in Section 4.2.1 with respect to Cors Bryn-y-Gaer and the same data would be applicable to Woodland Park and Pontpren SSSI. Given the data presented in Section 4.2.1 which shows that 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 proposed development site will not result in a direct significant effect on the integrity of this feature listed on the SSSI citation.

Birds

No bird species are listed on the SSSI citation.

Mammals

No mammal species are listed on the SSSI citation.

5.3 INDIRECT EFFECTS

In accordance with the information presented in the initial screening in Section 3, this section provides a discussion of the different potential indirect effects on Woodland Park and Pontpren SSSI from the proposed Enviroparks development.

5.3.1 Hydrological Changes

Information with respect to the potential effect of hydrological changes from the proposed development are discussed in Section 4.3.1 with respect to Cors Bryn-y-Gaer SSSI. Given the location of Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI it can be concluded that any potential effects identified at Cors Bryn-y-Gaer SSSI would have a smaller effect at Woodland Park and Pontpren SSSI. However, as it has been shown that there will be no effect on the integrity of the habitats within Cors Bryn-y-Gaer SSSI as a result of the proposed development it can be concluded that this would also be the same for Woodland Park and Pontpren SSSI.

5.3.2 Air Quality

Section 3 identified that with respect to some of the potential air pollutants, not all could be screened as insignificant with respect to Blaen Cynon SAC, which includes Woodland Park and Pontpren SSSI.

Additional information with respect to air pollution is given in Section 4.3.2 with respect to Cors Bryn-y-Gaer SSSI and it can be concluded that this information is also applicable to Woodland Park and Pontpren given the similarities between the habitats and the species (marsh fritillary) listed on the SSSI citation.

The only difference in the habitats between Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI is the presence of broadleaved woodland habitats within the SSSI citation for Woodland Park and Pontpren. In terms of the potential effects of changes to air quality 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 lichens disappeared from the woodland. A study from a large semi-natural *Fagus-Quercus* stand in France identified that between 1972 and 1991 where changes in the calcareous soils were followed, a significant increase in nitrophilous ground flora was observed in 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). However, as Section 4.3.2 has shown, the potential effects on the site from air pollution are considered to be negligible with respect to features listed on the SSSI citation for Woodland Park and Pontpren SSSI.

5.4 SUMMARY OF POTENTIAL EFFECTS ON BLAEN CYNON SAC

Table 5.4 summarises the potential impacts of the present proposals on the features listed on the Woodland Park and Pontpren SSSI citation.

Table 5.4: Summary of Potential Impacts of the Present Proposals on Features Listed on the Woodland Park and Pontpren SSSI Citation (continues)

SSSI Site	Potential Project Hazard	Consequence for Features Listed on SSSI Citation	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Woodland Park and Pontpren SSSI Shortest distance to scheme: 700 m north	Loss of habitats listed on SSSI citation within proposed development plot	Loss of habitat outside of SSSI but classified as the same habitat.	Negligible permanent, irreversible	Negligible	Distance and dispersion barriers between SSSI and proposed development site mean that the habitats within the development site are unlikely to be acting as a seed source or buffer to the habitats within the SSSI.
	Loss of floral species listed on SSSI citation within proposed development plot	Loss of floral species outside of SSSI but listed on the SSSI citation.	Negligible permanent, irreversible	Negligible	Distance and dispersion barriers between SSSI and proposed development site mean that the species within the development site are unlikely to be acting as a seed source or buffer to species within the SSSI.
	Loss of faunal species listed on SSSI citation within proposed development plot	Loss of habitat not being used by species listed on the SSSI citation but close to the SSSI	Negligible permanent, irreversible	Negligible	Surveys have shown that the site does not support faunal species listed on the SSSI citation.

Table 5.4 (cont.): Summary of Potential Impacts of the Present Proposals on Features Listed on the Woodland Park and Pontpren SSSI Citation

SSSI Site	Potential Project Hazard	Consequence for Features Listed on SSSI Citation	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Woodland Park and Pontpren SSSI Shortest distance to scheme: 700 m north	Deleterious change to surface water within SSSI	Effect on integrity of marshy grassland habitat within SSSI	Major negative, potentially permanent, possibly reversible	Negligible as surface water changes will not effect SSSI's hydrology	The proposed development site and the SSSI are not hydrologically linked through surface water systems.
	Deleterious change to groundwater within SSSI	Effect on integrity of wetland / marshy grassland habitats within SSSI	Major negative, potentially permanent, possibly reversible	Negligible as groundwater changes will not effect SSSI's hydrology	The groundwater gradient extends in a south-west direction away from the SSSI which is located to the north and east.
	Changes to air quality	Loss of features listed on the SSSI citation 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 features listed on the SSSI.

6. POTENTIAL EFFECTS ON BRYNCARNAU GRASSLANDS, LLWYDCOED SSSI

Refer to Citations included in Appendix 3.

6.1 BRYNCARNAU GRASSLANDS, LLWYDCOED SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

The following information is taken from the Bryncarnau Grasslands, Llwydcoed SSSI citation which is included in Appendix 3.

National Grid Reference:	SN 995 061
Area:	24.8 ha
Ordnance Survey Sheets:	1:50,000: 160
	1:10,000: SN 90, SN 00
Date Notified:	1993

Bryncarnau Grasslands are situated on a west-facing hillside at the head of the Cynon Valley, to the north of Aberdare. They range from 270 to 320m in altitude, and are bounded by small tributaries of the River Cynon which, towards the western end of the site, occupy deeply incised wooded valleys. The soils are derived from boulder clay over Coal Measures. The site represents a particularly good example of a gradation from lowland mesotrophic grassland to pasture of a more upland character. A range of plant communities are present and these include 2 of very high nature conservation value. A number of plants which are rare in the Glamorgans occur here.

The SSSI contains the following habitats: lowland grassland, these habitats can be ascribed to National Vegetation Classification habitats MG5 *Centaurea nigra – Cynosurus cristatus* neutral grassland and M24 *Molinia caerulea – Circium dissectum* fen meadow (Rodwell, 1991 et seq); and, dry acidic grassland.

The SSSI citation identified the plant species detailed in Table 6.1.

Table 6.1: Plant Species Listed within the Bryncarnau Grasslands, Llwydcoed SSSI Citation

Habitat	Species	Notes
MG5 neutral grassland	Common bent *Agrostis capillaris*,	Typcial grass species within habitat
	Sweet vernal-grass *Anthoxanthum odoratum*	Typcial grass species within habitat
	Crested dog's-tail *Cynosurus cristatus*	Typcial grass species within habitat
	Red fescue *Festuca rubra*	Typcial grass species within habitat
	Common knapweed *Centaurea nigra*, and	Typcial forb species within habitat
	Rough hawkbit *Leontodon hispidus*,	Typcial forb species within habitat
	Common bird's-foot-trefoil *Lotus corniculatus*	Typcial forb species within habitat
	Great burnet *Sanguisorba officinalis*	Typcial forb species within habitat
	Smooth lady's-mantle *Alchemilla glabra*	Locally occuring in community
	Common spotted-orchid *Dactylorhiza fuchsii*	Locally occuring in community
	Betony *Stachys officinalis*	Locally occuring in community
	Greater butterfly-orchid *Platanthera chlorantha*	Restricted distribution
	Wood bitter-vetch *Vicia orobus*	Restricted distribution
	Pale sedge *Carex pallescens*	Widely distributed in habitat
M24 fen meadow	Rushes	Dominant in some areas
	Meadow thistle *Cirsium dissectum*	Typcial in some areas
	Purple moor-grass *Molinia caerulea*	Typcial in some areas
	Carnation sedge *Carex panicea*	Typcial in some areas
Poorly drained grassland	Purple moor-grass Molinia caerulea	Dominant in this habitat
	Tormentil *Potentilla erecta*	Dominant in this habitat
	Cross-leaved heath *Erica tetralix*	Dominant in this habitat
Acid grassland	Common bent *Agrostis caipillaris*	Characteristic of habitat
	Sheep's fescue *Festuca ovina*	Characteristic of habitat
Spring and flushes	Round-leaved sundew *Drosera rotundifolia*	Present in habitat
	Few-flowered spike-rush *Eleocharis quinqueflora*	Present in habitat
	Fen bedstraw *Galium uliginosum*	Present in habitat
	Common butterwort *Pinguicula vulgaris*	Present in habitat

There are no faunal species noted within the SSSI citation.

Information with respect to the conservation objectives for Bryncarnau Grasslands, Llwydcoed SSSI was not available at the time of completion of report. The condition status of the SSSI is also not know at the present time.

6.2 DIRECT EFFECTS

Section 3 identified that there were no forseeable likely direct effects on Bryncarnau Grasslands, Llwydcoed SSSI.

6.3 INDIRECT EFFECTS

In accordance with the information presented in the initial screening in Section 3, this section provides a discussion of the potential indirect effects on Bryncarnau Grasslands Llwydcoed SSSI from the proposed Enviroparks development. These effects are related purely to air quality changes.

6.3.1 Air Quality

Section 3 identified that with respect to some of the potential air pollutants, not all could be screened as insignificant with respect to Bryncarnau Grasslands, Llwydcoed SSSI. The data presented in Table 3.8 (Section 3) shows that with respect to acid deposition (dry deposition only) the process contribution as a percentage of the critical load has been modelled as 1.30%, which is above the 1% insignificance screen for insignificant effects. This does not mean that there will be a significant effect from this deposition. Table 3.8 shows that the process contribution plus the background percentage of the critical load would equate to 721.30% which obviously exceeds the insignificance criteria for this pollutant. However, it should be noted that this value is high as a result of the existing background contributions which are already significantly exceeding the critical load (2.52 kg eq/Ha/yr).

The habitats within Bryncarnau Grasslands Llwydcoed SSSI are similar to those listed on the Cors Bryn-y-Gaer SSSI citation, and a discussion of the potential effects on aicd deposition on the habitats is provided in Section 4.3.2.

The potential acid deposition at this site (1.30%) as a result of the Enviroparks development, is only just above the 1% threashold of insignificance, and there are very high background levels already experienced at the site. 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 and the figure of 1.30% acid dry deposition is a worst case assessment.

The grasslands within Bryncarnau Grasslands Llwydcoed SSSI are 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 SSSI.

Therefore it can be considered that the potential air pollution changes as a result of the proposed development would have no significant effect on the integrity of the Bryncarnau Grasslands Llwydcoed SSSI.

6.4 SUMMARY OF POTENTIAL EFFECTS ON BRYNCARNAU GRASSLANDS, LLWYDCOED SSSI

Table 6.2 summarises the potential impacts of the present proposals on the features listed on the Bryncarnau Grasslands Llwydcoed SSSI citation.

Table 6.2: Summary of Potential Impacts of the Present Proposals on Features Listed on the Bryncarnau Grasslands Llwydcoed SSSI Citation

SSSI Site	Potential Project Hazard	Consequence for Features Listed on SSSI Citation	Effect Magnitude*, Duration & Reversibility	Probability of Occurrence	Assumption Made in Reaching Conclusion
Bryncarnau Grasslands, Llwydcoed SSSI Shortest distance to scheme: 5.5 km east	Changes to air quality	Loss of features listed on the SSSI citation and site's ecological integrity.	Major negative, potentially permanent, possibly reversible.	Negligible with appropriate measures designed into the system.	Although some air pollutants (acid deposition) 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 features listed on the SSSI.

7. ASSESSMENT OF SIGNIFICANCE OF ANY EFFECTS ON THE SSSIs

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 listed on the SSSI citation, but excluding trivial or inconsequential effects.

The assessment of the potential adverse effect of a proposed development scheme on a SSSI can be considered with respect to both direct and indirect impacts. Section 3 considers the potential direct and indirect effects on SSSIs within a 10 km radius of the proposed development site and concludes that there are only three SSSIs which may be affected by the proposed development:

- Cors Bryn-y-Gaer SSSI;
- Woodland Park and Pontpren SSSI; and,
- Bryncarnau Grasslands, Llwydcoed SSSI.

These three sites are considered in more detail in Sections 4, 5 and 6 respectively.

Given the distance to Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI from the proposed development site it can be concluded that there could potentially be some direct impacts on features listed on the SSSI citations from loss of habitat which is outside of the SSSI area but still potentially continuous with the site. However, Sections 4.2.1 and 5.2.1 show that with respect to the features listed on the SSSI citations, the habitats and species within the proposed development site are not in continuity with the habitats and species within the development site, 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 either Cors Bryn-y-Gaer SSSI or Woodland and Pontpren SSSI. The current state of scientific understanding does not consider that disturbance during construction or operation will have any direct effect on the marsh fritillary qualifying features listed on the SSSI citations of both of the sites and therefore it can also be considered that there will be no significant effect on the integrity of the SSSIs from disturbance.

In terms of indirect effects on Cors Bryn-y-Gaer SSSI, Woodland Park and Pontpren SSSI and Bryncarnau Grasslands Llwydcoed SSSI, Chapters 4, 5 and 6 respectively discuss the following aspects: hydrology (Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI only), air

quality; light pollution (Cors Bryn-y-Gaer SSSI only); changes in traffic movements (Cors Bryn-y-Gaer SSSI only).

As none of the features listed on the Cors Bryn-y-Gaer SSSI or Woodland Park and Pontpren SSSI citations will be affected 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 SSSIs from hydrological changes as a result of the proposed development.

Chapters 4, 5 and 6 show that although deposition from some air pollutants and acidifying species cannot be ruled as insignificant at Cors Bryn-y-Gaer SSSI, Woodland Park and Pontpren SSSI and Bryncarnau Grasslands Llwydcoed SSSI, the potential effects from these pollutants cannot be considered to have a significant effect on the intergrity of the features listed on the SSSI citations.

Consideration has been given to the likely contribution of traffic emissions to the nutrient nitrogen and acid deposition at Cors Bryn-y-Gaer SSSI. 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.

As none of the qualifying features associated with Cors Bryn-y-Gaer SSSI 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 SSSIs from light pollution.

The key significance indicators for potential impacts of the present proposals on Cors-Bryn-y-Gaer SSSI, Woodland Park and Pontpren SSSI and Bryncarnau Grasslands, Llwydcoed SSSI are summarised in Tables 7.1 to 7.3 respectively.

Table 7.1: Table of Key Significance Indicators – Cors Bryn-y-Gaer SSSI

SSSI / Significant Effect	Cors Bryn-y-Gaer SSSI
Loss of habitat area	No loss of habitat within SSSI. Some loss of habitat close to the SSSI which is not continuous to the SSSI and, although supporting some of the same habitats and species listed on the SSSI citation, is not considered to be a valuable seed source or buffer for the SSSI.
Fragmentation	None. The proposed development site is not situated between different sections of the SSSI.
Disturbance: duration or permanence, distance from site	Construction disturbance as close as 100 m away from the SSSI. It is not anticipated that the features listed on the SSSI citation 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 features listed on the SSSI citation 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 features listed.
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 cannot be screened as insignificant when considering the process contribution to the critical load, where background concentrations were available, the contribution of the process to the background predicted environmental concentrations was minimal considering the already exceeded backgournd concentrations. 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 the SSSI features.
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 7.2: Table of Key Significance Indicators – Woodland Park and Pontpren SSSI

SSSI / Significant Effect	Woodland Park and Pontpren SSSI
Loss of habitat area	No loss of habitat within SSSI. Some loss of habitat close to the SSSI which is not continuous to the SSSI and, although supporting some of the same habitats and species listed on the SSSI citation, is not considered to be a valuable seed source or buffer for the SSSI.
Fragmentation	None. The proposed development site is not situated between different sections of the SSSI.
Disturbance: duration or permanence, distance from site	No 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 features listed on the SSSI citation 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 features listed.
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 cannot be screened as insignificant when considering the process contribution to the critical load, the contribution of the process to the background predicted environmental concentrations was minimal considering the already exceeded backgournd concentrations. 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 the SSSI features.
Noise	No foreseeable effect.
Light pollution	No foreseeable effect.

Table 7.3: Table of Key Significance Indicators – Bryncarnau Grasslands, Llwydcoed SSSI

SSSI / Significant Effect	Bryncarnau Grasslands, Llwydcoed SSSI
Loss of habitat area	No loss of habitat within SSSI.
Fragmentation	None.
Disturbance: duration or permanence, distance from site	No disturbance.
Changes to populations of qualifying species	Air pollution modelling has identified that the process may contribute to not insignificant amounts of acid deposition which, if significant could result in detrimental changes to the vegetation communities within the site. Given the likely overestimation of the modelled process contributions, the high background levels of the pollants under consideration and the small increases in these levels that would be attributable to the proposed development, it is not considered that the process contributions will have a significant impact on the integrity of the features listed.
Water resources	No change anticipated as sites are not hydrologically connected.
Water quality	No change anticipated as sites are not hydrologically connected.
Air quality	Although some of the pollutants (acid deposition) considered cannot be screened as insignificant when considering the process contribution to the critical load, the contribution of the process to the background predicted environmental concentrations was minimal considering the already exceeded backgournd concentrations. Therefore, the PEC of acid deposition can be considered unlikely to have a significant effect on the integrity of the SSSI features.
Noise	No foreseeable effect.
Light pollution	No foreseeable effect.

8. 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.

9. 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.

10. 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 SSSI site within a 10 km radius of the proposed development 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 (which includes Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI) 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 of the proposals and no significant effects from changes to the hydrology of the SSSIs 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 (which includes Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI, 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 (which includes

Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI), for example, 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 (which includes Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI), 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 (which includes Cors Bryn-y-Gaer SSSI and Woodland Park and Pontpren SSSI) and its conservation objectives.

At Bryncarnau Grasslands Llwydcoed SSSI, 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 were only marginally above this threashold (1.30%). Therefore although not all pollutants can be considered insignificant, they can still be considered to represent a small contribution to the overall assessment level.

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.

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APPENDICES

APPENDIX 1: Location Plan

APPENDIX 2: Plan of Proposed Scheme

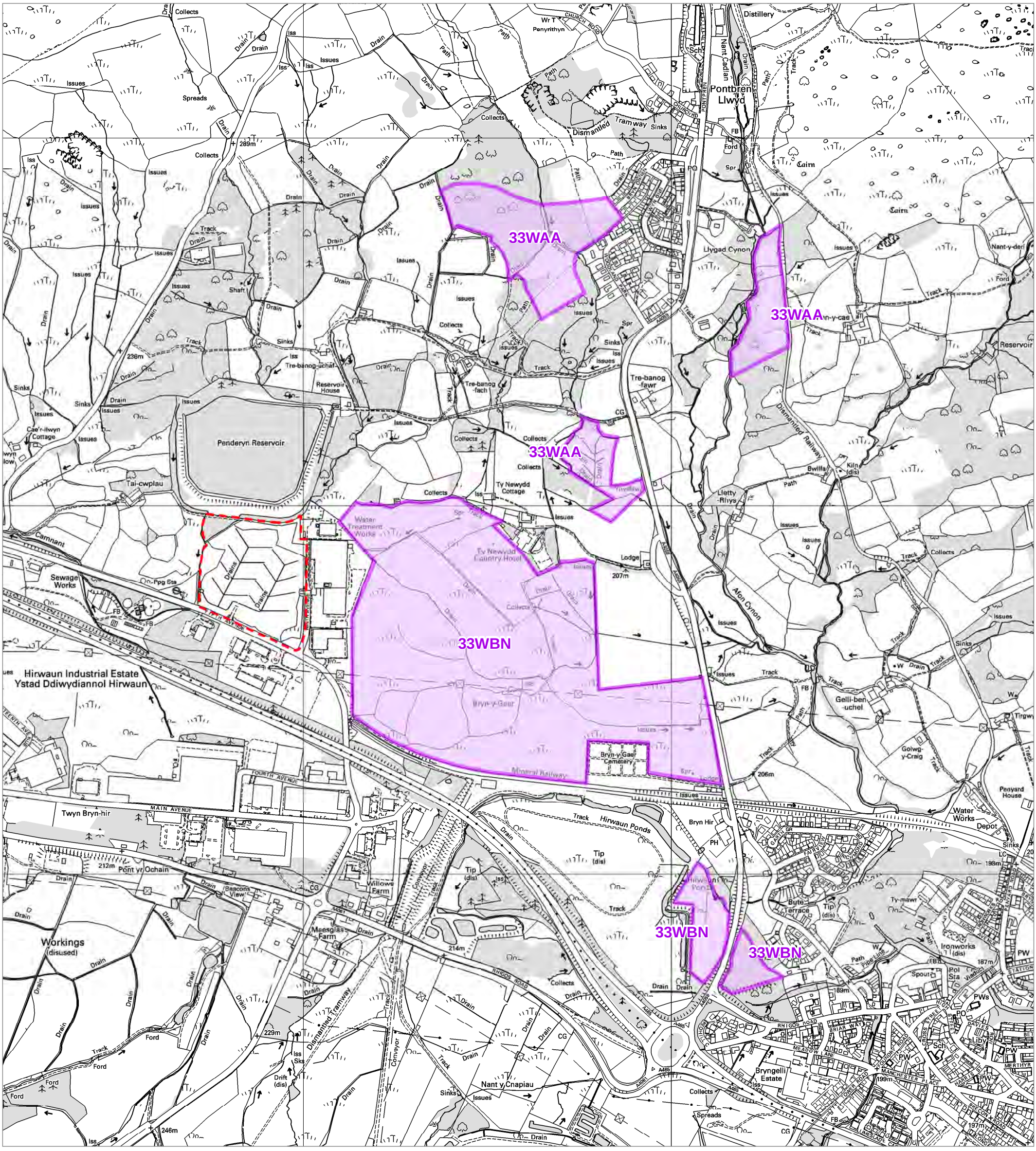
APPENDIX 3: Details of SSSIs

APPENDIX 4: Screening Matrix

APPENDIX 5: Significant Effects Report Matrix

APPENDIX 1

Location Plan



Legend

SSSI

Site boundary

Key to site names:

33WBN	Cors Bryn-y-Gaer SSSI
33WAA	Woodland Park and Pontpren SSSI

N.B.

The location of Bryncarnau Grasslands Llwydcoed SSSI is not shown due to limitation in the extent of OS base plan data available.

N

Client: Envisage	Project: Hirwaun Industrial Estate
Drawing: Site Location Plan	Drawing Number: C105067-01
Revision: 00	Date: May 2009
Scale at A3: 1:10,000	Drawn By: SKS
Approved By: KR	Notes: -

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C105067-01

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

SSSI Citation Forms

CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

SITE OF SPECIAL SCIENTIFIC INTEREST CITATION

RHONDDA CYNON TAFF **CORS BRYN-Y-GAER**

Date of Notification: 2002

National Grid Reference: SN 945065

O.S. Maps: 1:50,000 Sheet number: 160
1:10,000 Sheet number: SN 90NE and NW

Site Area: 52.1 ha

Description:

Cors Bryn-y-gaer is of special interest for its lowland bog and for areas of soligenous flush, marshy grassland, dry neutral grassland and lowland acid grassland. These habitats occur in a complex with wet heath, swamp and semi-improved grassland. The site is also of special interest for the marsh fritillary butterfly *Eurodryas aurinia*.

The site is located immediately north-west of Hirwaun and south of the Brecon Beacons National Park. Cors Bryn-y-gaer is situated at the northern edge of the South Wales Coalfield, on glacial boulder clay, with areas of deep peat on lower ground. Several small water courses and springs are associated with the site, which is in the catchment of the Afon Cynon. The altitude varies from 205 to 220m. The main part of the site comprises several drumlins (smooth oval hills of glacial drift) interspersed with lower lying flat ground. A series of enclosed fields form the northern margin. Also included within the site are two small level fields situated 500 m to the south of the main block of land; these fields are bisected by the A4059 Hirwaun-Penderyn road.

The lowland bog at Cors Bryn-y-gaer is actively peat forming. The vegetation is characterised by a carpet of bog moss *Sphagnum cuspidatum*, together with species such as deergrass *Trichophorum cespitosum*, hare's tail cottongrass *Eriophorum vaginatum* and round-leaved sundew *Drosera rotundifolia*. In slightly drier areas cross-leaved heath *Erica tetralix* becomes more abundant and there is a greater range of bog moss species *Sphagnum spp*., whilst in the wettest areas common cottongrass *Eriophorum angustifolium* is frequent.

Areas of acidic soligenous flush (under the influence of slow flowing mineral-rich ground or surface waters) cover most of the remaining deep peat between the drumlins. Here the vegetation is dominated by sharp-flowered rush *Juncus acutiflorus* over a carpet of bog moss. Associated species include purple moor-grass *Molinia caerulea*, heath wood-rush *Luzula multiflora* and tormentil *Potentilla erecta*. More sedge-rich flushes, with abundant carnation sedge *Carex panicea*, frequent bog asphodel *Narthecium ossifragum* and common cottongrass occur locally.

Marshy grassland is common on sloping ground on drumlins throughout Cors Bryn-y-gaer.

Much of this grassland is dominated by purple moor-grass together with species such as sheep's fescue *Festuca ovina* and tormentil. In places, this grassland is slightly heathy with frequent heath rush *Juncus squarrosus* and occasional cross-leaved heath. Elsewhere grasses are more prominent, including sweet vernal-grass *Anthoxanthum oderatum* and heath grass *Danthonia decumbens*. Small patches where the soil is slightly less acidic are distinguished by the presence of meadow thistle *Cirsium dissectum*.

Areas of marshy grassland dominated by rushes such as soft rush *Juncus effusus* and sharp-flowered rush are also present throughout Cors Bryn-y-gaer. Associated species include frequent marsh bedstraw *Galium palustre*, devil's-bit scabious *Succisa pratensis* and greater bird's-foot-trefoil *Lotus pedunculatus*.

Other habitats found at Cors Bryn-y-gaer include dry acid and neutral grassland. The neutral grassland is characterised by a range of grasses including common bent *Agrostis capillaris*, red fescue *Festuca rubra* and crested dog's tail *Cynosurus cristatus*, together with common knapweed *Centaurea nigra* and common bird's-foot trefoil *Lotus corniculatus*. On the lower slopes of the drumlins this community often grades into the more extensive acid grassland community, containing frequent sheep's fescue *Festuca ovina* and bird's-foot trefoil. Several small areas of wet heath also occur in association with marshy grassland and acid flush. These typically include frequent purple moor-grass, along with deergrass, cross-leaved heath and a range of mosses.

Many of the plant communities are closely juxtaposed, with well displayed transitions between them. Other habitats present on the site include small patches of swamp, inundation vegetation and scrub which add to the ecological and structural diversity of the site.

The nationally scarce marsh fritillary butterfly is associated with the marshy grassland, in which its larval food plant, devil's bit scabious, is frequent and widespread.

Cors Bryn-y-gaer also supports a population of cruet collar moss *Splachnum ampullaceum*, a nationally declining species, scarce in south Wales. This moss occurs mainly in lowland wet pastures, where it grows on decaying cattle and sheep dung.

Remarks:

Cors Bryn-y-gaer SSSI and the nearby Woodland Park/Pontpren SSSI support one of the largest metapopulations of marsh fritillary in South Wales. These two sites comprise the Blaen Cynon candidate Special Area of Conservation (cSAC).

Cors Bryn-y-gaer supports the following UK Biodiversity Action Plan priority habitats: lowland raised bog, purple moor-grass and rush pasture, fen, lowland acid grassland and lowland meadow.

The marsh fritillary is included on Annex IIa of the EC Habitats and Species Directive (Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) and Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and is a Biodiversity Action Plan species.

CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

SITE OF SPECIAL SCIENTIFIC INTEREST CITATION

RHONDDA CYNON TAFF **WOODLAND PARK AND PONTPREN**

Date of Notification: 2000, 2002

National Grid Reference: SN 946077, SN 952075, SN 948071

O.S. Maps: 1:50,000 Sheet number: 160
1:10,000 Sheet number: SN90NW, SN90NE

Site Area: 14.5 ha

Description:

Woodland Park and Pontpren is of special for the interest for the marsh fritillary butterfly *Eurodryas aurinia*. Additional special interest is provided by its mixture of habitat types, including marshy grassland, dry acid and neutral grassland, heathland and woodland, which add to the ecological and biodiversity interest of the site and which also provide food and shelter necessary for the survival of the marsh fritillary.

This site consists of three separate blocks of land, approximately 1km south of the village of Penderyn. The underlying geology is of Namurian and Westphalian sandstones, overlain by stagnohumic gleyed soils. Drainage is impeded across most of the site. The altitude ranges from 210 to 265m.

A variety of purple moor-grass *Molinia caerulea*-dominated communities are present at the site. The largest stands, in the north-western block, were planted with trees in 1995 and are rather tussocky and species-poor. Smaller areas of tussocky vegetation with an abundance of tall herbs such as wild angelica *Angelica sylvestris*, are present in the southern block. Scattered throughout the site are small, grassier stands, with species such as sheep's-fescue *Festuca ovina*, sweet vernal-grass *Anthoxanthum odoratum*, small sedges *Carex spp.* and tormentil *Potentilla erecta*. Heathier areas have cross-leaved heath *Erica tetralix* and bog mosses *Sphagnum spp.*.

Small patches of fen-meadow, with abundant meadow thistle *Cirsium dissectum*, tawny sedge *Carex hostiana* and flea sedge *C. pulicaris*, occur scattered in all three blocks of land and, more locally, there are base-enriched flushes with a high cover of bryophytes such as *Bryum pseudotriquetrum* and *Campylium stellatum*.

Marshy grassland with a high cover of sharp-flowered rush *Juncus acutiflorus* and soft-rush *J. effusus* occurs in the eastern and southern blocks, where it sometimes grades into tall-herb fen dominated by meadowsweet *Filipendula ulmaria* or damp grassland dominated by tufted hair-grass *Deschampsia cespitosa*.

On better drained soils there are small areas of acid and neutral grassland and bracken. The acid grassland is characterised by species such as common bent *Agrostis capillaris*, sheep's-fescue,

heath bedstraw *Galium saxatile* and tormentil. Common species in the neutral grassland include crested dog's-tail *Cynosurus cristatus*, common bird's-foot-trefoil *Lotus corniculatus* and red clover *Trifolium pratense*.

Devil's-bit scabious *Succisa pratensis*, the larval food plant of the marsh fritillary, is widespread and abundant in most of the wet and dry pasture at the site. It is also common in ditches in planted areas in the north-west of the site. Flowers of plants such as meadow thistle, provide a nectar source for the adult marsh fritillary.

Stands of broadleaved woodland and scrub occur throughout the site. On wetter ground, the main species are alder *Alnus glutinosa* and willow *Salix spp*., with oak *Quercus spp.* and birch *Betula pubescens* common on more free-draining soils.

Remarks:

Woodland Park and Pontpren SSSI and the nearby Cors Bryn-y-gaer SSSI support one of the largest metapopulations of marsh fritillary in south Wales. These two sites comprise the Blaen Cynon Special Area of Conservation (cSAC).

The marsh fritillary is included on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Annex IIa of the EC Habitats Directive (Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) and is a priority Biodiversity Action Plan species.

The site, apart from the most southerly field, lies within the Brecon Beacons National Park.

CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

SITE OF SPECIAL SCIENTIFIC INTEREST CITATION

RHONDDA CYNON TAFF **BRYNCARNAU GRASSLANDS, LLWYDCOED**

Date of Notification: 1993

National Grid reference: SN995061

O.S. Maps: 1:50,000 Sheet number: 160
1:25,000 Sheet number: SN90, SO 00

Site Area: 24.8 ha

Description:

Bryncarnau Grasslands are situated on a west-facing hillside at the head of the Cynon Valley, to the north of Aberdare. They range from 270 to 320m in altitude, and are bounded by small tributaries of the River Cynon which, towards the western end of the site, occupy deeply incised wooded valleys. The soils are derived from boulder clay over Coal Measures. The site represents a particularly good example of a gradation from lowland mesotrophic grassland to pasture of a more upland character. A range of plant communities are present and these include 2 of very high nature conservation value. A number of plants which are rare in the Glamorgans occur here.

The western part of the site and the isolated south western field both support a mosaic of lowland grassland types including plant communities typical of both well and poorly drained ground. The drier areas are typified by grasses such as common bent *Agrostis capillaris*, sweet vernal-grass *Anthoxanthum odoratum*, crested dog's-tail *Cynosurus cristatus* and red fescue *Festuca rubra* with a range of broad-leaved herbs including common knapweed *Centaurea nigra*, rough hawkbit *Leontodon hispidus*, common bird's-foot-trefoil *Lotus corniculatus* and great burnet *Sanguisorba officinalis*. Other species which occur more locally in this community include smooth lady's-mantle *Alchemilla glabra*, common spotted-orchid *Dactylorhiza fuchsii* and betony *Stachys officinalis*. The wetter areas include some which are dominated by rushes and others typified by meadow thistle *Cirsium dissectum*, purple moor-grass *Molinia caerulea* and carnation sedge *Carex panicea*. In terms of the National Vegetation Classification, most of the drier grassland may be ascribed to the *Centaurea nigra* - *Cynosurus cristatus* neutral grassland and substantial areas of the wetter ground to the *Molinia caerulea* - *Cirsium dissectum* fen meadow. The upper, eastern part of the site includes an extensive area of dry, acidic grassland typified by common bent and sheep's-fescue *Festuca ovina*. Also present is a smaller area of more poorly drained grassland dominated by purple moor-grass with tormentil *Potentilla erecta* and cross-leaved heath *Erica tetralix*.

A number of unusual plants occur within the site. Greater butterfly-orchid *Platanthera chlorantha* and wood bitter-vetch *Vicia orobus* both have a very restricted distribution in the dry neutral grassland within the site pale sedge *Carex pallescens* is more widely distributed in the same community. Springs and flushes areas towards the upper end of the site support round-leaved sundew *Drosera rotundifolia*, few-flowered spike-rush *Eleocharis quinqueflora*, fen bedstraw *Galium uliginosum* and common butterwort *Pinguicula vulgaris*.

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 SSSI sites	Twenty-three SSSIs are considered in this report. These are: • Cors Bryn-y-Gaer SSSI • Woodlands Park and Pontpren SSSI • Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI • Cwm Cadlan SSSI • Cwm Gwrelych and Nant Llynfach Streams SSSI • Craig-y-Llyn SSSI • Bryn Bwch SSSI • Caeau Nant-y-Llechau SSSI • Gweunedd Dyffern Nedd SSSI • Bryncarnau Grasslands Llwyncoed SSSI • Blaenrhondda Road Cutting SSSI • Blaen Nedd SSSI • Ogof Ffynnon Ddu Pant Mawr SSSI • Caeau Ton-y-Fildre SSSI • Penmoelallt SSSI • Mynydd Ty-Isaf Rhondda SSSI • Plas-y-Gors SSSI • Daren Fach SSSI • Cwm Glo SSSI • Waun Ton-y-Spyddaden SSSI • Gorsllwyn Onllwyn SSSI • Cwm Taf Fechan Woodlands SSSI • Nant Llech SSSI The closest of these is approximately 100 m from the proposed development site.

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 SSSI site are: • Disturbance to species on the SSSI citation rom construction works and operation 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 SSSI site by virtue of: • **Size and scale;** • **Land-take;** • **Distance from SSSI 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 aany SSSI from the proposed scheme. The scheme may have indirect impacts on a SSSI. Conceivable indirect impacts include those arising from: • Hydrology changes • Air pollution • Increased traffic exhaust emissions • 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 SSSIs or being utilised as a seed source or buffer by features listed on the SSSI citation. At majority of SSSIs within the 10 km study radius, the levels of air pollutants have all been screened as insignificant. The exceptions are: • Cors Bryn-y-Gaer SSSI; • Woodland Park and Pontpren SSSI; and, • Bryncarnau Grasslands, Llwydcoed SSSI. At Blaen Cynon SAC (and therefore Cors Bryn-y-Gaer SSSI and Woodland and Pontpren SSSI) 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 listed on the SSSI citation and which support the marsh fritillary butterfly (a feature listed on both SSSI citations). At Bryncarnau Grasslands, Llwydcoed SSSI process contribution levels of acid deposition cannot be screened as insignificant. Increases in deposition of the above pollutants could result in a change in the composition of habitats listed on the SSSI citation.
Describe any likely impacts on the SSSIs 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 SSSI 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 SSSI	Twenty-three SSSIs are considered in this report. These are: • Cors Bryn-y-Gaer SSSI • Woodlands Park and Pontpren SSSI • Dyffrynoedd Nedd a Mellte a Moel Penderyn SSSI • Cwm Cadlan SSSI • Cwm Gwrelych and Nant Llynfach Streams SSSI • Craig-y-Llyn SSSI • Bryn Bwch SSSI • Caeau Nant-y-Llechau SSSI • Gweunedd Dyffern Nedd SSSI • Bryncarnau Grasslands Llwyncoed SSSI • Blaenrhondda Road Cutting SSSI • Blaen Nedd SSSI • Ogof Ffynnon Ddu Pant Mawr SSSI • Caeau Ton-y-Fildre SSSI • Penmoelallt SSSI • Mynydd Ty-Isaf Rhondda SSSI • Plas-y-Gors SSSI • Daren Fach SSSI • Cwm Glo SSSI • Waun Ton-y-Spyddaden SSSI • Gorsllwyn Onllwyn SSSI • Cwm Taf Fechan Woodlands SSSI • Nant Llech SSSI The nearest of these is located 100 m east of the scheme.
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? (provide details)	The project is not directly connected with or necessary to the management of any of the SSSIs.
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 SSSIs.

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 SSSIs.
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 features listed on the SSSI citations 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	TBC	Time: TBC Dates: TBC Tel.: TBC Address: TBC

Overall Conclusions
Explain how the overall conclusion that there are No Significant Effects on the SSSIs sites 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

ASSESSMENT OF POTENTIAL
EFFECT ON SSSIS

A Report to Envisage

Contract Number: C105067
Report Number: RT-MME-105067
Revision Number: Version 1
Description: Final
Date: May 2009

Checked by:

James Calow
Principal Biodiversity Consultant

Approved by:

Dr Philip Fermor
Managing Director