Cyfoeth Naturiol Cymru
Natural Resources Wales

CORE MANAGEMENT PLAN
INCLUDING CONSERVATION OBJECTIVES

FOR

CRYMLYN BOG / CORS CRYMLYN SPECIAL AREA OF CONSERVATION (SAC)/CRYMLYN BOG RAMSAR SITE

Cyfoeth Naturiol Cymru
Natural Resources Wales

NATURA 2000

Ramsar

Noddir gan Lywodraeth Cymru
Sponsored by Welsh Government

Version	Date	Summary of changes made	Approved by
Version 6	25 April 2014	Updated to the new format. Conservation Objectives rewritten and monitoring results updated.	Mary Youell
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Contents

PREFACE

This document provides the main elements of Natural Resources Wales' management plan for the site(s) named. It sets out what needs to be achieved on the site(s), and advice on the action required. This document is made available through Natural Resources Wales' web site and may be revised in response to changing circumstances or new information. This is a technical document that supplements summary information on the Natural Resources Wales' web site.

One of the key functions of this document is to provide Natural Resources Wales' statement of the Conservation Objectives for the relevant Natura 2000 site(s). This is required to implement the Conservation of Habitats and Species Regulations 2010, as amended. As a matter of Welsh Government Policy, the provisions of those regulations are also to be applied to Ramsar sites in Wales.

1. VISION FOR THE SITE

This is a descriptive overview of what needs to be achieved for conservation on the site. It brings together and summarises the Conservation Objectives (part 4) into a single, integrated statement about the site.

Lowland fen will be the predominant habitat at Crymlyn Bog SAC, covering approximately 80% of Crymlyn Bog itself and about 75% of Pant y Sais fen.

A range of fen communities will be represented, including the SAC Annex I habitat types 'calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*' and 'transition mires and quaking bogs'; at least 56 ha of the former habitat and 21 ha of the latter type will be present across the SAC.

Effective habitat management will be carried out to maintain the lowland fen vegetation (including its component SAC habitats) in favourable condition. This conservation management will be based on techniques such as grazing and vegetation cutting, as requirements dictate. Targeted scrub control will also be undertaken to prevent scrub development in important habitat areas. Wider protection measures will safeguard water levels, water quality and atmospheric pollution impacts at the site; this will include measures to minimise impacts from known surrounding sources including Tir John landfill site, the former Llandarcy oil refinery site (now being redeveloped as Coed Darcy urban village) and watercourses such as Crymlyn Brook.

Wet woodland will occupy approximately 10% of Crymlyn Bog, including the SAC Annex I habitat 'alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*'. This woodland will continue to develop a natural wet woodland species composition and structure, through natural dynamic processes. A strong population of marsh fern *Thelypteris palustris* will also be present.

The fen vegetation at Crymlyn Bog SAC will support a suite of uncommon plant species, including a large and sustainable population of slender cotton-grass *Eriophorum gracile.*

The range of fen and associated open water habitats will also support a suite of uncommon invertebrates. In particular a viable population of the rare fen raft spider *Dolomedes plantarius* will occupy the various canal and open water habitats at the site. A viable population of the hornet robberfly *Asilus crabroniformis* will also occur in the drier pastures on the western periphery of Crymlyn Bog.

The purpose of the designation of Natura 2000 sites is to help secure the maintenance or restoration of habitats and species to favourable conservation status *for the foreseeable future*. Given that we foresee a changing climate, despite the uncertainty of the nature, degree and timing of those changes, we must address the need to ensure the resilience of each

site to that changing environment. This will be achieved in the first instance by ensuring favourable condition of the important features, since a healthy feature is likely to be more resilient to the effects of climate change than one which is already stressed. Secondly, consideration must be given to those structures, functions and processes which maintain or boost the resilience of ecosystems to climate stress, including the avoidance, reduction or mitigation of other stress factors such as invasive species, nutrient enrichment, habitat and population fragmentation.

This site forms part of a wider network, and is ecologically connected with its surroundings and with other designated sites in the region. Although the focus of this document is on the individual site, the conservation objectives and management requirements need to be considered in the wider context. A connected network of sites is more robust than sites in isolation, and more resilient to pressures such as climate change.

2. SITE DESCRIPTION

2.1 Area and Designations Covered by this Plan

Grid reference: SS694947

Unitary authorities:

- Abertawe / Swansea
- Castell-Nedd a Porth Talbot / Neath and Port Talbot

Area (hectares): 299.45Ha

Designations covered: Crymlyn Bog / Cors Crymlyn Special Area of Conservation (SAC) comprises two component Sites of Special Scientific Interest (SSSI):

Cors Crymlyn / Crymlyn Bog SSSI;
Pant-y-Sais SSSI.

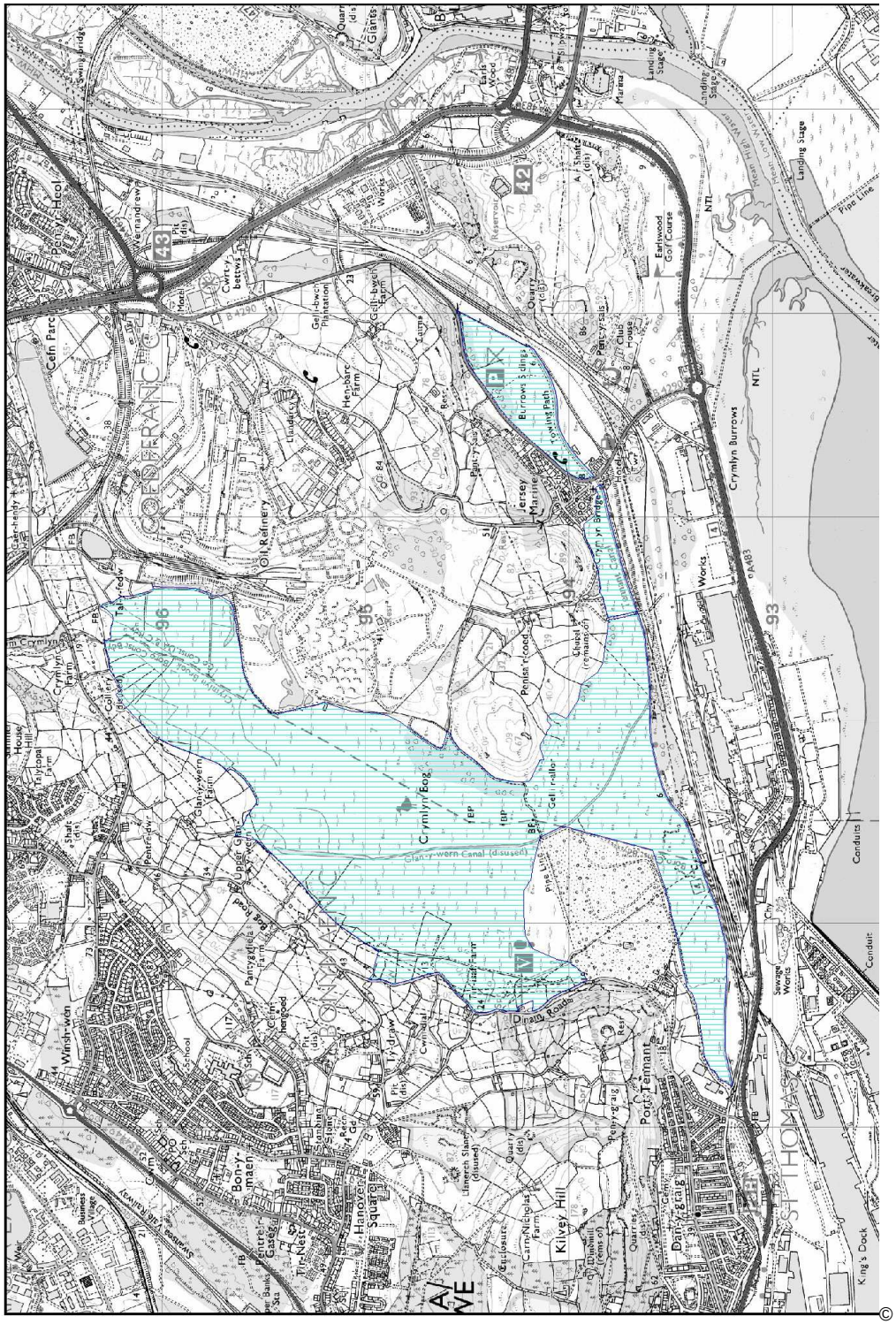
Apart from approximately 35 hectares of land at the northern end of Crymlyn Bog, the majority of the SAC (including Pant-y-Sais SSSI) is also designated a Ramsar site.

Approximately one-third of Crymlyn Bog, and all of Pant-y-Sais (excluding the adjoining Tennant Canal), is declared as a National Nature Reserve (NNR). Pant-y-Sais is also a Local Nature Reserve (LNR).

Detailed maps of the designated sites are available on the Natural Resources Wales web site.

A summary map showing the coverage of this document is shown below:

Crymlyn Bog/Cors Crymlyn SAC



2.2 Outline Description

Crymlyn Bog is a large lowland fen situated in a glacial depression on the eastern edge of Swansea. In addition to Crymlyn Bog itself, the SAC also includes Pant-y-Sais fen, a smaller (approximately 20 ha) wetland located about 1 km east of the main site.

The predominant habitat at Crymlyn Bog and Pant-y-Sais is lowland topogenous fen, which comprises a diverse range of mire, tall-herb fen and swamp communities. Of particular interest are the stands of the SAC Annex I habitat types 'Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*' and 'Transition mires and quaking bogs'.

Also of interest are the stands of wet woodland at Crymlyn Bog, including the Annex I habitat 'Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*' (*Alno-Padion, Alnion incanae, Salicion albae*).

In addition the SAC supports a suite of uncommon plant species, including a large population of the nationally rare slender cotton-grass *Eriophorum gracile*; marsh fern *Thelypteris palustris* also occurs within the alluvial woodland.

The site is also of importance for its invertebrate fauna. Of particular note is the population of the fen raft spider *Dolomedes plantarius*, which is known from just two other sites in the UK. The hornet robberfly *Asilus crabroniformis* also occurs in some of the drier pastures on the western flank of Crymlyn Bog.

2.3 Outline of Past and Current Management

The main current management practices at Crymlyn Bog SAC are grazing and scrub control.

At Crymlyn Bog, a fairly extensive area of grazing has been established within the western, NRW-managed NNR block, using Welsh Mountain ponies. Other peripheral parts of the bog are also grazed by neighbouring farmers' livestock, including some of the eastern section next to Penisa'r-coed Farm (cattle grazed). Much of the rest of the bog is very wet and inaccessible, making grazing of these areas difficult, both for NRW and adjoining landowners.

No grazing takes place at Pant-y-Sais. There are no stock-proof boundaries here and the site does not lend itself to livestock management at present.

An annual programme of scrub control has been carried out since at least 1995, covering both Crymlyn Bog and Pant-y-Sais.

Open water restoration work has also been carried out in recent years, to benefit fen raft spider and other open water-dependent species.

The Tennant Canal, which forms the southern boundary of Crymlyn Bog and the south-eastern boundary of Pant-y-Sais, has been maintained as an open water channel by the canal owners. The Glan y Wern Canal, an arm of the Tennant Canal that runs through the centre of Crymlyn Bog, has received little management in recent times but still persists as an open water conduit along much of its length.

In terms of past management, it is presumed that grazing is a long-established practice at Crymlyn Bog, especially around the periphery of the bog. A local farmer has reported that grazing was formerly more extensive on the western side of the bog, using a mix of cattle and horses. However, anecdotal evidence suggests that the site has become wetter in recent times, making extensive grazing of the site less straightforward than before. Historical maps show a network of drainage ditches across the bog, which would have enabled at least parts of the site to be grazed more effectively than now.

The wetter nature of the site in recent decades is likely to be genuine, resulting from high water levels in the Glan y Wern and Tennant Canals. Regular over-topping of these canals is believed to influence the distribution of the Annex I habitats.

Scrub control may also have been carried out in the past. However, local people claim that the site was previously burned on a regular basis, as a means of controlling scrub development, preventing build up of litter and reducing rank vegetation.

2.4 Management Units

The area covered by this plan has been divided into management units to enable practical communication about features, objectives, and management. This will also allow us to differentiate between the different designations where necessary. In this plan the management units have been based mainly on tenure, but also with reference to features and land management requirements.

Maps showing the management units referred to in this plan are on this site's web page.

The following table confirms the relationships between the management units and the designations covered:

Unit reference	Unique unit number	SAC	Ramsar	SSSI	NNR	Natural Resources Wales owned/managed
Crymlyn Bog SSSI						
1	000901	✔	✔	✔		
2	000904	✔	✔	✔		
3	000906	✔	✔	✔		
4	000907	✔	✔	✔	✔	✔
5	000908	✔	✔	✔	✔	✔
6a	000909	✔		✔	✔	✔
6b	002511	✔	✔	✔	✔	✔
7	000911	✔		✔		
8	000914	✔	✔	✔	✔	✔
9	000915	✔	✔	✔	✔	✔
10	000916	✔	✔	✔		
11	000920	✔	✔	✔		
12	000922	✔		✔		
13	000923	✔	✔	✔		
Pant-y-Sais SSSI						

14	000927	✔	✔	✔		
15	000928	✔	✔	✔	✔	✔

2.5 Position within an ecological network

Crymlyn Bog is the most extensive area of lowland fen in south Wales. In terms of its important SAC habitats, calcareous fen is highly restricted in the UK, with its two main centres of distribution being the Broadlands of East Anglia and the fen systems of Anglesey. Apart from Crymlyn Bog, there are no other known examples in south Wales, although it should be noted the Crymlyn stands are a rather poorly characterised form of calcareous fen and lack any strongly calcicolous species of the *Caricion davallianae*. Transition mires and quaking bogs are more widespread in the UK, but this habitat is still scarce in a south Wales context. Wet woodlands are relatively common, although true alluvial forests in a flood plain setting are more fragmentary.

3. THE FEATURES

3.1 Confirmation of Features

Designated feature	Relationships, nomenclature etc	Conservation Objective in part 4
SAC features		
Annex I habitats that are a primary reason for selection of this site 1. Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (EU habitat code 7210)	Part of topogenous fen Ramsar feature and SSSI feature	1
2. Transition mires and quaking bogs (EU habitat code 7140)	Part of topogenous fen Ramsar feature and SSSI feature	2
Annex I habitats present as a qualifying feature, but not a primary reason for site selection *3. Alluvial forests with* Alnus glutinosa *and* Fraxinus excelsior *(*Alno-Padion, Alnion incanae, Salicion albae*) (EU habitat code 91E0)*	Part of wet woodland SSSI feature	3
SPA features		
Not applicable		
Ramsar features (provisional) *Note: The Ramsar features for Crymlyn Bog SAC are open to interpretation at present. They will be subject to a 'quality control' exercise in the future, to confirm the qualifying features. Hence the following list of Ramsar features is only provisional at present. Conservation objectives for the Ramsar features will be developed once the confirmed list of features has been agreed.*		
4. Topogenous fen	Equates to topogenous fen SSSI feature. Includes above two SAC fen features (Features 1 and 2)	To be developed, with reference to 1 and 2 above
5. Slender cotton-grass	Equates to slender cotton-grass SSSI feature	To be developed
6. Peatland invertebrate assemblage	Equates to invertebrate assemblage SSSI feature	To be developed
7. Plant species		To be developed

assemblage		
SSSI features		
8. Topogenous fen	Equates to topogenous fen Ramsar feature. Includes above two SAC fen features (Features 1 and 2)	To be developed, with reference to 1 and 2 above
9. Wet woodland	Includes above alluvial woodland SAC feature (Feature 3)	To be developed, with reference to 3 above
10. Slender cotton-grass	Equates to slender cotton-grass Ramsar feature	To be developed
11. Marsh fern		To be developed
12. Fen raft spider		Has been developed
13. Hornet robberfly		Has been developed
14. The weevil *Tapeinotus sellatus*		Has been developed
15. Peatland invertebrate assemblage	Equates to invertebrate assemblage Ramsar feature	To be developed

3.2 Features and Management Units

This section sets out the relationship between the designated features and each management unit. This is intended to provide a clear statement about what each unit should be managed for, taking into account the varied needs of the different special features. All features are allocated to one of seven classes in each management unit. These classes are:

Key Features

KH - a 'Key Habitat' in the management unit, i.e. the habitat that is the main driver of management and focus of monitoring effort, perhaps because of the dependence of a key species (see KS below). There will usually only be one Key Habitat in a unit but there can be more, especially with large units.

KS – a 'Key Species' in the management unit, often driving both the selection and management of a Key Habitat.

Geo – an earth science feature that is the main driver of management and focus of monitoring effort in a unit.

Other Features

Sym - habitats, species and earth science features that are of importance in a unit but are not the main drivers of management or focus of monitoring. These features will benefit from management for the key feature(s) identified in the unit. These may be classed as 'Sym' (sympathetic) features because:
(a) They are present in the unit but may be of less conservation importance than the key feature; and/or

(b) they are present in the unit but in small areas/numbers, with the bulk of the feature in other units of the site; and/or
(c) their requirements are broader than and compatible with the management needs of the key feature(s), e.g. a mobile species that uses large parts of the site and surrounding areas: and/or
(d) key features (KH, KS) are closely associated with these features, and the conservation of key features depends on them being managed appropriately.

Nm - an infrequently used category where features are at risk of decline within a unit as a result of meeting the management needs of the key feature(s), i.e. under Negative Management. These cases will usually be compensated for by management elsewhere in the plan, and can be used where minor occurrences of a feature would otherwise lead to apparent conflict with another key feature in a unit.

Mn - Management units that are essential for the management of features elsewhere on a site e.g. livestock over-wintering area included within designation boundaries, buffer zones around water bodies, etc.

x – Features not known to be present in the management unit.

The table below sets out the relationship between the features and management units identified in this plan:

Crymlyn Bog SSSI	Management units													
Unique unit number	**901**	**904**	**906**	**907**	**908**	**909**	**2511**	**911**	**914**	**915**	**916**	**920**	**922**	**923**
Unit reference	**1**	**2**	**3**	**4**	**5**	**6a**	**6b**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Unit name	Tennant Canal – managed section	Tennant Canal – unmanaged section	Glan y Wern Canal	CCW wet woodland	CCW fen	CCW grassland A (non-Ramsar)	CCW grassland B	BP A (Non-Ramsar)	BP B	BP C	Tennant Canal Company	Crymlyn Farm A	Crymlyn Farm B (non-Ramsar)	Glan y Wern Farm
SAC	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Ramsar	✔	✔	✔	✔	✔		✔		✔	✔	✔	✔		✔
SSSI	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
NNR/Natural Resources Wales managed				✔	✔	✔	✔		✔	✔				
SAC features														
1. Calcareous fen	**x**	**x**	**x**	**x**	**KH**	**x**	**x**	**KH**	**KH**	**KH**	**KH**	**KH**	**x**	**x**
2. Transition mire	**x**	**x**	**x**	**x**	**KH**	**x**	**x**	**KH**	**KH**	**x**	**KH**	**KH**	**KH**	**KH**
3. Alluvial forest	**x**	**x**	**x**	**KH**	**Sym**	**x**	**x**	**x**	**KH**	**KH**	**x**	**x**	**x**	**x**
Ramsar features (provisional)														
4. Topogenous fen	**x**	**x**	**x**	**x**	**KH**	**x**	**Sym**	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**
5. Slender cotton-grass	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**Sym**	**x**	**x**	**Sym**	**Sym**	**x**	**Sym**
6. Invertebrate assemblage	**Sym**	**Sym**	**Sym**	**x**	**Sym**	**x**	**x**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**
7. Plant species assemblage	**x**	**x**	**x**	**x**	**Sym**	**x**	**x**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**
SSSI features (provisional)														
8. Topogenous fen	**x**	**x**	**x**	**x**	**KH**	**x**	**Sym**	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**
9. Wet woodland	**x**	**x**	**x**	**KH**	**Sym**	**x**	**x**	**x**	**KH**	**KH**	**Sym**	**x**	**Sym**	**x**
10. Slender cotton-grass	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**Sym**	**x**	**x**	**Sym**	**Sym**	**x**	**Sym**
11. Marsh fern	**x**	**x**	**x**	**KS**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
12. Fen raft spider	**KS**	**KS**	**KS**	**x**	**Sym**	**x**	**x**	**x**	**x**	**x**	**Sym**	**Sym**	**x**	**Sym**
13. Hornet robberfly	**x**	**x**	**x**	**x**	**x**	**KS**	**KS**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
14. The weevil *Tapeinotus sellatus*	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
15. Invertebrate assemblage	**Sym**	**Sym**	**Sym**	**x**	**Sym**	**x**	**x**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**	**Sym**

Crymlyn Bog has an additional two units to those listed above (7042 and 7044). These aren't included in the table as they have no Annex 1 habitats or Annex 2 species features.

Pant-y-Sais SSSI	Management units	
Unique unit number	**927**	**928**
Unit reference	**14**	**15**
Unit name	**Tennant Canal**	**Fen**
SAC	✔	✔
Ramsar	✔	✔
SSSI	✔	✔
NNR/Natural Resources Wales managed		✔
SAC features		
1. Calcareous fen	**x**	**KH**
2. Transition mire	**x**	**KH**
3. Alluvial woodland	**x**	**x**
Ramsar features (provisional)		
4. Topogenous fen	**x**	**KH**
5. Slender cotton-grass	**x**	**Sym**
6. Invertebrate assemblage	**Sym**	**Sym**
7. Plant species assemblage	**x**	**Sym**
SSSI features (provisional)		
8. Topogenous fen	**x**	**KH**
9. Wet woodland	**x**	**x**
10. Slender cotton-grass	**x**	**Sym**
11. Marsh fern	**x**	**x**
12. Fen raft spider	**KS**	**x**
13. Hornet robberfly	**x**	**x**
14. The weevil *Tapeinotus sellatus*	**KS**	**x**
15. Invertebrate assemblage	**Sym**	**Sym**

4. CONSERVATION OBJECTIVES

Background to Conservation Objectives:

a. Outline of the legal context and purpose of conservation objectives.

Conservation objectives for individual SACs and SPAs are required by the 1992 'Habitats' Directive (92/43/EEC). The aim of the Habitats Directive is the maintenance or where appropriate the restoration, of the 'favourable conservation status' (FCS) of habitats and species listed in the Annexes to the Directive (see Box). Therefore FCS provides the overarching framework for defining the conservation objectives for individual SACs.

Although neither the Birds Directive nor the Ramsar Convention refer to FCS, Natural Resources Wales considers that the overall aim of both those legal instruments is sufficiently similar to FCS to make it practical and proportionate to use the same guiding principle when establishing the conservation objectives for SPAs and Ramsar sites, as well as SACs. Therefore the Habitats Directive definition of FCS is considered to provide the overarching framework for conservation objectives for all SACs, SPAs and Ramsar sites in Wales.

Favourable conservation as defined in Articles 1(e) and 1(i) of the Habitats Directive

"The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- Its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- population dynamics data on the species indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."

The achievement of FCS is not an objective that applies at the level of the individual sites. Rather it is a wider objective to which each individual site contributes. Therefore the conservation objectives for an individual site are intended to express what is considered to be that site's appropriate contribution to achieving FCS. Since SACs are the most important mechanism in the Habitats Directive for achieving FCS, and the sites represent the most important areas for conservation of the Annex I habitat types and Annex II species, the objectives for each individual SAC should seek to ensure that the site makes a substantial contribution which properly reflects its importance in a local, national and European context and the particular reasons why the site was selected for inclusion in the network. A similar approach is taken to setting conservation objectives for SPAs and Ramsar sites.

Achieving the conservation objectives of individual sites requires appropriate management and the control of factors which are influencing, or may influence the features.

The conservation objectives have a number of specific roles:

- Communication
  The conservation objectives should help convey to stakeholders what are the reasons for the designation and what it is intended to achieve.

- Site planning and management
  The conservation objectives guide management of sites, to maintain or restore the designated habitats and species. They provide the basis for identifying what management is required both within the site boundary, and outside it, where achieving the objectives requires action to be taken outside the site.

- River Basin Management Planning
  Conservation Objectives for aquatic and water dependent Natura 2000 features are also used as the "standards and objectives" referred to in Article 4 (1c) of the Water Framework Directive (WFD) (2000/60/EC). In 2009, Welsh Ministers decided that where Natura 2000 conservation objectives are more stringent than 'Good Ecological Status' (GES) as defined in the WFD, they (and the standards they contain) are the objectives referred to in Article 4(1c) of the WFD.

- Assessing plans and projects
  Article 6(3) of the 'Habitats' Directive requires the assessment of proposed plans and projects in view of a site's conservation objectives. Subject to certain exceptions, plans or projects may not proceed unless it is established that they will not adversely affect the integrity of sites. There are similar requirements for the review of existing decisions and consents.

- Monitoring and reporting
  In addition to foregoing purposes, conservation objectives provide the basis for defining the evidence that will be used for assessing the condition of a feature and the status of factors that affect it. That evidence is contained in a separate but closely related set of 'performance indicators' which provide the basis for monitoring and reporting. To avoid confusion between the conservation objectives and the measures specified in performance indicators, the performance indicators are set out in an Appendix to this document.

The conservation objectives in this document reflect Natural Resources Wales' current information and understanding of the site and its features and their importance in an international context. The conservation objectives are subject to review by Natural Resources Wales in the light of new knowledge.

b. Format of the conservation objectives

Each conservation objective is a composite statement defining a site-specific aspiration for each designated feature. This composite statement contains clauses that correspond to all the elements of FCS, namely:

For habitat features:

- Extent should be stable in the long term, or where appropriate increasing;
- Quality (including in terms of ecological structure and function) should be being maintained, or where appropriate improving;
- Populations of the habitat's typical species must be being maintained or where appropriate increasing;
- Factors affecting the extent and quality of the habitat and its typical species (and thus affecting the habitat's future prospects) should be under appropriate control.

For species features:

- The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term;
- The distribution of the population should be being maintained;
- There should be sufficient habitat, of sufficient quality, to support the population in the long term;
- Factors affecting the population or its habitat should be under appropriate control.

The elements above constitute a generic checklist or guide to the elements that should normally be included in the conservation objectives, in order to ensure that the site makes an effective and appropriate contribution to achieving favourable conservation status for the habitats and species for which it is designated.

There is one conservation objective for each designated feature listed in part 3. In some cases, where there are distinct areas or forms of a designated habitat or separate populations of a designated species within a site, the conservation objective is sub-divided into different sections to enable different aspirations to be expressed for different occurrences of the features within the site.

As well as describing the aspirations for the condition of the feature, each conservation objective contains a statement that the factors which significantly affect the feature are under appropriate control.

4.1 Conservation objective for Feature 1: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (EU habitat code 7210)

The extent should be stable in the long term, or where appropriate increasing.	The extent and distribution of calcareous fen should be as mapped in 2005 and 2009 (Bosanquet *et al.*, 2005; Bosanquet *et al.*, 2009).
Quality (including in terms of ecological structure and function) should be being maintained, or where appropriate improving.	The calcareous fen should be of high quality throughout. At Crymlyn Bog the calcareous fen occurs in two forms: tall vegetation dominated by Great Fen-sedge *Cladium mariscus* and more open calcareous fen. The *Cladium* dominated areas should continue to be present as a minimum extent but should not increase at the expense of the open calcareous fen; ideally they should be opened up to allow increased plant diversity within them. The open calcareous fen should be species-rich, with little or no rank vegetation. Non-native species and indicators of eutrophication and/or changing water levels should be largely absent. Providing these broad quality standards are met across the whole feature area, some heterogeneity in condition is both natural and acceptable, but the bulk (at least 70%) of the open calcareous fen should be referable to good quality calcareous fen habitat, where: • Tufted-sedge *Carex elata* is present, with associates such as Yellow Loosestrife *Lysimachia vulgaris*, Greater Spearwort *Ranunculus lingua*, Blunt-flowered Rush *Juncus subnodulosus*, Cyperus Sedge *Carex pseudocyperus*, Lesser Bulrush *Typha angustifolia*, Water Dock *Rumex hydrolapathum*, Purple-loosestrife *Lythrum salicaria*, Hemp-agrimony *Eupatorium cannabinum*, Marsh Cinquefoil *Potentilla palustris* and Royal Fern *Osmunda regalis*. • Common Reed *Phragmites australis* or Great Fen-sedge *Cladium mariscus* are not dominant. • Scrub is absent. • Non-native species including Himalayan Balsam *Impatiens glandulifera* are absent.
Populations of the habitat's typical species must be being maintained or where appropriate increasing.	In addition to the above typical plant species, the calcareous fen areas will also contribute to the wider fen environment of Crymlyn Bog in supporting a range of typical fenland bird and invertebrate species.
Factors affecting the extent and	Factors affecting the extent and quality of the calcareous fen habitat (including water quality, atmospheric pollution, water

quality of the habitat and its typical species (and thus affecting the habitat's future prospects) should be under appropriate control.	levels, successional change, scrub encroachment and non-native species) should be under appropriate control.

4.2 Conservation objective for Feature 2: Transition mires and quaking bogs (EU habitat code 7140)

The extent should be stable in the long term, or where appropriate increasing.	The extent and distribution of transition mire should be as mapped in 2005 and 2009 (Bosanquet *et al*., 2005; Bosanquet *et al*., 2009). Plus an additional 3 ha of transition mire should also be restored.
Quality (including in terms of ecological structure and function) should be being maintained, or where appropriate improving.	The transition mire should be of high quality throughout and composed of typical native species. The stands should be species-rich, with little or no rank vegetation or scrub encroachment. Non-native species and indicators of eutrophication and/or changing water levels should be largely absent. Providing these broad quality standards are met across the whole feature area, some heterogeneity in condition is both natural and acceptable, but the bulk (at least 60%) of the habitat should be referable to good quality transition mire, where: • Bottle Sedge *Carex rostrata* is present at high cover; or, where the vegetation is composed of mixtures of: Bogbean *Menyanthes trifoliata*, Marsh Cinquefoil *Potentilla palustris*, Water Horsetail *Equisetum fluviatile*, Common Cottongrass *Eriophorum angustifolium*, Slender Cottongrass *E. gracile*, Bottle Sedge *Carex rostrata*, Bog Sedge *C. limosa*, Star Sedge *C. echinata*, Lesser Water-parsnip *Berula erecta*, Branched Bur-reed *Sparganium erectum* and the bog mosses *Sphagnum squarrosum* and *S. subnitens*. • Common Reed *Phragmites australis* is not dominant. • Purple Moor-grass *Molinia caerulea*, Greater tussock-sedge *Carex paniculata*, Tufted-sedge *C. elata* and Great Fen-sedge *Cladium mariscus* are not abundant. • Scrub is absent. • Non-native species including Himalayan Balsam *Impatiens glandulifera* are absent.
Populations of the habitat's typical species	In addition to the above typical plant species, the transition mire areas will also contribute to the wider fen environment of Crymlyn Bog in supporting a range of typical fenland bird and

must be being maintained or where appropriate increasing.	invertebrate species.
Factors affecting the extent and quality of the habitat and its typical species (and thus affecting the habitat's future prospects) should be under appropriate control.	Factors affecting the extent and quality of the transition mire habitat (including water quality, atmospheric pollution, water levels, successional change, scrub encroachment and non-native species) should be under appropriate control.

4.3 Conservation objective for Feature 3: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (EU habitat code 91E0)

The extent should be stable in the long term, or where appropriate increasing.	The extent of alluvial forest should be as mapped in 2009 by the last SAC monitoring exercise (Wilkinson & Bevan, 2009). An increase in alluvial forest at the expense of important open fen vegetation is not desirable.
Quality (including in terms of ecological structure and function) should be being maintained, or where appropriate improving.	The alluvial forest should be of high quality throughout and composed of typical native species. Non-native species and indicators of eutrophication and/or drying out should be largely absent. Providing these broad quality standards are met across the whole woodland area, some heterogeneity in condition is both natural and acceptable, but the bulk (at least 75%) of the habitat should be referable to good quality alluvial forest, where: • The canopy is composed of Alder *Alnus glutinosa*, Grey Willow *Salix cinerea* and/or Downy Birch *Betula pubescens.* • Over-mature canopy trees are frequent throughout. • The field layer is dominated by Greater Tussock-sedge *Carex paniculata*, with associates such as Yellow Loosestrife *Lysimachia vulgaris*, Royal Fern *Osmunda regalis*, Purple-loosestrife *Lythrum salicaria*, Bittersweet *Solanum dulcamara*, Yellow Iris *Iris pseudacorus*, Skullcap *Scutellaria galericulata* and Branched Bur-reed *Sparganium erectum*. • Viable regeneration of *A. glutinosa*, *S. cinerea* and/or *B. pubescens* is frequent throughout, either as saplings or as regrowth from the base of trees or fallen stems. • Species indicative of drying out (e.g. Bracken *Pteridium aquilinum*) or eutrophication (e.g. Common Nettle *Urtica dioica*) are absent. • Non-native species such as Himalayan Balsam *Impatiens glandulifera* are absent.
Populations of the habitat's typical species must be being maintained or where appropriate increasing.	The alluvial forest should also support species that are naturally associated with a high quality alluvial forest ecosystem, including all its components from the soil, through ground flora and shrub layer to the canopy, and the micro-habitats and structural variations that occur within them. This includes soil flora and fauna, epiphytic lower plants, breeding birds and higher plants as listed above. Characteristic plants of the habitat in this locality such as Royal Fern *Osmunda regalis* and Marsh Fern *Thelypteris palustris* should also be stable or increasing.
Factors affecting the extent and quality of the	Factors affecting the extent and quality of alluvial forest (including water quality, atmospheric pollution, water levels and grazing) should be under appropriate control.

habitat and its typical species (and thus affecting the habitat's future prospects) should be under appropriate control.	

5. ASSESSMENT OF STATUS AND MANAGEMENT REQUIREMENTS

This section provides:

- A summary of the assessment of the status of each feature.
- A summary of the management issues that need to be addressed to maintain or restore each feature.

5.1 Status and Management Requirements of Feature 1: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (EU habitat code 7210)

Status of Feature 1

The calcareous fen feature was last monitored in 2012 (Wilkinson, 2013a). The feature was judged to be in **unfavourable: declining** condition. The main reason for this assessment was a high cover of *Phragmites australis* and/or *Cladium mariscus*, with a corresponding shortage of positive indicator species in places.

It is presumed that the calcareous fen vegetation has become more rank and overgrown since previous monitoring visits, with a reduction in species-richness, through natural vegetation succession. Although some of the calcareous fen areas are grazed by cattle, insufficient management is presumably the main cause of this vegetation succession.

Management Requirements of Feature 1

Grazing is the principal management requirement for restoring the calcareous fen feature to favourable condition. The calcareous fen vegetation in units 8, 9 and 10 is currently (2014) grazed by cattle belonging to the neighbouring farmer, and grazing levels have indeed increased in recent years. Despite this the calcareous fen in these units is still deemed to be unfavourable, although the quality of the vegetation may improve after grazing has been in place longer term.

The calcareous fen in units 7, 11 and 15, and parts of unit 5, is currently ungrazed. Restoring grazing to these units is highly problematic at present, given the very wet ground and inaccessibility. Nonetheless opportunities to expand grazing at the site should continue to be explored where feasible. Other techniques such as vegetation cutting and biomass removal should also be considered.

Scrub control is already carried out at the site on an annual basis. Scrub encroachment is therefore less of a problem for most of the calcareous fen areas, although targeted scrub control should continue in future to maintain this position.

5.2 Status and Management Requirements of Feature 2: Transition mires and quaking bogs (EU habitat code 7140)

Status of Feature 2

The transition mire feature was last monitored in 2011 (Wilkinson, 2013b). The feature was judged to be in **unfavourable: declining** condition. The reasons for this vary between stands, but a high cover of *Phragmites australis* and/or scrub in places, sometimes with a corresponding shortage of positive indicator species, are the main issues.

It is thought that most of the transition mire vegetation is becoming more rank and overgrown due to natural vegetation succession, probably encouraged by enrichment. Insufficient management is presumably the main cause of this vegetation succession, coupled with lack of control over the nutrient status of some key hydrological inputs. The main areas of transition mire are located in units 5, 7, 10, 11, 13 and 15.

Management Requirements of Feature 2

Grazing is one of the principal management practices required for restoring the transition mire feature to favourable condition. The transition mire in parts of units 5 and 10 is currently (2014) grazed by ponies and/or horses, but the bulk of these units are ungrazed, as are units 7, 11, 13 and 15. Restoring grazing to these units is highly problematic at present, given the very wet ground and inaccessibility. Nonetheless opportunities to expand grazing at the site should continue to be explored where feasible. Other techniques such as vegetation cutting and biomass removal should also be considered.

Scrub control is already carried out at the site on an annual basis. Targeted scrub control should continue in future, to ensure any scrub encroachment within transition mire areas is tackled.

Hydrological control is the other major management type required for restoration of the feature. It is thought that over-topping of Crymlyn Brook is leading to a replacement of transition mire habitat by more swampy vegetation in the north of Crymlyn Bog, through over-wettening and perhaps nutrient enrichment. The clearing out of Crymlyn Brook to address this issue, together with nutrient reduction measures, is currently being explored and needs to be carried forward. It is envisaged that clearing out Crymlyn Brook could lead to an overall expansion of transition mire habitat in the north of the site in future. In addition, it is believed that over-topping of the Glan y Wern Canal is limiting the extent of the influence of nutrient-poor inflows from the sides of the wetland, thus favouring swampy vegetation rather than transition mire. Coupled with re-opening the Glan y Wern Canal, the possibility of slightly lowering the water level in the Glan y Wern and Tennant Canals to reduce the extent of over-topping is being investigated.

5.3 Status and Management Requirements of Feature 3: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae, Salicion albae*) (EU habitat code 91E0)

Status of Feature 3

The alluvial forest feature was last monitored in 2009 (Wilkinson & Bevan, 2009). The feature was judged to be in **unfavourable: recovering** condition. The main reason for the unfavourable assessment is the lack of over-mature trees in certain areas, a reflection of the relatively young age of some of the woodland. However, it is felt that the woodland is developing a more mature age structure under its own devices, with no management intervention required; hence the 'recovering' status.

Management Requirements of Feature 3

Key management requirements for the alluvial forest feature are to maintain the high water table and prevent any increase in nutrient levels. There are no concerns over either of these factors at the current time. Similarly there is no threat from excessive grazing at present, as the wet ground conditions provide a natural deterrent to livestock.

A key conservation aim for the alluvial forest feature is for it to develop a natural wet woodland species composition and structure through natural dynamic processes. It is envisaged that this condition will be achieved simply through the current non-intervention management.

6. ACTION PLAN: SUMMARY

This section takes the management requirements outlined in Section 5 a stage further, assessing the specific management interventions required on each management unit. This information is presented in two parts:

- A summary of the information held in Natural Resources Wales' Actions Database for sites
- A summary of ongoing management which is not recorded in Natural Resources Wales' actions database

6.1 Actions in Natural Resources Wales' actions database

Unit reference	Unique unit number	Unit name	Summary of Conservation Management Issues	Action needed?
1	000901	Tennant Canal - managed section	Tennant Canal requires regular sympathetic management to maintain open water habitat and marginal tussocky vegetation for fen raft spider. Current management, carried out by Tennant Canal Company, is ideal.	No
2	000904	Tennant Canal - unmanaged section	This section of Tennant Canal has not been managed for many years and has become choked with encroaching vegetation. Reinstatement of management is required to provide open water habitat for fen raft spider.	Yes
3	000906	Glan y Wern Canal	The Glan y Wern Canal has not been managed for many years and has become choked with encroaching vegetation. Reinstatement of management is required to provide open water habitat for fen raft spider.	Yes
4	000907	CCW wet woodland	Current non-intervention management is ideal for alluvial forest/wet woodland feature.	No
5	000908	CCW fen	Key management issue is vegetation succession of fen vegetation to tall rank vegetation and woody scrub. Parts of unit are grazed by ponies (CCW stock); other parts are currently ungrazed. Need to consider introduction of grazing to currently ungrazed areas. Cutting of vegetation (and removal of arisings) using specialised machinery should also be considered. Burning is another possible management option. Scrub control is carried out to reduce scrub encroachment. Eutrophication linked to elevated nutrient levels in Crymlyn Brook has also been highlighted as a potential threat to the fen vegetation in this unit, as well as over-topping of Glan y Wern Canal.	Yes
6a	000909	CCW grassland A (non-Ramsar)	Grassland is grazed by horses, and scrub control is carried out to prevent scrub encroachment. Current	No

			management regime is ideal for hornet robberfly feature.	
7	000911	BP A (non-Ramsar)	Key management issue is vegetation succession of fen vegetation to tall rank vegetation and woody scrub. Unit is currently ungrazed. Need to consider introduction of grazing; cutting of vegetation (and removal of arisings) using specialised machinery should also be considered. Scrub control is carried out to reduce scrub encroachment. Overtopping of Crymlyn Brook could be leading to a replacement of transition mire habitat here, through over-wettening and perhaps nutrient enrichment. Clearing out Crymlyn Brook to address this issue, together with nutrient reduction measures, is being explored and should be carried forward.	Yes
8	000914	BP B	Key management issue is vegetation succession of fen vegetation to tall rank vegetation and woody scrub. Part of unit (including calcareous fen vegetation) is grazed by cattle belonging to neighbouring tenant farmer. Need to consider increased grazing. Cutting of vegetation (and removal of arisings) using specialised machinery should also be considered. Burning is another possible management option. Scrub control is carried out to reduce scrub encroachment.	Yes
9	000915	BP C	Current non-intervention management is ideal for alluvial forest/wet woodland feature.	No
10	000916	Tennant Canal Company	Key management issue is vegetation succession of fen vegetation to tall rank vegetation and woody scrub. Part of unit (including calcareous fen vegetation) is grazed by cattle belonging to neighbouring tenant farmer. Need to consider increased grazing; however, much of unit is extremely wet and unsuitable for grazing. Cutting of vegetation (and removal of arisings) using specialised machinery should also be considered. Burning is another possible management option. Scrub control is carried out to reduce scrub encroachment. Eutrophication linked to elevated nutrient levels in Crymlyn Brook has also been highlighted as a potential threat to the fen vegetation in this unit, as well as overtopping of Glan y Wern Canal.	Yes
11	000920	Crymlyn Farm A	Key management issue is vegetation succession of fen vegetation to tall rank vegetation and woody scrub. Unit is currently ungrazed. Need to	Yes

			consider introduction of grazing; cutting of vegetation (and removal of arisings) using specialised machinery should also be considered. Scrub control is carried out to reduce scrub encroachment. Overtopping of Crymlyn Brook could be leading to a replacement of transition mire habitat here, through over-wettening and perhaps nutrient enrichment. Clearing out Crymlyn Brook to address this issue, together with nutrient reduction measures, is being explored and should be carried forward.	
12	000922	Crymlyn Farm B (non-Ramsar)	Key management issue is vegetation succession of fen vegetation to tall rank vegetation and woody scrub. Unit is currently ungrazed. Need to consider introduction of grazing; cutting of vegetation (and removal of arisings) using specialised machinery should also be considered. Scrub control is carried out to reduce scrub encroachment. Overtopping of Crymlyn Brook could be leading to a replacement of transition mire habitat here, through over-wettening and perhaps nutrient enrichment. Clearing out Crymlyn Brook to address this issue, together with nutrient reduction measures, is being explored and should be carried forward.	Yes
13	000923	Glan y Wern Farm	Key management issue is vegetation succession of fen vegetation (and associated uncommon species) to tall rank vegetation and woody scrub. Unit is currently ungrazed. Need to consider introduction of grazing; however, unit is very wet and unsuitable for grazing. Cutting of vegetation (and removal of arisings) using specialised machinery should also be considered. Burning is another possible management option. Scrub control is carried out to reduce scrub encroachment.	Yes
14	000927	Tennant Canal	Tennant Canal requires regular sympathetic management to maintain open water habitat and marginal tussocky vegetation for fen raft spider. The current management, carried out by the Tennant Canal Company, is ideal.	No
15	000928	Fen	Key management issue is vegetation succession of fen vegetation (and associated uncommon species) to tall rank vegetation and woody scrub. Unit is ungrazed and there is no history of grazing at the site (no stockproof boundaries). Cutting of vegetation (and removal of arisings)	Yes

			using specialised machinery could be considered. Burning is not a viable management option due to the close proximity of housing and also the recreational use of the site. Scrub control is carried out to reduce scrub encroachment.	
6b	002511	CCW grassland B	Grassland is grazed by horses, and scrub control is carried out to prevent scrub encroachment. Current management regime is ideal for hornet robberfly feature.	No
18	007044	Ramsar boundary error B		No

6.2 Ongoing management

Grazing should continue where it is currently taking place at Crymlyn Bog. Opportunities to expand grazing should continue to be explored, although restoring grazing to much of the site is highly problematic due to the very wet ground and inaccessibility.

Scrub control is already carried out on an annual basis and this should continue, often targeted towards stands of SAC calcareous fen and transition mire vegetation.

Open water restoration work has been carried out in recent years, to benefit fen raft spider and other open water-dependent species. Extending this work to the currently disused sections of the Tennant Canal (unit 2) and Glan-y-wern Canal (unit 3) should continue to be explored.

Measures to tackle the over-topping of Crymlyn Brook with nutrient-enriched water need to be decided and implemented, as do measures to tackle over-topping of the Glan y Wern Canal. Any other problems with point-source inputs of nutrients also need to be tacked as required, as well groundwater migration of leachate from the Tir John landfill site; the latter issue is currently being addressed through a variation to the existing permit for the Tir John site.

7. GLOSSARY

This glossary defines some of the terms used in this **Core Management Plan**. Some of the definitions are based on definitions contained in other documents, including legislation and other publications of Natural Resources Wales and the UK nature conservation agencies.

Action	A recognisable and individually described act, undertaking or project of any kind, specified in section 5 or 6 of a Core Management Plan or Management Plan, as being required for protecting, managing or enhancing one or more of the features for which a site is designated.
Attribute	A quantifiable and monitorable characteristic of a feature that, in combination with other such attributes, describes its condition.
Common standards	See JNCC common standards.
Condition	A description of the state of a feature in terms of qualities or attributes that are relevant in a nature conservation context. For example, the condition of a habitat usually includes its extent and species composition and might also include aspects of its ecological functioning, spatial distribution and so on. The condition of a species population usually includes its total size and might also include its age structure, productivity, relationship to other populations and spatial distribution. Aspects of the habitat(s) on which a species population depends may also be considered as attributes of its condition. Condition is considered favourable when all the conservation objectives are being met.
Conservation management	Acts or undertaking of all kinds, including but not necessarily limited to actions, taken with the aim of achieving the conservation objectives of a site. Conservation management includes the taking of statutory and non-statutory measures, it can include the acts of any party and it may take place outside site boundaries as well as within sites. Conservation management may also be embedded within other frameworks for land/sea management carried out for purposes other than achieving the conservation objectives.
Conservation objective	The expression of the desired state of a feature, expressed as a composite statement defining the

	condition that we wish the feature to be in. Each feature has one conservation objective.
Core Management Plan	A Natural Resources Wales document containing the conservation objectives for a site and a summary of other information contained in a full site Management Plan.
Factor	Anything that has influenced, is influencing, or may influence the condition of a feature. Factors can be natural processes, human activities or effects arising from natural process or human activities. They can be positive or negative in terms of their influence on features, and they can arise within a site or from outside the site. Physical, socio-economic or legal constraints on management of the site can also be considered as factors.
Favourable condition	See condition.
Favourable conservation Status	The Habitats Directive definition of Favourable Conservation Status (FCS) is given in full in section 4.
Feature	The species population, habitat type or other entity for which a site is designated. The ecological or geological interest which justifies the designation of a site and which is the focus of conservation management.
Integrity	See Site integrity.
JNCC common standards	A set of principles developed jointly by the UK nature conservation agencies to help ensure a consistent approach to monitoring and reporting on the features of sites designated for nature conservation, supported by guidance on identification of attributes and monitoring methodologies.
Key Feature	The habitat or species population within a management unit that is the primary focus of management and monitoring in that unit.
Management Plan	The full expression of a designated site's legal status, vision, features, conservation objectives, performance indicators and management requirements. A complete management plan may not reside in a single document, but may be contained in a number of documents (including in

	particular the Core Management Plan) and sets of electronically stored information.
Management Unit	An area within a site, defined according to one or more of a range of criteria, such as topography, location of features, tenure, patterns of land/sea use. The key characteristic of management units is to reflect the spatial scale at which site management and monitoring can be most effectively organised. They are used as the primary basis for differentiating priorities for conservation management and monitoring in different parts of a site, and for facilitating communication with those responsible for management of different parts of a site.
Monitoring	An intermittent (regular or irregular) series of observations in time, carried out to show the extent of compliance with a formulated standard or degree of deviation from an expected norm. In monitoring of sites designated for habitat and species conservation, the formulated standard is the quantified expression of favourable condition based on attributes.
Operational limits	The levels or values within which a factor is considered to be acceptable in terms of its influence on a feature. A factor may have both upper and lower operational limits, or only an upper limit or lower limit. For some factors an upper limit may be zero.
Performance indicators	The attributes and factors together with their associated target values (or ranges of values) which provide the standard against which information from monitoring and other sources is used to determine the degree to which the conservation objectives for a feature are being met.
Plan or project	**Project:** Any form of construction work, installation, development or other intervention in the environment, the carrying out or continuance of which is subject to a decision by any public body or statutory undertaker. **Plan**: a document prepared or adopted by a public body or statutory undertaker, intended to influence decisions on the carrying out of **projects.**

	Decisions on plans and projects which affect Natura 2000 and Ramsar sites are subject to specific legal and policy procedures.
Site integrity	This is defined in Welsh Government policy as the coherence of a site's ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it is designated.
Site Management Statement (SMS)	The document containing Natural Resources Wales' views about the management of a site issued as part of the legal notification of an SSSI under section 28(4) of the Wildlife and Countryside Act 1981, as substituted.
Special Feature	See feature.
Specified limits	The levels or values for an attribute which define the degree to which the attribute can fluctuate without creating cause for concern about the condition of the feature. The range within the limits corresponds to favourable, the range outside the limits corresponds to unfavourable. Attributes may have lower specified limits, upper specified limits, or both.
Unit	See management unit.
Vision Statement	The statement conveying an impression of the whole site in the state that is intended to be the product of its conservation management. A 'pen portrait' outlining the conditions that should prevail when all the conservation objectives are met. A description of the site as it would be when all the features are in favourable condition.

8. REFERENCES

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9. APPENDICES

These performance indicators describe the evidence, including in particular evidence to be obtained from monitoring of sites and features, that will be used to inform judgements about whether or not the conservation objectives (in section 4 of the Core management plans) are being met.

These performance indicators should NOT be used as a substitute for the conservation objectives, including in particular for the purposes of assessing plans and projects. The assessment of plans and projects should be made in view of the conservation objectives set out in section 4.

9.1 Appendix 1.1 - Performance indicators for Feature 1: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (EU habitat code 7210)

Performance indicators		**The calcareous fen with *Cladium mariscus* and species of the *Carex davallianae* at Crymlyn Bog SAC will be in favourable condition when:**
Extent	**Lower limit**	The extent and distribution of calcareous fen habitat should be at least that mapped as shown on Map 1 (Crymlyn Bog) & 2 (Pant-y-sais fen) (Bosanquet 2009 & Bosanquet 2005, revised in 2011). And Within the mapped areas of calcareous fen there are no stands of dense scrub > 10 x 10 m.
Quality	**Lower limit**	All of the following criteria should be met: • At least two areas of *'Cladium* dominated vegetation' should be retained on Crymlyn Bog. • There should be no areas of '*Cladium* dominated vegetation' within stands mapped as open, calcareous fen shown on Maps 3 & 4 (NVC communities S24 and '*Carex elata – Molinia* vegetation') (Bosanquet 2009 & Bosanquet 2005, revised 2011). • Vegetation meeting the definition of good condition calcareous fen should make up at least: 50% of each of plots B, D and E; 60% of plot A; and 70% of both plots C and F. Sample plot locations are shown on Map 5.

Site specific habitat definitions		
Calcareous fen		There are a number of communities that make up this Annex I habitat and they are variable in their composition. They include species-poor stands dominated by *Cladium mariscus*, sometimes with *Molinia caerulea* (S2 and *Cladio-Molinietum* vegetation), vegetation dominated by *Carex elata* and *Molinia* in association with other calcareous species (‘*Carex elata* – *Molinia* vegetation’) and more species-rich stands where *Lysimachia vulgaris*, *Juncus subnodulosus*, *Ranunculus lingua*, *Rumex hydrolapathum* or *Typha angustifolia* are frequent (NVC community S24)
Good quality calcareous fen		**Within a 2 m radius** of each sampling point: 1. *Carex elata* is present along with at least three of the following positive indicators: *Lythrum salicaria*, *Osmunda regalis*, *Lysimachia vulgaris*, *Potentilla palustris*, *Rumex hydrolapathum*, *Ranunculus lingua*, *Carex pseudocyperus*, *Eupatorium cannabinum*, *Typha angustifolia* or *Juncus subnodulosus* 2. The cover of *Phragmites australis* is <30% 3. The cover of *Cladium mariscus* is <20% 4. Scrub > 1m tall is absent 5. Non-natives are absent
Cladium dominated vegetation		Stands of vegetation > 20 x 20 m where *Cladium mariscus* forms > 50% cover.
Scrub		*Salix* sp., *Betula* sp., *Alnus glutinosa*, *Frangula alnus* or *Rhododendron* sp.
Stand of scrub		An area of continuous cover dominated by scrub species that is > 10 x 10 m.
Non-native		Any species that is not native to south Wales.

9.2 Appendix 1.2 - Performance indicators for Feature 2: Transition mires and quaking bogs (EU habitat code 7140)

Performance indicators		**To maintain the transition mire and quaking bogs habitat at Crymlyn Bog/Cors Crymlyn SAC in favourable condition where:**
Extent	**Upper limit**	Not set
	Lower limit	The extent and distribution should be at least that mapped by the Phase II team (Bosanquet 2009 & Bosanquet 2005, revised in 2011) Plus at least an additional 3 ha of transition mire and quaking

		bog habitat should be restored.
Quality	**Lower limit**	At least 60% of the vegetation within each of Plots 1 to 6 at Crymlyn Bog and Plots 1 and 2 at Pant-y-sais Fen (shown on Map 3) is referable to good condition transition mire and quaking bogs habitat.
Definitions		
Transition mire and quaking bogs		In the main bulk of the habitat some or all of the following species *Carex rostrata*, *Potentilla palustris*, *Equisetum fluviatile* or *Menyanthes trifoliata* are present, sharing dominance in varying combinations (NVC community S27). However, in some stands *Sphagna* species (particularly *squarrosum* and *subnitens* in stands referable to M5 and M21), *Narthecium ossifragum* (in M21) or *Erica tetralix* (in M15 'swampy variant') are more prevalent along side these four more typical poor fen species.
Good condition transition mire and quaking bogs		Within any 1m radius the following criteria are met: • **Either** Carex rostrata forms >30% cover **or** at least 4 of the following positives are present: Berula erecta, Carex echinata, C. limosa, C. rostrata, Equisetum fluviatile, Eriophorum angustifolium, E. gracile, Menyanthes trifoliata, Potentilla palustris, Sparganium erectum, Sphagnum squarrosum or S. subnitens with at least one of the four positives being a key transition mire and quaking bogs indicator species. • There are 50 or less green aerial shoots of Phragmites australis • The individual covers of each of Molinia caerulea, Carex paniculata and Carex elata are <20% • There are <10 green aerial shoots of Cladium mariscus • Scrub >1m tall is absent
Key transition mire and quaking bogs indicator species		*Carex limosa*, *C. rostrata*, *Equisetum fluviatile*, *Eriophorum gracile*, *Menyanthes trifoliata* and *Potentilla palustris*

Scrub	*Alnus glutinosa*, *Salix* sp., *Betula* sp., *Frangula* sp. or Rhododendron.

9.3 Appendix 1.3 - Performance indicators for Feature 3: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (EU habitat code 91E0)

Performance indicators		**To maintain the *alluvial forest* feature of Crymlyn Bog in favourable condition the following criteria should be met:**
Extent	**Upper limit**	No further expansion of the alluvial forest is desired. Additional spread will not affect the condition of the woodland feature but would impact on the condition of the fen habitats.
	Lower limit	Desired extent as shown in Map 1.
Quality	**Upper limit**	None set
	Lower limit	At least 75% of the alluvial forest will be in good condition.
Definitions		
Alluvial forest		Woodland with a canopy and shrub layer dominated by *Salix* sp., *Betula pubescens* or *Alnus glutinosa*, in any combination. *Frangula alnus* should be frequent in the shrub layer. The groundflora is typically dominated by *Carex paniculata*, although in slightly drier areas *Molinia caerulea* may be present. Other species that occur in the ground flora include *Lysimachia vulgaris*, *Osmunda regalis*, *Lythrum salicaria*, *Solanum dolcamara*, *Iris pseudacorus*, *Scutellaria galericulata* and *Sparganium erectum.*
Good condition alluvial forest		Woodland where, in a 15m radius: • At least 95% of the canopy is made up of *Salix* sp., *Alnus glutinosa* or *Betula pubescens*, in any combination • Viable regeneration of a typical alluvial forest species is at least present • At least one over mature tree is present And where, in a 5m radius: • Carex paniculata is present along with at least 2 of the following: Lysimachia vulgaris, Osmunda regalis, Lythrum salicaria, Solanum dolcamara, Iris pseudacorus, Scutellaria galericulata or Sparganium erectum • and Urtica dioica and Pteridium aquilinum are absent
Viable regeneration of a typical alluvial forest		Re-growth from a fallen stem, base of a tree or a sapling that is >1m in height yet does not reach the canopy of either *Salix* sp., *Betula pubescens* or *Alnus glutinosa*
Over mature tree		A tree with a trunk that is >20cm in diameter at chest height which either has at least one dead limb over 10cm in diameter or a dead crown or has fallen or is slumping.

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