

**CYNGOR CEFN GWLAD CYMRU
COUNTRYSIDE COUNCIL FOR WALES**

**CORE MANAGEMENT PLAN
INCLUDING CONSERVATION OBJECTIVES**

FOR

**CERNYDD CARMEL SAC (SPECIAL AREA OF
CONSERVATION)**

Versions	Date	Approved by:	Notes
11	21 February 2011	Charlotte Gjerlov	Current version
10	20 January 2011	Charlotte Gjerlov	Now superseded by version 11 (February 2011)
9	5 April 2008	Tracey Lovering	Now superseded by version 10 (January 2011)

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.



CONTENTS

Preface: Purpose of this document

- 1. Vision for the Site**
- 2. Site Description**
 - 2.1 Area and Designations Covered by this Plan**
 - 2.2 Outline Description**
 - 2.3 Outline of Past and Current Management**
 - 2.4 Management Units**
- 3. The Special Features**
 - 3.1 Confirmation of Special Features**
 - 3.2 Special Features and Management Units**
- 4. Conservation Objectives**

Background to Conservation Objectives

 - 4.1 Conservation Objective for Feature 1:
Turloughs**
 - 4.2 Conservation Objective for Feature 2:
Tilio-Acerion forests of slopes, screes and ravines**
 - 4.3 Conservation Objective for Feature 3:
Northern Atlantic wet heaths with *Erica tetralix***
 - 4.4 Conservation Objective for Feature 4:
European dry heaths**
 - 4.5 Conservation Objective for Feature 5:
Active raised bogs**
- 5. Assessment of Conservation Status and Management Requirements:**
 - 5.1 Conservation Status and Management Requirements of Feature 1:
Turloughs**
 - 5.2 Conservation Status and Management Requirements of Feature 2:
Tilio-Acerion forests of slopes, screes and ravines**
 - 5.3 Conservation Status and Management Requirements of Feature 3:
Northern Atlantic wet heaths with *Erica tetralix***
 - 5.4 Conservation Status and Management Requirements of Feature 4:
European dry heaths**
 - 5.5 Conservation Status and Management Requirements of Feature 5:
Active raised bogs**
- 6. Action Plan: Summary**
- 7. Glossary**
- 8. References and Annexes**

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.

Cernydd Carmel SAC will support a wide range of habitats, including woodland, heathland, raised bog and grassland, as well as the seasonal lake – or turlough – at the eastern end of the site.

The turlough will continue to fill and empty on a seasonal basis, with the basin typically filling with water during autumn and winter, and drying out in summer. It will be fed by clean, unpolluted water filtering in from the limestone aquifer below. Any scrub encroachment in the turlough basin will be controlled, allowing its specialist flora and fauna to thrive.

The ash woodland will remain as a distinct patchwork of wooded blocks, occupying the many limestone knolls at the site. It will form a characteristic element of the historic woodland-grassland landscape pattern of Carmel. The woodland canopy will be largely dominated by ash, over a rich under-storey of young trees and shrubs including hazel, hawthorn, spindle and buckthorn. The ground flora will include a rich mixture of woodland herbs including bluebell, dog's mercury, wood anemone, wild garlic and hart's tongue fern, as well as rarities such as lily of the valley, mezereon and herb paris.

Heathland will be prevalent on the southern Millstone Grit ridge. Stands of dry heath will occupy the more freely draining parts of the ridge, with wet heath on the damper soils. The heathland should be lightly grazed by cattle and ponies, to encourage a high cover of heather and other dwarf shrubs, whilst preventing encroachment by scrub or bracken.

Raised bog vegetation will occupy the series of peaty depressions within the Millstone Grit ridge. The natural hydrology of these bogs will be unaffected by artificial drainage or other modifying factors. The mire surfaces should display a natural 'hummock and hollow' topography and support a specialist bog flora including hare's-tail cotton-grass, deergrass, cross-leaved heath and bog mosses.

Species-rich neutral grassland should cover most of the freely draining land at Pwll Edrychiad. This vegetation will include a range of meadow flowers including common knapweed, bird's-foot-trefoil, red clover and whorled caraway; there should also be a large population of greater butterfly-orchid in most years. Stands of previously improved grassland elsewhere at the site (notably in the NNR units) will support more species-rich vegetation, a consequence of grassland restoration management.

Marshy grassland will cover the damper soils at Pwll Edrychiad and other wet parts of the site. These areas will support a typical range of wetland plants including purple moor-grass, sharp-flowered rush, carnation sedge, tormentil and devil's-bit scabious.

Finally the important geological exposures at Carmel should remain visible and available for continued study.

2. SITE DESCRIPTION

2.1 Area and Designations Covered by this Plan

Grid reference: SN 592 161

Unitary authority: Caerfyrddin / Carmarthenshire

Area (hectares): 361.14 ha

Designations covered:

Cernydd Carmel Special Area of Conservation (SAC) is also notified as Cernydd Carmel Site of Special Scientific Interest (SSSI). The SAC and SSSI boundaries are entirely coincident.

Approximately 85 ha of the site (mainly the Glangwenlais Quarry, Pwll Edrychiad and Garn land holdings) is also designated as Carmel National Nature Reserve (NNR).

Detailed maps of the designated sites are available through CCW's web site:
<http://www.ccw.gov.uk/interactive-maps/protected-areas-map.aspx>

For a summary map showing the coverage of this document see attached Unit Map.

2.2 Outline Description

Cernydd Carmel is situated immediately south of the village of Carmel in south Carmarthenshire. A diverse range of habitats is represented, including woodland, grassland, heathland and bog. Of particular interest is the seasonal lake – or turlough – situated next to the small hamlet of Pantllyn at the eastern end of the site.

The distribution of habitats is, to a large extent, determined by the underlying geology. Much of the site is located on a thin band of Carboniferous Limestone, which is overlain to the south by acidic Millstone Grit; linear bands of softer shales also occur within the Millstone Grit strata.

Pant-y-llyn turlough is an unusual seasonal lake with no natural inlet or outflow streams. It is fed entirely by groundwater from the underlying limestone aquifer, with its water level determined by seasonal variation in the groundwater table. The turlough fills to a depth of approximately 3 metres during the autumn-spring period and empties in summer. Discharge and recharge seemingly occurs through a swallow hole at the northern end of the basin, although other sinks and springs could also be involved. Pant-y-llyn turlough is thought to be the only known example of its kind in mainland Britain and is recognised as the SAC Annex I habitat type 'Turloughs'.

Ash woodland occurs extensively at Cernydd Carmel, generally occupying the many limestone knolls at the site. This woodland corresponds to the Annex I habitat 'Tilio-Acerion forests of slopes, screes and ravines'. It typically occurs as a patchwork of small woods with areas of grassland between, giving the landscape a distinctive mosaic pattern. Most of the grassland at Carmel is agriculturally improved, but stands of semi-natural neutral grassland occur in the Pwll Edrychiad holding.

Both dry and wet heath occurs on the acidic Millstone Grit ridge. The dry heath corresponds to the Annex I habitat 'European dry heaths', while the wet heath is referable to 'Northern Atlantic wet heaths with *Erica tetralix*'.

The bands of softer shale within the Millstone Grit have given rise to linear depressions supporting mire vegetation. These stands are recognised as the Annex I habitat 'Active raised bogs'.

2.3 Outline of Past and Current Management

With its rural setting, agriculture has inevitably been a significant historical land use at Carmel. It is presumed that most of the grassland has been managed mainly as pasture, but there is documentary evidence that arable farming was also carried out in the past (Dyfed Archaeological Trust, 1992).

The abundance of old quarries, lime kilns, spoil heaps and routeways indicate that quarrying was widely practised, probably from about the sixteenth century (Dyfed Archaeological Trust, 1992). Much of the quarried limestone would have been burnt in the numerous lime kilns to produce lime as an agricultural fertiliser. It is thought that small-scale quarrying and lime burning had largely ceased by the early 1900s, to be replaced by larger operations at Glangwenlais Quarry and Pwllymarch Quarry. A large gritstone quarry was also developed at Allt y Garn. Each of these quarries, however, has now ceased operating.

The long-established mosaic of woodland and grassland is well documented (e.g. Stringer & Davies, 1989). Various studies have shown that woodland management was also widely practised, especially coppicing (Rackham, 1992; Peterken, 1999). Rather than providing fuel for the numerous lime kilns, it has been suggested that most of the timber was used to produce charcoal for the local iron forges (Dyfed Archaeological Trust, 1992). Indeed the discovery of anthracite remains in many of the old spoil heaps indicates that anthracite was the principal fuel for the lime kilns, rather than charcoal.

Rackham (1992) estimates that regular coppicing of the woods ceased about 1920. Since then most of the woods have developed an even-aged, high forest structure in the absence of any management. Apart from some recent (2001/02) coppicing and thinning in the woodland around Glangwenlais Quarry, the majority of woods at Carmel have received very little woodland management in recent decades.

Most of the grassland at Carmel is now grazed by either cattle, ponies or, to a lesser extent, sheep. Much of this agriculture is fairly non-intensive. Indeed the grassland within the NNR parts of the site is managed principally for nature conservation, with the intention of maintaining the existing areas of semi-natural grassland at Pwll Edrychiad and restoring other more improved swards through appropriate grassland restoration methods. A number of private holdings in the Carmel SAC are also managed under agri-environment agreements.

There is evidence that part of the turlough was managed as a meadow in the nineteenth century (Blackstock *et al.*, 1993), but no such management has taken place in recent times. Some clearance of mature willow and alder scrub was undertaken in the turlough basin in 2003.

2.4 Management Units

The plan area 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.

It should be clarified here that some of the NNR units are managed by CCW, with other units managed by The Grasslands Trust. A small section of the NNR is also in private ownership but is subject to a Nature Reserve Agreement with CCW. The remainder of the SAC is in multiple private ownership.

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

Unit number	SAC	SSSI	NNR	CCW managed	Grasslands Trust managed
Cernydd Carmel					
1	✓	✓			
2	✓	✓			
3	✓	✓			
4	✓	✓			
5	✓	✓			
6	✓	✓			
7	✓	✓			
8	✓	✓			
9	✓	✓			
10	✓	✓			
11	✓	✓			
12	✓	✓			
13	✓	✓			
14	✓	✓			
15	✓	✓			✓
16	✓	✓			
17	✓	✓			
18	✓	✓			
19	✓	✓			✓
20	✓	✓			
21	✓	✓			
22	✓	✓			
23	✓	✓			
24	✓	✓			
25	✓	✓			
26	✓	✓			
27	✓	✓			
28	✓	✓			
29	✓	✓			
30	✓	✓			
31	✓	✓	✓		✓
32	✓	✓			
33	✓	✓			✓
34	✓	✓			
35	✓	✓			
36	✓	✓	✓		✓
37	✓	✓			
38	✓	✓			
39	✓	✓			
40	✓	✓	✓		✓

Unit number	SAC	SSSI	NNR	CCW managed	Grasslands Trust managed
Cernydd Carmel					
41	✓	✓			
42	✓	✓			
43	✓	✓			
44	✓	✓			
45	✓	✓	✓		
46	✓	✓			
47	✓	✓			
48	✓	✓			
49	✓	✓			
50	✓	✓			
51	✓	✓			
52	✓	✓	✓	✓	
53	✓	✓			
54	✓	✓			
55	✓	✓			
56	✓	✓			
57	✓	✓			
58	✓	✓			
59	✓	✓			
60	✓	✓			
61	✓	✓	✓	✓	

3. THE SPECIAL FEATURES

3.1 Confirmation of Special Features

<i>Designated feature</i>	<i>Relationships, nomenclature etc</i>	<i>Conservation Objective in part 4</i>
SAC features		
<i>Annex I habitats that are a primary reason for selection of this site</i>		
1. Turloughs (EU habitat code 3180)	Equates to standing water – seasonal/ temporary waters SSSI feature	1
<i>Annex I habitats present as a qualifying feature, but not a primary reason for site selection</i>		
2. <i>Tilio-Acerion</i> forests of slopes, screes and ravines	Part of broad-leaved woodland SSSI feature	2
3. Northern Atlantic wet heaths with <i>Erica tetralix</i> (EU habitat code 4010)	Equates to wet heath SSSI feature	3
4. European dry heaths (EU habitat code 4030)	Equates to dry heath SSSI feature	4
5. Active raised bogs (EU habitat code 7110)	Equates to lowland raised bog SSSI feature	5
SPA features		
Not applicable		
Ramsar features		
Not applicable		
SSSI features		
<i>Note: Conservation objectives for the SSSI features will be developed at a later stage.</i>		
6. Standing water – seasonal/ temporary waters	Equates to turlough SAC feature	1
7. Broad-leaved woodland	Includes <i>Tilio-Acerion</i> SAC feature	To be developed
8. Wet heath	Equates to Northern Atlantic wet heaths SAC feature	3
9. Dry heath	Equates to European dry heaths SAC feature	4
10. Lowland raised bog	Equates to active raised bogs SAC feature	5
11. Neutral grassland	No equivalent SAC feature	To be developed
12. Lily of the valley	No equivalent SAC feature	To be developed
13. Mezereon	No equivalent SAC feature	To be developed
14. Pebbly sandstones	No equivalent SAC feature	To be developed
15. Karst	No equivalent SAC feature	To be developed

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:

Cernydd Carmel	Management Units																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
SAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SSSI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NNR																																✓
CCW managed																																
Grasslands Trust managed															✓				✓													✓
SAC features																																
1. Turloughs	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH	x	KH	KH	KH	KH	KH	KH	KH	KH	x	KH	x	KH	KH	KH	x	x	x	KH	KH	KH	
2. <i>Tilio-Acerion</i> forests of slopes, screes and ravines	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	KH
3. North Atlantic wet heaths with <i>Erica tetralix</i>	x	x	x	x	KH	x	x	x	x	x	KH	x	x	x	x	x	x	x	x	x	x	Sym	x	x	x	x	Sym	KH	x	x	x	
4. European dry heaths	x	x	x	x	KH	x	x	x	x	x	KH	x	x	x	x	x	x	x	x	KH	x	Sym	x	x	x	KH	Sym	KH	x	x	x	
5. Active raised bogs	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	KH	x	x	x	x	KH	x	x	x	x	
SSSI features																																
6. Standing water	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH	x	KH	KH	KH	KH	KH	KH	KH	KH	x	KH	x	KH	KH	KH	x	x	x	KH	KH	KH	
7. Broadleaved Woodland	x	x	Sym	x	x	Sym	Sym	x	Sym	x	x	x	x	Sym	x	x	x	x	x	x	x	x	x	x	Sym	x	x	x	x	x	KH	
8. Wet Heath	x	x	x	x	KH	x	x	x	x	x	KH	x	x	x	x	x	x	x	x	x	x	Sym	x	x	x	x	Sym	KH	x	x	x	
9. Dry Heath	x	x	x	x	KH	x	x	x	x	x	KH	x	x	x	x	x	x	x	x	KH	x	Sym	x	x	x	KH	Sym	KH	x	x	x	
10. Lowland Raised Bog	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	KH	x	x	x	x	KH	x	x	x	x	
11. Neutral Grassland	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Sym	x	x	x	x	KH	KH	
12. Lily of the valley	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
13. Mezereon	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
14. Pebbly Sandstones	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
15. Karst	Geo	Geo	Geo	Geo	Geo	Geo	Geo	Geo	Geo	Geo	x	Geo	Geo	Geo	Geo	Geo	Geo	Geo	Geo	x	Geo	x	Geo	Geo	Geo	x	x	x	Geo	Geo	Geo	

Cernydd Carmel	Management Units																													
	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
SAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SSSI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NNR					✓				✓					✓							✓									✓
CCW managed																					✓									✓
Grasslands Trust managed		✓			✓				✓																					
SAC features																														
1. Turloughs	x	x	x	KH	KH	KH	KH	KH	x	KH	KH	KH	KH	KH	KH	x	x	KH	KH	KH	KH	KH	KH	x	x	KH	KH	KH	KH	KH
2. <i>Tilio-Acerion</i> forests of slopes, screes and ravines	x	x	x	x	KH	x	x	x	x	x	KH	KH	KH	KH	KH	x	x	x	KH	KH	KH	KH	x	x	x	x	x	x	x	x
3. North Atlantic wet heaths with <i>Erica tetralix</i>	x	Sym	x	x	x	x	x	x	Sym	x	x	Sym	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4. European dry heaths	KH	KH	Sym	x	x	x	x	x	x	x	x	Sym	x	x	x	KH	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5. Active raised bogs	x	Sym	KH	x	x	x	x	x	KH	x	x	KH	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
SSSI features																														
6. Standing water	x	x	x	KH	KH	KH	KH	KH	x	KH	KH	KH	KH	KH	KH	x	x	KH	KH	KH	KH	KH	KH	KH	x	x	KH	KH	KH	KH
7. Broadleaved Woodland	x	x	x	Sym	KH	x	x	x	x	x	KH	KH	KH	KH	KH	x	x	x	KH	KH	KH	KH	x	x	x	x	x	Sym	x	Sym
8. Wet Heath	x	Sym	x	x	x	x	x	x	Sym	x	x	Sym	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9. Dry Heath	KH	KH	Sym	x	x	x	x	x	x	x	x	Sym	x	x	x	KH	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10. Lowland Raised Bog	x	Sym	KH	x	x	x	x	x	KH	x	x	KH	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11. Neutral Grassland	x	x	x	x	Sym	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
12. Lily of the valley	x	x	x	x	KS	x	x	x	x	x	x	KS	x	KS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
13. Mezereon	x	x	x	x	x	x	x	x	x	x	x	KS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
14. Pebbly Sandstones	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Geo	x	x
15. Karst	x	x	x	Geo	Geo	Geo	Geo	Geo	x	Geo	Geo	Geo	Geo	Geo	Geo	x	x	Geo	Geo	Geo	Geo	Geo	Geo	Geo	x	x	Geo	Geo	Geo	Geo

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 Monitoring¹.

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 Feature 1: Turloughs (EU habitat code 3180)

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:

- The turlough will fill and empty according to natural seasonal fluctuations in the underlying aquifer. It will typically fill with water in the autumn-spring period and empty during the summer months.
- A natural pattern of vegetation zones will be apparent during the dry phase of the turlough, as determined by micro-topographical variation in the turlough basin in relation to the main swallow hole.
- The following vegetation zones, together with typical associated species, will be present: hydrophytic bryophyte zone; *Equisetum fluviatile* zone; *Carex vesicaria* zone; *Phalaris arundinacea* zone; *Salix cinerea-Galium palustre* woodland zone.
- Alien plant species such as *Crassula helmsii*, *Hydrocotyle ranunculoides*, *Myriophyllum aquaticum* and *Azolla filiculoides* will be absent.
- All factors affecting the achievement of the above conditions, including water quality, water levels and scrub development, will be under control.

Performance indicators for Feature 1

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.

<i>Performance indicators for feature condition</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A1. Extent	<p>This attribute was developed by CCW's SAC monitoring team (Lovering, 2006). The lower limit is based on extent during the wet phase. It assumes that in winter the water level will reach the upper limits of inundation, approx. 3.5 m above the swallow hole to the marginal <i>Salix</i> woodland zone. No upper limit has been set, as the extent is naturally limited by the size of the turlough basin.</p> <p>This attribute can be monitored via simple visual checks of winter water levels.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> Turlough basin will fill with water during wet phase</p>
A2. Quality	<p>This attribute was developed by CCW's SAC monitoring team (Lovering, 2006). The lower limit is based mainly on the continued presence of a number of vegetation zones in the turlough basin during the dry phase. The various zones were originally identified by Blackstock, <i>et al.</i> (1993). No upper limit is required in this case.</p> <p>Monitoring of this attribute should be carried out in during the dry phase, ideally in July. Full monitoring should be undertaken on a six-year cycle, although brief checks for non-native arrivals etc can be carried out more regularly.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> Each of the following vegetation zones should be present:</p> <ol style="list-style-type: none"> 1. Hydrophytic bryophyte zone – currently occurs in the immediate vicinity of the swallow hole. 2. <i>Equisetum fluviatile</i> zone – currently occurs c. 0.6 m above and to the south of the swallow hole. 3. <i>Carex vesicaria</i> zone – currently dominates most of the turlough basin, c. 1.2-2.2 m above the swallow hole. 4. <i>Phalaris arundinacea</i> zone – currently occupies the northern end of the basin, c. 2.2 m above the swallow hole. 5. <i>Salix cinerea-Galium palustre</i> woodland zone – extends as a narrow zone around the edge of the turlough basin, up to c. 3.5 m above the swallow hole. <p><u>And</u> associated species for each vegetation zone are present. Associated species for each zone include:</p>
<i>Performance indicators for feature condition (cont.d)</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A2. Quality (cont.d)		<ol style="list-style-type: none"> 1. Hydrophytic bryophyte zone – <i>Fontinalis antipyretica</i>, <i>Drepanocladus aduncus</i>. 2. <i>Equisetum fluviatile</i> zone – <i>Galium palustre</i>,

		<p><i>Mentha aquatica</i>, <i>Veronica scutellata</i>, <i>Persicaria hydropiper</i>, <i>P. maculosa</i>, <i>Fontinalis antipyretica</i>, <i>Drepanocladus aduncus</i>, <i>Calliergon cordifolium</i>.</p> <p>3. <i>Carex vesicaria</i> zone – <i>Mentha aquatica</i>, <i>Phalaris arundinacea</i>, <i>Solanum dulcamara</i>, <i>Fontinalis antipyretica</i>, <i>Drepanocladus aduncus</i>, <i>Calliergon cordifolium</i>.</p> <p>4. <i>Phalaris arundinacea</i> zone – <i>Solanum dulcamara</i>, <i>Galium palustre</i>, <i>Fontinalis antipyretica</i>, <i>Drepanocladus aduncus</i>.</p> <p>5. <i>Salix cinerea</i>-<i>Galium palustre</i> woodland zone – <i>Mentha aquatica</i>, <i>Solanum dulcamara</i>, <i>Agrostis stolonifera</i>.</p> <p><u>And</u> alien plant species are absent. Potentially invasive non-native species include <i>Crassula helmsii</i>, <i>Hydrocotyle ranunculoides</i>, <i>Myriophyllum aquaticum</i> and <i>Azolla filiculoides</i>.</p>
Performance indicators for factors affecting the feature		
Factor	Factor rationale and other comments	Operational Limits
F1-2. Water quality factors	<p>Good water quality is essential to the ecological integrity of the turlough. Increased nutrient levels in particular could be detrimental to the characteristic flora and fauna of the turlough. Common Standards Monitoring guidance states that, for turloughs, water quality determinands and limits should be defined on a site-by-site basis, ideally following collection of a data-set of readings over time – refer to Lovering (2006) for a fuller review of potentially relevant water quality parameters. Initial limits for pH and conductivity were proposed by Lovering (2006), based on readings taken in 1992 by Blackstock <i>et al.</i> (1993). Performance indicators for additional parameters (including nutrient determinands) will be developed in future following further water quality sampling.</p>	See below

<i>Performance indicators for factors affecting the feature (cont.d)</i>		
<i>Factor</i>	<i>Factor rationale and other comments</i>	<i>Operational Limits</i>
F1. Water quality: pH	Limits are based on pH measurements taken in 1992 (see above). Water sampling should take place during the wet phase, ideally in March to enable monitoring of both dry and wet phases in the same reporting year.	<i>Upper limit:</i> pH 7.1 <i>Lower limit:</i> pH 6.7
F2. Water quality: conductivity	Limits are based on conductivity measurements taken in 1992 (see above). Water sampling should take place during the wet phase, ideally in March to enable monitoring of both dry and wet phases in the same reporting year.	<i>Upper limit:</i> 634 $\mu\text{s cm}$ <i>Lower limit:</i> 275 $\mu\text{s cm}$
F3. Turbidity	The turlough is fed entirely by groundwater and its waters are normally very clear. Turbidity is most likely to arise from pollution, either via the groundwater or from surface water runoff. Monitoring should take place during the wet phase, and may be undertaken throughout the monitoring cycle.	<i>Upper limit:</i> Not required <i>Lower limit:</i> Entire bed of turlough should be visible during wet phase.
F4. Water levels	The hydrology of the turlough is determined by seasonal fluctuations in the groundwater table of the underlying aquifer. Any alterations to the cyclical fluctuation of water levels could have a detrimental impact on the ecological and hydrological integrity of the turlough.	Limits relating to water levels in the turlough are addressed in Attributes A1 and A2 above. Any concerns highlighted through monitoring of Attributes A1 and A2 should trigger investigations into Factor F4. Simple visual checks of water levels can also be carried out at various stages of the annual fill-drain cycle.
F5. Scrub encroachment	Development of willow and alder scrub in the turlough basin is a potential threat to the characteristic flora and fauna of the turlough. Scrub encroachment in the turlough basin is unacceptable and an upper limit of 5% scrub cover has been set.	<i>Upper limit:</i> 5% scrub cover <i>Lower limit:</i> Not required

4.2 Conservation Objective for Feature 2:

Tilio-Acerion forests of slopes, screes and ravines (EU habitat code 9180)

The following conservation objective only considers the desired condition for 'high forest' *Tilio-Acerion* woodland at Cernydd Carmel. Little reference is made to coppice woodland at present. Nonetheless active consideration is being given to the reinstatement of coppice management at Carmel, at least in certain woodland units. The *Tilio-Acerion* conservation objective will therefore be amended shortly to incorporate additional attributes for coppice woodland, once the desired location, extent and condition of coppice woodland has been agreed. The following conservation objective should therefore be considered as provisional at present.

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:

- *Tilio-Acerion* woodland will occupy approximately 44 ha of Cernydd Carmel SAC.
- The *Tilio-Acerion* woodland will occur as a patchwork of small woods with areas of grassland between, forming a characteristic element of the historic landscape pattern of Cernydd Carmel. The distribution of woods will mirror the pattern of woodland mapped in 1994.
- Within the high forest areas, the woodland will be maintained as far as possible by natural processes.
- Within the high forest areas, between 10 and 25% of the woodland will comprise open glades or canopy gaps, although the location of glades/canopy gaps may vary over time.
- Trees and shrubs of a wide range of ages and sizes should be present, including functionally mature canopy trees, young trees and an active shrub layer.
- Regeneration of locally native trees/shrubs will be plentiful.
- The canopy will comprise varying mixtures of locally native species including ash *Fraxinus excelsior*, oak *Quercus* spp., goat willow *Salix caprea*, yew *Taxus baccata* and wych elm *Ulmus glabra*. Typical shrub layer species will include hazel *Corylus avellana*, hawthorn *Crateagus monogyna*, blackthorn *Prunus spinosa*, spindle *Euonymus europaeus* and dogwood *Rhamnus catharticus*. Non-native species including sycamore *Acer pseudoplatanus* and beech *Fagus sylvatica* will be largely absent.
- The field layer will comprise a rich mixture of woodland herbs including *Ranunculus ficaria*, *Circaea lutetiana*, *Galium odoratum*, *Allium ursinum*, *Hyacinthoides non-scripta*, *Mercurialis perennis*, *Conopodium majus*, *Paris quadrifolia*, *Lamium galeobdolon*, *Conopodium majus*, *Phyllitis scolopendrium*, *Arum maculatum* and *Anemone nemorosa*.
- Locally uncommon species including *Rhamnus catharticus*, *Euonymus europaeus*, *Convallaria majalis*, *Paris quadrifolia* and *Daphne mezereum* will continue to be present.
- Dense bramble will be largely absent.
- Within the high forest areas, dead wood will be present in the form of standing and fallen trunks/limbs.
- All factors affecting the achievement of the above conditions, including grazing and browsing, will be 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.

<i>Performance indicators for feature condition</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A1. Extent of <i>Tilio-Acerion</i> woodland	<p>The <i>Tilio-Acerion</i> feature at Cernydd Carmel is analogous to W8 woodland, the extent of which (43.9 ha) was mapped by Mileto & Castle (1994). The lower limit is based on total extent mapped in 1994. To achieve favourable conservation status, the spatial extent of each individual wood mapped in 1994 must also be maintained. No upper limit has been set as the potential for expansion of <i>Tilio-Acerion</i> woodland is naturally limited by underlying geology and topography. In certain cases expansion of <i>Tilio-Acerion</i> will also be constrained by limits relating to other important features (e.g. neutral grassland) and the need to preserve the characteristic woodland-grassland landscape pattern.</p> <p>Repeat monitoring will be achieved by field-checks of baseline maps of individual woodland stands, reference to aerial photos, or a combination of both.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> As mapped in 1994</p>
A2. Canopy cover within <i>Tilio-Acerion</i> woodland [high forest areas only]	<p>This attribute has been developed specifically to cater for the open structure of the <i>Tilio-Acerion</i> woodland at Carmel.</p> <p>A glade or canopy gap is defined as an open area whose distance across is equal to or greater than the height of the tallest adjacent tree, or an area of between 15 and 30 m across.</p>	<p><i>Upper limit:</i> Open glades or canopy gaps will comprise 25% of the woodland area <i>Lower limit:</i> Open glades or canopy gaps will comprise 10% of the woodland area</p>

Performance indicators for feature condition (cont.d)		
Attribute	Attribute rationale and other comments	Specified limits
A3. Structure of <i>Tilio-Acerion</i> woodland [high forest only]	<p>This attribute is based on the standard Common Standards Monitoring (CSM) attribute for this feature, but has been modified according to site-specific requirements.</p> <p>Functionally mature trees are defined as those which show signs of maturity such as holes and hollows, rot columns, dead branches, etc. Relevant species include ash <i>Fraxinus excelsior</i>, oak <i>Quercus</i> spp., goat willow <i>Salix caprea</i>, yew <i>Taxus baccata</i>, rowan <i>Sorbus aucuparia</i>, downy birch <i>Betula pubescens</i>, alder <i>Alnus glutinosa</i> and wych elm <i>Ulmus glabra</i>.</p> <p>Young trees are defined as any tree greater than 3 m in height, with a girth of at least 15 cm at chest height.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> Within a 25 m radius of at least 80% of sample points, the following conditions will be met:</p> <ul style="list-style-type: none"> • At least 5 <i>functionally mature</i> canopy-forming trees are present • At least 1 <i>young tree</i> is present • An <i>active shrub layer</i> with at least 5 locally native trees/ shrubs of between 1 and 3 m is present.
A4. Tree regeneration within <i>Tilio-Acerion</i> woodland	<p>This attribute is based on the standard CSM attribute for this feature, but has been modified according to site-specific requirements.</p> <p>A sapling is defined as a young tree between 1 and 2 m in height.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> Within a 25 m radius of at least 80% of sample points, at least 10 saplings of any of the following species will be present: ash <i>Fraxinus excelsior</i>, oak <i>Quercus</i> spp., goat willow <i>Salix caprea</i>, yew <i>Taxus baccata</i>, downy birch <i>Betula pubescens</i> or wych elm <i>Ulmus glabra</i>.</p>
A5. Species composition of <i>Tilio-Acerion</i> woodland: canopy and shrub layers	<p>This attribute is based on the standard CSM attribute for this feature, but has been modified according to site-specific requirements.</p> <p>At Cernydd Carmel the main native canopy species are ash <i>Fraxinus excelsior</i>, oak <i>Quercus</i> spp., goat willow <i>Salix caprea</i>, yew <i>Taxus baccata</i> and wych elm <i>Ulmus glabra</i>. The main native shrub species are hazel <i>Corylus avellana</i>, hawthorn <i>Crataegus monogyna</i>, blackthorn <i>Prunus spinosa</i>, spindle <i>Euonymus europaeus</i>, buckthorn <i>Rhamnus catharticus</i>, holly <i>Ilex aquifolium</i> and rowan <i>Sorbus aucuparia</i>.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> The canopy and shrub layers will be comprised of locally native species, where:</p> <ul style="list-style-type: none"> • Non-native canopy-forming trees, including beech and sycamore, make up no more than 5% of the canopy. • Non-native species, including beech and sycamore, make up no more than 5% of the shrub layer.

Performance indicators for feature condition (cont.d)		
Attribute	Attribute rationale and other comments	Specified limits
A6. Species composition of <i>Tilio-Acerion</i> woodland: field and ground layers	<p>This attribute is based on the standard CSM attribute for this feature, but has been modified according to site-specific requirements.</p> <p>Dense bramble is defined as stands of bramble with greater than 50% cover and a radius of 5 m or more.</p> <p>Bare ground is defined as patches greater than 5 x 5 m, where bare ground exceeds 75% cover.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> Within a 3 m radius of at least 80% of sample points, the following conditions will be met:</p> <ul style="list-style-type: none"> • At least 5 of the following species are present: <i>Ranunculus ficaria</i>, <i>Circaea lutetiana</i>, <i>Galium odoratum</i>, <i>Allium ursinum</i>, <i>Hyacinthoides non-scripta</i>, <i>Mercurialis perennis</i>, <i>Convallaria majalis</i>, <i>Paris quadrifolia</i>, <i>Lamiae-strum galeobdolon</i>, <i>Conopodium majus</i>, <i>Phyllitis scolopendrium</i>, <i>Arum maculatum</i>, <i>Anemone nemorosa</i>, <i>Listera ovata</i>, <i>Sanicula europaea</i> • Dense bramble is absent • Bare ground is absent.
A7. Species composition of <i>Tilio-Acerion</i> woodland: locally distinctive species	<p>This attribute has been developed in recognition of the various uncommon plant species found in the <i>Tilio-Acerion</i> woodland at Carmel.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> <i>Rhamnus catharticus</i>, <i>Euonymus europaeus</i>, <i>Convallaria majalis</i>, <i>Paris quadrifolia</i> and <i>Daphne mezereum</i> will continue to be present at locations recorded in past surveys.</p>
A8. Dead wood [high forest areas only]	<p>This attribute is based on the standard CSM attribute for this feature, but has been modified according to site-specific requirements.</p>	<p><i>Upper limit:</i> Not required <i>Lower limit:</i> Within a 25 m radius of at least 80% of sample points, at least 2 dead wood trunks/limbs, standing or lying, of >20 cm diameter and at least 3 m long will be present.</p>

<i>Performance indicators for factors affecting the feature</i>		
<i>Factor</i>	<i>Factor rationale and other comments</i>	<i>Operational Limits</i>
F1. Grazing	<p>Excessive grazing is a potential threat to the <i>Tilio-Acerion</i> feature, leading to loss or change of ground flora species, reduced regeneration, excessive bare ground or poaching. Light grazing, however, can be beneficial in terms of suppressing bramble dominance, especially in recently coppiced woodland. Excessive grazing is not considered a major issue in the majority of woods at present, as the rocky woodland floor generally deters regular incursions by cattle and ponies. Future grazing by sheep should be discouraged.</p> <p>Similarly browsing (notably by deer) can have a detrimental impact on the shrub layer, but again browsing is not considered a significant issue at present. Deer are not common at Carmel at the current time, although numbers could increase in future.</p>	<p>Limits relating to grazing or browsing impacts are addressed in Attributes A4, A6 and A7 above. Any concerns highlighted through monitoring of these attributes should trigger investigation and/or management control of Factor F1</p>
F2. Non-native species	<p>Spread of non-native species can fundamentally alter the species composition of the <i>Tilio-Acerion</i> feature. Of particular relevance at Carmel is the presence of sycamore and, to a lesser extent, beech. Although their native status at Carmel can be debated (e.g. Peterken, 1999), any spread of these species is viewed as undesirable. Sycamore in particular can respond vigorously to increased light levels and may require specific control in any coppiced areas.</p>	<p>Limits relating to non-native species are addressed in Attribute A5 above. Any concerns highlighted through monitoring of Attribute A5 should trigger investigation and/or management control of Factor F2.</p>

4.3 Conservation Objective for Feature 3: Northern Atlantic wet heaths with *Erica tetralix* (EU habitat code 4010)

Vision for feature 3

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

- Northern Atlantic wet heath will occupy at least 6 ha of Cernydd Carmel SAC.
- The wet heath will have a high cover (>25%) of dwarf shrubs, including heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix* and bilberry *Vaccinium myrtillus*.
- Typical associates will include western gorse *Ulex gallii* and *Molinia caerulea*, but not at high cover.
- Bog mosses *Sphagnum* spp. will be prominent in the sward.
- Scrub and bracken will be largely absent.
- All factors affecting the achievement of these conditions, including grazing and scrub/bracken encroachment, are under control.

Performance indicators for Feature 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.

<i>Performance indicators for feature condition</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A1. Extent	This attribute was developed by Crowther & Groome (2004), with guidance from CCW staff. The lower limit is based on the extent of wet heath (approx. 5 ha) and potential wet heath (approx. 1 ha) mapped in 2003 – refer to map 2 in Crowther & Groome (2004). No upper limit has been set as the potential for expansion of wet heath is generally limited by natural edaphic factors and topography. In certain cases expansion of wet heath may also be constrained by limits relating to other important features (e.g. active raised bog).	<i>Upper limit:</i> Not required <i>Lower limit:</i> Extent of wet heath and potential wet heath mapped in 2003.
A2. Quality	This attribute was developed by Crowther & Groome (2004), with guidance from CCW staff. Minor amendments were made following further monitoring by CCW in 2008 (Wilkinson, 2008). The lower limit requires 60% of sample points in a series of representative plots (plots J-L) to be ‘good condition wet heath’. Plots J-L are shown in map 5 in Crowther & Groome (2004). No upper limit is required in this case. Good condition wet heath is defined as vegetation where, within a 1 m radius of any sample point: <ul style="list-style-type: none"> • Dwarf shrub cover is >25% • <i>Ulex gallii</i> cover is <25% • <i>Molinia</i> cover is <40% • <i>Sphagnum</i> cover is >10% • <3 fronds of bracken are present 	<i>Upper limit:</i> Not required <i>Lower limit:</i> At least 60% of sample points in plots J-L will be referable to ‘good condition wet heath’.

	<ul style="list-style-type: none">• Trees, saplings or scrub (excluding <i>Ulex gallii</i>) is absent.	
--	--	--

<i>Performance indicators for factors affecting the feature</i>		
<i>Factor</i>	<i>Factor rationale and other comments</i>	<i>Operational Limits</i>
F1. Grazing	An appropriate grazing regime is necessary to maintain wet heath vegetation in good condition. Under-grazing can lead to a rank growth of <i>Molinia</i> and encroachment of scrub and bracken. Conversely over-grazing can lead to loss of ericoids, poaching and damage to <i>Sphagnum</i> carpets.	Limits relating to the effects of grazing are addressed in Attribute A2 above. Any concerns highlighted through monitoring of Attribute 2 should trigger investigation and/or management control of Factor F1.
F2. Scrub/bracken encroachment	Although encroachment of scrub and bracken is essentially a consequence of under-grazing (see Factor F1 above), it is treated as a separate factor here due to the distinct management techniques involved in the control of scrub and bracken.	Limits relating to spread of scrub and bracken are addressed in Attribute A2 above. Any concerns highlighted through monitoring of Attribute 2 should trigger investigation and/or management control of Factor F2, with cross-reference to Factor 1.
F3. Burning	Burning is not considered an appropriate management tool for wet heath as it can damage <i>Sphagnum</i> mats and peat soils.	<i>Upper limit:</i> Not required <i>Lower limit:</i> No burning will be tolerated in the wet heath areas.

4.4 Conservation Objective for Feature 4: European dry heaths (EU habitat code 4030)

Vision for feature 4

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

- European dry heath will occupy at least 19 ha of Cernydd Carmel SAC.
- The dry heath will be dominated by varying mixtures of heather *Calluna vulgaris*, bilberry *Vaccinium myrtillus* and western gorse *Ulex gallii*, although *U. gallii* itself should not exceed 50% cover.
- Scrub, bracken, bramble, thistles, tall rushes, large docks and nettles will be largely absent.
- Bare ground will not exceed 10% cover.
- All factors affecting the achievement of these conditions, including grazing and scrub/bracken encroachment, are under control.

Performance indicators for Feature 4

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	This attribute was developed by Crowther & Groome (2004), with guidance from CCW staff. The lower limit is based on the extent of dry heath (approx. 16.5 ha) and potential dry heath (approx. 2.5 ha) mapped in 2003 – refer to map 2 in Crowther & Groome (2004). No upper limit has been set as the potential for expansion of dry heath is generally limited by natural edaphic factors and topography.	<i>Upper limit:</i> Not required <i>Lower limit:</i> Extent of dry heath and potential dry heath mapped in 2003.
A2. Quality	This attribute was developed by Crowther & Groome (2004), with guidance from CCW staff. The lower limit requires 70% of sample points in a series of representative plots (plots E-I) to be ‘good condition dry heath’. Plots E-I are shown in map 5 in Crowther & Groome (2004). No upper limit is required in this case. Good condition dry heath is defined as vegetation where, within a 1 m radius of any sample point: <ul style="list-style-type: none"> • Dwarf shrub (ericoids + <i>Ulex gallii</i>) cover is >75% • <i>Ulex gallii</i> cover is <50% • At least 2 of the ericaceous species <i>Erica cinerea</i>, <i>Calluna</i> and <i>Vaccinium</i> spp. are present, with a combined cover of >25% • <3 fronds of bracken are present • Bare ground cover is <10% • Trees, scrub, bramble, thistles, tall <i>Juncii</i>, large docks or nettle are absent. 	<i>Upper limit:</i> Not required <i>Lower limit:</i> At least 70% of sample points in plots E-I will be referable to ‘good condition dry heath’.
Performance indicators for factors affecting the feature		
Factor	Factor rationale and other comments	Operational Limits
F1. Grazing	An appropriate grazing regime is necessary to maintain dry heath vegetation in good condition. Under-grazing can lead to a tall, even-aged sward of mature and over-mature <i>Calluna</i> , or dense <i>Ulex gallii</i> . Lack of grazing will also result in scrub and bracken encroachment. Conversely over-grazing can lead to loss of ericoids, increased grass cover or excessive bare ground.	Limits relating to the effects of grazing are addressed in Attribute A2 above. Any concerns highlighted through monitoring of Attribute 2 should trigger investigation and/or management control of Factor F1.
F2. Scrub/bracken encroachment	Although encroachment of scrub and bracken is essentially a consequence of under-grazing (see Factor F1 above), it is treated as a separate factor here due to the distinct management techniques involved in the control of scrub and bracken.	Limits relating to spread of scrub and bracken are addressed in Attribute A2 above. Any concerns highlighted through monitoring of Attribute 2 should trigger investigation and/or management control of Factor F2, with

		cross-reference to Factor F1.
<i>Performance indicators for factors affecting the feature (cont.d)</i>		
<i>Factor</i>	<i>Factor rationale and other comments</i>	<i>Operational Limits</i>
F3. Burning	Burning of the dry heath areas may have been historically practised, but it has not been carried out in the recent past. Careful consideration would need to be given to any future proposals for burning of the dry heath.	<i>Upper limit:</i> Not required <i>Lower limit:</i> No burning should take place without prior consideration and approval.

4.5 Conservation Objective for Feature 5: Active raised bogs (EU habitat code 7110)

Vision for feature 5

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

- Active raised bog will cover at least 13 ha of Cernydd Carmel SAC.
- At least five raised bog peatland units will be present, occupying a series of peaty depressions within the Millstone Grit ridge.
- The mires will support a specialist bog flora including heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix*, deergrass *Scirpus cespitosus*, hare's-tail cotton-grass *Eriophorum vaginatum*, common cotton-grass *E. angustifolium*, bog asphodel *Narthecium ossifragum* and round-leaved sundew *Drosera rotundifolia*.
- Bog mosses *Sphagnum* spp. will be abundant, while purple moor-grass *Molinia caerulea* and other grasses will be scarce.
- The mire surfaces will display a characteristic hummock and hollow topography, with lawns of *Sphagnum* moss dominating the wet hollows.
- Scrub and bracken will be largely absent.
- All factors affecting the achievement of these conditions, including water levels, nutrient levels and grazing, will be under control.

Performance indicators for Feature 5

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.

<i>Performance indicators for feature condition</i>		
<i>Attribute</i>	<i>Attribute rationale and other comments</i>	<i>Specified limits</i>
A1. Extent	This attribute was developed by Crowther & Groome (2004), with guidance from CCW staff. The lower limit is based on the extent of raised bog (approx. 13 ha) mapped in 2003 – refer to map 2 in Crowther & Groome (2004). No upper limit has been set as the potential for expansion of raised bog is generally limited by natural edaphic factors and topography.	<i>Upper limit:</i> Not required <i>Lower limit:</i> Extent of raised bog mapped in 2003.
A2. Quality	This attribute was developed by Crowther & Groome (2004), with guidance from CCW staff. Certain inconsistencies in % cover values quoted by Crowther & Groome were also clarified when monitoring was repeated by CCW's SAC	<i>Upper limit:</i> Not required <i>Lower limit:</i> At least 60% of sample points in plots A-D will be referable to 'good condition raised bog'.

	<p>monitoring team in 2008 (Wilkinson, 2008).</p> <p>The lower limit requires 60% of sample points in a series of representative plots (plots A-D) to be 'good condition raised bog'. Plots A-D are shown in map 5 in Crowther & Groome (2004). No upper limit is required in this case.</p>	
Performance indicators for feature condition		
Attribute	Attribute rationale and other comments	Specified limits
A2. Quality (cont.d)	<p>Good condition raised bog is defined as vegetation where, within a 1 m radius of any sample point:</p> <ul style="list-style-type: none"> • Five or more of the following species are present: <i>Eriophorum vaginatum</i>, <i>E. angustifolium</i>, <i>Calluna vulgaris</i>, <i>Erica tetralix</i>, <i>Scirpus cespitosus</i>, <i>Narthecium ossifragum</i>, <i>Drosera rotundifolia</i>, <i>Rhynchospora alba</i> • total cover of <i>Sphagna</i> is >20% • cover of <i>Molinia</i> and other grasses is <10% <p>Trees, scrub and bracken are absent.</p>	
Performance indicators for factors affecting the feature		
Factor	Factor rationale and other comments	Operational Limits
F1. Water levels	<p>A high and stable water table is fundamental for the long-term conservation of the raised bogs at Cernydd Carmel. In an active, peat-forming system, the water table would normally be at or close to (within 10 cm) the mire surface throughout the year. Recent monitoring work by Crowther & Groome (2004) suggested that the unfavourable condition assessment was principally due to a drying out of the mire surfaces, although no significant evidence of drainage was noted within the individual bogs. Further investigation into the hydrology of the raised bogs is therefore required, to try to establish the cause(s) of the perceived drying out.</p>	Limits to be determined following future hydrological investigations.
F2. Water quality	<p>As an ombrotrophic (rain-fed) habitat, raised bogs are characterised by very low nutrient levels in the mire surface. Key species (notably peat-forming <i>Sphagna</i>) are highly susceptible to increases in nutrient levels, either from run-off from surrounding agricultural land or through atmospheric deposition (see Factor F3 below). As an indicator of oligotrophic conditions, pH has been chosen as the main criterion for assessing nutrient levels in the raised bogs at Carmel. Upper and lower limits specified here are based on a range of pH 2.7-4.5, which is typical for active raised bogs.</p>	<p><i>Upper limit:</i> surface water pH 4.5 <i>Lower limit:</i> surface water pH 2.7</p>
Performance indicators for factors affecting the feature (cont.d)		
Factor	Factor rationale and other comments	Operational Limits
F3. Atmospheric nutrient deposition	<p>In the absence of any inputs from surrounding land, raised bogs receive all their inorganic nutrients from precipitation or dry deposition. The critical load for raised and blanket bogs is 5-10 kg N/ha/yr. Current N deposition at this site is estimated at 19.2 kg N/ha/yr (source: Air Pollution Information Service,</p>	<p><i>Upper limit:</i> 10 kg N/ha/yr <i>Lower limit:</i> Not required</p>

	www.apis.ac.uk). Continued N deposition at this rate will encourage a spread of <i>Molinia</i> and a reduction in peat-forming <i>Sphagnum</i> spp. Local air quality should be regulated through rigorous development control measures, as well as wider environmental policies.	
F4. Scrub	Intact raised bogs are largely devoid of scrub due to the high surface water table. However, scrub can develop in certain situations, especially where the mire surface is drying out. Scrub encroachment will therefore not be tolerated in the raised bogs at Carmel.	Limits relating to scrub are addressed in Attribute A2 above. Any concerns highlighted through monitoring of Attribute A2 should trigger investigation and/or management of Factor F4, with cross-reference to Factor F1.
F5. Grazing	Grazing is not generally regarded as an essential tool in the conservation of pristine raised bog habitats, but does have a role on impacted sites such as Cernydd Carmel. It is currently practised on some of the raised bogs at Carmel and is presumably a historical activity. Grazing can be useful in suppressing <i>Molinia</i> growth, although potential input of nutrients through dunging should be borne in mind.	Grazing limits to be determined following future hydrological/ grazing studies.
F6. Burning	Many specialist bog species are intolerant of burning. Peat is combustible and fire has the potential to destroy a significant proportion of the mire substrate.	<i>Upper limit:</i> Not required <i>Lower limit:</i> No burning will be tolerated in the raised bog areas.

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 Feature 1: Turloughs (EU habitat code 3180)

Conservation Status of Feature 1

The turlough feature was monitored by CCW's SAC monitoring team in 2005/06 (Lovering, 2006). The feature was judged to be in **Unfavourable: un-classified** condition. This, however, was a provisional assessment, based on a precautionary approach due to lack of historic information on water quality at the site. Some concerns have been raised about certain parameters, namely phosphate levels, alkalinity and ionic levels, but future investigations will provide a fuller understanding of the turlough's water chemistry, enabling a more informed assessment of feature condition to be made. Aside from possible water quality parameters, there are no current concerns over seasonal water levels or vegetation attributes.

Management Requirements of Feature 1

Protection of the turlough's hydrological regime is fundamental to the long-term conservation of the feature. Any alterations to the cyclical fluctuation of the groundwater table could have a detrimental impact on the ecological and hydrological integrity of the turlough. Potential threats to its hydrology could arise through the construction of artificial drainage channels or culverts at the edge of the turlough itself, or through any lowering of the water table in the underlying aquifer by means of water abstraction or quarrying activities. The last two activities have the potential to impact upon the turlough if carried out anywhere within the catchment of the aquifer, not just in the immediate environs of the turlough. Any future proposals that could affect the hydrology of the turlough will therefore need to be carefully assessed and regulated.

The other main factor which could affect the conservation status of the turlough is water quality. Increased nutrient levels in particular could have a detrimental effect on its characteristic flora and fauna. Again this factor needs to be considered on a catchment scale and not just in the immediate vicinity of the turlough. Agriculture is the most likely potential source of any eutrophication in the aquifer, be it through direct application of fertiliser or slurry to farmland, or through accidental pollution from poorly maintained silage effluent or slurry systems. Low-intensity farming should therefore be encouraged throughout the aquifer's catchment. This should be achieved through direct management of farmland within NNR units, continued uptake of agri-environment agreements and other statutory mechanisms. Good agricultural practices should also be followed through appropriate regulatory means.

Occasional scrub control should be carried out in the turlough basin as required.

5.2 Conservation Status and Management Requirements of Feature 2: *Tilio-Acerion* forests of slopes, screes and ravines (EU habitat code 9180)

Conservation Status of Feature 2

The *Tilio-Acerion* forest feature was monitored by CCW in 2007 (Lucas, 2008). The feature was judged to be in **Unfavourable: declining** condition. This was mainly due to structural elements

including a shortage of mature trees, canopy gaps and deadwood; the feature also failed on the localised presence of dense bramble. On the positive side, the feature easily met the required criteria for species composition, including its characteristic ground flora and associated uncommon species.

It must be stressed that the conservation objective in its current form only considers high forest forms of *Tilio-Acerion*. No reference is made to coppice woodland at present. Nonetheless active consideration is being given to the reinstatement of coppice management at Carmel, at least in certain woodland units, due to the long history of coppicing at the site. The *Tilio-Acerion* conservation objective will therefore be amended shortly to incorporate additional attributes for coppice woodland, once the desired extent and condition of coppice woodland has been agreed. The conservation objective, and by definition the above condition assessment, must therefore be considered as provisional at present.

Management Requirements of Feature 2

Distribution and extent

To maintain the current extent of *Tilio-Acerion* woodland, no management as such is required, other than to ensure that none of the woodland is felled. However, excessive spread of scrub around the edges of individual woodland blocks should be controlled as required, to maintain the historic woodland-grassland landscape pattern. Such management is ongoing, notably in The Grasslands Trust NNR units.

Woodland structure

The current unfavourable condition assessment is largely a reflection of the relatively young structure of the *Tilio-Acerion* woodland. Although Carmel is regarded as an ancient woodland site (Lister & Whitbread, 1988), the woods have been regularly harvested for timber in the past. Hence structural elements such as mature and over-mature trees, canopy gaps and deadwood are under-represented at the site. However, as the woodland develops as high forest, these features should become more prevalent through natural dynamic processes. It is anticipated that the desired structural criteria for high forest could probably be achieved over time through a simple minimum-intervention regime, with management largely limited to light thinning of young canopy trees around older specimen oaks, to prolong their longevity.

The current structural criteria in the *Tilio-Acerion* conservation objective largely relate to a desired state for high forest. Obviously these criteria are not compatible with the structural composition of coppice woodland, so the conservation objective will need to be revised to take account of future coppice management, once a coppice plan has been agreed. It is likely that certain woodland units will be earmarked for the reintroduction of coppicing, while other units will be allowed to develop as high forest. The current structural criteria can then be applied solely to the high forest areas, with new structural criteria developed specifically for the coppice plots. Various management recommendations – including proposed locations for reintroduction of coppicing – have been put forward by Peterken (1999); it is likely that these proposals will form the basis for future coppice management at Carmel.

Woodland species composition

The characteristic species composition of the Carmel *Tilio-Acerion* is one of its key attributes. In particular, the conservation of its species-rich ground flora and associated uncommon species should be a fundamental consideration in the planning of any woodland management at the site. During the 2007 monitoring, the ground flora was found to meet the required criteria in the great majority of woodland units, suggesting that the current stage of woodland development (i.e. high forest) allows a species-rich ground flora to persist.

Despite the high frequency of key woodland herbs, dense bramble was a concern at a number of sample points. It should be noted that bramble has responded vigorously to increased light levels following the recent (2001/02) thinning and coppicing of the woodland around Glangwenlais Quarry, with a corresponding decline in typical woodland herbs. This bramble infestation might be an early transitional phase in the coppice cycle, or it could be a consequence of complete stock exclusion in the Glangwenlais Quarry unit. Coppicing combined with light grazing may result in a less vigorous growth of bramble, allowing the typical ash woodland herbs to flourish under coppice conditions. However, in view of the current bramble dominance at Glangwenlais, it is advised that no further coppicing is undertaken in any ungrazed woods at Carmel, at least not until the effects on the Glangwenlais ground flora are examined throughout the current coppice cycle. Further consideration is given to the effects of grazing below.

Non-native species

Beech and sycamore are treated as non-native species at Cernydd Carmel and their spread is viewed as undesirable. These species should be controlled within the *Tilio-Acerion* as required, to maintain the native species composition of the canopy and shrub layers. It should be noted there has been considerable regeneration of sycamore in the Glangwenlais Quarry 2001/02 coppice plots. It is therefore likely that additional sycamore control will be necessary in any stands where future coppice management is undertaken.

Grazing

Although certain woodland blocks are ungrazed, notably the Glangwenlais Quarry unit, the majority of woods at Cernydd Carmel are open to livestock. Indeed Rackham (1992) considers that most woods have not excluded stock for at least 100 years, if they ever did so. Nonetheless most of the *Tilio-Acerion* woodland appears to be only lightly grazed. Cattle and ponies are the predominant grazers in the area, and the rocky limestone floor in most woods seems to provide a natural deterrent to *regular* incursions by livestock. Certainly the rich ground flora and abundant regeneration in most woods suggests that the current grazing regime does not have a detrimental effect on the characteristic species composition of the *Tilio-Acerion* woodland. Indeed it may be beneficial in suppressing bramble growth and maintaining species-richness.

It is therefore proposed that light grazing by cattle and ponies should continue in most of the *Tilio-Acerion* units at Carmel. As stated above, this grazing may be especially beneficial in any areas where coppicing is reinstated, as light grazing can inhibit bramble response in such situations. The introduction of sheep grazing, however, should be discouraged. It is likely that sheep would find the rocky woodland terrain less of an obstacle, and could have a potentially damaging effect on ground flora species and regeneration.

5.3 Conservation Status and Management Requirements of Feature 3: Northern Atlantic wet heaths with *Erica tetralix* (EU habitat code 4010)

Conservation Status of Feature 3

The Northern Atlantic wet heath feature was last monitored by CCW's SAC monitoring team in 2008 (Wilkinson, 2008). The feature was judged to be in **Unfavourable: unchanged** condition, with less than 2% of sample points meeting the definition of good condition wet heath. The main basis for this assessment was the relatively high cover of *Molinia*. Low cover of ericoids and *Sphagnum* spp. was another contributory factor. It is proposed that under-grazing in some of the wet heath stands is the principal factor responsible, although grazing at inappropriate times of year (i.e. winter) may account for the low cover of ericoids at certain sample points.

Management Requirements of Feature 3

An appropriate grazing regime is necessary to deliver favourable conservation status for the Northern Atlantic wet heath feature. Shortage of grazing can result in a high cover of *Molinia*, together with encroachment by scrub and bracken.

The high cover of *Molinia* in the Carmel wet heath vegetation is the principal reason for its current unfavourable condition. Insufficient grazing, at least in certain stands, is considered to be the main causal factor. To address this issue, a suitable grazing regime should be implemented across the site. Most of the wet heath stands are grazed by ponies or cattle, which are the preferred grazers for this type of habitat. Grazing by sheep should be discouraged due to their selective grazing habits.

Within the grazed units, slightly higher stocking rates should therefore be considered, although grazing should not be increased to a level where the cover of dwarf shrubs is reduced. Furthermore grazing outside of the spring and summer period should be avoided, as grazing during the winter months can result in the preferential grazing of ericoids in the absence of other palatable vegetation.

A few of the wet heath stands are currently ungrazed (e.g. unit 22). Introduction of grazing to these stands should be encouraged, to reduce the rank growth of *Molinia* and prevent any future scrub or bracken development.

Although scrub and/or bracken encroachment has not been identified as a problem at the current time, scrub or bracken control may become necessary at some stage, if future monitoring highlights any such requirement.

5.4 Conservation Status and Management Requirements of Feature 4: European dry heaths (EU habitat code 4030)

Conservation Status of Feature 4

The European dry heath feature was last monitored by CCW's SAC monitoring team in 2008. The feature was judged to be in **Unfavourable: un-classified** condition, with only 10% of sample points meeting the definition of good condition dry heath. The main reason for this was a failure to reach >75% combined cover for ericoids and *Ulex gallii*. Excessive grazing in certain units is thought to be the main factor responsible for the relatively low ericoid/*U. gallii* cover, although one ungrazed plot (H) also failed on this criterion, perhaps because the sward is still developing in a former quarry situation. Other ungrazed plots (G and I) failed due to a high frequency of bracken and scrub.

Management Requirements of Feature 4

To achieve favourable conservation status for the European dry heath feature, an appropriate grazing regime is required, both in terms of stocking rates and grazing times. Overgrazing will result in a reduced cover of dwarf shrubs; lack of grazing will lead to scrub and bracken encroachment, together with rank, leggy heather growth. Pony or cattle grazing is preferential to sheep, due to the selective grazing habits of sheep.

The monitoring carried out in 2008 showed that some of the grazed dry heath stands are exhibiting localised signs of overgrazing (e.g. units 5 and 11). Reduced stocking levels in these units should enable recovery of the sward and a shift towards favourable condition. Again winter grazing should be discouraged to avoid preferential grazing of ericoids.

Reintroduction of grazing to the currently unmanaged dry heath areas is necessary to prevent further scrub and bracken encroachment, which has been identified as a problem in certain stands (e.g. units 26 and 27). Scrub and bracken control should also be carried out where required.

5.5 Conservation Status and Management Requirements of Feature 5: Active raised bogs (EU habitat code 7110)

Conservation Status of Feature 5

The active raised bog feature was last monitored in 2008 by CCW's SAC monitoring team. The feature was judged to be in **Unfavourable: unchanged** condition. Less than 11% of sample points met the definition of good condition raised bog. The main reason for this assessment was the low cover of *Sphagna* and the relatively high cover of *Molinia* and other grasses.

Management Requirements of Feature 5

High *Molinia* cover and a shortage of *Sphagna* in raised bogs is often attributable to surface or peripheral drainage. However, the lack of any obvious drainage affecting the Carmel mires suggests another factor could be involved.

Lack of grazing in most of the raised bog stands could be resulting in a dominance of *Molinia*, which in turn is suppressing *Sphagnum* growth. Indeed the one stand that is currently grazed is of markedly better quality than the ungrazed units. Efforts should therefore be made to reintroduce grazing to the currently unmanaged stands. Investigations might also be required to establish whether any hydrological or atmospheric deposition problems are affecting the raised bog vegetation.

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	001613	Unit 1	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
2	001614	Unit 2	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
3	001615	Unit 3	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
4	001616	Unit 4	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
5	001617	Unit 5	An appropriate light grazing regime, based on ponies or horses, is necessary to ensure favourable condition of the wet and dry heath features.	Yes
6	001618	Unit 6	Potential input of nutrients to the aquifer should be avoided.	No
7	001619	Unit 7	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer	No
8	001620	Unit 8	Potential input of nutrients to the aquifer should be avoided.	No
9	001621	Unit 9	Potential input of nutrients to the aquifer should be avoided.	No
10	001622	Unit 10	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
11	001623	Unit 11	An appropriate light grazing regime, based on ponies or horses, is necessary to ensure favourable condition of the wet and dry heath features.	Yes
12	001624	Unit 12	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
13	001625	Unit 13	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
14	001626	Unit 14	Potential input of nutrients to the aquifer should be avoided.	No
15	001627	Unit 15	Potential input of nutrients to the aquifer should be avoided.	No
16	001628	Unit 16	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
17	001629	Unit 17	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
18	001630	Unit 18	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
19	001631	Unit 19	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
20	001632	Unit 20	An appropriate light grazing regime, based on ponies or horses, is necessary to ensure favourable condition of the dry heath feature.	Yes
21	001633	Unit 21	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
22	001634	Unit 22	Further studies of the raised bogs are needed to investigate the hydrological problems affecting these habitats, before instigating restorative conservation management. An appropriate light grazing regime, based on ponies or horses, is also necessary to ensure favourable condition of the wet and dry heath features.	Yes
23	001635	Unit 23	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
24	001636	Unit 24	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
25	001637	Unit 25	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
26	001638	Unit 26	An appropriate light grazing regime, based on ponies or horses, is necessary to ensure favourable condition of the dry heath feature. Scrub and bracken control may also be required.	Yes
27	001639	Unit 27	Further studies of the raised bogs are needed to investigate the hydrological problems affecting these habitats, before instigating restorative conservation management. An appropriate light grazing regime, based on ponies or horses, is also necessary to ensure favourable condition of the wet and dry heath features.	Yes
28	001640	Unit 28	An appropriate light grazing regime, based on ponies or horses, is necessary to ensure favourable condition of the wet and dry heath features.	Yes
29	001641	Unit 29	Potential input of nutrients to the aquifer should be avoided.	No
30	001642	Unit 30	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer. Traditional farming practices should be followed to maintain the species-rich neutral grassland.	No
31	001643	Unit 31	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer. Traditional farming practices should be followed to maintain the species-rich neutral grassland and marshy grassland. The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed).	No

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
32	001644	Unit 32	An appropriate light grazing regime, based on ponies or horses, is necessary to ensure favourable condition of the dry heath feature.	Yes
33	001645	Unit 33	An appropriate light grazing regime, based on ponies or horses, is necessary to ensure favourable condition of the wet and dry heath features. Further studies of the raised bogs are needed to investigate the hydrological problems affecting this habitat, before instigating restorative conservation management.	Yes
34	001646	Unit 34	Further studies of the raised bogs are needed to investigate the hydrological problems affecting this habitat, before instigating restorative conservation management. An appropriate light grazing regime, based on ponies or horses, is also necessary to ensure favourable condition of the dry heath feature.	Yes
35	001647	Unit 35	Potential input of nutrients to the aquifer should be avoided.	No
36	001648	Unit 36	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer. The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed).	No
37	001649	Unit 37	Potential input of nutrients to the aquifer should be avoided.	No
38	001650	Unit 38	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
39	001651	Unit 39	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
40	001652	Unit 40	Further studies of the raised bogs are needed to investigate the hydrological problems affecting these habitats, before instigating restorative conservation management. An appropriate light grazing regime, based on ponies or horses, is also necessary to ensure favourable condition of the wet heath feature. Suitable grazing has just been reinstated here.	Yes
41	001653	Unit 41	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
42	001654	Unit 42	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Potential input of nutrients to the aquifer should be avoided.	No

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
43	001655	Unit 43	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Potential input of nutrients to the aquifer should be avoided. Further studies of the raised bogs are needed to investigate the hydrological problems affecting these habitats, before instigating restorative conservation management. An appropriate light grazing regime, based on ponies or horses, is also necessary to ensure favourable condition of the wet and dry heath features.	Yes
44	001656	Unit 44	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Potential input of nutrients to the aquifer should be avoided.	No
45	001657	Unit 45	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Potential input of nutrients to the aquifer should be avoided.	No
46	001658	Unit 46	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
47	001659	Unit 47	An appropriate light grazing regime, based on ponies or horses, is also necessary to ensure favourable condition of the dry heath feature.	No
48	001660	Unit 48	No SAC feature represented, but part of habitat mosaic of quartzite ridge.	No
49	001661	Unit 49	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
50	001662	Unit 50	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Potential input of nutrients to the aquifer should be avoided.	No
51	001663	Unit 51	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Potential input of nutrients to the aquifer should be avoided.	No
52	001664	Unit 52	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Potential input of nutrients to the aquifer should be avoided, and any artificial drainage which could affect the hydrology of the turlough. Occasional scrub control should be carried out in the turlough basin as required.	No

Unit Number	CCW Database Number	Unit Name	Summary of Conservation Management Issues	Action needed?
53	001665	Unit 53	The ash woodland should be managed under a minimum-intervention regime, apart from where coppice management is to be reinstated (location of coppice plots within SAC still to be agreed). Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
54	001666	Unit 54	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
55	001667	Unit 55	No SAC feature represented, but part of habitat mosaic of quartzite ridge.	No
56	001668	Unit 56	No SAC feature represented, but part of habitat mosaic of quartzite ridge.	No
57	001669	Unit 57	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
58	001670	Unit 58	Potential input of nutrients to the aquifer should be avoided.	No
59	001671	Unit 59	Potential input of nutrients to the aquifer should be avoided.	No
60	001672	Unit 60	Low intensity farming and good agricultural practices will be encouraged to minimise nutrient inputs to the aquifer.	No
61	001673	Unit 61	Potential input of nutrients to the aquifer should be avoided.	No

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 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

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

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 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

Blackstock, T.H., Duigan, C.A., Stevens, D.P. & Yeo, M. (1993). Vegetation zoning and invertebrate fauna in Pant-y-llyn, an unusual seasonal lake in South Wales, UK. *Aquatic Conservation: Marine and Freshwater Ecosystems*, Vol. 3, 253-268.

Crowther, K. & Groome, G. (2004). *Condition assessment of the Northern Atlantic wet heath with Erica tetralix, European dry heath and active raised bog habitats within the Cernydd Carmel cSAC*. CCW Environmental Monitoring Report No. 4. CCW, Bangor.

Dyfed Archaeological Trust (1992). *Past land-use at Carmel Woods, near Llandybie, Dyfed: an historical and archaeological survey*. Unpublished report to CCW.

Lister, J. & Whitbread, A. (1988). *Carmarthenshire Inventory of Ancient Woodland*. CSD Report. NCC, Peterborough.

Lovering, T. (2006). *Cernydd Carmel SAC monitoring report: turlough*. Unpublished CCW report.

Lucas, A. (2008). *Cernydd Carmel SAC monitoring report: Tilio-Acerion forests of slopes, screes and ravines*. Unpublished CCW report.

Mileto, R. & Castle, G. (1994). *Carmel Woods NVC woodland survey*. Unpublished report to CCW.

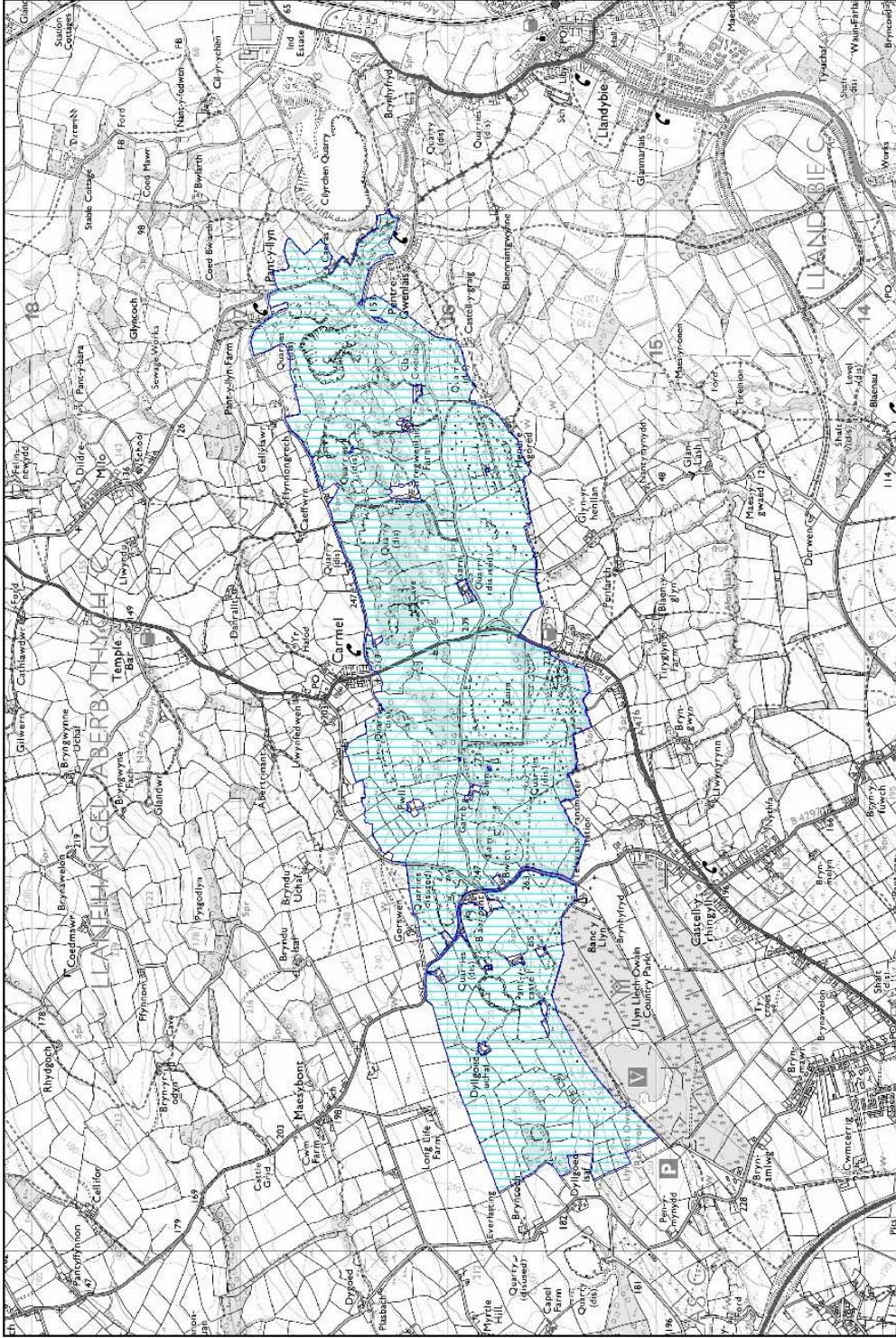
Peterken, G.F. (1999). *Management of Carmel Woods, Dyfed*. Unpublished report to CCW.

Rackham, O. (1992). *Carmel Woods*. Unpublished report to CCW.

Stringer, R.H. & Davies, R.H. (1989). *A botanical survey of Carmel Woods, Dyfed, Wales*. Unpublished report.

Wilkinson, K. (2008). *Cernydd Carmel SAC monitoring report: North Atlantic wet heath with Erica tetralix, European dry heath and Active raised bog*. Unpublished CCW report.

Cernydd Carmel SAC



Produced by CCW on: 14 April 2008

Scale 1:25000

OS base maps reproduced with permission of HMCO. Crown copyright reserved. CCW licence No. 100018813

