CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES

CORE MANAGEMENT PLAN
INCLUDING CONSERVATION OBJECTIVES

FOR

Cwm Cadlan Site Special Area of Conservation (SAC)

Version: 3

Date: 1st March 2008

Approved by: David Mitchell

More detailed maps of management units can be provided on request.
A Welsh version of all or part of this document can be made available on request.

Cyngor Cefn Gwlad Cymru
Countryside Council for Wales

NATURA 2000

Ramsar

Llywodraeth Cynulliad Cymru
Welsh Assembly Government
CORFF NODDEDIG | SPONSORED BODY

CONTENTS

PREFACE

This document provides the main elements of CCW's management plan for the site named. It sets out what needs to be achieved on the site, the results of monitoring and advice on the action required. This document is made available through CCW's 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 web site.

One of the key functions of this document is to provide CCW's statement of the Conservation Objectives for the relevant Natura 2000 site. This is required to implement the Conservation (Natural Habitats, &c.) Regulations 1994, as amended (Section 4). As a matter of Welsh Assembly 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.

Around half of the site is covered by marshy grassland. The majority of this is species-rich fen-meadow with a range of typical plants, including purple moor-grass, sharp-flowered rush, quaking-grass, flea sedge, tawny sedge, meadow thistle, devil's-bit scabious, marsh valerian, bog pimpernel and orchids. The remainder of the marshy grassland has a high cover of rushes, purple moor-grass, or tall herbs, such as meadowsweet. Plants indicating disturbance or nutrient enrichment, such as docks, nettles, creeping buttercup and white clover are uncommon or present at low cover, trees and shrubs are no more than scattered, and where bare ground occurs, it is present only in small patches, such as occasional hoof prints. Purple moor-grass and rushes are not overwhelmingly dominant within the fen-meadow areas.

About a sixth of the site supports alkaline fen associated with springs and flushes, with a high cover of small sedges, such as carnation sedge, tawny sedge and flea sedges and liverworts and mosses, including greasewort, intermediate hook-moss, yellow starry feather-moss and claw-leaved hook-moss, with a variety of other typical plants including butterwort, marsh arrowgrass, bogbean and marsh lousewort. This habitat is particularly important for populations of many uncommon plant species, including broad-leaved cottongrass, dioecious sedge, long-stalked yellow-sedge, knotted pearlwort and marsh helleborine. Plants indicating disturbance or nutrient enrichment, such as creeping buttercup and white clover are uncommon and there is minimal build-up of dead vegetation.

Scattered across the site, on better-drained soils, are small stands of unimproved neutral grassland with grasses such as common bent, red fescue, crested dog's-tail and sweet vernal-grass, and a variety of typical herbs including common bird's-foot-trefoil, common knapweed, red clover, rough hawkbit, lady's-mantle and great burnet. The majority of this grassland supports plants adapted to mildly acid or leached soils, including tormentil, devil's-bit scabious and heath-grass, but plants more typical of alkaline soils, such as salad burnet and lady's-mantle species, are locally prominent in places. Plants indicating nutrient enrichment, such as perennial rye-grass) are rare. Scrub and bracken are absent.

Other habitats present include acid grassland, dominated by bent grasses, sheep's-fescue and heath bedstraw, acidic flushes with frequent soft-rush, small sedges and bog-moss, and wet heath with deer-grass, cross-leaved heath, heather and bilberry. The wet heath mainly occurs at the head of the valley.

2. SITE DESCRIPTION

2.1 Area and Designations Covered by this Plan

Grid reference: SN961098

Unitary authorities: Rhondda Cynon Taf
Brecon Beacons National Park

Area (hectares): 83.9

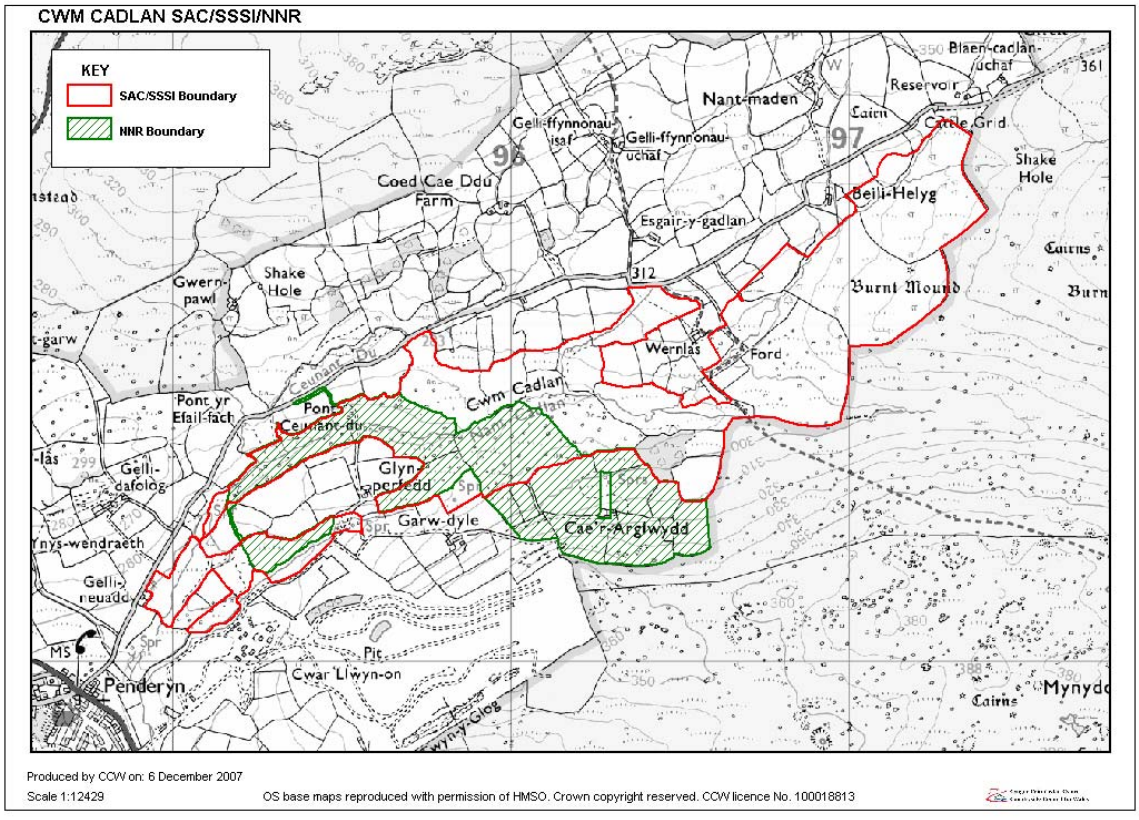
Designations covered: Cwm Cadlan SAC
Cwm Cadlan SSSI

The boundaries of Cwm Cadlan SAC and Cwm Cadlan SSSI are coincident and this plan covers all of the SAC and SSSI features (currently mainly covers SAC features and the Marshy grassland SSSI feature - the remaining SSSI features will be included at a later date). Part of the site is NNR. The NNR extends beyond the SSSI/SAC boundary (see Map 1) – this additional land is not covered by this plan.

Detailed maps of the designated sites are available through CCW's web site:

http://www.ccw.gov.uk/interactive-maps/protected-areas-map.aspx

Map 1 (below) shows the coverage of this document:



2.2 Outline Description

Cwm Cadlan is situated approximately 1km north-east of the village of Penderyn and about 4km north of Hirwaun, near Aberdare. The site was notified in 2000 and incorporates the former Cwm Cadlan Grasslands SSSI and Glyn-Perfedd Meadow SSSI. The SAC interests are:

- **'*Molinia* meadows on calcareous, peaty or clayey silt-laden soils (*Molinion caeruleae*)'** - Cwm Cadlan has the largest recorded example of 'Molinia meadows' (or fen-meadow) in Wales. The typical form of purple moor-grass–meadow thistle (*Molinia caerulea- Cirsium dissectum)* fen-meadow (NVC type M24b) is extensively developed, and there are clearly displayed transitions to a range of associated habitats, including base-rich flush and neutral grassland.

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

Both these habitats are considered to be 'best areas in the United Kingdom'. Part of the site is owned by CCW and was declared NNR in 2006.

The grassland communities, which constitute the SAC features are scattered across the site and occur in most of the management units. Some of the communities present, namely M10, M24 and base-rich sedge community are very close in their floristics, and it is possible that the latter vegetation is derived from one or both of M10 and M24 through some form of agricultural modification (possibly drainage or heavy grazing in the past). It is also possible that some of the fen-meadow is derived from alkaline fen through past drainage.

Additional SSSI features include:

- Marshy Grassland – this includes all the SAC fen-meadow marshy grassland and other forms of marshy grassland not included in the SAC habitat description.
- Unimproved neutral grassland (NVC MG5).
- Population of globeflower *Trollius europaeus*

The stands of neutral and acidic grassland, which are normally regarded as dry grassland types, generally have constant purple moor-grass, and often grade into wet grassland types. Similarly, at the head of the valley, marshy grassland grades into heathland, thus the site provides fine examples of transition zones between communities.

The globeflower population is possibly the largest in south Wales. Globeflower is found scattered across the site, mainly in stands on fen-meadow, alkaline fen and neutral grassland.

2.3 Outline of Past and Current Management

These fields were traditionally managed as pasture and some as hay-meadow but there has long been a liver fluke problem in this area and there have been past attempts to drain many fields within the SAC - there is an extensive network of drainage ditches within the site. Some of these are slowly infilling, but some vegetation is likely to have been permanently modified by these drains.

An extensive system of deep ditches was dug over most of the wet pasture in the National Nature Reserve (Unit 1 - see map below) in 1980/81 under a farm improvement scheme. Over the past 50 years much of the land has been grazed by a mixture of cattle and sheep, although between 1997 and 2003, grazing was mainly by sheep. Under CCW's management, the land has been returned to mainly cattle grazing. The south western-most enclosure (formerly Glyn-perfydd Meadow SSSI) was in the past cut, on average, every three years using horses, with the last cut in 1976. CCW intend to resume the hay-management in this field in an attempt to encourage the populations of some plant species, which appear to have become scarcer over the past 20 years.

The south western-most part of the site (Unit 2) is mainly wet pasture and is currently (2007) grazed by cattle and sheep, with a small area cut for hay.

The small area near the quarry (Unit 3) currently (2007) receives little grazing, with scrub-encroachment a problem. Some scrub and trees were removed by CCW c.2003. The field was part of a larger enclosure that existed before quarry tipping and the re-routing of a farm access track. These changes appeared to have occurred in 1980 or thereabout, being completed by 1983 when a fence was erected against the track.

Unit 4 (see below) receives only occasional grazing by sheep and ponies, currently (2007) some of the vegetation is rather rank. Part of the field was burned c. 2003.

A hay crop used to be taken in Unit 5 (see below) but this has not occurred for many years. Currently (2007), this field is managed with an adjoining improved hay field (outside the SSSI), therefore, the SSSI field tends to be grazed in autumn, winter and spring and rested in the summer months. The notified field is not treated with fertilizer, although some is applied to the adjoining field. Winter stock-feeding occurs in the adjoining field and this may be affecting the SSSI habitat. A spring in the field appears to be the main water supply to the farm house.

The central part of the site (Units 6 & 7) to these east of the NNR is currently (2007) under sympathetic management but, in the past, lime and basic slag were applied to the eastern-most enclosures (last in c.1985). The hay meadows, including the field supporting mainly dry grassland in the south-east of the site, were ploughed during the 1939-45 War. The drainage ditches were dug by POWs around this time and were last cleaned out c. 1985. The hay meadows tend to be cut towards the end of July. Some winter stock feeding occurs on drier ground within the SSSI.

Unit 8 was planted with alder trees by the Brecon Beacons National Park Authority c.1988. Some of these trees were removed by CCW in 2003 and eventually all will be removed.

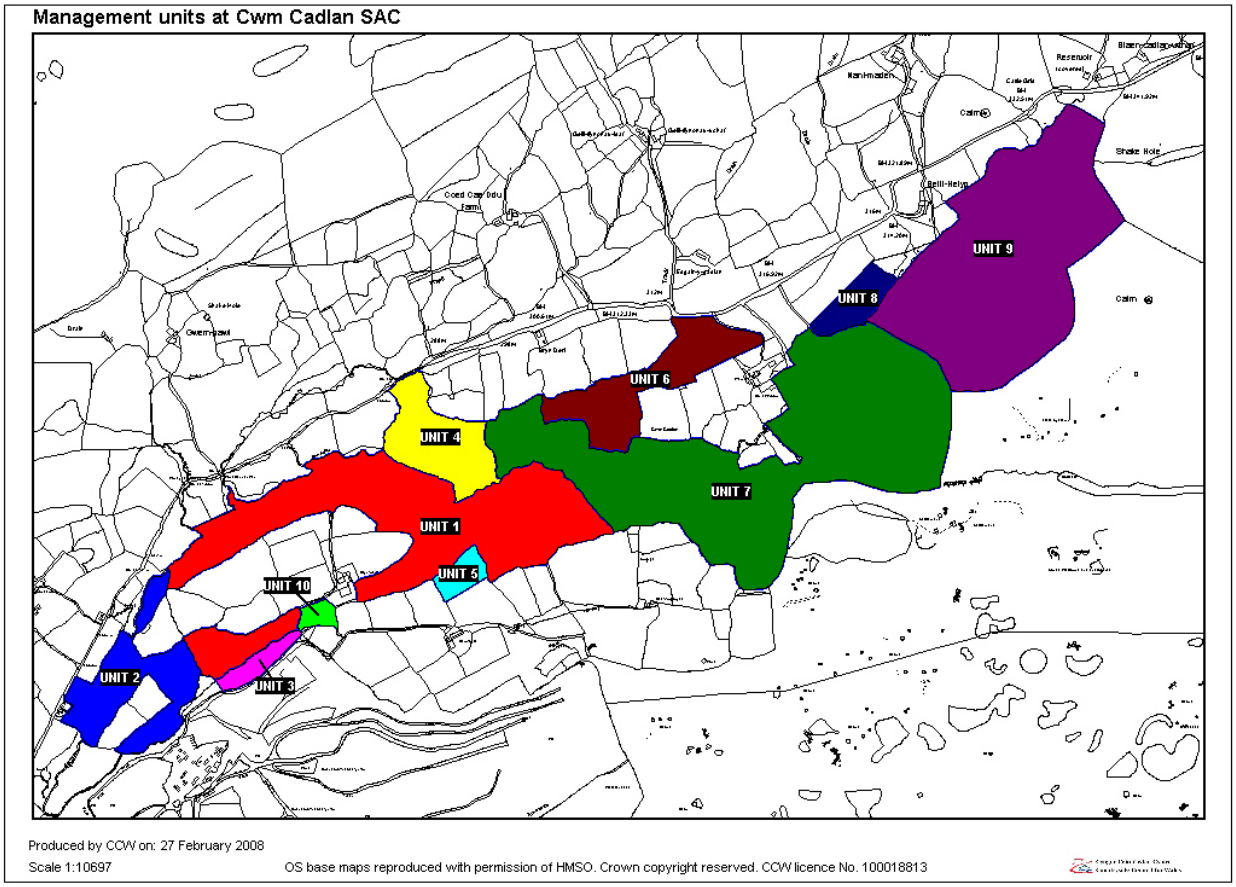
The eastern-most fields (Unit 9) are grazed throughout the summer mainly by cattle, with varying numbers of sheep at periods throughout the grazing season. There appears to be little or no grazing in winter. According to the owner, the wet pasture used to consist of large tussocks of purple moor-grass, but grazing by cattle over many years has reduced the tussocks.

Unit 10 is a small area of wet pasture land crossed by an access track and with a pool that provides water for farm stock.

2.4 Management Units

The plan area has been divided into 10 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 largely been based on tenure and management. A brief overview of past and current management on some of these units is given in the previous section.

Map 2 (below) illustrates the management units referred to in this plan:



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

Unit number	SAC	SSSI	NNR/CCW owned
Cwm Cadlan SSSI			
1	✔	✔	✔
2	✔	✔	
3	✔	✔	
4	✔	✔	
5	✔	✔	
6	✔	✔	
7	✔	✔	
8	✔	✔	
9	✔	✔	
10	✔	✔	

3. THE SPECIAL FEATURES

3.1 Confirmation of Special 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. *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	EU Habitat code: 6410. Consists of marshy grassland, corresponding to National Vegetation Classification (NVC) type M24 Generally referred to as 'fen-meadow'' throughout this document. Various forms (sub-communities) of M24 are present, ranging from vegetation similar to alkaline fen through grassy stands to more heathy vegetation. The fen-meadow and alkaline fen in particular tend to inter-grade. It is also possible that some of the fen-meadow is derived from alkaline fen through past drainage, therefore the two habitats are closely linked.	1
2. **Alkaline Fen**	EU Habitat code: 7230. Consists of base-rich flush, generally corresponding to National Vegetation Classification (NVC) type M10. As the alkaline fen is the most fragile of the two Annex 1 habitats, often occurring as wetter, or flushed, areas within stands of fen-meadow, and as it is the habitat that is most likely to respond most rapidly to lowering of the water table, it has tended to be the habitat on which most monitoring has focused. Habitat management is generally the same as for the fen-meadow.	2
SPA features		
Not applicable		
Ramsar features		
Not applicable		

SSSI features		
3. Marshy Grassland (non-SAC), with associated wet heath and acidic flushes.	A variety of wet grassland types including NVC M23, M25 and M27. The SSSI feature is essentially the SAC and non-SAC marshy grassland and therefore these are treated together as far as is possible throughout this document.	3 (but treated with 1 above)
4. Unimproved neutral grassland.	Corresponding to NVC type MG5. Most of this is present as small areas on better-drained ground within fields of mainly wet pasture.	4 (to be added later)
5. Globeflower *Trollius europaeus*.	Probably the largest population of this declining plant in south Wales, occurring mainly in stands of fen-meadow, alkaline fen and neutral grassland.	5 (to be added later)

3.2 Special Features and Management Units

This section sets out the relationship between the special 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 special 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' 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.

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 special features and management units identified in this plan:

Cwm Cadlan	**Management unit**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
SAC	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
SSSI	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
NNR/CCW owned	✔									
SAC features										
1. Fen-meadow	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**	**KH**	**x**
2. Alkaline fen	**KH**	**KH**	**KH**	**KH**	**X**	**KH**	**KH**	**KH**	**KH**	**KH**
SSSI features										
3. Marshy Grassland (non-SAC)	**Sym**	**Sym**	**X**	**Sym**	**Sym**	**Sym**	**Sym**	**X**	**Sym**	**Sym**
4. Dry Neutral Grassland	**Sym**	**Sym**	**X**	**X**	**KH**	**X**	**Sym**	**X**	**Sym**	**X**
5. Globeflower	**KS**	**X**	**X**	**X**	**KS**	**KS**	**KS**	**KS**	**?**	**X**

In general, the alkaline fen and fen-meadow are considered to be the main focus of management in all the units. Globeflower (the key species on the site) is strongly associated with these habitats and also a field (unit 5) largely comprising a damp form of neutral grassland. Other (non-SAC) forms of marshy grassland, together with neutral grassland and a variety of other habitats types occur as a patchwork across the site and management of the SAC habitats is generally compatible.

Globeflower is declining nationally and the population at Cwm Cadlan also seems to have declined since it was notified in 2000. Management in the units where it occurs should aim to maintain or increase the population. Parts of units 5 & 7 are managed for hay and these appear to be the main areas where the species flowers regularly. Until relatively recently, one of the fields in unit 1 supported a reasonable population of globeflower, but this seems to have declined rapidly – formerly this field was periodically cut for hay and the intention is to return to this management regime. Most of the neutral grassland occurs as small areas associated with damper pasture such as fen-meadow, where it occupies areas with more freely draining soils.

4. CONSERVATION OBJECTIVES

Background to Conservation Objectives:

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

Conservation objectives are required by the 1992 'Habitats' Directive (92/43/EEC). The aim of the Habitats Directives is the maintenance, or where appropriate the restoration of the 'favourable conservation status' of habitats and species features for which SACs and SPAs are designated (see Box 1).

In the broadest terms, 'favourable conservation status' means a feature is in satisfactory condition and all the things needed to keep it that way are in place for the foreseeable future. CCW considers that the concept of favourable conservation status provides a practical and legally robust basis for conservation objectives for Natura 2000 and Ramsar sites.

Box 1
Favourable conservation status 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."

Achieving these objectives requires appropriate management and the control of factors that may cause deterioration of habitats or significant disturbance to species.

As well as the overall function of communication, Conservation objectives have a number of specific roles:

- Conservation planning and management.

  The conservation objectives guide management of sites, to maintain or restore the habitats and species in favourable condition.

- Assessing plans and projects.

Article 6(3) of the 'Habitats' Directive requires appropriate assessment of proposed plans and projects against 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. This role for testing plans and projects also applies to the review of existing decisions and consents.

- Monitoring and reporting.

  The conservation objectives provide the basis for assessing the condition of a feature and the status of factors that affect it. CCW uses 'performance indicators' within the conservation objectives, as the basis for monitoring and reporting. Performance indicators are selected to provide useful information about the condition of a feature and the factors that affect it.

The conservation objectives in this document reflect CCW's 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 CCW in light of new knowledge.

b. Format of the conservation objectives

There is one conservation objective for each feature listed in part 3. Each conservation objective is a composite statement representing a site-specific description of what is considered to be the favourable conservation status of the feature. These statements apply to a whole feature as it occurs within the whole plan area, although section 3.2 sets out their relevance to individual management units.

Each conservation objective consists of the following two elements:

1. Vision for the feature
2. Performance indicators

As a result of the general practice developed and agreed within the UK Conservation Agencies, conservation objectives include performance indicators, the selection of which should be informed by JNCC guidance on Common Standards Monitoring[1].

There is a critical need for clarity over the role of performance indicators within the conservation objectives. **A conservation objective, because it includes the vision for the feature, has meaning and substance independently of the performance indicators, and is more than the sum of the performance indicators**. The performance indicators are simply what make the conservation objectives measurable, and are thus part of, not a substitute for, the conservation objectives. Any feature attribute identified in the performance indicators should be represented in the vision for the feature, but not all elements of the vision for the feature will necessarily have corresponding performance indicators.

As well as describing the aspirations for the condition of the feature, the Vision section of each conservation objective contains a statement that the factors necessary to maintain those desired conditions are under control. Subject to technical, practical and resource constraints, factors which have an important influence on the condition of the feature are identified in the performance indicators.

[1] Web link: http://www.jncc.gov.uk/page-2199

4.1 Conservation Objective for Features 1 & 3:
***Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (EU Habitat Code: 6410) - this also encompasses Feature 3: other non-SAC marshy grassland habitat**

Vision for feature 1

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

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

The rationale behind the selection and identification of performance indicators for fen-meadow and other marshy grassland and a map showing the main fen-meadow areas is given in Annex 1.

Performance indicators for Feature 1 (& 3)

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Extent and distribution of marshy grassland	Extent is based on ground surveys (1991/1998 & 1999) and aerial photographs. For detailed rationale, see Annex of this plan.	*Upper limit*: N/A, constrained by hydrology. *Lower limit*: 42 ha, of which 26 ha is fen-meadow (these figures represent the extent indicated by the most recent vegetation surveys). Located in units 1-9.
A2. Habitat quality	For the purposes of assessment against these criteria the main fen-meadow areas have been defined for all site units (see Annex for rationale and maps).	*Upper limit*: 100% of the vegetation meets the criteria listed below. *Lower limits*: In each of the fen-meadow areas shown on the map (see Annex), at least 75% of the vegetation meets the definition listed below for fen-meadow

		AND: 75% of the remaining marshy grassland meets the definition listed below for 'marshy grassland'.

Definition of fen-meadow:
In any 0.5m radius, purple moor-grass **and** at least 4 out of the following are present: quaking grass; tawny sedge; flea sedge; bog pimpernel; meadow thistle; devil's-bit scabious; marsh valerian.

and together the following species do not exceed 10%: creeping buttercup; common mouse-ear; crested dog's-tail; Yorkshire fog; creeping bent; ribwort plantain and white clover;

and the cover of tall rushes does not exceed 33%;

and cover of purple moor-grass does not exceed 66%;

and the cover of vegetation litter does not exceed 25%;

and the cover of bare ground does not exceed 5%;

and scrub/woody species are largely absent.

Definition marshy grassland:

As fen-meadow is mixed in with these other marshy grassland types, it is expected that focussing monitoring on the fen-meadow component should reflect quality of the other marshy grassland types:

The various marshy grassland stands generally reflect the NVC/vegetation types mapped during the vegetation surveys (see Annex). The marshy grassland is essentially pasture dominated by a mixture of purple moor-grass and rush spp. in varying proportions, with at least one of the following species present: common marsh bedstraw, fen bedstraw, greater bird's-foot trefoil, quaking grass, carnation sedge, flea sedge, tawny sedge, meadow thistle, devil's-bit scabious, marsh valerian……. (NB This will need further work to better define the types present).

and in any 1m radius, the vegetation height is between 5 and 40 cm tall (excluding tall rushes and flower heads);

and the cover of vegetation litter does not exceed 25%;

and the cover of bare ground does not exceed 5%;

and scrub/woody species are largely absent.

Performance indicators for factors affecting the feature

Factor	***Factor rationale and other comments***	***Operational Limits***
F1. Livestock grazing	The marshy grassland has been maintained through traditional farming practices. Without an appropriate grazing regime, the grassland would become rank and eventually turn to scrub and woodland. Light grazing by mainly cattle and ponies between April and November each year is essential in maintaining the marshy grassland and fen-meadow communities.	*Lower limits:* The wetland areas will be subject to light summer grazing by cattle and/or ponies at least 4 in every 5 years. *Upper limits:* No significant grazing outside the growing season or heavy grazing at any time during the summer.

		Light summer grazing is defined as - cattle and/or ponies at a rate of 0.4 LSU/ha/year for the period April to October. Heavy grazing is defined as greater than 1 LSU/ha/year (1 LSU is equivalent to a cow/horse, plus calf/foal).
F2. Drainage	The marshy grassland communities are strongly influenced by the quantity and base status of the groundwater. Reductions in the quality and quantity of the water in the springs and watercourses feeding the site may lead to a loss of marshy grassland or changes in species composition. Conversely, reduced/impeded drainage may lead to ground-water stagnation and a different change in species composition, e.g. increased abundance of rushes. Infilling some of the many ditches at the site is likely to lead to re-wetting of some marshy grassland. Dewatering of the adjacent quarry has potential to affect the hydrology of the site.	*Upper limit:* No new drainage ditches to be installed within the open meadow areas of the site. NB. It is not possible to set more specific pending a fuller understanding of current situation and habitat requirements. Rewetting could lead to a switch from marshy grassland to alkaline fen, which should be acceptable as this would be the more natural (and scarcer) community. Monitoring of the quarry dewatering should give an early indication that the dewatering is affecting the site.
F3. Adjacent land use	Management of adjoining land has potential to affect the nutrient status of soils (some marshy grassland is at the base of slopes with the rest of the field managed as hay-meadow).	No limits set. Monitoring vegetation should indicate any changes. Much adjoining land is under sympathetic management, and so the risk of any adverse impact is low.
F.4 Scrub encroachment	Open wetland areas are prone to invasion by alder and willow scrub. Optimum grazing levels should help control spread of scrub, but occasionally active scrub eradication is necessary. Scrub and woodland is also a natural component of such wetland complexes and enhances the site both biologically and visually, therefore older well-established stands will be retained.	The maximum area of mature dense wet woodland will be 6.5ha (extent in 1999). Scattered scrub will be tolerated within the following limits: *Lower limits:* Scattered scrub present in defined locations. *Upper limits:* No scrub covering area greater than 5m x 5m within stands mapped as marshy grassland (see Annex).
F.5. Atmospheric pollution.	The alkaline fen may be the more sensitive vegetation type present	see 4.2 below

4.2 Conservation Objective for Feature 2:
Alkaline Fen (EU Habitat Code: 7230)

Vision for feature 2

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

- Alkaline Fen will occupy about 11 ha or more.
- The remainder of the site will mainly consist of other semi-natural habitat including fen-meadow.
- Typical alkaline fen plants will be common.
- Plants indicating agricultural modification or alteration of hydrology and drying of soils will be absent or present only at low cover.
- Although rushes are frequent, the more bulky species will not exceed 33% cover.
- Bare ground will generally not exceed 5% cover and vegetation litter 10 %.
- Scrub species will be largely absent from the alkaline fen.
- At selected springheads, water should flow in all but the most severe drought conditions.
- All factors affecting the achievement of these conditions are under control.

Performance indicators for Feature 2

The performance indicators are part of the conservation objective, not a substitute for it. Assessment of plans and projects must be based on the entire conservation objective, not just the performance indicators.

Performance indicators for feature condition		
Attribute	***Attribute rationale and other comments***	***Specified limits***
A1. Extent and distribution	Extent is based on ground surveys and 2006 aerial photographs. For detailed rationale, see Annex of this plan.	*Upper limit*: N/A, constrained by hydrology. *Lower limit*: 11 ha. Located in Units 1-4, 6-9 (NB - some of the quarry monitoring is carried out in small stands in Unit 1 L7 (see Annex) - here the alkaline fen occurs mainly as small runnels too small to map individually)
A2. Habitat quality	For the purposes of assessment against these criteria the main areas of alkaline fen have been identified (see maps in Annex of this plan). For detailed rationale see Annex.	*Upper limit*: 100% of the vegetation meets the criteria listed below. *Lower limits*: In each of the main areas of fen at least 75% of the vegetation meets the definition listed below.

Definition of alkaline fen:
In any 0.5m radius, the vegetation height is between 5 and 20 cm tall;

And at least 5 out of the following are present: tawny sedge; flea sedge; dioecious sedge; intermediate hook-moss *Drepanocladus cossonii*; yellow starry feather-moss *Campylium stellatum*; curled hook-moss *Palustriella commutata*; *m*arsh bryum *Bryum pseudotriquetrum*; maidenhair pocket-moss *Fissidens adianthoides*; bog pimpernel; marsh lousewort; common butterwort; quaking grass; water mint; marsh pennywort; marsh valerian and marsh arrowgrass;

and, the cover of 'brown' mosses (see above) is over 10%;

and, the cover of creeping buttercup, lesser spearwort and white clover does not exceed 10%.

and the cover of tall rushes and purple moor-grass does not exceed 33%;

and there is no discernable cover of vegetation litter - less than 10%;

and the cover of bare ground does not exceed 5%;

and scrub/woody species are largely absent.

Performance indicators for factors affecting the feature		
Factor	***Factor rationale and other comments***	***Operational Limits***
F1. Grazing	The alkaline fen has been maintained through traditional farming practices. Without an appropriate grazing regime, the sward would become rank and eventually turn to scrub and woodland. Light grazing by mainly cattle and ponies between April and November each year is essential in maintaining the habitat.	See 4.1 above
F2. Drainage	The alkaline fen communities are strongly influenced by the quantity and base status of the groundwater. Reductions in the quality and quantity of the water in the springs and watercourses feeding the site may lead to a loss of alkaline fen or changes in species composition. Conversely, reduced/impeded drainage may lead to ground-water stagnation and a different change in species composition, e.g. increased abundance of rushes. Infilling some of the many ditches at the site is likely to lead to re-wetting of some former alkaline fen areas. Dewatering of the adjacent quarry has potential to affect the hydrology of the site.	See 4.1 above.
F3. Adjacent land use	See 4.1 above.	See 4.1 above.

F.4 Scrub encroachment	See 4.1 above.	See 4.1 above.
F.5. Atmospheric pollution.	Atmospheric deposition at this site has the potential to harm the alkaline fen feature. Dust deposition is likely to be high given the close proximity of Penderyn Quarry, and the absence of a published critical load for this pollutant against this habitat should be taken as indicating lack of impact. Atmospheric N deposition in this area is estimated at 21.8 kg N/ha/yr which lies above the lower critical load limit for this pollutant (15-35 kg N / ha / yr). Its likely that the critical load for N for M10 forms of alkaline fen is towards the lower end of this range.	Lower limits: None set – very low dust and N deposition regimes may be beneficial. Upper limits: Suggest 15 kg N / ha / year for N. None yet defined for dust – further advice needed.

4.3 Conservation Objective for Feature 3: Non-SAC marshy grassland

See under Feature 1.

5. ASSESSMENT OF CONSERVATION STATUS AND MANAGEMENT REQUIREMENTS

This part of the document provides:

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

5.1 Conservation Status and Management Requirements of Features 1 & 3: *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (EU Habitat Code: 6410) - this also encompasses Feature 3: other non-SAC marshy grassland habitat

Conservation Status of Feature 1

The conservation status of these features within the site is considered to be **Unfavourable** (2007).

Assessment carried out in 2004 indicated that the condition of both was: **Unfavourable, no change.** White clover, at a low cover and frequency, may be a natural component of the sward. In 2004, the cover and frequency of white clover was a little on the high side in some areas, which detracts somewhat from the quality of the stands of fen-meadow. Part of the site, until purchased by CCW, had been quite heavily grazed by sheep - sometimes throughout the year. Current management by CCW (Unit 1) has returned the grazing to a more cattle-based state and other areas are now in favourable management (units 2, 6 & 7) that should ensure that the quality of the more modified swards recover. Unit 4 is only occasionally grazed and this has resulted in some of the vegetation being rather tussocky. Overall the factors affecting the feature appear to be largely under control, apart from continuing uncertainty over the impacts of drainage and quarrying and the need for more a suitable more grazing in some parts of the site.

Common standards monitoring reports for 2004 are presented as an Appendix 3. Detailed monitoring reports considering possible changes to vegetation and hydrology as a result of quarry dewatering are also held by CCW.

Management Requirements of Feature 1

Grazing

The fen-meadow is mixed in with other marshy grassland and mire types, but each management unit is subjected to one prescription (excepting those areas that are mown for hay). Management should focus on maintaining or restoring the condition of the fen-meadow and therefore the condition of the remaining areas of marshy grassland will be of secondary importance, but it is likely that if management is suitable for the fen-meadow it should also benefit most other forms of marshy grassland

Maintaining or restoring the marshy grassland should be attainable through the implementation of the present grazing regime and scrub control, with cattle producing the best sward structure. The site has been managed under a relatively light grazing regime in recent years. The present management is considered to be generally acceptable for recovery of modified stands in the long term, and site management will be reviewed periodically. Stocking rates should be guided by the values listed in the Lowland Grassland Handbook.

Some grazing earlier in the year and mowing to remove the ranker vegetation should help to encourage grazing in those areas of ranker grassland, control scrub development and reduce the build-up of any litter. Grazing levels need monitoring and management agreements adjusted if required. Monitoring structural elements (bare ground, litter) will identify any problems with the intensity of grazing management. Any excessive grazing pressure would be expected to increase the frequency and

cover of bare ground and agricultural species. These are all covered by attributes in the feature objectives.

Stocking levels are dependant on the growth of vegetation, which may vary from year to year, but the agreed management policy allows for this. Cessation of cattle farming could affect the vegetation, as sheep are more selective grazers.

Control of nutrient inputs

There has been concern about fertilizer run-off from some adjacent improved fields causing localised nutrient enrichment. Any effects from agricultural run-off from adjacent fields will be identified through monitoring the quality of the vegetation under the feature objectives, looking for increases in the cover of perennial ryegrass and white clover and other indicator plants and reductions in the frequency of sedges and other plants of value. Management agreements on adjacent land will partly address this problem.

Scrub encroachment

Scrub developing within the areas of marshy grassland will on the whole be controlled, although the presence of a few scattered scrub and trees will benefit invertebrates and birds. The marshy grassland areas could be increased beyond the current extent by cutting back the scrub edges and is something that needs to be kept under review, should opportunities arise.

The established stands of alder and willow woodland should not be viewed unfavourably as they lend structure to the site and also provides habitat for invertebrates and birds, with the ground vegetation also containing plant species of note (e.g. meadow saxifrage) and the trees themselves supporting good moss and liverwort communities and uncommon lichens. In addition, some stands afford a refuge for colonies of globeflower. However, woodland and scrub should not encroach further into the unimproved grassland, in particular the communities of highest conservation value (alkaline fen, fen-meadow and neutral grassland).

Drainage

The networks of ditches throughout the SSSI have obviously affected the hydrology and vegetation. These ditches should be allowed to infill naturally (as some have already). Where possible, active restoration of the hydrology should be considered, although this may be difficult in some areas as there would be conflict with the monitoring associated with the quarrying activities. Should de-watering of Penderyn quarry affect the hydrology of the SSSI and/or if the recent run of very dry summers in which watercourses have dried-up continue, then floristic changes are likely to occur.

Other marshy grassland

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

5.2 Conservation Status and Management Requirements of Feature 2: Alkaline Fen (EU Habitat Code: 7230)

Conservation Status of Feature 2

The conservation status of this feature within the site is considered to be **Unfavourable** (2007).

Assessment carried out in 2004 indicated that feature condition was: **Unfavourable, recovering**. Some alkaline fen has been modified by past attempts at drainage resulting in a few stands, which are rather dry and somewhat intermediate to fen-meadow. It is also possible that some stands of fen-meadow were derived from alkaline fen. Part of the site, until purchased by CCW, had been quite heavily grazed by sheep - sometimes throughout the year. Current management by CCW (Unit 1) has returned the grazing there to a more cattle-based regime and sympathetic management elsewhere (units 2, 6 & 7) should ensure that the quality stands are maintained. Some areas are slightly under-grazed or partially affected by past tree planting. Removal of some planted trees has been undertaken and the remaining trees should be removed with the next few years (Unit 8). Under-grazing for a year or two is probably not detrimental to the quality of the fen, but is something that needs addressing (Unit 4). Overall, the factors affecting the feature are still not quite under control, although the habitat is recovering, hence the unfavourable status assessment for 2007.

Management Requirements of Feature 2

Grazing

These areas will be subject to the same grazing regime as the marshy grassland (see 5.1 above) because they occur together in the same management units. Therefore it is considered inappropriate to specify specific grazing regimes for this habitat. Structural attributes will help to ensure that this habitat is grazed appropriately, so long as this is compatible with achieving the required condition for the marshy grassland. As the alkaline fen is some of the wettest habitat at the site, damage by over-grazing, e.g. excessive poaching, is likely to be readily observed.

Scrub encroachment

Scrub can be monitored by a simple inspection of the site; in most cases the limits should not be exceeded before those limits for other attributes. This and compliance with the management agreement can be determined while monitoring other attributes. See also 5.1 above.

Drainage

See 5.1 above.

Atmospheric deposition
N deposition emanates from point and diffuse sources. Reductions in N emissions from the latter require ongoing policy reform and advice at national (Wales and UK) levels. Point source impacts need to be evaluated and minimised through RoC and the planning system. Dust deposition from the quarry should be minimised by standard good working practice. Dust deposition should be monitored by the quarry, and appropriate thresholds sought from the literature. Comparison of the two may reveal the need for modifications to working practice.

6. ACTION PLAN: SUMMARY

This section takes the management requirements outlined in Section 5 a stage further, assessing the specific management actions required on each management unit. This information is a summary of that held in CCW's Actions Database for sites, and the database will be used by CCW and partner organisations to plan future work to meet the Wales Environment Strategy targets for sites.

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
1	000271	Unit 1	On parts of the site, including much of the land owned by CCW, vegetation has been modified by the installation of drainage ditches in the past. In the ideal world at least some of the ditches could be infilled to restore the natural hydrology of the site, but due to the conditions attached to the planning permission for quarrying and de-watering at the nearby quarry, this infilling ditches is not a simple option as it could affect the hydrological and vegetation monitoring that has been put in place by the quarry company, which is intended to pick up possible effects on the European habitats due to the quarrying. CCW, EA, Hanson have regular meetings to discuss the results of the monitoring associated with the quarrying.	Yes
2	000272	Unit 2	This management Unit is in Tir Gofal	No
3	000273	Unit 3	This field is Included in the Quarry monitoring regime. This management unit is currently undergrazed.	Yes
4	000274	Unit 4	This field is rather rank and undergrazed.	Yes
5	000275	Unit 5	Stock-feeding on adjoining field outside the SSSI appears to be enriching the sward on the field within the SSSI.	Yes
6	000276	Unit 6	land is in Tir Gofal	No
7	000277	Unit 7	Land is under S15 agreement	No
8	000278	Unit 8		Yes
9	000280	Unit 9	Land not visited for some time, but observations from road indicate that the habitats are still being managed in a favourable manner mainly by cattle.	No
10	000281	Unit 10	Small area of land in separate ownership - there does not appear to be any issues at the current time.	No

7. GLOSSARY

This glossary defines the 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 CCW and the UK nature conservation agencies. None of these definitions is legally definitive.

Action A recognisable and individually described act, undertaking or **project** of any kind, specified in section 6 of a **Core Management Plan** or **Management Plan**, as being required for the **conservation management** of a site.

Attribute A quantifiable and monitorable characteristic of a **feature** that, in combination with other such attributes, describes its **condition**.

Common Standards Monitoring A set of principles developed jointly by the UK 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.

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 assessment The process of characterising the **condition** of a **feature** with particular reference to whether the aspirations for its condition, as expressed in its **conservation objective**, are being met.

Condition categories The **condition** of **feature** can be categorised, following **condition assessment** as one of the following[2]:

Favourable: maintained;
Favourable: recovered;
Favourable: un-classified
Unfavourable: recovering;
Unfavourable: no change;
Unfavourable: declining;
Unfavourable: un-classified
Partially destroyed;
Destroyed.

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 **conservation status** of a **feature,** expressed as a **vision for the feature** and a series of **performance indicators**. The conservation objective for a

[2] See JNCC guidance on Common Standards Monitoring http://www.jncc.gov.uk/page-2272

feature is thus a composite statement, and each feature has one conservation objective.

Conservation status A description of the state of a **feature** that comprises both its **condition** and the state of the **factors** affecting or likely to affect it. Conservation status is thus a characterisation of both the current state of a feature and its future prospects.

Conservation status assessment The process of characterising the **conservation status** of a **feature** with particular reference to whether the aspirations for it, as expressed in its **conservation objective**, are being met. The results of conservation status assessment can be summarised either as 'favourable' (i.e. conservation objectives are met) or unfavourable (i.e. conservation objectives are not met). However the value of conservation status assessment in terms of supporting decisions about **conservation management**, lies mainly in the details of the assessment of feature **condition**, **factors** and trend information derived from comparisons between current and previous conservation status assessments and condition assessments.

Core Management Plan A CCW 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 **conservation management** can also be considered as factors.

Favourable condition See **condition** and **condition assessment**

Favourable conservation status See **conservation status** and **conservation status assessment.**[3]

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**

Key Feature The habitat or species population within a **management unit** that is the primary focus of **conservation management** and **monitoring** in that unit.

[3] A full definition of favourable conservation status is given in Section 4.

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 **conservation 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 **Common Standards Monitoring**, 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 their associated **specified limits**, together with **factors** and their associated **operational limits,** 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. Performance indicators are part of, not the same as, conservation objectives. See also **vision for the feature**.

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 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 CCW's 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 limit 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 for the feature The expression, within a **conservation objective**, of the aspirations for the **feature** concerned. See also **performance indicators.**

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 AND ANNEXES

References

Joint Nature Conservation Committee (JNCC). 2004a. Guidance on Common Standards Monitoring (CSM): Lowland grassland, Version February 2004. JNCC Report, JNCC, Peterborough. Available via website at: http://www.jncc.gov.uk

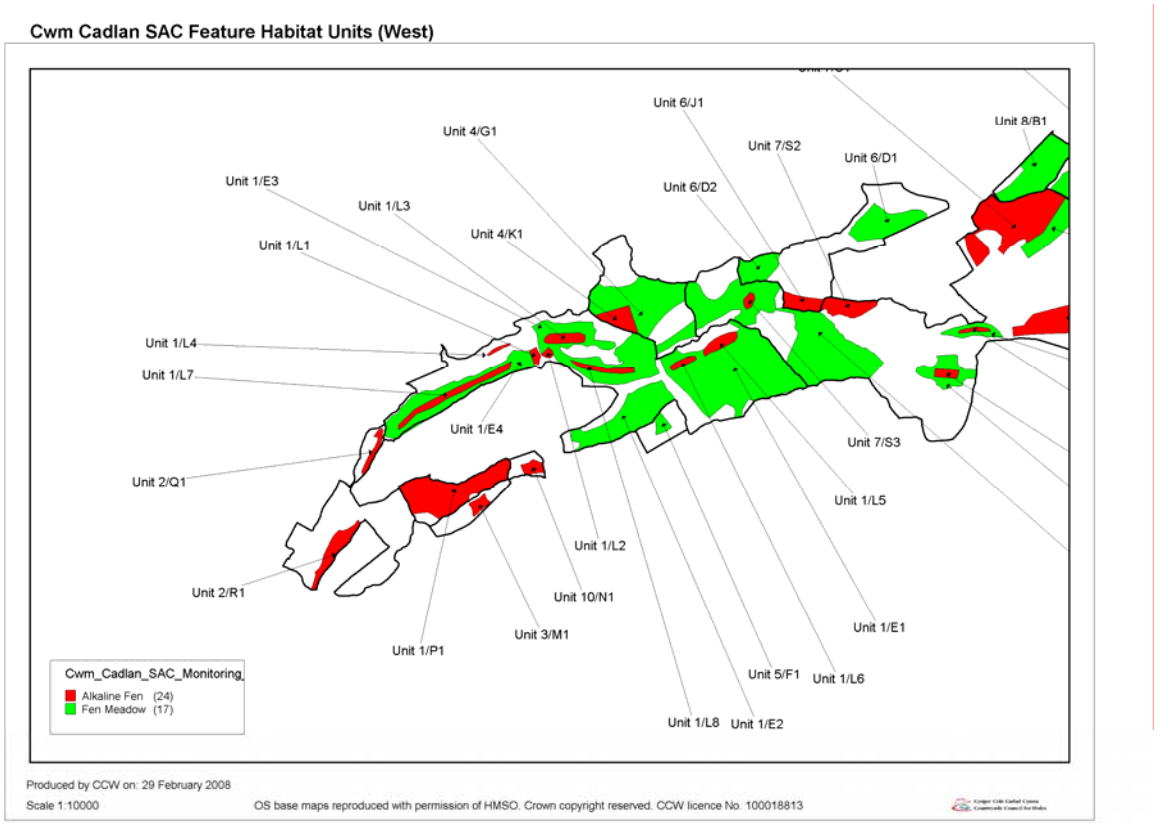
Joint Nature Conservation Committee (JNCC). 2004a. Guidance on Common Standards Monitoring (CSM): Lowland grassland, Version February 2004. JNCC Report, JNCC, Peterborough. Available via website at: http://www.jncc.gov.uk

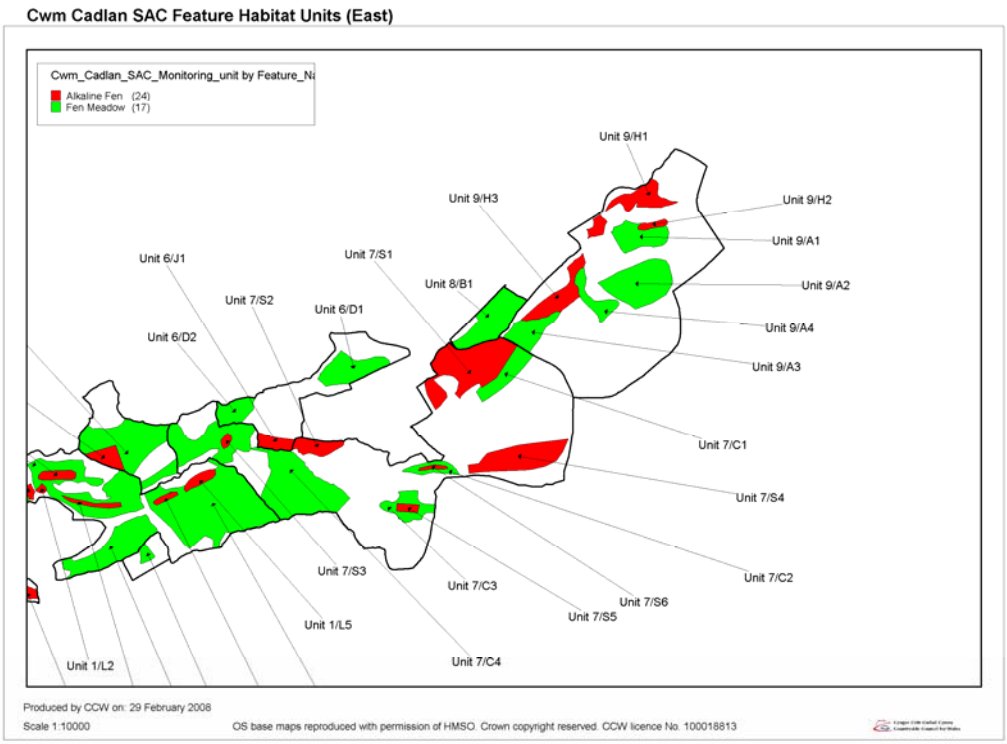
Rodwell, J. S., ed. 1991b. British Plant Communities, Volume 2, Mires and heaths. Cambridge. Cambridge University Press.

ANNEX 1: Rationale for the selection of performance indicators

The distribution of the different SSSI feature habitats is illustrated on the Phase II NVC maps in the copy of the survey report held in local CCW files.

The main stands of SAC feature habitats in which monitoring is focussed are show below:





Fen-meadow and marshy grassland:

The area of fen-meadow (NVC M24) is the largest in the mid and south Glamorgan and also represents one of the best examples nationally. There is a total of around 42 ha of marshy grassland including at least 26 ha of fen-meadow (based on 1991/98 and 1999 Phase II NVC surveys). The principle stands of this habitat are identified on the map above.

Any decline in the overall area of the 'marshy grassland' would be to scrub/woodland encroachment or the effects of drainage/agricultural intensification. The extent of the habitats included in this feature is illustrated on the Phase II NVC habitat map (see Annex). Losses to scrub/woodland are catered for by an upper limit on woody species in the sward and are also covered by operational limits.

This habitat is closely associated with rush-pasture, alkaline fen and other acid mire habitats, sometimes occurring in intimate mosaics and cannot easily be measured separately, except with the coarse precision using repeated habitat survey. It is therefore considered appropriate to combine these habitats as 'marshy grassland' for the purpose of setting an objective for extent.

The importance of the fen-meadow can be addressed by setting minimum quality standards for the proportion of the 'marshy grassland' that can be attributed to fen-meadow (see quality below). Losses in the extent of fen-meadow to rush pasture or other grassland habitats can be determined by changes in quality, on the basis that if the habitat is of acceptable quality this will be judged to be sufficient evidence that there has been no loss of extent. It is also unlikely that there would be a change from the fen-meadow to other communities without a change in management and/or hydrology, which are likely to be detected through surveillance activities.

Information from the Phase II NVC survey indicates that there are scattered stands of fen-meadow and other marshy grassland throughout the site, with variation in the structure and species-richness of the vegetation. It is considered impractical to set quality standards for all individual stands of marshy grassland, especially when this is compounded by the presence of several distinct NVC sub-community types. It has therefore the main large stands of fen-meadow have been identified and covered by detailed species and structure attributes. Achieving these targets will be treated as

sufficient for this SAC feature. This decision is based on the assumption that under a set management regime if quality standards are being met in the main stands then they are likely to be achieved elsewhere in the smaller stands of fen -meadow (which will be tested by general surveillance activities).

General fabric and structural attributes to identify gross changes and potentially damaging management should more appropriately assess the remainder of the marshy grassland resource. For practical reasons, these will also cover those areas of alkaline fen, acid flush, wet heath and neutral grassland that are not covered by more specific quality objectives in subsequent sections of the plan.

Past drainage and management have almost certainly modified some of the fen-meadow. The presence of frequent white clover and occasional ribwort plantain in some stands of M24 detract somewhat from its quality; but the characterising community constants remain well represented. The species composition of the fen-meadow is likely to remain fairly consistent provided appropriate grazing pressure, soil and nutrient conditions and hydrological conditions are maintained. This will be confirmed by the presence of a range of 'typical' species: quaking grass, bog pimpernell, tawny sedge, flea sedge, meadow thistle, devil's-bit scabious and marsh valerian.

Of greatest concern are changes in the existing hydrology, although these may have a more immediate effect on the alkaline fen. New drains or deepening existing drainage would result in a decline in the wetness of the vegetation. The close proximity of a working quarry which is being deepened below the water table, with water pumped away, has potential to affect hydrology. More hydrophilous species, such as tawny sedge and marsh valerian, could be replaced by species more typical of drier grassland. Should drains and ditches become blocked, this would lead to increased waterlogging in some areas. This may produce a decline in the quality of the vegetation towards more rush-dominated vegetation (increases in rush spp.), and excessive poaching could bulk up rush cover, with a corresponding decline in the abundance of 'typical' species associated with the fen-meadow, but equally, where grassland became more flushed it could become more like the alkaline fen.

Inappropriate grazing regimes are also of concern. Increased quantities of litter would be evidence of insufficient grazing pressure and would permit succession to scrub/woodland. The small areas of scrub and woodland are mostly adjacent to habitat of high conservation value, so its expansion would be of concern. Over grazing may damage the sward, creating bare ground and/or causing eutrophication and encourage agricultural species. Species indicative of such shifts should be monitored, and the following species have been selected: creeping buttercup, lesser spearwort, ribwort plantain, crested dog's-tail, Yorkshire fog, white clover, common mouse-ear.

In the areas of marshy grassland and other non-wooded habitat, appropriate attributes are considered to be vegetation height (specified as a range), bare ground, litter build up and scrub development. Operational limits can also be used to determine when any widespread management problems need to be addressed.

The attributes selected have been considered sufficient (at this stage) to provide evidence of the condition of the feature. Agricultural intensification and drainage require consent from CCW, and do not require attributes to be identified.

Alkaline Fen:

Some wet grassland was mapped as base-rich sedge community or creeping bent-sedge sward as it did not fit the framework of the NVC, but this is probably best treated as some form of alkaline fen. There is a total of at least 11.5 ha of alkaline fen, including those areas of base-rich sedge community, based on 1998/99 NVC surveys. The main areas of this habitat are identified on the SAC feature habitat/monitoring map (see above). The area of alkaline fen (NVC M10) mire is the largest in the area of search and also represents one of the best examples nationally.

Any decline in the overall area of the alkaline fen would be likely to be due to scrub/woodland encroachment or the effects of changes in site hydrology or agricultural management, which should be detected through surveillance activities. The current extent of the habitat included in this feature is illustrated on the Phase II habitat maps (dated 1991/98 & 1999), although these are not easily distinguished from aerial photographs. Losses to scrub/woodland are also catered for by an upper limit on woody species in the sward and are also covered by operational limits. This habitat is closely associated with marshy grassland and cannot easily be measured separately, except with the precision possible using repeated habitat survey.

The alkaline fen is mixed in with marshy grassland, but each field/management unit is subjected to one prescription. The fen-meadow and alkaline fen are the principle features of importance, as recognized by their SAC status, and therefore other habitats will tend to be considered of secondary importance.

Information from the Phase II grassland surveys indicates that there are scattered stands of alkaline fen throughout the site, with variation in the structure and species-richness of the vegetation. It is considered impractical to set detailed species quality standards for all individual stands, especially when this is compounded by the presence of at least two different types of this habitat (NVC sub-communities). It has therefore been decided that the main large stands of alkaline fen will be identified and covered by detailed species and structure attributes. Achieving these targets will be treated as sufficient for this SAC feature. This decision is based on the assumption that under a set management regime if quality standards are being met in the main stands then they are likely to be achieved elsewhere in the smaller stands within the same management unit (which can be tested by general surveillance activities).

Confirming that the fabric and structural attributes stated for the marshy grassland feature are also achieved for the remaining alkaline fen areas can back this up, with some additions to cover those species more specific to this habitat. This will also be applied to those areas of alkaline fen that occur in a mosaic with habitats other than fen-meadow. In those management units that contain very small stands, it its suggested that confirmed presence of the alkaline fen will suffice.

Of greatest concern are changes in the existing hydrology. This is likely to control the extent and species complement, provided that the management is of the appropriate type and intensity. The quality of the vegetation will be assessed by confirming the presence of a subset of at least five site-specific typical species: tawny sedge, flea sedge, dioecious sedge, bog pimpernell, broad-leaved cottongrass, few-flowered spike-rush, marsh lousewort, butterwort, quaking grass, water mint, marsh pennywort, marsh valerian, and the mosses *Drepanocladus cossonii, Bryum pseudotriquetrum, Fissidens adianthoides, Campylium stellatum, Palustriella commutata*

New drains or deepening existing drainage would result in a decline in the wetness of the vegetation. More hydrophilous species would be replaced by species more typical of drier grassland.

This habitat is potentially threatened by current deepening and pumping water from a nearby quarry, but possible effects from this is being covered by a long term surveillance programme as part of the planning permission.

Insufficient grazing is likely to produce a decline in the quality of the vegetation towards more purple moor-grass and rush-dominated vegetation (increases in tall rushes), with a corresponding decline in the abundance of ‘typical’ plants associated with the alkaline fen, and especially of the bryophytes and species such as butterwort in the first instance. Increased quantities of litter (especially of purple moor-grass) would be evidence of insufficient grazing pressure and may permit succession to scrub/woodland. The small areas of scrub and woodland are mostly adjacent to habitat of high conservation value, so its expansion would threaten these.

Over-grazing may damage the sward, creating bare ground and/or causing eutrophication and encourage agricultural species. Species indicative of such shifts should be monitored, and the following species have been selected: white clover, velvet bent, lesser spearwort and creeping buttercup.

Other fabric attributes in the main alkaline fen areas are vegetation height (specified as a range between 5 & 25 cm, excluding flower heads) and scrub development. Operational limits can also be used to determine when any widespread management problems need to be addressed.

The attributes selected have been considered sufficient (at this stage) to provide evidence of the condition of the feature. Agricultural intensification and drainage require consent from CCW, and do not require attributes to be identified.