



Application writing Example proposals

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LIFE + Nature and Biodiversity

TECHNICAL APPLICATION FORMS

**Part B – technical summary and
overall context of the project**

SUMMARY DESCRIPTION OF THE PROJECT (Max. 3 pages; to be completed in English)

Project title: Restoring alkaline fen and calcareous fen within the Corsydd Mon and Llyn (Anglesey and Llyn Fens) SACs in Wales.

Objectives:

The objective of this project is to bring 751 ha of fen within the Corsydd Mon/Anglesey Fens SAC and Corsydd Llyn/Lleyn Fens SAC into favourable or recovering condition through measures aimed at tackling the factors adversely affecting their condition and by delivering more sympathetic management.

Specifically we will:

- address each of the factors responsible for the unfavourable condition of the Annex I fen features of these sites
- direct and facilitate change within the catchments of the project area to further tackle the causal factors of unfavourable condition.

Actions and means involved:

The factors to be addressed each represent a critical threat and are:
management neglect or inappropriate management on and adjacent to sites
nutrient enrichment
drainage

successional change (leading to scrub development and other undesirable changes)
inappropriate management of land outside direct conservation management, leading to cultural enrichment and ecological fragmentation
uncontrolled burning
climate change
ecological fragmentation
lack of information about the importance of the project sites and the need for wetland conservation management

The actions taken by this project will address each of these threats, which are detailed further in section B2d.

Neglect and inappropriate management (Threat 1) have led to ecological dereliction and the development of rank derelict vegetation at the expense of both Annex I habitats. The following actions and means will address this:

- Mowing and harvesting of rank derelict vegetation to enable the implementation of appropriate grazing management. Mowing and simultaneous harvesting of cut material will be carried out using specialist machinery. Sensitive areas will be hand mown and raked/baled. Cut biomass will be used together with stripped peat to establish and support a local composting enterprise.
- Appropriate maintenance and restoration grazing will be secured and will involve introduction of suitable livestock, seasonal grazing regimes and optimal grazing intensities, and development of a sustainable local market.
- Scrub encroachment will be managed by cutting, hand-pulling and appropriate after treatment.

Nutrient enrichment (Threats 2 and 5), direct reductions in nutrient inputs will be achieved by the following actions and means:

- installation of one-off nutrient reduction facilities on land owned by the Countryside Council for Wales (CCW) or negotiated with landowners on and around the project area
- installation of measures or removal of nutrient sources at locations before or where nutrients enter the project area will be delivered through CCW's delivery mechanism (Section 15 of the Countryside and Rights of Way Act)
- existing enriched substrate will be removed on 5 sites, and grazing and biomass removal will be applied on all sites to remove nutrients.

Drainage (Threat 3) - improvements to hydrological regimes will be enabled by the following actions:

- drains will be blocked, raising water levels and reducing further damage to drying peat by shrinkage and oxidation, and re-establishing water level regimes which are required for the two Annex 1 habitats
- hydrological pathways will be restored through a varied programme of ditch blocking, infilling, diversion and re-engineering to create (as appropriate) diffuse surface and sub-surface flows on and outside sites. This activity is essential to restore key groundwater supply pathways.

Successional change (Threat 4) will be addressed by all of the management neglect actions (See above) and also by:

- localised peat stripping and direct scrub control.

Inappropriate management of land (Threat 5) outside direct conservation management will be addressed by:

- innovative and demonstrative use of management agreements
- land purchase
- a programme of engagement with agricultural and other stakeholders to raise awareness and establish partnership working.

Uncontrolled burning (Threat 6) will be greatly reduced by the management neglect actions (see above) which will reduce fuel load and also by:

- mown fire breaks to reduce the likelihood of extensive fires.

Climate change (Threat 7) - increased resilience to climate change will be addressed by the following actions:

- creation and expansion of 'stepping stones' and ecological corridors on and between disparate sites
- reducing water loss caused by a high cover of scrub and tall vegetation.

Fragmentation Historically, these sites sat in the centre of a complex of complementary habitats and low-intensity land use and have become remnants of larger valley and basin mire systems. Improvements in condition, and FCS, and favourable management activities within the catchments will re-build corridors and pathways between and on sites for Annex I and II habitats and species.

Information - the following actions will address lack of information and understanding:

- demonstration events and open days
- publications e.g. newsletter (400), leaflets (5000)
- establishment of stakeholder groups for consultation and participative purposes
- establishment of project website.

Expected results (quantified as far as possible):

We will bring 751 ha of fen within the Corsydd Mon/Anglesey Fens SAC and Corsydd Llyn/Lleyn Fens SAC into favourable or recovering condition through a suite of measures aimed at delivering more sympathetic management. Detailed expected results for the Fen SACs are:

- We will bring 84 ha of alkaline fen and 104 ha of calcareous fen into favourable or recovering condition through a suite of measures aimed at delivering more sympathetic management
- 114 ha will be mown and harvested
- Sustainable grazing management will be managed on 446 ha
- Scrub management will be applied to 60 ha

- Controlled burning will be applied to 168 ha

2007- B1 contd

- Management Agreements will be negotiated on a minimum of 217 ha within, linking or critical to the integrity of the SAC
- Constructed wetlands will be installed in 8 locations
- 15 ha of peat stripping and topographic re-profiling will be carried out
- 3479 m of hydrological pathways will be restored
- Water levels will be raised along 5813 m of ditches
- 66 ha of land will be taken into conservation ownership
- 76 ha of firebreaks will be created
- 4 colonies of Annex II species will be brought back into favourable condition
- Farm nutrient, biodiversity and diversification management plans will be written for 40 farms
- 8 access gates designed by local school children will be installed
- 22 site signs will be erected, 1 website will be established

GENERAL DESCRIPTION OF THE AREA / SITE(S) TARGETED BY THE PROJECT

Name of the project area: .. Corsydd Mon / Anglesey Fens

Surface area (ha): 467.19 ha.....

EU protection status: SPA **NATURA 2000 Code :**
pSCI **NATURA 2000 Code :**UK0012884.....

Other protection status according to national or regional legislation:

Cors Goch SSSI and National Nature Reserve (NNR); Cors Erddreiniog SSSI and NNR; Cors Bodeillio SSSI and NNR; Caeau Talwrn SSSI; Waun Eurad SSSI; Gwenfro and Rhos y Gad SSSI; Craig Wen/Cors Castell SSSI; Cors y Farl SSSI
Anglesey and Llyn Fens Ramsar site (UK140005)

Main land uses and ownership status of the project area:

	on SAC	in Catchment
Farming	20%	70%
Tourism	5%	5%
Nature Conservation	70%	20%

Ownership of catchment area: private 85%, public 15%

Ownership of SAC: private 50%; public 50%

Scientific description of project area:

The Anglesey Fens SAC comprises 7 wetland sites occurring in valley-head or basin contexts. The climate is oceanic, with mild winters and moderate precipitation (c. 1100mm p.a). Morphologically the SAC ranges from extensive complex sites with marginal soligenous fens grading into core topogenous fens with deep deposits of peat and marl such as Erddreiniog (289ha), to small soligenous wetlands manifesting as discrete sloping seepage faces, such as Waun Eurad (3.7ha).

The sites are influenced by groundwater sourced from Palaeozoic sedimentary rocks and drift deposits. This is predominately alkaline and of critical significance to the rich-fen communities. Surface runoff and rainfall also contribute significant amounts of water and together with the topographic retention of water result in perennially high water tables.

The habitat cover is dominantly wetland and mostly herbaceous rich-fen. Annex I habitats that are the primary reason for the selection of the SAC are 'Alkaline fen' (H7230) and 'Calcareous fen with *Cladium mariscus* and species of the *Caricion davallianae*' (H7210). 'Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp' (H3140) are also a primary reason for site selection and will benefit from all of the measures proposed primarily for the fen features in this application.

Alkaline fen occurs within the SAC as marginal zones of soligenous fen and as topogenous stands within the main fen basins. All examples appear to be associated with calcareous groundwater seepage. Vegetation dominated by black bog-rush *Schoenus nigricans* mire ([M13] in the British NVC scheme of Rodwell (1991) forms the bulk of the soligenous element of this resource and this SAC supports the best quality and most extensive stands in western Britain (Wheeler, 1980b)

The stands of calcareous fen represent the second largest area of this vegetation in the UK and include vegetation strongly dominated by saw sedge *Cladium mariscus*. *Cladium* dominance appears mainly associated with lack of management, and many of the measures outlined in this project are aimed at securing a more open and species-rich vegetation commensurate with the core definition of this habitat in a UK context.

Both fen features sit within a wider supporting matrix of mainly topogenous fen and fen meadow. Substantial areas are suffering from management neglect and represent degraded successors to the Annex I types. Widespread drainage has contributed to this degradation trend. Project actions will reverse the trend of degradation and restore examples of both Annex I habitats.

Other Annex I habitats present as qualifying features on this SAC are 'Northern Atlantic wet heaths with *Erica tetralix* (4010), and 'Molinia meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caeruleae*)' (6410). Other habitats within the SAC include wet woodland, various forms of swamp vegetation, and both neutral and calcareous grassland.

The Anglesey Fens SAC hosts several Annex II invertebrate species including Geyer's whorl snail *Vertigo geyeri* (1013), Southern damselfly *Coenagrion mercuriale* (1044) and marsh fritillary butterfly *Euphydryas aurinia* (1065). All of these species will benefit from the measures outlined in this application for rich-fen restoration. Other nationally rare or scarce invertebrates recorded from these fens include the soldier fly *Stratiomys chamaeleon* and the leaf hopper *Cicadella lasiocarpae*.

Importance of the project area for biodiversity and/or conservation of the species/habitat types targeted at regional, national and EU level

The Anglesey fens SAC supports the most ecologically significant and extensive concentration of rich-fen habitat in Wales (Jones *et al*, 2003) and western Britain as a whole (Ratcliffe, 1977). Some of the individual sites support particularly large expanses of rich-fen habitat that are '*among the habitats [in Europe] that have undergone the most serious decline*' (Commission of the European Communities, 1991). Based on the most up-to-date information available (JNCC, 2007), the Anglesey Fens SAC supports 42% of the total Welsh resource of Alkaline fen and 3.9% of the UK SAC resource of this habitat.

The Anglesey fens support the second largest area of calcareous fen in the UK (Jackson & McLeod, eds, 2000), amounting to 56% of the Welsh and 19% of the UK SAC resource based on JNCC (2007).

In a European context, alkaline fen is rare and of limited total extent because of very significant habitat loss (Commission of the European Communities, 1991) and its requirement for rather specific hydrological regimes (Brooks *et al.*, 2004). The situation with respect to calcareous fen is similar; this habitat is generally rare in Europe (Jackson & McLeod, eds, 2000) and extensive examples occurring within a wider rich-fen context are of particular importance. The oceanic character of these examples of both habitats is the defining feature of their biogeographical distinctiveness, and further underlines their significance in a European context.

The importance of the Anglesey Fens for alkaline and calcareous fen makes them a logical focus for this project. The planned actions have been developed to address both the unfavourable condition and conservation status of the habitats themselves, and the factors which influence condition and ultimately the prospects for their recovery.

GENERAL DESCRIPTION OF THE AREA / SITE(S) TARGETED BY THE PROJECT

Name of the project area:Corsydd Llyn/Lleyn fens.....

Surface area (ha):283.68 ha.....

EU protection status: SPA **NATURA 2000 Code :**
pSCI **NATURA 2000 Code :** ... UK0030187

Other protection status according to national or regional legislation:

Cors Hirdre SSSI; Cors Geirch SSSI and National Nature Reserve (NNR); Rhyllech Uchaf SSSI; Abergeirch SSSI.

Anglesey and Llyn Fens Ramsar site (UK 140005)

Main land uses and ownership status of the project area:

	on SAC	in Catchment
Farming	20%	70%
Tourism	5%	5%
Nature Conservation	70%	20%

Ownership on catchment area: private 95%, public 5%

Ownership on SAC: private 90%, public 10%

Scientific description of project area:

The Lleyn Fens SAC comprises a total of 4 wetland sites on the Llyn Peninsula, 50km south-west of the Anglesey Fens area. It spans almost the entire width of the Llyn Peninsula; the Abergeirch and Rhyllech Uchaf SSSI define the northern and southern limits of the SAC and are relatively small seepage-fed sites. In-between lie the valley-head systems of Cors Hirdre and Cors Geirch. The Llyn fens sit within a predominantly agricultural landscape subject to intensive pastoral management. The climate is oceanic, with mild winters and moderate precipitation (c. 1100mm p.a).

The hydrology of the Llyn fens differ markedly from the Anglesey suite in that the groundwater influence is derived largely from superficial drift deposits comprising extensive terrace deposits of locally calcareous sand, silt and gravel on the bounding valley sides.

The Annex I habitat that is the primary reason for the selection of this SAC is 'alkaline fen' (7230); 'Calcareous fen with *Cladium mariscus* and species of the *Caricion davallianae*' (7210) is present as a qualifying feature.

Alkaline fen occurs within the Corsydd Llyn SAC as narrow zones of soligenous fen around the margins of the sites, and as topogenous stands within the main fen basins. All appear to be associated with calcareous groundwater manifesting either as direct discharge, or as slow lateral percolation over the surface or within the uppermost layers of peat. Vegetation dominated by black bog-rush *Schoenus nigricans* mire ([M13] in the British NVC scheme; Rodwell, 1991) forms the bulk of the soligenous element of this resource, and this SAC supports the second largest extent of this habitat (after Anglesey Fens SAC) in western Britain.

Stands of calcareous fen are confined within the SAC to Cors Geirch and include vegetation strongly dominated by saw sedge *Cladium mariscus*, as well as more open and species-rich vegetation with elements of the *Caricion davallianae*. Important examples of the *Cladium - Molinia* community (*Cladio-Molinietum*) of calcareous fen occur within the SAC (Shaw & Wheeler, 1992) on predominantly topogenous peats, together with extensive areas of more strongly modified topogenous fen variously dominated by blunt-flowered rush *Juncus subnodulosus*, purple moor-grass *Molinia caerulea*, common reed *Phragmites australis* and bog myrtle *Myrica gale*. Much of this vegetation may be of secondary origin following extensive peat cutting, and substantial areas are suffering from management neglect and likely to represent degraded successors to Annex I types. Management effort will seek to reverse the trend of degradation and restore examples of both Annex I habitats.

The Llyn Fens SAC hosts several Annex II species associated with and dependent upon rich-fens including Desmoulin's whorl snail *Vertigo moulinsiana* (1016) and Geyer's whorl snail *Vertigo geyeri* (1013). The Llyn Fens support a significant wider invertebrate interest, with notable species of Lepidoptera, Hymenoptera, Coleoptera, Diptera, Hemiptera and Odonata. The vertebrate fauna of Llyn Fens is similar to that of Anglesey Fens.

Importance of the project area for biodiversity and/or for the conservation of the species/habitat types targeted at regional, national and EU level (give quantitative information if possible):

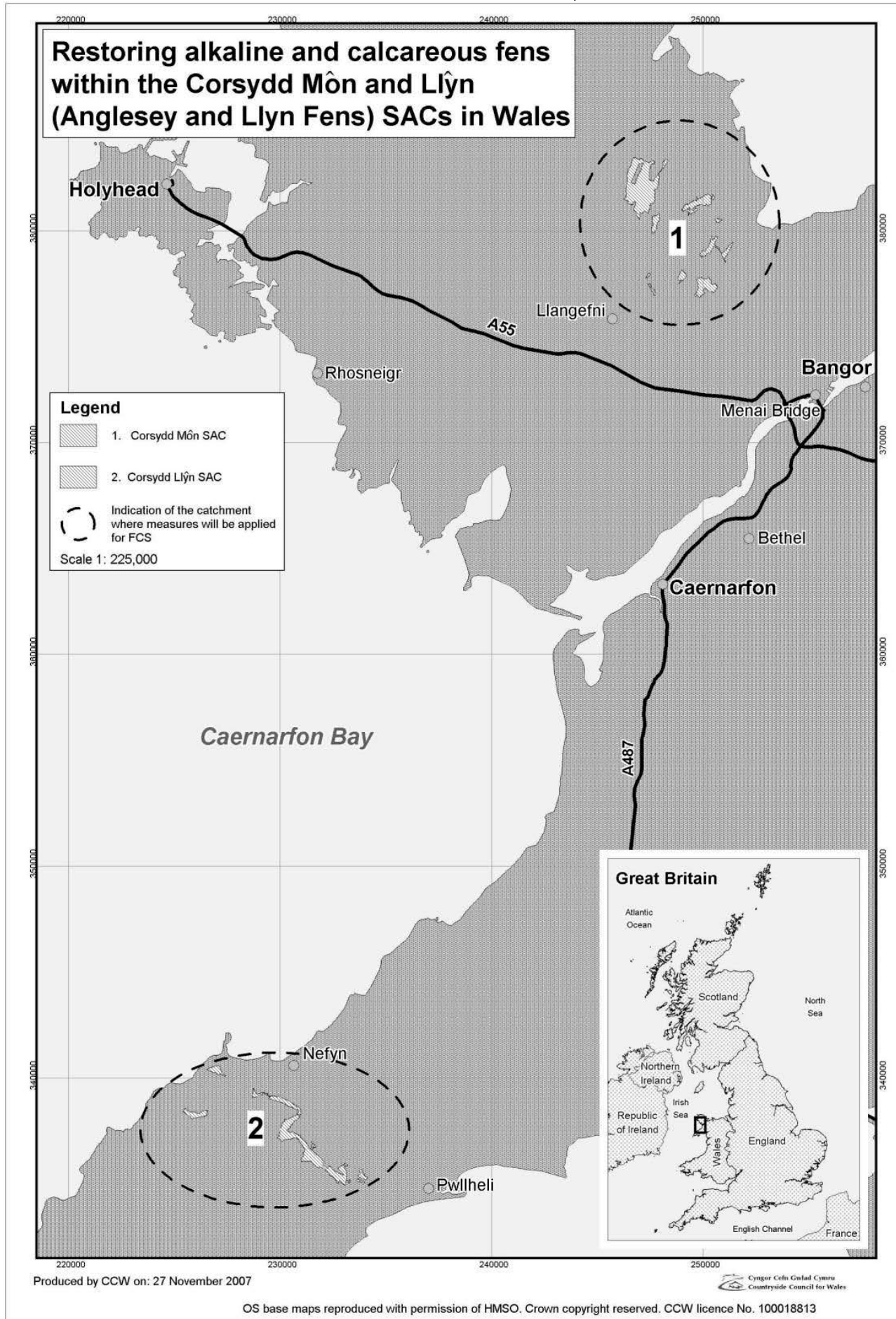
The Llyn Fens represent the next most significant concentration of calcareous rich-fen vegetation in Wales after the Anglesey Fens, supporting just over 13% and 6% respectively of the Welsh and UK SAC resource of alkaline fen. These figures underplay the significance of the alkaline fen resource, and the proportional significance of the Llyn sites for alkaline fen vegetation dominated by *Schoenus nigricans* is much greater in both regional and UK terms; this also applies to the Anglesey examples.

Calcareous fen in Llyn amounts to 6.5% and 2% respectively of the Welsh and UK SAC resource of this habitat, but these figures do not reflect the disproportionate importance of the Llyn resource in terms of habitat quality and character.

The Llyn examples of both Annex I habitats represent the most westerly regional concentration of the resource in Great Britain. Together with the Anglesey Fens, they define a western British stronghold for these habitats on the Atlantic fringe of Europe, but also display a number of distinct ecological factors including their exclusive dependence on drift as a source of groundwater.

The Llyn Fens support the same features and face the same threats as the Anglesey Fens and require the same broad programme of restorative measures. The relatively close proximity of the two areas will enable a coordinated programme of action and give logistical benefits such as sharing of equipment, grazing stock, personnel and expertise. Most importantly, the inclusion of both sites means that this project will make a significant contribution to securing the favourable conservation status of the main western British representation of the two Annex I habitats.

MAP OF GENERAL LOCATION OF THE PROJECT AREA (Refer ANNEX 1 for Scale Colour Map)



**DESCRIPTION OF SPECIES / HABITATS / BIODIVERSITY ISSUES
TARGETED BY THE PROJECT**

See Annex 8 for further information on occurrence and distribution.

Name: Alkaline fens Annex I: 7230

Habitat area: 84 ha

Status: Unfavourable declining. At Corsydd Mon, condition assessment revealed failure to achieve target standards on 5 out of 7 component SAC sub-sites. Attributes relevant to this assessment included excess *Molinia caerulea* litter and lack of brown moss components in many samples, the former probably due to undergrazing and the latter to associated shade or surface standing water (Creer, 2005).

Name: Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* Annex I: 7210

Habitat area: 104 ha

Status: Unfavourable. Large areas of calcareous fen at Cors Erddreiniog in particular have been subject to drainage resulting in the removal of surface standing water and the development of *Molinia caerulea* dominated stands. Some improvements have been made but drainage of peripheral areas continues to affect the feature. The paucity of species-rich calcareous fen is a cause for concern and results in the overall unfavourable condition assessment (Creer, 2005).

Name: Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. Annex I: 3140

Habitat area: 9.3ha/1.2%

Status: Unfavourable. Studies of Llyn Coron (Cors Goch) show this to have suffered a significant change from low productivity oligotrophic status to one typical of high nutrient concentrations, based on diatom analysis. Studies of Llyn yr Wyth Eidion show high winter NO₃ and total N, and again suggest a change from the former oligotrophic status to a mesotrophic environment.

Name: Northern Atlantic wet heaths with *Erica tetralix* Annex I: 4010

Habitat area: 18ha / 2.3%

Status: Unfavourable. Monitoring of the Atlantic wet heath feature on Cors Goch and Cors Erddreiniog has revealed an excess of *Molinia caerulea* litter and reduced cover of ericoid shrubs associated with inadequate burning and grazing management. (Creer, 2005).

Name: *Molinia* meadows on calcareous, peaty clay or silt laden soils (*Molinion caeruleae*) Annex I: 6410

Habitat area: 8.9ha/1.2%

Status: unfavourable due to undergrazing and invasive species.

Name: Geyer's whorl snail *Vertigo geyeri* **Annex II: 1013**

Habitat area: Present at 3 sites within the SAC.

Status: The populations of Geyer's whorl snail on both the Corsydd Mon and Corsydd Llyn SACs overall is assessed to be unfavourable and declining due to under-grazing of the habitat. This is particularly the case at Cors Erddreiniog where much of the habitat is outwith the ownership of conservation bodies. At Waun Eurad a CCW management agreement seeks to maintain appropriate grazing via common land grazing.

Name: Southern damselfly *Coenagrion mercuriale* **Annex II 1044**

Habitat: found on one site.

Status: unfavourable declining.

Name: Desmoulin's whorl snail *Vertigo moulinsiana* **Annex II: 1016**

Population size / habitat area: Present on only one site in Wales.

Status: Desmoulin's whorl snail at Cors Geirch, its only site, is assessed to be favourable.

CONSERVATION / BIODIVERSITY PROBLEMS AND THREATS

Threat 0:

Name of the threat:

Project management structures and delivery mechanisms are inadequate to ensure the success of the project.

Description:

This is not a direct ecological threat but rather a recognition of two issues: (i) that conservation management has not to-date been adequately resourced to deliver management conducive to the eventual recovery of the Annex I features and their wider supporting fen and wetland ecosystems, and (ii) that successful delivery of this project requires good organisation, sound management structures, and adequate resourcing at all levels.

Location:

This threat applies to the whole project rather than any particular location.

Impact on habitats/species:

Failure to counter this threat would have a detrimental effect on the project and therefore the conservation status of the two target Annex I habitats.

How these problems and threats will be dealt with during the project:

Effective project management will follow the CCW accredited Project Management methodology which is based on PRINCE2 and also provides in-house mentoring and support. (Action E.1).

Threat 1:

Name of the threat:

Alkaline fen and calcareous fen are derelict as a result of management neglect.

Description:

Alkaline fen and calcareous fen have both suffered as a result of management neglect (dereliction). The main reason for dereliction is undergrazing. All the fens used to be more actively grazed, chiefly by cattle, but also ponies and sheep. This grazing has declined because modern farm animals and economics are not suited to grazing wetlands or wetland vegetation where forage is poor and the terrain dangerous to animals that are suited to intensified agricultural land. There is also a perception that the areas contain disease. Modern agriculture is also carried out at much larger scales and following set methods, including regular movement of stock and supplementary feeding. Animal bedding, foodstuffs and roofing thatch are no longer harvested from the wetlands, and this has added to the general trend of management neglect. Fire was used widely to remove litter and provide bursts of new growth, but this practice has dwindled and become confined to accidental burns at the wrong time of year which burn hotter and damage the peat.

Location:

This threat is a key (often the primary) causal factor for stands of both Annex I habitats failing to meet conservation objectives across the project sites. It applies in most cases to all or the overwhelming majority of stands and stand areas in each site.

Impact on habitats/species:

Lack of management is regarded as the most widespread cause of species impoverishment in undrained rich-fens (Wheeler & Shaw, 1987; Wheeler 1988¹). Ecologically, this shows in over-dominance of single graminoid species and scrub, where stands become very rank leading to the suppression of lower-growing plants.

Derelict stands of both Annex I types exhibit poor diversity in structure and species. Long derelict stands become impassable and ungrazable, exhibit little or no exposed water or substrate, a key factor for many specialist fen taxa including the two Annex II species *Vertigo geyerii* and *Coenagrion mercuriale* (CCW, 1996).

How these problems and threats will be dealt with during the project:

We will tackle dereliction by re-introducing, or increasing grazing (Action C.4), coupled, where necessary, with mowing, scrub management (C.7) and biomass removal (C.1-3). The provision of grazing will be through the establishment of a Grazing Animals Project (A.10). This will be combined with fencing (C.5 & C.6); and the development of a specialist market for stock reared in project sites. This action will focus heavily on sites in the SAC, but is also required to help develop and establish corridors and stepping stones between component sites. Here the Management Agreement Scheme (C.9) will facilitate grazing. In most cases, mowing will be used first to tackle dereliction and make it possible for animals to graze. Each site has areas where vegetation requires minimum intervention management (light or no grazing and scrub control only). This is critical for several factors, not least the importance of unmanaged wetland vegetation for certain invertebrates (Foster & Proctor, 1995; Cattin *et al.*, 2003).

Threat 2:**Name of the threat:**

Nutrient enrichment has damaged alkaline fen and calcareous fen and threatens the wider supporting fen matrix.

Description:

All of the project sites suffer from enrichment from both diffuse and point source which is consistent with the clear link observed in an England and Wales-wide survey between catchment management intensity and base and nutrient enrichment in fen soils (Shaw & Wheeler, 1991). Sources include inorganic fertilisers, organic manure, slurry and the disposal of abattoir and other organic waste adjacent to the sites, as well as sewage, both from sewage treatment works and septic tanks. Further nutrient inputs emanate from atmospheric nitrogen deposition. This particularly affects the Anglesey (Corsydd Mon) sites, where nitrogen deposition (NO_x and NH_x combined) exceeds the published critical load for the closest equivalent habitat (Bobbink *et al.*, 2002).

Quantitative evidence for nutrient enrichment is mostly limited to water and substratum analysis. Supra-optimal concentrations of inorganic nitrogen have been recorded in spring discharge waters bordering some sites (Boyer & Wheeler, 1989; Shaw *et al.*, 2000; Environment Agency, 2007), and palaeolimnological evidence points to a recent eutrophication trend in benthic sediments of the fen lake Llyn Cadarn within Cors Goch. It is even clearer on some sites e.g. Cors Erddreniog, Corsydd Mon (Shaw *et al.*, 2000) and Cors Geirch Corsydd Llyn, (Shaw & Wheeler, 1992) where phytometric evidence shows excess levels of substratum fertility.

Many sites have still not recovered from attempts at agricultural improvement of fen soils – these exhibit areas of very heavily modified marshy grassland and rush pasture on fen peat.

Location:

Nutrient enrichment is a key factor on all sites to varying degrees, but the most impacted sites are Gwenfro & Rhos y Gad and Cors Erddreniog in Corsydd Mon, and Cors Hirdre and Cors Geirch in Corsydd Llyn

¹ See Annex 11 for full citation of references

Impact on habitats/species:

Agricultural improvement has led to the replacement of typical fen vegetation with rush-pasture and a range of semi- or improved grasslands. Acute enrichment associated with point-source impacts beyond the site boundaries has also led to the localised replacement of typical fen vegetation with a range of nutrient-responsive species such as *Holcus lanatus* and *Poa trivialis*, or with dense stands of *Phragmites australis*. More widespread is a trend of increased productivity towards fen margins consistent with nutrient income from the surrounding catchments (Hawley *et al.*, 2004).

The ecological effects of nutrient enrichment compound dereliction and drainage, and include dominance by one or a few competitive graminoids, reduced species diversity, and reduced bryophyte biomass. Recent evidence for one of the project sites (Cors Erddreiniog,) suggests that agricultural enrichment is likely to be promoting peat decomposition and the subsequent release of dissolved organic carbon into surface water outflows. This poses a threat to the long-term integrity of the peat body, and also creates serious problems for the treatment of drinking water extracted from the Llyn Cefni reservoir downstream.

How these problems and threats will be dealt with during the project:

Actions to tackle dereliction will deal with the consequences of enrichment, but are unsustainable unless combined with measures to tackle this problem at source. Targeted Management Agreements (Action C.9) using simple and effective prescriptions will establish buffers, reduce sediment inwash and overland flow, and prevent contamination by farmyard waste. Enrichment will also be tackled by encouraging nutrient off-take through grazing and mowing (C.1–C.4); removal of heavily enriched substrate (C.13); hydrological repair (C.10 & C.11), which will be used to route enriched water through and out of the fens in cases where there are no feasible actions for improving water quality, or else into reedbed treatment areas for *in-situ* nutrient removal (C.14). More generally, hydrological repair will aid improvements in water quality by reducing hydraulic gradients and thus aiding the *in-situ* treatment of nutrients by bio-geochemical processes, including denitrification.

Threat 3:**Name of the threat:**

Drainage leading to sub-optimal hydrological regimes and interruption of key hydrological pathways.

Description:

Artificial drainage is very common throughout the project area. This was undertaken for agriculture, peat cutting and to provide effective conduits for water emanating from drainage schemes within the site catchments. Drainage has also been focussed within areas of groundwater discharge adjacent to and on the slopes above many of the fen sites. Most drainage infrastructure takes the form of open surface channels; under-drainage has been more localised.

Location:

Drainage affects all sites. Most have a main channel down the centre, linked to smaller networks of drains throughout the sites affecting virtually the entire peat body. Drainage lateral to these main channels, and around the margins of fens, has affected all sites to some degree.

Impact on habitats/species:

The fens occur in topographic basins and valley-heads and receive groundwater discharge, surface runoff from around the site margins, and direct rainfall. Drainage results in water table drawdown, particularly during the summer months, and peat dehydration above the water table to a point which damages the two Annex I habitats. Longer term consequences include peat decomposition and shrinkage, nutrient enrichment from mineralisation of organically bound fractions, and acidification caused by the reduced influence of calcareous groundwater. The hydrological and ecological effects of drainage have been studied in detail at Cors Erddreiniog (see Gilman & Newson, 1982; and Meade & Blackstock, 1988, respectively),

where extensive areas which would naturally have been conducive to alkaline and calcareous fen instead support impoverished vegetation dominated by *Molinia caerulea* as a result of drier conditions and surface acidification. The other main consequence of drainage is that it severs important hydrological links between groundwater discharge zones and areas of dependent fen. This is a particular problem with drainage engineered at the base of groundwater discharge slopes – a common scenario on the project sites.

How these problems and threats will be dealt with during the project:

Hydrological repair (Actions C.10 & C.11) will be used to restore target water levels and re-establish functionally critical corridors between groundwater discharge areas and dependent areas of alkaline and calcareous fen. Target water levels will be established through reference to published guidance on the hydrological requirements of the two Annex I fen habitats (including Brooks *et al.*, 2004; Wheeler & Shaw, 2007) and local site specific hydrological monitoring data (Countryside Council for Wales unpublished data).

Threat 4:

Name of the threat:

Successional change leading to the loss of alkaline and calcareous fen or significant deterioration in their condition.

Description

Human activity alters the rate and direction of succession. Historically, management has had beneficial and harmful impacts on the fens. Dereliction leads to scrub encroachment, whereas the pattern of small old peat and marl cuttings display some of the best hydroseral vegetation development and succession - many examples of both of the Annex I types are clearly associated with such contexts. Evidence from the Norfolk Broads suggests that because of successional change, periodic re-cutting of peat may be necessary to ensure the future presence of certain key rich-fen vegetation types, even in cases where contemporary stands are subject to otherwise optimal management (Giller & Wheeler, 1986).

Location:

Successional change threatens all of the project sites. Scrub development is the most visible sign, but loss of early successional stages of both Annex I types has also been widespread.

Impact on habitats/species:

Scrub encroachment and the eventual development of closed scrub woodland affects both Annex I types in the project area, but total removal would have implications for specialist invertebrate and lower plants. The key issue is to ensure that scrub is managed in an appropriate manner. The larger project sites all offer areas where scrub can be left but this leaves many areas where removal and management is necessary.

How these problems and threats will be dealt with during the project:

Scrub development will be tackled through a combination of mowing (Actions C.1 & C.2), grazing (C.4) and the management of scrub (C.7); scrub development and its eventual maturation as wet woodland will be permitted in defined areas according to the site management plans (A.1). Peat cutting (C.13) will be used to rejuvenate hydroseres and ensure the long-term survival of certain key elements of the two Annex I habitats.

Threat 5:

Name of the threat:

Inappropriate management of agricultural land within and adjacent to fen sites, land linking sites to each other, and land functionally critical to their survival.

Description:

Land surrounding the fens is almost wholly devoted to intensive agricultural land management. Furthermore, many areas of fen and other forms of semi-natural habitat occur within agricultural holdings adjacent to or themselves subject to statutory protection.

Appropriate management of this land is critical in order to secure Favourable Conservation Status for the fens and their Annex I and II features.

Location:

This threat affects all of the project sites to varying degrees. Fragmentation has been most profound at Cors Geirch (Corsydd Llyn) which consists of several discrete blocks of wetland vegetation separated by areas of peat and mineral ground which formerly supported fen. Similar instances of fragmentation have occurred within Corsydd Mon. Peripheral habitat loss has been far more severe and widespread, with comparatively few surviving instances of gradational contacts between fen and other wetland and dryland habitats.

Impact on habitats/species:

Intensive agricultural land management has fragmented the fen sites and resulted in the loss of connecting corridors critical for species movement and genetic exchange. Fragmentation threatens the viability of individual sites through impacts on population genetics (Hooftman *et al.*, 2003), increased vulnerability to chance events, and the creation of unsustainably small or impacted wetland units. Fragmentation reduces the viability of surviving wetland units by increasing their vulnerability to marginal impacts and drainage. Marginal habitat loss and the elimination of critical ecotones between fen and other habitats have a wider biodiversity impact, whilst also removing protective buffer zones. Nutrient enrichment represents a further critical ongoing and cumulative effect. Inappropriate land management also has a direct impact on areas of fen within agricultural holdings and adjacent to the main conservation sites.

How these problems and threats will be dealt with during the project:

Management Agreements (Action C.9) will establish financial incentives for the favourable management of fen habitat, habitat supporting Annex II species (C.15) and peripheral non-wetland habitat of functional significance to these species and the two Annex I habitats. Management Agreements will include prescriptions for the restoration/re-creation of 'edge habitat'. Land purchase (B.1) will also include land parcels which bridge the gap between now isolated but formerly connected blocks of fen. Appropriate management will improve ecological connectivity within sites and between fen unit's contiguous habitats (C.1 – C.7). Within sites, non-conservation land owners and occupiers will be encouraged to participate in the mowing and grazing actions (C.1 – C.4). This will be possible by loan of machinery and expertise, joining the grazing scheme and participation in feedback groups (E.2). Education resources and training days will be aimed specifically at farming neighbours to help raise awareness of the value of the fen resource, and the contribution which the local agricultural community can make to their conservation (D.8). A wide range of actions (section D) will be used to promote the importance and value of the sites amongst local communities and organisations.

Threat 6:

Name of the threat:

Alkaline and calcareous fen and their wider supporting fen matrix are threatened by uncontrolled fires.

Description:

Uncontrolled burns damage peat layers and encourage scrub and dominant graminoids. Managed burns will form an action of the project (Action C.8) but will be combined with grazing (C.4) and only permitted under certain prescribed conditions in order to ensure that negative effects are minimised.

Location:

This threat potentially affects all of the project sites, but is most significant for the largely topogenous expanses of fen which tend to support extensive stands of vegetation with a sizable fuel load in the form of accumulated litter – i.e. Cors Bodeilio, Cors Goch and Cors Erdreiniog (Anglesey Fens) and Cors Geirch and Cors Hirdre (Llyn Fens).

Impact on habitats/species:

Uncontrolled burns can be extensive and spread to areas of habitat which would not be considered eligible for burning because of their sensitivity (notably areas of both alkaline and calcareous fen in good quality) or lack of appropriate follow-on management. Burning can encourage *Molinia* on wet peatlands (Kennison, 1991) and may also result in an increase in the density of reed stems (Van der Toorn & Mook, 1982); these effects could be problematic in areas with inadequate grazing. These problems will be avoided under managed burning through the use of follow-up grazing. Burning at the wrong time of year may result in mortality or disturbance to breeding birds, and invertebrates are especially sensitive (Harding, 2005). Uncontrolled hot burns can also result in combustion of the underlying peat, leading to loss of substrate, modification of its hydrophysical properties, and destruction of the seed bank and perennating vegetative organs. These effects will be minimised under managed burning by confining burning to the autumn and winter, and by only burning small areas at a time.

How these problems and threats will be dealt with during the project:

All of the measures aimed at tackling dereliction will reduce the overall fuel load and thus reduce the risk of large fires developing as a result of accidents, lightning strikes or arson. Fire breaks will be mown (C.8) at regular intervals, based on the successful practice already established at Cors Goch (Anglesey Fens) by the North Wales Wildlife Trust. Engagement of the farming community and local residents (Actions D.4, D5, D.8, D.10) will help raise awareness of the ecological and conservation problems associated with uncontrolled burns.

Threat 7:

Name of the threat:

Climate change threatens the long-term survival and quality of alkaline fen and calcareous fen.

Description:

Climate change is inevitable, and recent predictions for Wales indicate increased winter-time precipitation, and drier hotter summers (Farrar & Vaze, 2000).

Location:

This threat applies across the board, although the marginally more oceanic climate of the Llyn sites may help offset the impact of climate change to some degree.

Impact on habitats/species:

More frequent summer droughts will lead to low water tables that will impact the two Annex I features. The ecological effects of this will be similar to drainage, which will encourage undesirable competitive species eg *Molinia caerulea* which respond well to fluctuating water tables and further scrub encroachment. Warmer drier conditions will promote peat decomposition and the release of dissolved organic carbon into downgradient water courses.

How these problems and threats will be dealt with during the project:

Hydrological repair (Actions C.10 – C.12) will be used to help 'climate-proof' the project sites by reducing water loss through drainage, and encourage its seepage into the systems from marginal water courses – subject to appropriate water quality. Scrub management (C.7) will help reduce evapo-transpirative demand.

Threat 8:

Name of the threat:

Insufficiently focussed management may lead to continued decline of Annex II species threatened by management neglect.

Description:

Populations of *Coenagrion mercuriale* and *Euphydryas aurinia* are known to have declined on

the project sites, with ecological dereliction being a key factor. Similarly, populations of *Vertigo geyeri* are known to be vulnerable to the loss of open small-sedge communities. *Vertigo moulinsiana* is primarily associated with tall swamp, but nevertheless requires focussed attention to ensure that suitable areas of swamp are retained or encouraged to expand.

Location:

This threat applies to all project sites with current or recent historic populations of the Annex II species. Loss and deterioration of suitable niches has been especially pronounced at Cors Erddreiniog.

Impact on habitats/species:

Population decline or loss, resulting in increased fragmentation and vulnerability to a range of external and intrinsic factors relating to population structure and gene flow.

How these problems and threats will be dealt with during the project :

The primary solution will be carefully targeted management within priority areas defined for all four species (Action C.15). Particular attention will be paid to fine-tuning sensitive hand-mowing and biomass removal (C.2) and grazing (C.4), with electric fencing being used to enable precise control over the latter (C.6). Grazing exclusion will be continued/extended to provide suitable habitat for *Vertigo moulinsiana*. Small-scale re-opening of choked runnels in areas of *Schoenus* vegetation will be used specifically for *Coenagrion mercuriale*.

OBJECTIVES OF THE PROJECT

Objectives:

The objective of this project is to bring 751 ha of fen within the Corsydd Mon/Anglesey Fens SAC and Corsydd Llyn/Lleyrn Fens SAC into favourable or recovering condition through measures aimed at tackling the factors adversely affecting their condition and by delivering more sympathetic management.

To reach this objective the project has specific objectives to:

- tackle the factors which cause the poor condition of their features, putting in place the necessary measures to maintain and further improve the condition of the important habitats and species;
- direct and facilitate change within the supporting catchments, to open up derelict corridors and stepping stones and to increase the understanding of stakeholders within the catchments; informing stakeholders, practitioners and the wider community of the objectives and actions of the project; and why they are important.

PREVIOUS CONSERVATION EFFORTS IN THE PROJECT AREA AND/OR FOR THE HABITATS / SPECIES TARGETED BY THE PROJECT

The Corsydd Anglesey & Llyn were known to early naturalists such as the Rev Huw Davies and J E Griffiths, and noted by Her Majesty's Government in the *Report of the Wildlife Conservation Special Committee* (Cmnd 7122), 1947. Some sites (Cors Goch, Cors Bodeilio, Cors Geirch) were notified as Sites of Special Scientific Interest (SSSI) in 1957, with Cors Erddreiniog (1961) Cors y Farl (1968) Cors Edern (1979) notified later under the National Parks & Access to the Countryside Act 1949.

Threats to Cors Goch from landfill development led directly to the foundation of the North Wales Wildlife Trust (NWWT) in 1963 and the first acquisition, followed by a series of purchases by NWWT and Countryside Council for Wales. Since the fens often occur on the boundaries of several farms, land ownership is often split between multiple owners. Today some 368.5ha (49%) of the sites are owned by conservation bodies with a further 68ha (9%) held under lease or management agreement. Some 296ha (40%) has been declared National Nature Reserve.

All the sites have been renotified as SSSI under the Wildlife & Countryside Act 1981 and site management statements (CCW's views on management) issued. Management plans – some draft - have been produced for Cors Goch, Cors Bodeilio, Cors Erddreiniog and Cors Geirch.

Direct management by conservation bodies since 1963 is largely restricted to the NNRs and includes very small areas of controlled burning, small-scale cutting, scrub control and limited grazing. A herd of Welsh mountain ponies has been used on several NNRs for the past 20 years. This management has established the efficacy of these techniques but has failed to achieve the scale of works required. Indirect management is via agreements with private landowners in response to threats, largely from agricultural improvement. These agreements prevent the destruction but not always the deterioration of the sites. Lack of incentive and often lack of traditional wetland management skills, labour or livestock, precludes more active management in these cases.

All the sites lie within the former Llyn and Anglesey Environmentally Sensitive Areas for agri-environment payments, but there was little participation. The Tir Gofal agri-environment scheme has addressed limited areas more recently. Discussions continue with the Welsh Assembly Government on the possibility of Nitrate Vulnerable Zones to assist the management of nutrient loads in these catchments. Research and survey projects on the sites include palynological investigations of the peat profiles, topographic, hydrological and water quality investigations, vegetation, botanical, entomological, herpetological, ornithological and mammalian surveys.

CCW and its partner statutory agencies are committed to the protection of the SACs under Article 6.2, but in this case we are faced with intractable problems that have developed over many years and require significant, but short-term pulses of effort to solve them that is beyond our, or our partners' capacity to solve without LIFE+ funding. We are confident that no further external funding will be required once this project is over as the sites will be under appropriate management to secure Favourable Conservation Status.

Article 6.2 (and subsequent sections) obliges member states to avoid the deterioration of natural habitats (and the adverse effects of other plans and projects). However, the degradation and fragmentation of habitat features on Corsydd Mon & Llyn long pre-dates its designation as a SAC. The loss of traditional livestock breeds, the abandonment of former modes of biomass harvesting the fragmentation of wetland habitat and the loss of traditional

land management skills occurred throughout the 20th century. The project seeks to re-create long lost habitat quality, extent and connections. It is therefore additional to the Article 6.2 obligations.

EU ADDED VALUE OF THE PROJECT AND ITS ACTIONS

EU Added Value of the Project and its Actions

The actions identified in this project will bring about a sustained improvement in the condition of alkaline fen and calcareous fen within two SACs located on the western biogeographical limit of their European distribution. In terms of the British Isles, these sites represent an irreplaceable biogeographical stepping stone between the East Anglian fens and the Atlantic fringe fens of Ireland. No other site within western Britain bears a comparable extent or quality of this habitat resource. In terms of quantitative significance, the two sites support an appreciable component of the total extent of the A/B graded source in the UK, amounting to 44% for calcareous fen and 25% for alkaline fen. These figures are especially significant in a UK context, given the modest representation of A/B graded examples of these habitats when expressed as a percentage of the equivalent resource estimated for the Atlantic biogeographic region – namely 2.9% for calcareous fen, and 1.9% for alkaline fen².

This project will bring about a sustained improvement in the condition of alkaline and calcareous fen. The current level of management and restoration effort is only sufficient to at best achieve localised improvements in condition.

Failure to implement the project will result in the two features, alkaline fen and calcareous fen, remaining in unfavourable condition, with continued deterioration as the overall trend.

The demonstration elements of this project are highly relevant to other examples of these habitats occurring in the other countries of the Atlantic fringe. The demonstration elements are relevant because they address widespread threats, namely management neglect leading to dereliction (Action C.1), nutrient enrichment from adverse catchment management (C.9 & C.14), loss of key hydrological pathways (C.11), successional change leading to the loss of Annex I habitats (C.13) and the need to tackle all these and other threats through an integrated package of cost-effective actions. Public awareness and dissemination actions will be targeted specifically at managers of analogous sites in Europe.

² Information on the European extent of A/B graded features of alkaline and calcareous fen was kindly provided by Dr Doug Evans of the European Topic Centre on Biological Diversity – November 2007.

BEST PRACTICE / INNOVATION / DEMONSTRATION CHARACTER OF THE PROJECT**Best practice / innovation / demonstration character of the project**

This project offers both *best practice* and *demonstration* elements

Best practice:

Some of the prescribed actions are already well established as cost effective and proven techniques for the conservation and restoration of rich-fens, including grazing (Action C.4), scrub management, (C.7) and the raising of water levels (C.10), and we will use (and where appropriate revise and develop) available guidance to support their implementation (D.12). The use and development of this guidance will be disseminated and communicated through several actions and will support work by the main beneficiary and partners to develop a Fen Management Handbook under a separate initiative. The best practice developed by this project can be used to inform future programmes of support and intervention for the integration of wetlands in the wider context of rural development.

Demonstration value:

The demonstration value of this project is in two main areas: (i) development and use of several novel measures within the specific ecological and geographical context of this bid, and (ii) the application of these demonstration actions together with many elements of existing best practice as part of an integrated package of measures to achieve significant sustained improvements in the condition of the two Annex I features.

Novel measures (demonstration elements) of this project are as follows:

Use of a new lightweight tracked wetland harvester unit to support simultaneous mowing and harvesting (Action C.1).

Development of a bespoke land management scheme tailored to the specific requirements of the two main project areas and administered through the format of the existing section 15 management agreement mechanism.

Action to restore hydrological pathways (Action C.11) represents a novel measure that will make full use of a new innovative approach to characterising wetland function in relation to water supply mechanisms (Wheeler & Shaw, 2007³).

Peat stripping has not been widely employed in the UK beyond East Anglia, and its application and value remain largely untested. We will apply it (C.13) to a range of contexts which are likely to recur on other comparable sites within the Atlantic biogeographic region.

The application of all these measures, together with those conforming to established best practice, as part of an integrated programme of restoration is a key demonstration component of this project. The criteria employed to decide on which combination of measures to use in a given situation will be developed as guidance (section D), and their use and effectiveness carefully monitored (section E). The development of such a 'tool-kit' of varied actions is likely to be highly relevant elsewhere.

³ See Annex 11 for full citation of references

EFFORTS FOR REDUCING THE PROJECTS 'CARBON FOOTPRINT'

The main emissions of carbon will be (i) combustion of fuel by machinery, (ii) decomposing mown vegetation and extracted peat and (iii) burning. We have sought to minimise the extent of activities requiring machinery, with grazing being used as far as possible. Transit distances for the disposal of cut biomass and peat will be reduced by using one main receptor in each of the project areas. Transport of equipment between project sites will be minimised through efficient work-planning. C emissions from burning will be minimised by preventing combustion of underlying peat, and by confining this activity to periods when there is less standing crop. C emissions from extracted peat and mown vegetation will be partially offset by the use of both products for compost; this will reduce local market demand for other products derived from peat, as well as 'carbon miles' resulting from the transport of such products to the region. Equipment requiring an electrical supply will wherever possible be provided by solar power.

The potential for C emissions must be set against the significant potential for C sequestration as a result of restoration. Most of the threats (see form B2d) are likely to have reduced or halted peat formation, and peat loss through oxidation and DOC emissions is occurring (Cohen *et al*, 2007⁴). The restoration of habitat features is likely to be paralleled by renewed or increased rates of peat formation. Peat stripping will include the removal of areas of oxidised and moribund peat, and will encourage fresh peat formation. Rates of net carbon accumulation would be expected to lie in the region of 30 g C m⁻² based on studies of rich-fens elsewhere (Yu *et al*, 2003). Assuming that active peat formation is achieved across only 25% (~187 ha) of the total combined SAC area (a conservative assessment), this gives a net C accumulation rate of 56 tonnes per annum.

Reductions in the income of nutrients from adverse catchment management could help reduce DOC emissions to receiving waters by up to 30%⁵; hydrological restoration will also contribute to reductions in DOC (Wallage *et al*, 2006). These reductions in DOC export will be especially significant in the case of Cors Erddreiniog; this forms part of the headwater system of the Llyn Cefni drinking water reservoir on Anglesey where DOC treatment is a very significant economic concern.

A more quantitative assessment of the relative magnitude of carbon sequestration and carbon figures as a preparatory action (Action A.14). The results of this will be used to modify actions (within project limits) to attain net sequestration within a realistic timeframe.

⁴ See Annex 11 for full reference citation.

⁵ Prof Chris Freeman, School of Biological Sciences, Bangor, personal communication: based on work on ombrogenous systems, halving the nitrogen load results in about 30-40% less phenol oxidase activity, which would be expected to translate into about a third less mobilised carbon.

EXPECTED CONSTRAINTS AND RISKS RELATED TO THE PROJECT IMPLEMENTATION

External events which could have major negative impacts on the successful implementation of the project (see Annex 9 for risk log).

1. Land linking component sites are ineligible for the project under LIFE

Potential influence: Both the Anglesey and Llyn Fen SACS are comprised of component sites. Action required between these sites to tackle critical factors would not be addressed and favourable conservation status would not be possible.

How constraint will be overcome: Withdraw bid, re-focus project on SAC, support Bid

2. Prioritised land sales fall through

Potential influence: Purchase of high priority land to enable implementation of project actions is unsuccessful. This would result in land purchase money not being spent.

How constraint will be overcome: Target other identified sales. Target other means i.e. management agreements. Claim actuals.

3. Management agreement scheme oversubscribed

Potential influence: This will reduce local community and farmer support. There will be less opportunity for achieving positive impacts on Favourable Conservation Status than if more resources were available.

How constraint will be overcome: Additional budget will be diverted from under-subscribed actions. CCW will input additional resources. Additional funding will be sought from other partners.

4. Composting is shown to be uneconomic; or not possible

Potential influence: Need alternative way to deal with biomass waste; reduced socio economic benefits, alternative disposal methodologies could be costly and less environmentally desirable.

How constraint will be overcome: Alternative means of disposal will be used. The short-term option will be to stockpile material on CCW land, waste exemption licence to be sought at start of project to cover this.

5. Increase in cost of materials/services/land

Potential influence: This would result in an increase in the cost of the project and/or less outcome delivered than expected.

How constraint will be overcome: Reduce planned actions; CCW meets shortfall. Find alternative methods which are still value for money.

6. Animal health/bio-security emergency, e.g. Foot and Mouth Disease, blue tongue, avian flu

Potential influence: Severe restrictions on stock, machinery and personnel movements within the project areas. The restrictions could extend over substantial periods e.g. 6 months.

How constraint will be overcome: Budget and personnel would be diverted to other activities in the short term. If restrictions were more prolonged, project would be extended.

7. Breakdown in community relationships

Potential influence: The co-operation and active engagement of local communities, and especially the farming sector, is critical. Failure to achieve this could result in a delay in the start of the project or in the worst case, an abandoned project.

How constraint will be overcome: It is vital at the outset to communicate effectively with all stakeholders; the partners, the local community and the landowners/occupiers involved. The project management approach will ensure that communication and consultation with the parties involved is begun early and continued throughout the project. Liaison and negotiation with the local farming community is vital, and a farming advisory panel would be set up at an early stage.

8. Intensification of production to meet food demands

Potential influence: Political and policy decisions on the use of marginal land could make conservation un-competitive compared with the potential income available from stock production. Less land is then available for conservation action.

How constraint will be overcome: Re-focus project on available land; increase rates of payment; purchase critical land.

9. Management agreement scheme under-subscribed

Potential influence: Under-subscription to the scheme will reduce its conservation impact and result in budget under-spend.

How constraint will be overcome: Ensure that the scheme is appropriately marketed. Change the prescriptions to make the scheme more attractive to key catchment landowners. Target other farms within the catchment. If all else fails divert budget to land purchase.

10. Planning permission for peat extraction refused

Potential influence: The ability to remove peat becomes restricted and the ability to use it as the basis of a local business would be removed.

How constraint will be overcome: This is considered a negligible risk. Anglesey Council are supportive of this project (see form A8/3). Details of this action will be dealt with in close consultation at pre-planning application stage to meet the required conditions.

11. Waste exemption licence not granted

Potential influence: This would prevent stockpiling of extracted peat on site and compromise the overall viability of peat removal.

How constraint will be overcome: Alternative options include the use of other partners in helping to deal with waste peat, paying for its disposal, and using part or all of the extracted resource on-site for ditch blocking/infilling operations.

12. Poor project management

Potential influence: This would result in poor project delivery, missed milestones, inadequate or incomplete delivery of project actions, and failure to deliver the project objectives.

How constraint will be overcome: Section C-E describes the comprehensive range of measures that will be employed to ensure sound project management. CCW has good experience of project management and has developed its own methodology based on PRINCE2.

**CONTINUATION / VALORISATION OF THE PROJECT RESULTS
AFTER THE END OF THE PROJECT**

- *Which actions will have to be carried out or continued after the end of the project?*

During the project, the actions in Part C. c will be applied at restoration levels of activity. Actions continuing after 5 years will be applied at a much reduced maintenance level – these are C.4 (grazing), limited rotational mowing (based on C.1 and C.2) biomass removal (C.3), burning (C.8) and maintenance of constructed wetlands (C.14). Continuation of agreements covered by the Management Agreement Scheme (C.9) will be required.

- *How will this be achieved, what resources will be necessary to carry out these actions?*

Continuation of C9 will be supported by the main beneficiary and uptake by new entrants will also be sought. CCW will programme other management into its annual work planning. These will be fully met from CCW budgets. The achievements of this project are likely to attract other forms of land management support.

- *Potential for using other EU funds after the end of the project*

There is the potential to bid for LIFE Biodiversity funding to tackle wider Habitats Directive Article 10 issues not benefiting directly from this project. It is also possible that Rural Development Programme money may be available for some continuing actions but this is not yet clear.

- *Protection status under national/local law of sites/species/habitats targeted (if relevant)*

Areas currently designated as SAC and/or SSSI will remain.

Some areas of land will come into protective ownership through purchase by CCW. Areas of land to be purchased will include: land already within the SACs; land outside the SAC but already designated as SSSI or meeting SSSI selection criteria; land not to be designated as either SAC or SSSI but where appropriate management is critical to maintaining the integrity of the SACs.

Some areas of land outside the SAC will be subject to legally binding management agreements made under SSSI legislation (section 15 of the Wildlife and Countryside Act).

Where areas of land outside the SACs are considered to meet SAC selection criteria, such as through restoration or enhancement work carried out during the project, extensions to the SACs will be proposed. The Welsh Assembly Government has confirmed its willingness to propose additional areas to the European Commission as SAC extensions at the first available submission window following their reaching the appropriate criteria.

The wider catchment areas of the two fen SACs will be considered for designation as Nitrate Vulnerable Zones (NVZs) under Article 3 of Directive 91/676/EEC.

- *How, where and by whom will the equipment acquired be used after the end of the project?*

All equipment purchased will be retained by CCW and used for the ongoing maintenance of Annex I features within the project sites and to help manage other wetland Annex I features on SAC sites in Wales.

- *To what extent will the results and lessons of the project be actively disseminated after the end of the project to those persons and/or organisations that could best make use of them (please identify these persons/organisations)?*

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Form C section D identifies an active programme of information dissemination. We will target this at two main sectors; (i) managers of adjacent land (mainly farmers), and (ii) conservation managers of rich fens located with agricultural landscapes in the UK and elsewhere in Europe. This will include state-funded and NGO bodies.

- *Any other issues*

The programme of actions described here represents part of a much wider project to develop a more sustainable local rural economy of benefit to the long-term conservation of these fens. This wider project will focus on issues such as access, interpretation, education, green tourism and the diversification of rural land-use.



LIFE + Nature and Biodiversity

TECHNICAL APPLICATION FORMS

Part C – detailed technical description of the proposed actions

Important note:

- **All calculations and detailed cost breakdowns necessary to justify the cost of each action should be included in the financial forms F. In order to avoid repeating the financial information (with the risk of introducing incoherencies), Part C should only contain financial information not contained in the financial forms (e.g. details explaining the cost per hectare).**
- **All forms in this section may be multiplied, so as to include all essential information.**
- **Each action described should have a clear indication of its physical target (e.g., action 1 will take place in area "X" and/or will target species "Y"). Whenever this is relevant, the location of these actions should also be identified on one or several maps which must be provided in annex (preferably one map per site). Where feasible, a map of each site should be provided that indicates the location of all the actions taking place on that site.**
- **Any action that is sub-contracted should be just as clearly described as an action that will be directly carried out by the beneficiaries.**

A. Preparatory Actions

ACTION A.1

Name of action: Revision / preparation of management plans, including land purchased as part of this project.

Description:

Existing management plans will be revised and expanded to cater for land purchased as part of this project. The format of the management plans will follow established CCW guidance and will build upon an existing programme of work to revise and finalise management plans for both SACs by the end of 2007. Both programmes of work will ensure that the actions and objectives of this project are fully addressed in formal management plan format. Work to revise management plans to cover land purchased as part of this project will be undertaken immediately after confirmation of purchase.

Reasons why this action is necessary:

Management plans are essential to ensure effective and efficient management of newly purchased land. They also provide a platform for the detailed planning of actions in relation to conservation and restoration objectives.

Beneficiary responsible for implementation:

Plans will be prepared by CCW staff.

Expected results:

Detailed management plans will be produced for newly purchased land, specifying how the land will be managed for the following five years.

ACTION A. 2

Name of action: Plant community level survey across all project sites.

Description:

Recent plant community level survey data is already available for 9 of the project sites and survey of the remaining sites will be undertaken during the first two years of the project. This action will yield habitat resource data for all project sites. The survey will characterise and map vegetation to community/sub-community level using the National Vegetation Classification Scheme (Rodwell [ed], 1991). Plant communities will be mapped at a scale of between 1:5,000 and 1:2,500 to a minimum mapping resolution of 0.05 ha. Community records will be collected using standard quadrat-based recording techniques. Mapped data will be captured onto CCW's Mapinfo GIS application, other data on standard software. We have an existing GIS tool to generate Annex I habitat maps from the NVC maps, and we will be able to convert these to the EUNIS scheme. We confirm we will undertake this within the projected budget. CCW is aware of the requirements of the INSPIRE Directive (2007/2/EC) and we maintain close contact with the UK Government Department (DEFRA) responsible for transposing the Directive into UK legislation. Our understanding is that the implementing rules for INSPIRE are not yet finished in the UK. However, once finalised we confirm that we will collect, hold and publish metadata from the project sites to the required standard.

Reasons why this action is necessary:

This will provide essential data on the distribution, composition and quality of the habitat resource and will be used to fine-tune the delivery of actions, as well as providing a baseline against which to measure project success. Survey outputs will also help in the targeting of more detailed monitoring effort.

Beneficiary responsible for implementation:

CCW will undertake all survey work using highly trained in-house staff. This action will require an estimated 128 days staff time, which will be contributed by CCW outwith the current project.

Expected results:

Detailed community/sub-community level maps, quadrat records, and site appraisal and description reports for each site. A collated report for each of the two SACs will be produced.

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ACTION A.3

Name of action: Undertake baseline assessment of condition of alkaline fen and calcareous fen.

Description:

Monitoring of feature condition will be undertaken to gauge attainment of the overall project objective, and more specific objectives set for individual project sites, site compartments, and stands. Conservation and restoration objectives will be defined and performance indicators drawn-up. Monitoring of condition will be undertaken in relocatable sample plots within blocks of alkaline and calcareous fen and degraded vegetation targeted for restoration at positions judged suitable for making inferences about stand or overall feature condition. Plot locations will include those established by Creer (2003; 2005). Baseline condition assessment will take place in year 1. Baseline targets for feature extent will be provided by the programme of NVC survey (Action A2).

For this action we will employ performance indicators devised for Annex I habitats or habitat elements which are designed to assess feature condition. The methodology we will use is based on a combination of best practice elements. The performance indicators are based on the UK Common Standards Monitoring Guidance for wetland habitats produced by the Joint Nature Conservation Committee, and modified locally to reflect the specific character of the Annex I features within the project area. The sampling methodology is based on a previous LIFE – Nature funded project (LIFE 95 NAT/UK/000821) awarded to CCW. The methodology has already been applied by CCW to enable reporting on the quality of both fen features in both SACs. The methodology consists of assessing two main components, (i) feature extent, and (ii) feature quality. Feature extent will be assessed through reference to detailed vegetation maps produced under Action A.2; the lower limit target is for there to be no reduction in the baseline extent. Feature quality will be evaluated against a range of performance indicators that collectively provide a point-based definition of habitat in good condition – an example for calcareous fen at Corsydd Llyn is provided below.

Example performance indicator for habitat quality of open sward examples of calcareous fen at Corsydd Llyn.

Sample target for restoration management	To restore the Calcareous fens at Corsydd Llyn / Llyn fens cSAC to favourable condition where,
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Quality	Lower limit	Open <i>Cladium</i> sward In any 1m radius there is: <ol style="list-style-type: none"> 1. <i>Cladium mariscus</i> is present at <20% cover, 2. At least two of the following are present: <i>Schoenus nigricans</i>, <i>Carex diandra</i>, <i>C. lasiocarpa</i>, <i>C. rostrata</i>, <i>Potentilla palustris</i>, <i>Cardamine pratensis</i>, <i>Menyanthes trifoliata</i>, <i>Pedicularis palustris</i>, <i>Galium uliginosum</i>, and <i>Eriophorum spp.</i> 3. At least one of the following species are present: <i>Carex panicea</i>, <i>C. lepidocarpa</i>, and <i>C. hostiana</i>, 4. <i>Myrica gale</i> forms no more than 20% cover, 5. <i>Molinia caerulea</i> forms no more than 20% cover, 6. No more than 20% cover of dead vegetation litter 7. No more than 30 stems of <i>Phragmites australis</i> 8. <i>Salix</i> is absent from 90% of sample points At least 70% of sample points should pass the criteria set.
Sampling approach	Mapping	
Sampling method	Systematic grid recording	
Sample size	1m radius	

These performance indicators are assessed for points laid out within a relocatable grid or transect plots, and a target set for the proportion of points which must pass all of the performance indicators for the feature to be in good condition. Use of this approach for Action A.3 is summarised below, together with a breakdown of costs for each parameter.

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Parameter to be measured	Method & targets	Intensity	Cost
Habitat extent	Comparison of extent against mapped estimates. Extent must equal or exceed baseline extent as reported at time of SAC notification.	Whole resource will be assessed.	€2245.18
Habitat quality	Point based assessments of habitat quality against site-specific performance indicators. Sample points to be re-locatable, and where appropriate positioned within plot grids or transects.	Sample based approach – 102, 20 x 20 m plots established across the two Annex I features on both sites. Mean plot density expressed as no. per ha of Annex I habitat = 0.54.	€ 22935.86
Reporting	Data management and reporting		€ 2245.16
Total			€ 27426.2

Reasons why this action is necessary:

To provide baseline condition data.

Beneficiary responsible for implementation:

CCW will design the monitoring scheme and oversee its implementation. Field work and reporting will be undertaken by contracted staff.

Expected results:

Relocatable monitoring plots will be installed on all project sites. Baseline vegetation composition and structure data will have been recorded.

ACTION A.4

Name of action: Establish baseline plots for detailed investigation of vegetation response to applied management.

Description:

Detailed assessment is required to determine the ecological result of several of the concrete conservation actions, particularly the demonstration elements (Actions C.1, C.9, C.11). This action covers the establishment of baseline monitoring plots to be followed up in year 5 as described in Action E.4.02. Attributes reflecting vegetation composition and structure will be assessed in permanently marked, relocatable plots before applied management, and where relevant in control plots. The design of the project will be statistically rigorous and enable publication of results in the peer-reviewed scientific literature.

This action will be confined to the National Nature Reserves included in the project to ensure long-term security and guaranteed access to plots – these are Cors Bodeilio, Cors Goch and Cors Erddreiniog (Anglesey Fens) and Cors Geirch (Llyn Fens). The experimental design of plots will ensure assessment of the effects of different regimes of cutting height (C.1), depth of peat removed (C.13) hydrological pathway repair (C.11) and nutrient reduction (C.9, C.12 & C.14) are assessed. Baseline assessments will be undertaken in year 1.

Reasons why this action is necessary:

This action is needed to assess the effect of applied restoration actions, particularly the demonstration elements. This information is essential if demonstration actions are to receive wider uptake by other projects, and to ensure that successes (and failures) are fully evaluated and disseminated through publication.

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Beneficiary responsible for implementation:

Project staff will design the monitoring scheme. Implementation will either be undertaken by consultants, or as part of a research programme based with an academic partner.

Expected results:

Permanent plots will have been established and baseline data recorded to monitor the effects of key restoration actions. Results will be published in the final project report, with interim results produced for the baseline round. At project completion we will seek publication of results in the scientific literature.

ACTION A.5

Name of action: Investigations to inform the detailed design of hydrological repair and peat stripping actions.

Description:

Investigations will be required to aid the detailed design of actions for raising water levels (Action C.10), restoring hydrological pathways (C.11), and stripping nutrients and rejuvenating early successional examples of both Annex I types (C.13). Some relevant information is already available for the project area, including Bragg (1998), CCW (2007), Shaw & Wheeler (1992), Wheeler & Shaw (2007) and unpublished topographic surveys for several sites, but further site investigations will be required. For clarity, these are described below as separate sub-actions.

Sub-action A.5.01: Hydrological investigations

Actions to restore hydrological pathways (C.11) will be preceded by an assessment of the existing and target water supply mechanisms for each affected area based on the framework recently established for wetlands in England and Wales (Wheeler & Shaw, 2007 – in press). This framework uses a variety of data to categorise and describe the principal mechanisms by which water is supplied to ecological features of conservation interest, including Annex I habitats. The study included all of the larger wetlands encompassed by this project, which

means that relatively modest work is needed to characterise the critical water supply mechanisms at specific locations ear-marked for project actions within these sites. Work on the ground will consist of a targeted programme of shallow (hand) coring and inspection of sediments, piezometer/dipwell installation and short-term (up to 12 months) monitoring of water levels, topographic survey (see below), and in some cases measurements of simple water quality parameters (namely temperature, electrical conductivity and pH). This information will be used to provide simple field design sheets for hydrological repair which can be followed by contractors and project staff. The investigations described here will be supported by a separate ongoing collaborative study between the Environment Agency (Wales) and CCW to examine the character of groundwater/wetland interactions in the project area. Hydrological investigations will follow established best practice in the form of published guidance (e.g. Environment Agency, 2003) and appropriate case studies (e.g. Cooper et al, 1998)

Hydrological investigations will also be used to identify target post-restoration water levels for examples of both Annex I features impacted by dehydration (C.10). This is needed to ensure that actions to raise water levels do not result (for example) or excessive surface flooding – an important issue for soligenous examples of alkaline fen. This will be achieved using simple short-term monitoring of water levels in open ditches and adjacent peat, coupled with knowledge of the optimal hydrological regime required by the two Annex I features based on national guidance (Brooks et al, 2004) and local monitoring of hydrological regimes within the project sites (CCW, 2007). This approach will also be used to examine the functional relationship between different hydrological features, and the likely effects of hydrological repair. Flow monitoring will be used to optimise the size of constructed wetlands (c.14) in terms of their ability to strip nutrients from point-sources under normal and peak flows. Automated flow and water level monitoring apparatus will be used where this is cost effective.

Sub-action A.5.02: Topographic surveys

Topographic surveys will be used to (i) identify the optimal spacing and height increments between hydrological control structures such as weirs and synthetic/peat based dams; (ii) examine the likelihood of any negative consequences of hydrological repair upon adjacent land holdings under agricultural or

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other non-conservation based management; and, (iii) assess the extent of terrain re-modelling and peat stripping required to increase the areal influence of surface groundwater discharges.

Sub-action A.5.03: Stratigraphic survey.

Stratigraphic survey will figure as a component of sub-project A.5.01, specifically in order to identify the location of aquitards and aquicludes and their stratigraphic relationship and thus help ensure that management results in the supply of water of an appropriate quality and quantity. This work will also guide decisions on the extent and depth of peat to be excavated from artificial peat cuttings required for increasing the spatial influence of groundwater, or for restoring early successional stages of either of the Annex I habitats, and to ensure that peat stripping is not attempted on uncut (primary) peat surfaces of palaeoecological importance.

Sub-action A.5.04. Water and substratum chemistry analysis.

Analysis of water quality will focus on plant macronutrients (K, SRP, total P, NH₄-N, NO₃, N tot); base cations (Ca, Mg); markers of organic pollution (Cl); and, suspended solids, pH, EC and T. Water quality analysis will be performed on single samples or up to a one year time series based on monthly samples.

Substratum chemistry will be examined mainly by measuring the response of test plants (phytometers) grown on samples of peat. This approach is considered preferable to standard methods based on the extraction of nutrients from peat as it provides a more integrated and ecologically meaningful measure of in-situ fertility (Wheeler et al, 1992).

These actions will be confined to sites ear-marked for hydrological repair and/or peat stripping. These actions will usually precede restoration measures and will therefore be concentrated in the first 2 years of the project.

Reasons why this action is necessary:

The effectiveness of the hydrological repair and peat stripping actions will depend on careful design informed where necessary by one or a combination of the investigations outlined above. Restoration of hydrological pathways (C.11) must be informed by the pre-impact water supply regime and knowledge of the nature of modification. This will ensure that restoration yields optimal hydrological regimes (both in terms of water chemistry and dynamics of supply) appropriate to the interest feature in its specific landscape context – i.e. regimes that work with, rather than against, the hydroecological grain. Measures to counter the effects of drainage (C.10) must be informed by prior survey, not least to ensure that hydrological repair does not lead to conditions which are either too wet (including excessive flooding) or too dry. Topographic survey is needed for the three reasons given under A.5.02 and also to ensure cost effective restoration is achieved – for example by avoiding the need for secondary visits by heavy and expensive machinery to fine-tune ground-works. Stratigraphic work will guide the design detail of actions to strip peat, either for hydrosereal rejuvenation, or as a means of increasing the areal influence of spring water, or in order to identify the amount of soil and peat which needs to be stripped to expose groundwater seepage zones. Water quality analysis will be undertaken to ensure that actions to restore functional hydrological pathways and water levels are appropriate and do not lead to inadvertent enrichment by placing enriched water into direct contact with nutrient sensitive examples of both Annex I features. A further application will be to track improvements in water quality resulting from project action C.9. Substratum analysis will be used to identify the vertical limit of enrichment and thus the amount of peat stripping required to restore the oligotrophic conditions required by both Annex I features – this will prevent the removal of an un-necessarily large volume of peat, a key consideration given the expense and habitat disturbance associated with its handling and removal.

Beneficiary responsible for implementation:

The co-ordinating beneficiary (project staff) will be responsible and will appoint contractors to implement some of the works, whilst others will be implemented by project staff.

Expected results:

The results of the investigations required here would be better informed site restoration actions with a higher probability of achieving their specific aims for each location, and ultimately favourable condition for the two Annex I habitats.

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ACTION A.6

Name of action: Preparatory investigations of constructed wetland locations and design requirements.

Description:

Locations chosen for constructed wetlands (Action C.14) will be assessed for their suitability for this action. This assessment will include topography and water supply pathways of the proposed constructed wetland areas. Water quality sampling and measurements of water flow will be undertaken on a monthly basis over a 6 month period to ensure that the constructed wetlands are appropriate to the required target outflow water chemistry. This latter parameter will be set on a site specific basis. The final component of this action will be detailed design of wetland configuration to ensure optimal operation in relation to the output water quality targets.

This preparatory work will be required at each of the 8 proposed locations. All preparatory work will be undertaken in year 1 to enable work on the construction of the water treatment wetlands to commence in year 2.

Reasons why this action is necessary:

This action is necessary to ensure the appropriate siting and design of constructed wetlands in relation to target output water chemistry.

Beneficiary responsible for implementation:

Project staff will lead on this action, but will draw on expertise and experience in this field held by relevant project partners. All investigations will be sub-contracted to appropriate specialist contractors.

Expected results:

Feasibility and detailed design studies for all 8 constructed wetland locations.

ACTION A. 7

Name of action: Recruit staff, build team and train in equipment operation and management techniques.

Description:

Following an examination of the tasks required to deliver the project and the estimated time to carry out this work, we believe that four core staff are required to deliver the project;

- Project manager
- Project officer – Anglesey
- Project officer – Llŷn
- Finance and Administration Officer

These staff will be recruited by CCW's Human Resources Department who will also be responsible for identifying the need for, and provision of, relevant training. Details of the staffing structure can be found in Part C, Action E.1. It is expected that most of the posts will be filled by permanent staff who will be specifically seconded to the project.

Staff will be recruited and in post by April 2009. Staff will be employed for five years from April 2009 until end of December 2013.

Reasons why this action is necessary:

Adequate staffing is necessary to ensure successful implementation of the project. Staff must be competent to carry out their roles effectively for the success of the project. The Project Manager (PM) will oversee the project, manage staff and be responsible for liaising with partners and reporting to the Steering Group⁶ which will direct the project. The PM will be responsible for publicity for the project

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(including the Project Web Site). S/He will be responsible for identifying training needs for staff and ensuring that a high standard of health and safety practice is maintained by project staff and contractors.

The Project Officers will oversee contractors and carry out works on the fens and work with landowners on surrounding sites.

The Finance and Administration Officer will be responsible for ensuring the smooth financial running of the project, ensuring that appropriate financial planning takes place and that receipts and invoices are in order. They will also be responsible for ensuring that other administrative parts of the project run smoothly.

The training required will depend on staff qualifications and experience.

Beneficiary responsible for implementation:

⁶ The Steering Group will consist of senior staff of the partner organisations involved in the project, i.e. CCW, Environment Agency, North Wales Wildlife Trust and Anglesey County Council.

Staff will be employed by CCW and staff will be eligible to attend CCW courses as well as external courses.

Expected results:

Staff will be well trained and therefore equipped to ensure that the Project is successful.

ACTION A.8

Name of action: Procure machinery required for project.

Description:

This action will cover all machinery procurement. Equipment purchase will be undertaken through a process of open competition conducted using the well established procedures of the co-ordinating beneficiary. Equipment specifications will be produced for all items of machinery. The wetland harvester unit will be a bespoke machine which bridges the gap between the innovative machine developed for the UK Broads Authority under LIFE project LIFE 97 ENV/UK/000511 (Andrews, 2000), and smaller conventional tracked machines in widespread use on wetlands; an outline specification is provided in Annex 3. Visits to suppliers and on-site demonstrations of equipment will be held to help inform machinery requirements, although this is already well researched for all of the items described above. Tender invitation templates are already available within CCW for such purchases.

This action will start in year 1 of the project.

Action	Machine	Cost	Detail of Cost	Source of Cost
A8	Light-weight tracked Machines	131,612	Bespoke Wetland Harvester Design and development of High power, rear engine, rubber tracked Wetland Harvesting System including: High power PTO (60kw) pump to give 117l/min at 350bar; Front linkage to suit heavy duty Flail mower, forager, chipper etc. including all hoses, Quick release couplings, Valves etc. for Hydrostatic drive to Mower; Front loading, high tip 5.5 m3 rear bulk bin comprising of a lightweight galvanised steel frame and aluminium clad container with a full height rear mesh door; Road lighting pack, including: indicators, sidelights, tail lights and number plate light; Mirrors including side, rear view; Air-Conditioning for cab; delivery, training and 5 year maintenance	SOFTRAK by LOGLOGIC Loglogic Peverstone Mutterstock Cullompton Devon EX15 1RW Tel: 01884 839999 http://www.loglogic.co.uk
			Cut and Collect Soft track Standard Softrak machine complete with High power rear PTO (32kw) c/w 1 3/4" 6 spline PTO shaft @ 540rpm; Rear three-point linkage Cat 1/2. c/w Stabilisers and lower link restraint; Front linkage to suit heavy duty Flail mower, including all hoses, Quick release couplings, Valves etc; Road lighting pack, including: indicators, sidelights, tail lights and number plate light; Mirrors including side, rear view; Air-Conditioning for cab; delivery, training and 5 year maintenance	SOFTRAK by LOGLOGIC Loglogic Peverstone Mutterstock Cullompton Devon EX15 1RW Tel: 01884 839999 http://www.loglogic.co.uk
A8	Flail Harvester	20,063	Front mounted, modified JF FH1450 Flail Harvester c/w Electric Chute Control, hydrostatic drive system, hoses, couplings etc – compatible with sofrack system	As above
A8	Chipper unit	17,131	Timberwolf 150 PTO chipper converted to front mounting with hydraulic drive system, hoses, couplings, modified discharge chute and a spare set of blades - compatible with sofrack system	As above
A8	Flail Mower	8,670	Front Mounted, Hydrostatic drive, Berti AF160 Flail Mower. 1.6m cut with manual side-shift suitable for up to 3" scrub - compatible with sofrack system	As above
A8	Hand baler	26,689	BCS Commander professional mower Mini-baler Coupler Delivery, installation and training	Ben Burgess Garden Equipment Norwich
A8	Strimmers(3)	2,669	3 x Stihl strimmer/brushcutters (2 x medium and 1 x large)	Rowena Garden Supplies Llangefni Anglesey 01248 750 477
A8	Electric Fencing	9,500	ESB 130 Solar energizer x 12 Poly posts x 240 Tape 20m/400mm x 48 Tape 400m/40mm x 24 Electro gates x 12	Burgess Llangefni Anglesey

Reasons why this action is necessary:

Specifications establish clearly what equipment is required. An open competition will ensure value for money.

Beneficiary responsible for implementation:

CCW will undertake all aspects of specification production, open competition and contract award.

Expected results:

Appropriate machinery supplied at optimal cost.

ACTION A. 9

Name of action: Procure non-machinery equipment items.

Description:

This action will cover all required non-machinery procurement. Equipment purchase will be undertaken through a process of open competition conducted using the well established procedures of the main beneficiary. Specifications will be produced for all items of equipment not covered by Action A.8. Visits to suppliers and on-site demonstrations will be held to help inform equipment requirements. Tender invitation templates are already available within CCW for such purchases. Software requirements will consist of the following software packages: Windows Professional, Microsoft Office Package (Word, Excel, Power-point), Mapinfo GIS, Microsoft Access. Microsoft Publisher Professional, Countryside Management System (CMS) and five year licences for all.

This action will take place in year 1 of the project.

Reasons why this action is necessary:

Specifications establish exactly what equipment is required. An open competition will ensure value for money.

Beneficiary responsible for implementation:

CCW will undertake all aspects of specification production, open competition and contract award.

Expected results:

Appropriate equipment supplied at optimal cost.

ACTION A. 10

Name of action: Procure grazing stock and infrastructure.

Description:

Establishment of effective grazing regimes across all project sites, is a key action (C.4). A.10 will focus on establishing the necessary herd capacity to deliver this across the project area. Contact will be established with landowners to seek lease agreements for stock use on the project sites. A limited resource of suitable stock is already available, but this will be increased with Welsh native breeds. A marketing strategy for finished stock will be developed for the use of produce in local food outlets. Infrastructure eg stock handling pens will be installed. Coordination will be achieved through the development of a local Grazing Animals Project (see Annex 5). The action will be carried out in each year of the project.

Purchase and lease of appropriate stock to graziers will be used to demonstrate that traditional hardy breeds can be profitable on this land. Lease costs to the grazier will be determined by a qualified land agent with reference to market conditions and site conditions at the time. Graziers will contract to lease the livestock and deliver the defined conservation grazing service. In some cases this will be on their own land or on land owned by project partners or third parties. In return graziers take on the risks associated with livestock rearing, the costs of management (which may be higher than normal due to the difficult terrain, and longer time to maturity of many traditional breeds) and benefit from their sale of meat and

other products, assisted by the project-sponsored Local Marketing Strategy. At the end of the contract graziers will return livestock of equivalent number, type and value to the project (with the options to buy the livestock or to contract another lease).

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The project itself will not be involved in the selling of meat or other animal products. That is the role of the farmer / grazier. The project will account only for the purchase, lease and subsequent recovery of leased livestock, and of course for the condition of the resulting managed habitat.

Reasons why this action is necessary:

Procurement of appropriate stock and the setting-up of a local Grazing Animals Project are essential if effective grazing is to be achieved across project sites.

Beneficiary responsible for implementation:

CCW will appoint a suitable contractor to undertake this work through a process of open competition.

Expected results:

A fully operational local Grazing Animals Project with all the necessary stock, handling infrastructure, and marketing strategy in place.

ACTION A. 11

Name of action: Produce contract specifications for all out-sourced project elements.

Description:

Actions requiring the involvement of contractors will be governed by a written specification produced under this action using the established procurement procedures of the coordinating beneficiary (CCW). Specification templates are already available within CCW for many of the actions which need to be outsourced wholly or in part. Each specification will include the LIFE and main beneficiary logo and include a project title, introduction to the project and background to the requirement for the specific contracted element/s, objectives, required or suggested methodology, and sections covering required timescale, project milestones and deliverables, health and safety requirements, payment schedules and technical annexes – including location maps. Specifications will meet the standards adopted by CCW's Corporate Governance procedures which ensure that specifications are of the highest possible standard, are legally sound, and provide a clear and concise definition of the work or products required.

This action will cover all contracted actions and tasks as outlined in Part C sub-sections A-E. The action will start in Year 1 and continue as necessary throughout the project.

Reasons why this action is necessary:

Specifications establish exactly what work is required and to what standard. Clear specifications are also essential for the fair and equitable selection of contractors.

Beneficiary responsible for implementation:

CCW will undertake all aspects of specification production.

Expected results:

Clearly written specifications for all outsourced elements.

ACTION A.12

Name of action: Undertake feasibility study to assess the commercial potential for establishing an outlet for composted products resulting from biomass harvesting within the Anglesey and Llyn Fens SAC.

Description (what, how, where and when):

A feasibility study will assess the viability of creating a sustainable business producing harvested biomass and peat-based soil improver / compost products derived from material resulting from actions C.1, C.2 and C.13. Further details of the scope of this project are described in Annex 6. The results of this study will feed into plans for the disposal of cut biomass and peat – see Action C.3.

Reasons why this action is necessary:

This project will produce large volumes of mown biomass and peat. The feasibility study is necessary to establish whether it is possible to create a sustainable composting business using the by-products as raw materials.

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Beneficiary responsible for implementation:

The feasibility study will be compiled by contractors. Project staff will provide the study brief, and oversee the tendering, selection and commissioning process. Project staff will provide guidance and expertise as appropriate to the successful individuals / organisations.

Expected results:

A detailed feasibility study identifying whether it is possible to create a sustainable composting business by adding value to by-products of fen restoration within the Anglesey and Llyn fens project area.

ACTION A. 13

Name of Action: Apply for necessary licences, permissions and consents.

Description:

Licences and consents will be required for some of the actions in the project including peat extraction, waste movements and actions involving water resources. Planning permission will be required for some of the works, including information signs at the project sites. Applications will be made to the relevant authorities at the start of the project and in sufficient time to allow works to be carried out to timetable.

Reason why this work is necessary:

This action is necessary to ensure that all works carried out during the project comply with the relevant local, national and European legislation.

Beneficiary responsible for implementation:

The coordinating beneficiary (CCW) will be responsible for applications.

Expected results:

All necessary permits, consents and licences will be in place when required.

ACTION A.14

Name of action: Calculate carbon budget for project.

Description:

The carbon budget will be used to measure whether the target of net sequestration is likely to be attained, and if this is not likely, what aspects of project delivery need to be modified (within project limits) to ensure this. The carbon budget will be calculated for a 20 year period because it is recognised that some aspects of the project will result in short-term C emissions, whilst others will bring about longer term benefits as a result of renewed or stimulated peat formation and reductions in C emission. The carbon budget will be calculated for two main scenarios, (i) according to the current situation, and (ii) following application of all project actions. This action applies to the whole project area. Direct measurements of C emissions and sequestration will be confined to one or more of the National Nature Reserve sites.

This action will be carried out in year 2. This timing will allow sufficient data to be collected from direct measurements of C content and release.

Reasons why this action is necessary:

This action is needed to assess whether the project can deliver net benefits in terms of carbon sequestration. This is vital in order to demonstrate the relationship between the wise use of wetlands and the wider benefits to society that can result. As a statutory conservation body, we feel it is important for CCW to be able to demonstrate these links and benefits.

Beneficiary responsible for implementation:

Project staff and consultants will design the methodological approach. The budget will be calculated through a contract let to an appropriate academic centre.

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Expected results:

A carbon budget which identifies the main sinks and sources of carbon resulting from project activities compared with the current situation. We will use this information in relevant project literature and interpretational material.

ACTION A. 15

Name of action: Improvements to access infrastructure.

Description:

Improvements to track and gateway infrastructure are required to enable access by machinery for mowing and the removal of cut biomass and peat. We will install temporary trackways (based on geotextile matting), upgrade and install permanent tracks, upgrade gateways, and build culverts and bridges. The main access points to sites under conservation ownership (4 sites) will be marked by gates bearing designs produced by local schools under the guidance of an artist. Each gate will be unique, but will reflect as common themes both 'sense-of-arrival' and 'wetland wilderness'. All gates will be equipped with hidden people counters. Access improvements will be focussed on the largest and least accessible sites (Cors Geirch, Cors Erddreiniog and Cors Goch), with minor improvements sufficing at the smaller sites. This work will be carried out in year 1 of the project to ensure that access routes are adequate before conservation actions are carried out.

(Costings based on experience and also price estimates from Sarah Francis, Principal Quantity Surveyor; for Franklin & Andrews; Ty Mott MacDonald, Woodland Road West, Colwyn Bay, LL29 7DH)

SITE	TYPE	AMOUNT	To facilitate actions	COST (€)
Cors y Farl	Gateway improvement including hardstanding to allow tractor and 15 tonne trailer access and loading	1 x Gateway enlargement; hardstanding; scrub removal	C1, C2, C4, C8, C10, C12	1,086
Cors Bodeilio	Low grade 300mm culvert bridges to allow access of machinery and tractor and 15 tonne trailers across Fen ditches	5 x culverts	C1, C2, C3, C4, C8, C10, C12	5,430
	Gateway improvement including hardstanding to allow tractor and 15 tonne trailer access and loading	2 x gateways; hardstandings	C1, C2, C3, C4, C8, C10, C12	6,082
	Upgrade/repair of existing track for project and	1 x track; gateway; stile; public right of way access;	C1, C2, C3, C4, C8, C10, C12	48,871

	occasional vehicular access after project finished 300m	hardstanding and scrub removal		
	Creation of new track that will not be used after project finished 200m	1 x track; fence repair; gate	C1, C2, C3, C4, C8, C10, C12	30,409
	"Local school gate"	2 x gate designed and created by Talwrn School	Continued public access; sense of place and community involvement	10,860
	Use of temporary tracking to avoid damage to sensitive fen e.g. "rola-trak" http://www.rolatrac.co.uk/	112m	C1, C2, C3, C4, C8, C10, C12	12,341

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Cors Geirch	Upgrade/repair of existing track for project and occasional vehicular access after project finished 200m	1 x track; gateway; stile; public right of way access; hardstanding and scrub removal	C1, C2, C3, C4, C8, C10, C12	35,839
	"Local school gate"	1 x gate designed and created by Rhyd y Clafdy School	Continued public access; sense of place and community involvement	5,430
	Use of temporary tracking to avoid damage to sensitive fen		C1, C2, C3, C4, C8, C10, C12	10,860
	Low grade 300mm culvert bridges to allow access of machinery and tractor and 15 tonne trailers across Fen ditches	8 x culverts	C1, C2, C3, C4, C8, C10, C12	8,688
Cors Erddreiniog	Purchase of land and installation of track to allow safe tractor and trailer access and exit onto public highway	1 x purchase; 1 x cattle grid, 1 x disability access re-instatement	C1, C2, C3, C4, C8, C10, C12	16,290 (excluding land purchase)
	"Local school gate"	1 x gates designed and created by Ty Mawr School	Continued public access; sense of place and community involvement	5,430
	Low grade 300mm culvert bridges to allow access of machinery and tractor and 15 tonne trailers across Fen ditches	8 x culverts	C1, C2, C3, C4, C8, C10, C12	8,688
	Upgrade of existing track for project use, and re-instatement of disabled access and vehicular access	1 x track; 1 x cattle grid; 1 x gateway; public right of way access; disability access re-instatement; hardstanding	C1, C2, C3, C4, C8, C10, C12	35,839

	200m			
	Creation of new track that will not be used after project finished 200m	2 x track; fence repair; gate enlargement (Bogynda and Nant Isaf)	C1, C2, C3, C4, C8, C10, C12	56,474
	Use of temporary tracking to avoid damage to sensitive fen	350m	C1, C2, C3, C4, C8, C10, C12	38,011
Cors Goch				
	Low grade 300mm culvert bridges to allow access of machinery and tractor and 15 tonne trailers across Fen ditches	8 x culverts	C1, C2, C3, C4, C8, C10, C12	8,688

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	Gateway improvement including hardstanding to allow tractor and 15 tonne trailer access and loading	2 x gateways; hardstandings	C1, C2, C3, C4, C8, C10, C12	6,082
	"Local school gate"	1 x gate designed and created by Goronwy Owen School	Continued public access; sense of place and community involvement	5,430
	Use of temporary tracking to avoid damage to sensitive fen	Use earlier track	C1, C2, C3, C4, C8, C10, C12	n/a
H4C trail	Facilitation of public access crossing Anglesey fens			21,721

Reasons why this work is necessary:

To enable access by project machinery, the removal of cut biomass and peat, and to prevent damage to the sites during implementation of actions in Part C. c.

Beneficiary responsible for implementation:

CCW will be responsible for the implementation of this action, using local contractors procured through the procedures described in Action A11.

Expected results:

Improved access at all sites, with community involvement in the design of key access points.

B. Purchase/lease of land and/or compensation payments for use rights

ACTION B.1

Name of Action: Purchase of land within or impacting the Corsydd Mon and Corsydd Llyn SACs.

As a publicly funded agency, and the Welsh Assembly Government's advisor, CCW has to operate within strict financial guidelines. With respect to buying land this means that a purchase may only proceed on the basis of an independent valuation carried out by the District Valuer (Valuation Office Agency <http://www.voa.gov.uk/index.htm>) or an appropriately qualified Land Agent. It is standard UK Government policy to allow for negotiation and the price paid would normally be at or below the valuation figure, but in exceptional circumstances may be up to 10% above that figure. Specifically, in relation to this project we can confirm that land purchase, or lease, costs will concur with policy and will not be above the average in the region. Each transaction will contain a verified, supported statement from an appropriate land notary/independent professional agent.

Description:

Sub-action B 1 a: Purchase of land within the 2 SACs.

The land targeted is either comprised of Annex I habitat, or is critical to its functioning. Once purchased the land will be added to the land owned and managed for nature conservation in perpetuity. CCW is at advanced negotiation stage with 32 ha of this land (Cors Nant Isaf). CCW commissioned Carter Jonas LLP (www.carterjonas.co.uk) to carry out a feasibility study of land that could be purchased (Annex 4). This report will be used to prioritise and finalize negotiations with relevant landowners. To avoid overestimation of budgets, land purchase costs have been kept to a minimum with a large contingency of land purchase actions that can be pursued if others fall through. The land is identified on the maps at Annex 1

Sub-action B 1 b: Purchase of land outside the 2 SACs.

As described in Threat 5, Part B2d, inappropriate management of adjacent land is a direct threat to the conservation status of the SACs. CCW has identified i) strategic locations adjacent to the SACs (see below table) which have a direct and significant benefit on the success of this project (see Annex 1); ii) areas of land with Annex I habitat or Annex II species that could be restored and annexed to the SACs; iii) areas of land that have a critical role in acting as corridors or stepping stones between component sites. The coordinating beneficiary will report to the EU if any sites or parts of sites outside SAC boundaries are restored to qualifying SAC standard as a result of this project.

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Parcel/Site	Adjacent, direct & significant bearing	With Annex I habitat/Annex II spp that could be restored	Stepping stones or corridors	Outside SAC - Actions		Further explanation
				If Purchased	If not	
Cors Bodeilio				If Purchased	If not	
CB.1	x		x	C1, C10,	C9	Land owner likely to oppose action C10. Purchase required. Parcel has potential for wetland restoration and connectivity
CB.2	x			C4	C9	Area directly upgradient of a critical spring that is already enriched with Nitrogen. Purchase would stop fertilizer input
Cors Erddreiniog						
CE.1	x		x	C4	C9	Elevated ridge of agricultural land surrounded by rich fen. Critical source area for groundwater feeding SAC habitat
Cors Goch						
CG.1			x	C4	C9	Critical stepping stone between recently acquired Conservation Land and SAC land
CG.2	x		x	C4	C9	As CG.1 but also directly adjacent to areas of alkaline fen
CG.3	x		x	C4	C9	Directly adjacent to SAC habitat
CG.4	x		x	C4	C9	As CG.3 but also links CG.5 to main fen basin
CG.5	x	x	x	C2, C3, C4, C7	C9	Basin fen with Alkaline and calcareous fen
CG.6	x			C4, C10	C9	Land owner likely to oppose action C10. Purchase required
Cors Geirch						
Cge.1	x		x	C4	C9	Directly adjacent to SAC habitat

Reasons why this action is necessary:

This land lies outside the control of the coordinating beneficiary, is classified as being in unfavourable condition and derelict and cannot be subject to appropriate management. It is subject to threat from lack of or inappropriate management, and accidental fire. The fragmented nature of the SAC, comprising individual separated sites, can be addressed by gaining management control. Populations of *Coenagrion mercuriale* in Cors Nant Isaf have probably become extinct because of the dereliction, and lack of access to conservation staff. However, good populations exist on adjacent areas of the SAC along with potential corridors that would allow the historic sites to be re-populated if managed appropriately (Action C.15)

Beneficiary responsible for implementation:

The co-ordinating beneficiary will implement the land purchase.

Expected results:

This action will lead to at least 66 ha of wetland, or land critical to its functioning being taken into conservation management in perpetuity. It will also restore at least 4 sites which historically supported populations of Annex II species but which currently lie outside of conservation management control.

C. Concrete conservation actions

See separate Maps Annex (Annex I) for detailed location of actions. Further technical information in support of Actions C.1, C.2 and C.13 appears in Annex 14.

Action C.1

Name of the action: Large-scale mowing and biomass removal.

Description:

Mowing and harvesting will be undertaken using a dedicated and specially designed self-propelled tracked machine (see Annex 3 for an outline specification and Action A.8). The removal of accumulated litter is a key aim of this action. Mowing blocks will have irregular outlines to reduce the landscape impact of this operation. Cut material (biomass) will be stock-piled at site margins (see preparatory action A.13 relating to Environment Agency exemption certificates) and left for up to six weeks to reduce in volume and then loaded into trailers, transported off-site and utilised in a local supported composting enterprise (C.3).

Project sites have been mapped to identify areas suitable for machine mowing, mowing in sensitive areas will be undertaken using hand-held machinery – see C.2). The areas within which mowing will take place are shown in site maps in Annex I. This action has been identified as necessary on 57 ha across 7 sites in the project area.

An average of 40% of each of the areas mapped for this activity in Annex I will be mown as discrete blocks of irregular outline to create a maximum edge:area ratio of uncut vegetation for follow-on grazing and to aid re-colonisation from the edges by invertebrate and other species (Harding, 2005).

Restoration mowing will start in year 2 and annually a regime of one third or one fifth of the area will be for mown at each site. For planning purposes, we have referred to guidance on recommended rotational cycles to minimise impacts on invertebrates (Lott *et al*, 2002). Mowing will be scheduled for July to mid September to avoid disturbance to invertebrates and nesting birds and also to coincide with the late summer water table minimum when soils are less liable to damage by surface loading.

For action C.1 (Large Scale Intensive Cutting) we have employed two day rates. Day rate 1 covers contractor costs for cutting and harvesting on a hectare (ha) basis, and day rate 2 covers contractor costs for removal of cut biomass, also on a ha basis.

Day rate 1: 0.75ha. per day @ £150 per day
Day rate 2: 0.33ha. per day @ £300 per day

Running costs (diesel and machinery uptake) has been calculated at: 0.75ha. per day @ £62.50 per day.

The total area identified for this management is 239.68 ha. To this figure we have applied a multiplier which calculates the actual areas to be selected for cutting within overall mapped limits. This brings the total area to be covered by this action to 58.84 ha.

Sub-total for rate 1 is $58.84 / .75 \times £150 = £11768$
Sub-total for rate 2 is $58.84 / .33 \times £300 = £53491$
Sub-total for running costs is $58.84 / .75 \times £62.5 = £4903$
Total £70,162

Convert to Euros (@ £0.70 = €1.00)
Add VAT (17.5%)
Add 12% for inflation as the mid-point for project years 1-5 (08/09 3%, 09/10 6%, 10/11 9%, 11/12 12%, 12/13 15% and 2013/2014 18%).

Overall cost $70162 / 0.7 \times 1.175 \times 1.12 = €131,905$

Reasons why this action is necessary:

Mowing is necessary to address Threat 1, (ecological dereliction). The principal symptoms of dereliction in the project area are:

- (i) Dominance of competitive graminoids
- (ii) The expansion of woody elements
- (iii) Canopy closure (over-dominance) by one or more of the key alkaline fen/calcareous fen species. These contexts will serve as the primary focus for mowing management.

Lack of vegetation management is regarded as the most widespread cause of species impoverishment in undrained rich-fens (Wheeler & Shaw, 1987; Wheeler 1988). Mowing reduces above ground biomass and litter and achieves direct ecological benefits by reducing inter-specific competition for light and other resources. Mowing will always be accompanied by the removal of cut material to prevent the smothering effect of litter which can be as deleterious as no mowing (Wheeler & Giller, 1982; Wheeler 1984a). Mowing will also aid the activities of grazing livestock by (i) encouraging their access to formerly rank and closed-canopy stands, and (ii) increasing the ecological effectiveness of grazing by reducing the proportion of unpalatable material. Finally, we will use ultra close-mowing as a preparatory measure for areas subject to peat stripping.

Beneficiary responsible for implementation:

Project staff will undertake this action. CCW will own, house and maintain the machinery according to recommended schedules. Operation of machinery may be part sub-contracted. Machinery maintenance and repair will be undertaken via a contract let to a local agricultural machinery service centre.

Expected results:

Mowing will achieve significant reductions in standing crop and dead biomass and together with grazing will result in increased species-richness and structural heterogeneity.

Action C.2

Name of the action: Hand cutting of vegetation.

Description:

Cutting derelict fen vegetation with hand-held cutting tools is widely used for small scale management of sensitive vegetation. The project will use gangs of experienced conservation contractors to extend the scale of this cutting operation across all sites. This cutting results in a more heterogenous pattern of cut heights. Rapid removal of biomass will follow the cutting to prevent smothering of bryophytes and smaller sedges/herbs; to reduce nutrient input; and to encourage re-colonisation of exposed patches of substrate. Cut material will be harvested using either a self-propelled but hand-steered low ground weight mini-bailer, or the wetland harvester.

In specific areas some ultra-sensitive mowing will be carried out by trained project staff. This will open up runnels between tussocks and allow more exact mowing heights - particularly important for two of the Annex II species targeted for action by this project (namely *Coenagrion mercuriale* and *Vertigo geyeri* – Action C.15).

This action has been identified as necessary at 10 sites – areas outlined for this action are shown in the maps presented in Annex I.

The mowing regime described here is a restoration action and will commence in year 1 and annually one third or one fifth of the scheduled area will be mown at each site. We have referred to guidance on recommended rotational cycles to minimise impacts on invertebrates

(Lott *et al*, 2002⁷). Mowing will be scheduled for July to mid September for reasons explained in C.1. The ecological effectiveness of mowing is likely to be maximised by late summer mowing (Rowell *et al.*, 1985), and observations show standing crop increases most markedly in late summer (particularly August), suggesting this as the

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optimal month for aiding nutrient offtake. Following the projects, there will be a requirement for a much reduced intensity of rotational mowing, the costs of which will be met by the coordinating beneficiary and partners.

For action C.2 (Hand Cutting and Removal) we have employed two day rates. Day rate 1 covers contractor costs for hand cutting using strimmers, and day rate 2 covers contractor costs for removal of cut biomass, also on a ha basis.

Day rate 1: 0.25ha. per day @ £140 per day

Day rate 2: 0.33ha. per day @ £300 per day

The total area identified for this management is 79 ha. To this figure we have applied a multiplier which calculates the actual areas to be selected for cutting within overall mapped limits. This brings the total area to be covered by this action to 57.68 ha.

Sub-total for rate 1 is $57.686/.25 \times £140$

Sub-total for rate 2 is $57.686/.33 \times £300$

Total £84,747.5

Convert to Euros (@ £0.70 = €1.00)

Add VAT (17.5%)

Add 12% (mid-point value as explained under C.1) for inflation

Overall cost $84747.5 / 0.7 \times 1.175 \times 1.12 = €159,323$

Reasons why this action is necessary:

Mowing is necessary to address Threat 1, namely ecological dereliction. A full rationale in support of this action appears under the closely related action C.1. The specific requirement for Action C.2 is to address acute dereliction in areas of fen which would suffer from machine mowing and which are currently unattractive for grazing.

Beneficiary responsible for implementation:

Project staff will contract out this operation except in the areas where ultra-sensitive mowing is required where project staff will carry out the work.

Expected results:

Significant reductions in standing crop and dead biomass, which together with grazing will result in increased species and structural diversity. At least 58ha will be subject to this action across the project area.

Action C.3

Name of action: Biomass removal off-site and composting.

Description:

The harvested biomass and peat from project sites will be used in a sustainable composting business. The business case for this action is outlined in further detail in Annex 6.

Biomass and harvested peat will be removed off-site and transported to a composting outlet. Preparatory action (Action A.12) will examine the feasibility of establishing local composting

⁷ See Annex 11 for full citation of references

outlets to receive and process the material. If the composting option is not viable, the cut material will be temporarily stock-piled. Such material will be used eventually as a soil conditioner for agricultural land managers within the region, or in the short-term as bedding for stock over-wintered inside. Biomass removal will take place on both SACs and will start in year 1 of the project.

For action C.3 (Peat Cutting) we have employed two day rates. Day rate 1 covers contractor costs for peat removal, and day rate 2 covers contractor costs for removal of extracted peat, also on a ha basis.

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Day rate 1: 0.2ha. per day @ £270 per day
Day rate 2: 0.03ha. per day @ £300 per day

The total area identified for this management is 35 ha. To this figure we have applied a multiplier which calculates the actual areas to be selected for peat cutting within overall mapped limits. This brings the total area to be covered by this action to 15.75 ha.

Sub-total for rate 1 is $15.75/.2 \times £270$
Sub-total for rate 2 is $15.75/.03 \times £300$
Total £178,767
Convert to Euros (@ £0.70 = €1.00)
Add VAT (17.5%)
Add 12% (mid-point value as explained under C.1) for inflation

Overall cost = €336,083

Reasons why this action is necessary:

Use of harvested biomass will help to achieve sustainability of the management of the named fen sites, creating a sustainably produced, locally sourced product that is less damaging to the environment than conventional peat-based composts.

Beneficiary responsible for implementation:

Project staff will be responsible for implementation using contractors where this offers best value.

Expected results:

Removal of all cut biomass and peat from project sites and its use in a composting outlet. This outlet will provide unique opportunities for disseminating information about the wider projects and its aims through actions D.1 – D.5 and D.8.

ACTION C.4

Name of the action: Establishment and operation of suitable grazing management.

Description:

Establishing and managing grazing across all the project sites is necessary to secure appropriate management and restore habitats to favourable condition. Grazing will increase species diversity, reduce the dominance of aggressive graminoids, open up patches of Annex I habitats, create suitable niches for Annex II species and re-establish historical land management practices.

A feasibility study into what is required for carrying out the grazing action has been carried out by Pont (Pori Natur a Threftadraeth) which is a part of the UK Grazing Animals Project www.grazinganimalsproject.org.uk/pont_home (Annex 5). Traditional cattle and pony breeds will be used for grazing. Appropriate stocking levels will be used for restoration and maintenance grazing. Temporary and permanent fencing (Actions C.5 and C.6) will be used to secure appropriate stocking rates.

Grazing will be targeted on the SACs, but will also need to make use of other conservation sites in and around the catchment of the SACs to ensure optimum grazing intensity at all times of the year; and to avoid issues of animal welfare. See table below for breakdown of costs into stock and equipment – this is based upon a feasibility study undertaken by PONT – see Annex 5.

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ACTION	Detail	Cost(€)*
C4- Grazing Action Infrastructure	Stock trailer	4,287
	Moveable pen and crush for cattle	14,290
	Consumables	27,636
A10 – Grazing Action Livestock	Cattle	85,740
	Ponies	41,441
	Sheep	857
	Consumables (e.g. vet)	17,148

Reasons why this action is necessary:

Calcareous and alkaline fen and the Annex II species on the sites will all benefit from this action. Grazing is traditional and the most sustainable management tool available for progressing habitat and species features towards favourable condition. It is necessary to naturally “mow” all vegetation, including those areas that are derelict and require machine mowing first. Stock will also break up tussocks, create poached bare substrate which provide valuable niches for many calcareous and alkaline fen specialist species, and open up ditches and vegetation for use by populations of the *Coenagrion mercuriale*.

Beneficiary responsible for implementation:

Project staff will be responsible for managing the implementation of this action which will be carried out by a contractor.

Expected results:

Grazing will be employed over a total SAC area of 446 ha. All areas of alkaline fen will receive some level of grazing, the amount depending on their ‘starting’ condition as assessed under Action A.3. Approximately 90% of calcareous fen will be grazed, the remainder, comprising wet water-fringe vegetation, will remain naturally ungrazed.

Action C.5

Name of action: Targeting animals onto habitat with the use of permanent fencing.

Description:

Land within and adjacent to sites is often subject to inappropriate grazing or land management regimes. The erection of stock-proof fencing will be used to closely manage stock and ensure optimum management for blocks of Annex I habitat. Fencing will be contracted out to local experienced contractors to specifications designed by project staff. Fencing will be undertaken on and adjacent to all sites in the ownership of conservation bodies, and will also be negotiated on adjacent land. Our estimate for the length of permanent fencing required is 14,320 m.

Reasons why this action is necessary:

Calcareous and alkaline fen and three of the Annex II species on the sites will benefit from this action through the implementation of appropriate grazing regimes.

Beneficiary responsible for implementation:

Project staff will co-ordinate the action and project staff will oversee the work of the contractors.

Expected results:

Fencing will be erected to enable appropriate grazing.

Action C.6

Name of action: Creating temporary, confined grazing with portable electric fencing.

Description:

Electric fencing allows rapid and simple adjustments to stocking density and allows control of grazing intensity within areas of both Annex I habitats, particularly in relation to other project actions such as mowing (Actions C.1 and C.2) and burning (C.8). Electric fencing has been identified as a requirement

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at the majority (11) of the project sites. Solar electric fencing will be purchased (Action A.9) to reduce carbon usage and also to reduce staff time inputs. It will be erected by project staff in line with optimum grazing conditions to ensure improvements in habitat condition. Our estimate for the length of temporary fencing required is 12 x 1ha blocks of land where grazing can be exclusively directed onto specific areas of wetland. For example targeting ponies onto areas of Alkaline or calcareous fen within Cors Erddreiniog where there is no other way to corral animals in one location. It will be necessary to have the flexibility to concentrate animals on at least 12 different parcels (see table in question 31 (A8 electric fencing).

Reasons why this action is necessary:

Blocks of Annex I habitat, and areas of habitat supporting Annex II species, need finely tuned grazing action to recover to favourable condition.

Beneficiary responsible for implementation:

Project staff will identify the areas requiring temporary grazing and it will be implemented by project staff. Project staff will erect and maintain fencing.

Expected results:

Temporary electric fencing will enable appropriate grazing.

Action C. 7

Name of action: Scrub management.

Description:

Scrub encroachment is a symptom of management neglect and is exacerbated by drainage and nutrient enrichment. Following removal of scrub, appropriate grazing will be used to reduce re-colonisation. Light scrub will be managed by hand pulling and cutting. Established and taller scrub will be cut and chipped or treated with an appropriate herbicide applied to notch-cut stems or severed stumps. In the latter case, cut material will be removed off-site; treated notch-cut stems will be left to rot *in situ*, adding a valuable resource of dead standing wood. A chipper unit will be purchased/leased to support this work (A.8); chipped material will be removed from the sites. The area of scrub which needs to be managed has been assessed at each site – see Annex I.

Scrub removal will occur in years 1-4 through a programme ensuring that parts of each site are cut each year. Following the project, grazing and low intensity maintenance will keep scrub cover at levels suitable to maintain favourable condition of the two Annex I habitats.

Reasons why this action is necessary:

Scrub leads to the progressive modification of herbaceous rich-fen vegetation, and the loss of certain characteristic species intolerant of shade. Scrub has expanded within the project area as a result of drainage and management neglect. Scrub also increases evapo-transpirative loss which reduces the effectiveness of hydrological repair actions, whilst also contributing more widely to sub-optimal hydrological regimes where hydrological repair is not feasible.

Beneficiary responsible for implementation:

Project staff will oversee this action, supported by contractors where required. CCW will own, house and maintain machinery used for this action.

Expected results:

Scrub management will leave no more than scattered standing scrub across the majority of alkaline and calcareous fen (84 and 104 ha respectively).

Action C.8

Name of action: Removal of litter build up by burning.

Description:

Where the build-up of vegetation litter is so great and mowing is not possible, controlled burning will be carried out. Blocks of no more than 1ha will be selected for burning at a time. Where possible fire

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breaks will be cut around the areas to be burned and/or other features such as streams, ditches and tracks will be used as firebreaks.

Burning will take place during the autumn and winter on occasions when the surface vegetation is sufficiently dry to allow successful burning to take place.

Reasons why this action is necessary:

Burning has traditionally been carried out in a disorganised way on all of the fens, but in recent years lack of interest in grazing the fens has meant that local farmers have no incentive to burn. In addition, the purchase of many of the fens by conservation bodies has also reduced levels of burning due to concerns regarding the destructive impact of burning on sensitive species, particularly *Sphagnum* mosses. However, in areas where these species are not present and where the build-up of litter in particular is significant, burning offers an efficient means of reducing the dominance of graminoids and allowing the restoration of rich-fen vegetation.

Beneficiary responsible for implementation:

CCW has much experience of burning, although predominantly on upland heaths. Therefore staff with this experience will be used to plan and oversee burning on the fens. Part of their work will involve training local conservation staff and other landowners in this work. CCW's tracked fire prevention vehicle will be brought to sites where burning is taking place to reduce the risk of fires getting out of control. Contractors will be employed to carry out the burning.

Expected results:

Burning has been identified as being necessary at 8 sites covering a total area of 168 ha. Most of this is on sites owned by the main beneficiary or project partners.

Action C.9

Name of action: Securing favourable management through management agreements.

Description:

Favourable management of land not already in the control of CCW, both within the designated sites and in the catchment critical to the integrity of the SACs, will be secured by management agreements. These agreements will provide for changes in management

lasting the duration of the scheme (such as changes in grazing management to restore habitats) as well as for capital investments or one off actions such as fencing or restoration mowing and biomass removal.

CCW has existing powers under section 15 of The Wildlife and Countryside Act to enter into management agreements with landowners. These agreements will be entered into with the occupier and/or owner of the land for a maximum of 5 years. The occupier/owner will manage the land in accordance with an agreed plan. A range of prescriptions for these agreements is presented in Annex 7. Recurring actions, if appropriate, will be funded separately by CCW. Agreements will be targeted towards owners and occupiers within and surrounding the designated sites with land that has been prioritised and is integral to the integrity of the SACs; or form corridors or stepping stones between the dispersed sites that make up the SAC. Landowners have been visited and identified by the feasibility study presented in Annex 4 as being willing to enter into agreements. This feasibility study identified 43% of owners/occupiers as being interested in entering into a management agreement.

Agreements will be negotiated during years 1, 2 & 3 and implemented over years 2, 3, 4 & 5

Reasons why this action is necessary:

The fens sit at the bottom of shallow sided valleys, fed by lime rich springs which are often outside the boundary of the SAC. One of the biggest factors affecting the conservation status of the SACs is intensive land-use on the valley sides. Agreement with owners/occupiers is required on land not directly controlled by CCW and partners to permit the partners to carry out management and or to secure management actions by the owner/occupier.

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Beneficiary responsible for implementation:

Project staff with the aid of contractors will negotiate and finalise management agreements with owner/occupiers.

Expected results:

Secure agreements on 217 ha within and adjoining the sites

Action C. 10

Name of action: Raise and stabilise water levels.

Description:

Surface drainage has had a significant negative impact on the hydrological regime of all the project sites. The effects of drainage will be addressed by raising and stabilising water levels and, where necessary, maintaining flows. Water levels will be raised using a range of methods, including peat dams, corrugated plastic piling, wooden weirs and biomass bales. Peat dams will be fitted with overflow pipes to prevent erosion of peat dams by water scour. Plastic piling and wooden weirs will be used where permanent flow is required, or where peat material is unavailable or of unsuitable structural quality.

This action will be undertaken at 9 project sites along the indicative drainage courses mapped in Annex I. Preparatory investigations (Action A.5) will be used to identify the exact location and spacing of control structures. Alternative locations to those marked in Annex I may be used if site investigations indicate this is necessary.

This action will be occur during years 2-5.

Reasons why this action is necessary:

This action is needed to address threat 3 (drainage and interruption of hydrological pathways). Drainage leads to lowered water tables in adjacent peats and results in water table regimes which are unsuitable for the two Annex I habitats. Drainage also results in

nutrient enrichment as a result of peat mineralisation, release of dissolved organic carbon into water courses, and wastage and shrinkage of peat.

Beneficiary responsible for implementation:

Project staff will coordinate and oversee all aspects of this action. A combination of project staff and contractors will undertake the site-works.

Expected results:

Restored water table regimes will achieve improvements in habitat condition and also aid increases in the extent of both Annex I habitats. This action will be pursued along a total length of 5,800 m.

Action C. 11

Name of action: Restoration of critical hydrological pathways.

Description:

Critical hydrological pathways have been severed by surface drainage. This action will restore lime-rich water to stands of the target Annex I habitats, and increase its overall influence across the fen sites.

Hydrological pathways will be re-established by infilling drainage features and installing impermeable cross-bunds to prevent continuing preferential flow down the length of infilled ditches. Buried culverts (concrete or plastic pipes) will be used where drainage from adjoining land has to be maintained. Other methods employed to restore pathways will involve modifying surface topography to maximise the spatial influence of surface water flow from spring inputs, and the use of buried perforated pipes to create recharge trenches providing diffuse seepage inputs up-gradient from Annex I habitats.

This action has been shown to be necessary at locations shown in Annex I. Preparatory investigations (A.5) will be used to provide design detail and identify exact locations. Alternative locations to those marked in Annex I may be used if site investigations indicate this is necessary, but the total extent of this action will remain unchanged.

This action will be occur during years 2-5.

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Reasons why this action is necessary:

This action is needed to address Threat 3 (drainage and interruption of hydrological pathways). Hydrological pathways are a key determinant of the distribution, extent and quality of both Annex I habitats (Wheeler & Shaw, 2007 in press⁸). Water supplied from groundwater is calcareous and usually oligotrophic – key habitat requirements for both habitats. Reduction in the supply of this water is likely to lead to dehydration and an increase in the proportional contribution of rainfall and thus eventually surface acidification. These trends lead to sub-optimal conditions for both habitats.

Beneficiary responsible for implementation:

CCW has identified areas where this action is needed. Site works will be undertaken by project staff and contractors.

Expected results:

Restored hydrological pathways will achieve improvements in habitat condition and increase the extent of both Annex I habitats. Pathways will be restored along a total length of 3,479 m proximal to examples of both Annex I habitats and their wider supporting fen matrix.

Action C.12

Name of action: Control of water levels in the main drain at Cors Erddreiniog.

⁸ See Annex 11 for full citation of references

Description:

The majority of surface water outflow leaves Cors Erddreiniog (the largest of the Anglesey Fens sites) via a substantial concrete weir fitted with two sluice control structures. The weir was installed in 1992 to raise water levels in the main site drain which had been greatly over-deepened in the 1960's to aid agricultural drainage and reclamation. Water levels behind the weir are maintained by periodic manual adjustment of one or both sluices, the aim being to maintain water levels at or slightly above the surface of peats bordering the drain. This action will result in automation of sluice operation.

A stilling well and water depth sensor will be installed upstream of the weir. Hourly water level measurements will be compared with a pre-programmed target water level for each month. If necessary, an electronic signal will be sent to activate movement of the weir. Electronic over-ride via telemetry from a phone link and manual over-ride will also be provided. Weir movement will be in incremental steps to prevent rapid changes in level. A minimum by-pass flow will be maintained to sustain flows in the outflow stream downstream of the weir. All equipment will be powered from a solar panel and back-up battery. This work will be completed in year 3.

Reasons why this action is necessary:

Manual adjustment is time consuming, and insufficient staffing means that sluice adjustment is not always carried out in a timely manner. This leads to periodic and uncontrolled inundation or dehydration of vegetation on either side of the drain.

Beneficiary responsible for implementation:

Project staff will produce outline specifications for the project which will be designed and installed by contractors.

Expected results:

Better control of water levels within the main drainage feature at Cors Erddreiniog will prevent undesirable flooding by potentially nutrient enriched water, and also avoid periods of excessive summertime water table draw-down. This will help reduce emissions of dissolved organic carbon into receiving waters.

Action C. 13

Name of action: Peat cutting to restore and re-create alkaline and calcareous fen.

Description:

Surface peat layers will be cut and removed to increase the extent and quality of both fen habitats. This will be carried out in the following contexts:

- (i) as shallow cuttings to remove enriched vegetation and soil which have accumulated as a result of cultural enrichment, lack of cropping, and mineralisation of organic pools following drainage;
- (ii) to rejuvenate hydrosere within areas of long-derelict fen to create conditions suitable for the development of secondary hydrosere sequences;
- (iii) to create modified surface topographies which allow the more widespread influence of water arising from groundwater discharge.

Cuttings excavated to a depth sufficient to result in flooding will receive no further direct management other than reed cutting, should this prove necessary. Cuttings excavated to leave surfaces which are only seasonally wet or inundated will be protected from grazing until at least 50% of the peat is re-vegetated. Thereafter, light grazing will be applied (Action C.4).

Most peat cuttings will be created using tracked excavators with temporary matting to avoid terrain damage. Cuttings constructed for habitat creation in areas of long derelict fen will mimic the size and shape of historic cuttings.

Excavated material without an excessive nutrient burden may be used locally and more or less immediately for hydrological repair actions (Actions C.10 and C.11), otherwise it will be removed off-site (Action C.3), processed and utilised as a compost conditioner in a local composting enterprise.

Peat cutting will be undertaken throughout the project period, but focussed in years 2 – 4 inclusive. Peat stripping will be scheduled for the late summer/early autumn months to coincide with the seasonal water table minimum to reduce ground damage from machinery.

Reasons why this action is necessary:

Peat cutting will achieve long-term expansion in the area of both fen habitats within the SAC. Peat stripping will also benefit neighbouring blocks of habitat, by removing soil nutrients, increasing the spatial influence of groundwater, and aiding habitat connectivity.

Peat cutting is now well established as a conservation tool in British and European fens (Rowell, 1988; Wheeler *et al.*, 2002). This project element will draw on these studies to ensure we adopt and adapt relevant best practice, and will have significant demonstration value. This technique will not be applied to any pristine primary (i.e. uncut) wetland surfaces.

Beneficiary responsible for implementation:

CCW has considerable experience in this field, and several local contractors have undertaken this kind of work in the recent past. Contractors will be appointed and supervised by project staff.

Expected results:

Peat cutting has been identified as a necessary activity over a total area of 15 ha on 6 sites. Most of this activity will take place on sites owned by the main beneficiary or project partners. Investigations described in Action A.5 will confirm the areas to be stripped. Outline locations for this action across the project sites are shown in Annex 1. Exposed peat and open water will be allowed to re-vegetate naturally. Vegetation development will be monitored (Action E.4.02). Hydrological regimes at cut-over sites will be monitored for at least twelve months post excavation (Action E.4.03).

Action C. 14

Name of action: Construction of reedbed wetlands to tackle point-source pollution.

Description:

Several locations have been mapped (see Annex 1) where either diffuse sources of pollution combine, where point source inputs occur, or where specific necessary catchment operations cannot easily or quickly be tackled.

Constructed wetlands will be designed to be predominantly of the vertical flow type to minimise the spatial footprint, and will utilise common reed *Phragmites australis*. Monthly samples of water quality and flow velocity will be undertaken in year 1 of the project to provide data to inform appropriate sizing of each constructed wetland; this sampling will be timed to accommodate peak winter flows and low summertime flows (see Action A.5).

Periodic removal of the standing crop (to remove amassed nutrients) will be undertaken and where appropriate, this material will be fed into the composting biomass stream (C3).

Constructed wetlands represent the best option for reducing nutrient inputs at 8 locations, shown in Annex 1. Constructed wetlands will be installed off-site or at site margins to ensure no negative impact on Annex I features. Installation will occur in years 2-4 follow preparatory actions in year 1 to fine-tune locations and acquire sufficient data to inform design.

Reasons why this action is necessary:

Point-source inputs of enriched water have led to localised but severe eutrophication and are a direct cause for the unfavourable condition of some stands of alkaline fen, and are a contributory factor at all of the other project sites where this action has been identified.

Beneficiary responsible for implementation:

CCW has identified areas where this action is needed and will coordinate implementation. Monitoring of water quality and flow to calculate input nutrient loadings (Action A.5) will be undertaken to inform design criteria. Design and construction will be carried out under contract.

Expected results:

Improvements in water quality to target levels of N and P as identified under Action A.5, leading to improvements in the condition of areas of both alkaline fen and calcareous fen. Six rounds of monitoring of output chemistry (Action E.4.04) will be undertaken during the first year of operation to assess function in relation to target water chemistry. This may lead to a requirement for minor redesign and engineering.

Action C.15

Name: Action for Species within the project sites

Description:

In addition to the Annex I habitats, several of the component SAC sites are designated for Annex II species, namely *Euphydryas aurinia* (Lepidoptera), *Coenagrion mercuriale* (Odonata), *Vertigo geyeri* (Mollusca) and *Vertigo moulinsiana* (Mollusca). Although these species will benefit from generic actions to improve the habitat quality of component sites, they also require targeted action to ensure populations are in or restored to favourable condition.

The priority for *Coenagrion mercuriale* and *Vertigo geyeri* is to undertake mowing using hand-held machinery (Action C.2) and then increase grazing levels (C.4), aided where necessary with permanent or temporary enclosure (C.5 and C.6), such that the very rank and closed swards within the calcareous seepage zones in which both species occur are made more open. Both species require warm microclimates for development and the shading produced

by rank vegetation currently limits the extent of optimal habitat available to both species. Hand-digging (an operation specific to this action) will be used to open up runnels within selected spring flushes to create suitable breeding microhabitats for *Coenagrion mercuriale*. Restoration of a ditch system linking two parts of the Cors Erddreiniog system (Action C.11) will also facilitate dispersal of *Coenagrion mercuriale*, with the objective of securing the

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recolonisation of a location from which it has recently become extinct. Some areas where there are previous records of the species require fairly drastic action involving machine digging and mowing to open up the dense reed beds.

The marsh fritillary, *Euphydryas aurinia*, requires grazed fen meadow habitats for breeding, but stock density is at a lower level than that described above. The re-introduction of appropriate grazing to neglected pastures in the vicinity of existing populations and restoration of suitable habitat within the catchment (C.4, C.9) will establish a functional metapopulation network and increase the number of satellite populations in the landscape to buffer the population from stochastic extinction. Tussocky grassland with an abundance of *Succisa pratensis* (the larval foodplant) is the required habitat and this can be achieved through moderate grazing by ponies or cattle at a density of 0.3 livestock units.

In North Wales *Vertigo moulinsiana* is associated with stands of *Cladium mariscus* growing in old ditch systems that have not been dredged for a considerable length of time. As succession proceeds, however, these ditch systems become shaded by willow and alder scrub and hence become less suitable for the snail. Small-scale rotational management (namely scrub control, C.7, and clearance of selected ditch sections – the latter being an operation specific to this action) will restore optimal conditions and permit *Vertigo moulinsiana* to spread to other sites downstream of the existing population.

Burning will be prevented in the vicinity of existing and recovery stations by using fire-breaks constructed as part of action C.8.

This action will be targeted at Cors Erddreiniog, Waun Eurad, Cors Goch and Cors Goch. Action within the wider site catchments (chiefly C.9) will be necessary to tackle the metapopulation issues associated with the recovery of *Euphydryas aurinia*.

Reason why this action is necessary:

The status of all four of these species has been assessed as unfavourable, declining in the recently completed management plans for the two SACs. Each of the species will benefit from the overall programme of measures, but each also requires the specifically targeted measures described above to achieve population recovery and the re-establishment of extinct populations.

Beneficiary responsible for implementation:

These actions will be undertaken by contractors and the coordinating beneficiary.

Expected results:

Site specific conservation objectives have recently been written (March 2008) which define favourable condition for the four species within the SAC sites – an example is given under action E.4.05 for *Vertigo geyeri* at Waun Eurad. We will implement favourable management for all four species within the lifetime of this project. We expect to restore populations of *Vertigo geyeri*, *V. moulinsiana* and *Coenagrion mercuriale* to favourable condition by the end of the project. We expect to have achieved significant improvements in the status of *Euphydryas aurinia* by 2013, but acknowledge that attainment of favourable condition will depend on the success of uptake of action C.9 within the site catchments.

D. Public awareness and dissemination of results

Please note that **All promotional materials will be produced in both English and Welsh.**

Action D.1

Name of action: Develop and maintain project website.

Description:

A website will be designed, set-up and maintained throughout the project and for 5 years after its completion as part of CCW's corporate website. The website will include information on the rationale for the project, its contribution to the Natura 2000 network, a description of the habitats and species covered, information on the project participants and their roles, announcements of events, news updates, action plans and reports, and any other relevant material. This website will be accessible via links from the CCW website and from the websites of CCW's partner organisations.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Develop and maintain project website	Via CCW corporate Website and links to partners http://www.ccw.gov.uk/Splash.aspx	Wider public Interest Groups Partners Stakeholders Local stakeholders Local community Land managers Peers	Microsite from CCW host site 25,000

Reasons why it is necessary:

This action is a requirement for all LIFE-Nature projects. The website will be a valuable and cost-effective medium for promoting awareness of the objectives of the project - targeting local people and other land managers and reporting results and achievements throughout the life of the project. It will also facilitate information exchange with other groups working on similar projects throughout Europe.

Beneficiary responsible for implementation:

The website will be set up and maintained as part of CCW's corporate website, under the supervision of the project manager.

Expected results:

Project website, which will enable information about the project to be disseminated to a very wide audience. It will therefore contribute to raising awareness of the project, and ultimately to the achievement of the project's objectives.

Action D.2

Name of action: Design, create and erect project information signs.

Description:

Modular information signs will be erected, two at each project site with spares in case of damage. Each will have a timber frame, a header board and hardwearing A3-sized inserts providing key project information. The signs will be designed so that the inserts can be updated at minimal cost. The LIFE logo will be displayed prominently on each.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Design, create and erect project information signs.	30, Updatable, A3 Interpretation signs. 2 per conservation site	Local people Local stakeholders Local community Recreational walkers Visitors to the project SACs	Design and print 30 wooden signs and laminated posters 17,857

Reasons why it is necessary:

The signs will communicate key messages about the project to local people, recreational walkers, and others visiting the project SACs. As they can be easily updated, they will keep interested parties informed of project progress.

Beneficiary responsible for implementation:

The signs will be designed by an appointed consultant (A.11) and managed by a specialist company, working in close consultation with the Project manager.

Expected results:

Thirty signs in total. Two durable signs erected at each site within the project area and updated throughout the project. These signs will help improve awareness and understanding of the project among the key stakeholders and therefore gain support of our actions.

Action D.3

Name of action: Public Promotion and Project Marketing Publications.

Description:

Public information leaflets will be produced describing the objectives and activities of the project. The leaflets will be printed on A3 paper folded to DL size. They will bear the project title and the logos of the LIFE programme and will contain photographs showing the sites, the threats and the methods to be used to address them.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Public Promotion and Project Marketing Publications	5000 Public information leaflets distributed via partners' offices' tourist information centres; libraries, post offices, local shops, farming outlets; farming unions, retail outlets, local agricultural shows and other events, hand delivery, via CCW's Enquiry Unit	Neighbours Local landowners Tourists Partners Stakeholders Local stakeholders Local community Land managers	Print 7,143

Reasons why it is necessary:

By highlighting management issues on the sites and the key threats to the habitat it will help understanding and negotiation towards appropriate management. The leaflets will be distributed through local tourism and retail outlets and will be circulated directly to key audiences including neighbouring landowners.

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Beneficiary responsible for implementation:

The Project manager will coordinate production of the leaflets with assistance from the Project Administrator. The leaflets will be printed externally.

Expected results:

5000 copies of the leaflet will be produced initially, and at least 3000 distributed in the first 2 years of the project.

Action D.4

Name of action: Produce project newsletters.

Description:

An annual newsletter, displaying the LIFE logo, will be produced to inform interested parties of the progress of the project and provide details of lessons learned and future actions. It will be circulated to all relevant groups and individuals and will also be produced electronically and made available via the project website.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Produce project newsletters.	500 hard copies, Annual newsletters distributed farming outlets; farming unions, retail outlets, local agricultural shows, hand delivery and CCW's Enquiry Unit Also made available electronically via website	Wider public Interest Groups Partners Stakeholders Local stakeholders Local community Land managers Peers Local governance - community councillors, local authority members, AM, MP	Printing 8,016

Reasons why it is necessary:

The project newsletter will be a vital means of informing stakeholders and will therefore help to address threat 5.

Beneficiary responsible for implementation:

The Project Manager with the help of project staff will produce the newsletter.

Expected results:

400 copies of the newsletter will be produced and distributed every year during the project. This will result in local people and other interested parties being informed in detail of progress to date and forthcoming activities.

Action D.5

Name of action: Produce layman's report.

Description:

At the end of the project a layman's report will be created in paper and electronic format describing the project and its achievements in succinct, non-technical language. The paper version will be printed and bound professionally and the electronic version made available on the project website.

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Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Produce layman's report.	1000 hard copy non-technical and accessible text reports distributed to key stakeholders identified during the project. Also available electronically via the website	Local and national policy and decision makers Wider public Interest Groups Stakeholders Local stakeholders Local community Land managers Farming unions	Printing 8,000

Reasons why it is necessary:

The report will be aimed at a relatively broad audience, and will inform decision-makers and other non-specialist target groups of the objectives and results of the project. It will help to encourage applications of lessons learned during the project.

Beneficiary responsible for implementation:

Production will be the responsibility of the project manager using external contractors for printing.

Expected results:

A layman's report will be produced in hard copy and electronically.

Action D.6

Name of action: Take project photographs.

Description:

A professional photographer will take photographs at key activity and achievement points throughout the project. These photographs will illustrate all aspects of the project, and will be used on the website, on signs, in publications, in presentations, as a basis for the management demonstration leaflets/website and as a tool to help verify the achievements of the project.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Take project photographs.	Project photographs disseminated via other leaflets; reports; website etc. Photography scheme will be	All	Photos 4,000

	developed highlighting each site; each conservation action (C Action); and per season each year Photo library established so that project photographs can be used by other organisations		
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Reasons why it is necessary:

Photographs are highly effective tools for communicating messages to technical and non-technical audiences; they will be used to explain the need for the project, and its impact. Use of photographs will greatly increase the attractiveness of publications and other media used during the project, increasing their effectiveness.

Beneficiary responsible for implementation:

The professional photographer will work under the direction of the Project Manager.

Expected results:

High-quality photographs for use in a wide variety of project communications.

Action D.7

Name of action: Produce media releases and articles.

Description:

Media releases will be produced and distributed to local and national newspapers and other media throughout the project. These will provide information on the objectives of the project and progress towards these objectives. They will be supplemented by articles and news items in other media.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Produce media releases and articles.	<p>A pre-programmed calendar, developed as part of the communication plan, will focus on 1 major article per quarter; and "extraordinary" events. Currently on CCW's mailing list are at a Wales level 13 television contacts; 13 radio contacts, and 28 national print contacts as well as a further 11 more locally based newspapers. In addition to this we have 12 and 8 contacts on nature and agriculture specialist publications. Press releases and feature articles will be aimed at popular radio and television programmes. Regional newspapers - Daily Post and Western Mail have already run feature articles on the potential of the project and are waiting for follow up stories. BBC Wales, BBC Cymru, Radio Cymru and Champion Radio all shown interest in running regular features.</p> <p>An invitation for national newspaper environment correspondents would be set up for special features.</p> <p>Adaptations of major articles will appear in local papers, local community papers, NWWT's newsletter 'Natur', CCW's magazine 'Adain y Ddraig', popular regional nature magazines such as Natur Cymru and Naturiaethwr and the project</p>	<p>Wider public Interest Groups Partners Stakeholders Local stakeholders Local community Land managers Peers</p>	<p>No – CCW and partners</p>

	website as well as other online news outlets		
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Reasons why it is necessary:

Media work will be an essential means of raising awareness of the project and of the problems faced by alkaline and calcareous fens. It will also help to increase understanding of the Nature 2000 network and the role of the LIFE-Nature programme in conservation.

Beneficiary responsible for implementation:

The Project Manager, who will consult project participants on the content of releases and articles and seek suggestions for additional pieces, will coordinate media work.

Expected results:

The action will result in information about the project and its progress being made available to a wide audience through all media. It will make a major contribution to increasing awareness of and support for the project.

Action D.8

Name of action: Inform and include local people.

Description:

A stakeholder plan has been prepared to support interactions with specific interest groups in the local area.

Key elements of the stakeholder plan are as follows:

- engagement with community councils in the area to describe the project, invite comment and discuss concerns;
- visits to all local landowners in person to explain the project and invite comment and participation;
- continue to meet and liaise with those with the shooting rights to the sites;
- ensure that the project is understood by staff within the beneficiary and partner organisations.

Local people will be informed and consulted about our aims and activities throughout the course of the project using a variety of methods, the most important of which are below.

Regular guided walks will be arranged to demonstrate the extent of the works being undertaken, the areas in which the works will be carried out and the results we expect to achieve. At least 5 walks per year will be held during years 2-5 of the project, aiming to have at least 10 attendees each time.

Project information will be disseminated to younger members of the local community through communication with local schools and talks and visits or other events arranged to provide information at the appropriate level.

We will host visits by the ten schools within the project area during years 2-5 of the project, with approximately 20-30 pupils in each visit.

3 local schools (Ysgol in Welsh) have agreed to help design educational material. This will relate to on-site habitat conservation; the role of the wetlands in the surrounding communities and their historical impact; and will combine site visits with classroom work. Ysgol Ty Mawr Capel Coch lies adjacent to Cors Erddreiniog, the largest project site, and pilots a Foundation Phase approach (Welsh Assembly Government, 2007) to the education of younger pupils. This approach lays particular emphasis on conservation and sustainability.

Additional events, such as public meetings and illustrated talks at local village halls and community centres, will be arranged locally throughout the project to promote awareness of our objectives and report results and achievements.

We will offer talks to every relevant community group / council in the project area (4 community councils).

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Inform and include local people.	Project staff visits to 4 community councils; all neighbouring landowners; others with rights to sites (eg shooting clubs) Project staff on guided walks (5 per year) including the "Anglesey Walking Festival" and school visits (10 schools) - 3 schools have agreed to help develop educational material; local meetings and talks Library information panel for local authority to circulate around local libraries	Neighbouring landowners Interest Groups Stakeholders Local stakeholders Local community Land managers Community Councils Local Schools	Develop educational resource – 16,000 Info panel – 10,000 Transport and venues for meetings 5,000

Reasons why it is necessary:

This action will address threat 5. Informing and consulting local people is essential to gain support for the project and maximise its local effect.

Beneficiary responsible for implementation:

Community work will be part of the Project Team's duties.

Expected results:

Evidence from past experience shows that this action will secure increased understanding of and support for the project among the local communities. It will therefore make a major contribution to the overall success of the project.

Action D.9

Name of action: Create promotional video / DVD.

Description:

A promotional DVD/video will be created by a specialist film-making unit.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Create promotional video / DVD	To make information on the project available to those that might not want to read published material Use also at events such as agricultural shows as well as at seminars, community council evenings etc	Neighbouring landowners Interest Groups Stakeholders Local stakeholders Local community Land managers Community Councils Local Schools	Yes 5,154

Reasons why it is necessary:

The DVD/video will provide an introduction to the project. It will complement the printed materials which some people may be unwilling or unable to read. The DVD/video will be used extensively during educational and community events. It will increase understanding of our work and the reasons for it, and will therefore help to generate support for the project. The DVD/video will address threat 5.

Beneficiary responsible for implementation:

The video will be made by an external company under the supervision of the Project manager.

Expected results:

This action will lead to the production of a high-quality DVD/video that will increase awareness and understanding of the project and fen conservation.

Action D.10

Name of action: Hold project demonstration day.

Description:

A project demonstration day will be organised consisting of presentations, discussions and a tour of the project area during which key management actions will be demonstrated and explained. It will be held in 2011 by which time substantial progress will have been made.

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Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Hold project demonstration day.	On site "open day" during 2011. Invitation list is likely to exceed 500	Local landowners Tenant farmers Other relevant stakeholders Neighbouring landowners Interest Groups Stakeholders Local stakeholders Local community Land managers	Event organizers to help with planning of the day 6,000

Reasons why it is necessary:

This action will address threat 5 as it will be aimed primarily at individuals managing the alkaline and calcareous fens within the sites. It will provide an opportunity to strengthen relationships directly with these individuals, explain the reason for the project, demonstrate the methods we are using and promote the use of these methods elsewhere.

Beneficiary responsible for implementation:

The demonstration day will be part of the Project Team's duties.

Expected results:

The demonstration day will increase understanding of the project techniques and willingness to use them among local land managers.

Action D.11**Name of action: Hold end-of-project technical workshop.****Description:**

The workshop will review implementation of the project, assess its wider implications for the conservation of alkaline and calcareous fens elsewhere and include invited contributors from other workers in the field. We will invite approximately 40 - 50 delegates from a range of European organisations involved in the field of wetland restoration and fen management. We anticipate interest from four UK countries, Ireland, Belgium, Germany, Austria, Italy, Slovenia, Poland, the Baltic States and Sweden. Discussions at the seminar will be partly by project staff and partly by relevant experts. Workshop proceedings will be published (D.12) and distributed to all delegates and made available (via the website) to other interested parties in the EU.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted, and subcontracted cost (€)
Hold end-of-project technical workshop.	40 - 50 delegates from a range of European organisations involved in the field of wetland restoration and fen management. We anticipate interest from the four UK countries, Ireland, Belgium, Germany, Austria, Italy, Slovenia, Poland, the Baltic States and Sweden. Discussions at the seminar will be partly by project staff and partly by relevant experts	Technical practitioners/experts Peers Partners Land managers	Event organizer 12,000 – event organizer, venue, transportation

Reasons why it is necessary:

Effective communication of findings and lesson from projects is an essential element of the LIFE process. The workshop will ensure wider communication of measures taken to address all of the project threats, with particular emphasis on the demonstration actions. It is a vital tool in disseminating information about the project among conservation professionals and others, and in encouraging action to restore and conserve alkaline and calcareous fens elsewhere in Wales, the UK and Europe.

Beneficiary responsible for implementation:

The seminar will be organised by the Project manager and Board in consultation with the Project Steering Group.

Expected results:

The seminar will result in information about the project and the restoration and conservation of alkaline and calcareous fens more generally being disseminated to and discussed by a large number of professionals working in this field. It will inform and provide an opportunity to catalyse work to conserve alkaline and calcareous fens throughout Europe, thereby making a valuable contribution to efforts to maintain the integrity of the network of Natura 2000 sites established to protect this habitat.

Action D.12**Name of action: Produce workshop proceedings and technical guide to project actions and outcomes. Produce and launch handbook.**

Description:

The proceedings of the workshop (D.11) will be published and will also contain a technical guide to project actions and outcomes. The workshop proceedings will include invited contributions from expert delegates whilst the technical outputs of this project will provide additional context and case examples. The proceedings will be illustrated and produced with input from partners and local communities, and will take full account of lessons learned during the project. It will be aimed at professional conservationists.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
Produce workshop proceedings and technical guide to project actions and outcomes. Produce and launch handbook	Proceedings of the workshop described under Action D.11 will be published – this will also contain a technical guide to project actions and outcomes carefully matched against the planned UK Fen Management Handbook which CCW proposed and which is being developed by a consortium of all the UK statutory conservation and environmental regulatory agencies and leading NGOs. The proceedings will be fully illustrated and produced with input from the project partners and local communities, and will take full account of lessons learned during the project	Professional conservationists, Students taking tertiary education courses in countryside management and similar subjects. Partners Technical practitioners/experts	Printing Because of large translation costs this amounts to 11,000

Reasons why it is necessary:

It is necessary to disseminate how successful the project actions have been in delivering favourable condition for the habitats and species features addressed, and for placing this experience in a wider informed European context. The publication will be an effective means of disseminating information and advice about the conservation of alkaline and calcareous fens.

Beneficiary responsible for implementation:

Work on the handbook will be lead by the Project Manager and technical members of the Project Board.

Expected results:

Production of the handbook will make a major contribution to our efforts to promote the restoration and conservation of alkaline and calcareous fens as widely as possible and will be effective in catalysing and informing work on this habitat amongst the conservation community.

Action D.13

Name of action: Carry out advocacy work with farmers and other land managers in the locality of the project sites and produce farming community guides to conservation management techniques and fen management.

Description:

A varied programme of advisory and advocacy work aimed mainly at local farmers will be implemented. As many farmers in the project area as possible will be visited to discuss the conservation of the alkaline and calcareous fens and their related issues, promote best practice and provide advice on management techniques, potential sources of funding and other subjects as appropriate. This will involve free consultations with a farm advisory consultancy as to the status of their soil nutrient levels and farm biodiversity levels. Recommendations will then be given about how to increase their biodiversity; and maintain favourable soil and water nutrient conditions both from a farming and conservation viewpoint. In addition, visits will be arranged to the project sites for individual farmers or groups of farmers who express interest, so that the methods used in the project can be demonstrated at first hand.

There are 120 landowners and tenants within the Corsydd Mon a Llyn Wetland Project area. We will invite all of these individuals to visit the project and meet the farm advisory consultees, and estimate that

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60% will accept (i.e. 72 people). We therefore plan to host 20 visits to the project by groups of up to five landowners/tenants during years 2-5, each lasting half a day.

We will seek to follow up these project visits with visits to individual landowners/tenants on their own holdings. We estimate that 70% of individuals who visit the project will agree to follow-up visits (i.e. 50 people). These 50 visits will be spread between years 2-5. Visits by the farm advisory consultancy will be in addition to these, and arranged directly with the landowners.

Dissemination item	Mode of Dissemination	Target Groups	Parts subcontracted , and subcontracted cost (€)
<p>Carry out advocacy work with farmers and other land managers in the locality of the project sites and produce farming community guides to conservation management techniques and fen management.</p>	<p>Project staff visits to local farmers - free consultations with a farm advisory consultancy as to the status of their soil nutrient levels and farm biodiversity levels.</p> <p>Visits will be arranged to the project sites for individual farmers or groups of farmers who express interest, so that the methods used in the project can be demonstrated at first hand.</p> <p>There are 120 landowners and tenants within the Corsydd Mon a Llyn Wetland Project area. We will invite all of these individuals to visit the project and meet the farm advisory consultants, and estimate that 60% will accept (i.e. 72 people). We therefore plan to host 20 visits to the project by groups of up to five landowners/tenants during years 2-5, each lasting half a day.</p> <p>We will seek to follow up these project visits with visits to individual landowners/tenants on their own holdings. We estimate that 70% of individuals who visit the project will agree to follow-up visits (i.e. 50 people). These 50 visits will be spread between years 2-5. Visits by the farm advisory consultancy will be separate and arranged between themselves and the landowners.</p> <p>We will produce simple, conservation management technique cards that will clearly show optimum habitat condition for Annex I habitats and Annex II species within the project site in the context of agricultural land holdings.</p>	<p>Neighbouring land owners Farming unions Partners</p>	<p>Nutrient and biodiversity analysis 500 each = 40,000</p> <p>management cards printing 15,000</p>

	This will complement the more technical output described above under action D.12. Its content will be co-ordinated by the farming community liaison group established by the user group described under action E.2		
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Reasons why it is necessary:

Face-to-face advocacy will be essential if we are to convey our conservation messages effectively to individuals managing alkaline and calcareous fens outside the areas we are working on directly, and to persuade these individuals to take action to conserve alkaline and calcareous fens on their own land. By providing a nutrient and biodiversity analysis landowners will be encouraged to participate more closely with the project and conservation of the fens.

Beneficiary responsible for implementation:

The Project officer (catchment) will lead the advocacy and advice programme and will report their activities and achievements to the Project Manager. The nutrient and biodiversity analysis will be contracted out, while the Project Support will closely monitor the results and advice given.

Expected results (quantitative information when possible):

The primary aim of this work will be to bring about a major change in attitude among the 120 landowners within the project area. We hope that by the end at least 50% of these land managers will have a positive attitude towards conservation-based land management – specifically drain-blocking, burning, appropriate grazing and mowing. This will represent a significant advance from the current situation, where the majority of landowners view such practices negatively.

We will measure changes in attitude through a 'before and after' survey process.

A key outcome of this action will be, in combination with the professional photographs taken, to produce a series of simple, conservation management technique cards that will clearly show optimum habitat condition for Annex I or II habitat or species within the project site in the context of agricultural land holdings. This will complement the more technical output described above under action D.12. Its content will be coordinated by the farming community liaison group and include input from the Project Manager; specialist agri-environment advisors from the Environment Agency and the Welsh Assembly Government.

E. Overall project operation and monitoring

Action E1

Name of Action: Manage project

Description:

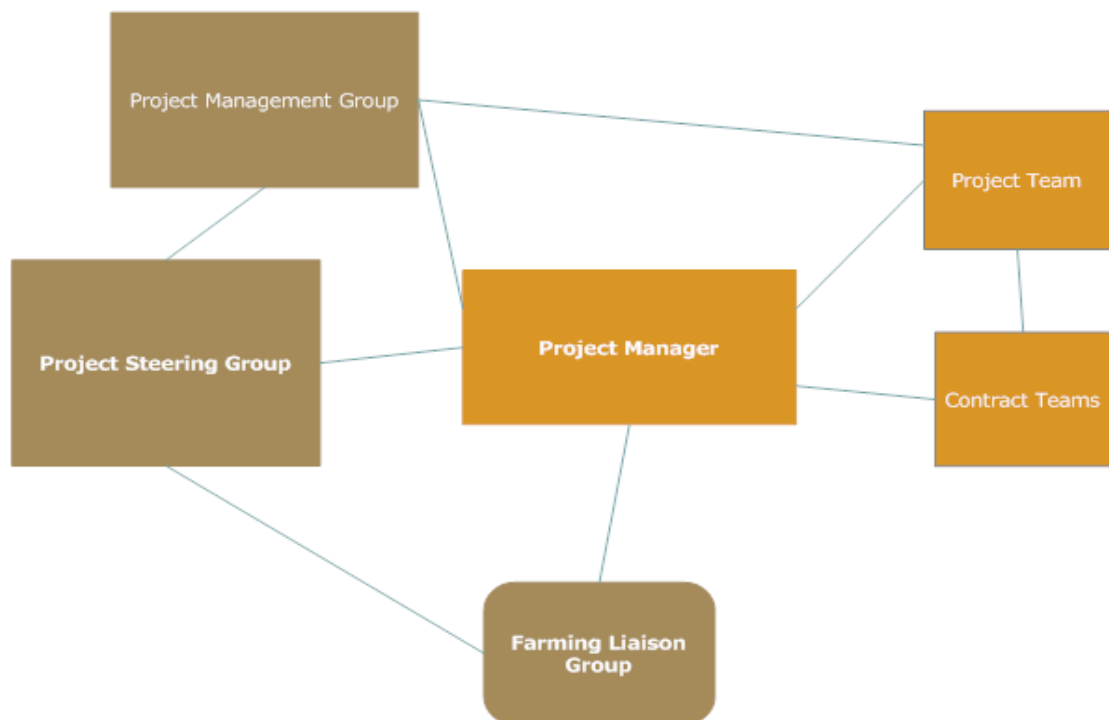
A variety of project management-related activities will be carried out during the project. These activities can be divided into 5 main sub-actions, as follows.

- Establish and maintain effective project management framework.
- Select contractors.
- Hold regular meetings of the Project Steering Group, project management group and farming liaison group
- Produce project and technical activity reports.
- Conduct financial monitoring and reporting.

For clarity, each of these sub-actions is described separately below.

Sub-action E.1.01: Establish and maintain effective project management framework

An effective project management framework will be established before; and maintained throughout the duration of the project. This framework is summarised diagrammatically below.



Project Steering Group (PSG)

Overall direction and steer will come from the Project Steering Group (PSG). It will be made up of senior representatives of the project partners; and those also involved in a wider catchment partnership called "Horses 4 Corsydd". The PSG will meet quarterly (unless required to meet more often) and will be made up of:

- CCW Regional/Deputy Regional Director (the main beneficiary and Chair)
- Environment Agency Wales Northern Area Environment Manager
- Dwr Cymru/Welsh Water Operational Manager
- North Wales Wildlife Trust Director
- Isle of Anglesey County Council Head of Planning and Environment
- Gwynedd County Council Head of Planning and Environment
- Representatives of community councils and elected portfolio members from county councils
- Representative from farming liaison group

The project manager and a member of the Project Management Group (PMG) will service the PSG

It will also make links to and initiate other spin off projects within the catchment.

Project Management Group (PMG)

The Project Management group will meet every 2 weeks and will help the project manager, project team and contract teams keep the project on track, identifying issues early that need raising with the PSG. It will be made up of operational and advisory experts from the partnership involved in the project, namely:

- Project Manager
- Project Officers (catchment, sites and support)
- Team Leader - CCW North Wales Sites Team
- Biodiversity Officer/Habitats Directive Manager Dwr Cymru/Welsh water
- Biodiversity Officer Environment Agency Wales
- Biodiversity Officer Isle of Anglesey County Council
- Biodiversity Officer Gwynedd County Council
- Senior Conservation Officer North Wales Wildlife Trust
- CCW North Region Senior Reserves manager and Senior Estate Staff
- CCW Peatland ecologist
- PONT Coordinator

Project Manager

Day-to-day management of the project will be the responsibility of a full-time Project Manager, who will be appointed through the co-ordinating beneficiary's recruitment process. The Project manager will work with the, and be the link between the Project Management Group, Project Steering Group and the Project Team.

The Project Manager will coordinate the work of all other staff and contractors involved in the project.

The roles and responsibilities of the Project Manager, the Project Steering Group and Project management group, and all project staff will be defined and agreed in a formal terms of reference and partnership agreement.

Agreements will be concluded between the main beneficiary and the project partners, as required under Article 4 of the Common Provisions. All other aspects of project management will take full account of the relevant articles of the Common Provisions.

Project staff will be accommodated within the co-ordinating beneficiary, or one of the partners' existing offices, but some rented accommodation will be required for machinery etc.

Project Team

The Project Team will consist of the Project Manager and all other project staff under his/her direct line management (Project Officer Catchment, Project Officer Sites, Project Support, Hydrology Technician). These staff will carry out the day-to-day operational management of

the project and delivery of targets/actions etc arising from the Project Management Group or Project Steering Group.

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Sub-action E.1.02: Select contractors

Contractors to work on project actions which are wholly or part out-sourced (including actions A3-A8, A13, A15, B1, C1-6, C9-13, D1-6, D8-13) will be selected through a formal tender process involving advertisement throughout the region in which the project is to be carried out. The production of contract specifications is covered by Action A.12.

It has been agreed to use contractors rather than employing a labour force for many of the actions for a number of reasons;

- First, contracting out practical management work will enable us to engage directly with local farmers and other service providers and to bring significant financial benefits to at least some of them. In turn, this will help us to gain support for the project from local communities. Contract work is important for the region, as it relies heavily on it to supplement the income they derive from farming operations.
- Secondly, using contractors will be significantly less expensive than employing staff directly. This is mainly because, if we employ staff directly, we will also have to purchase all of the machinery they need to carry out the work we propose. If we use contractors, in contrast, they will bring their own machinery, and we will therefore be able to minimise our expenditure. Where it is necessary to buy machinery, an element of the work will also be carried out by contractors as this will avoid employing further project team staff.
- Thirdly, using local contractors will potentially aid our efforts to influence management practices on alkaline and calcareous fens outside our direct control. While they are working for us, the contractors will gain first-hand experience of techniques for restoring and conserving alkaline and calcareous fens, and are also likely to gain an increased appreciation of the need for these techniques to be applied. We hope that this will lead them to discuss the techniques with others in the local farming community, and, if appropriate, to implement some of them on their own land.

Because we plan to use contractors for most of the practical management work in the project, the proportion of the total project budget that will be spent on external assistance will be greater than 35% (c.f. Article 21.4 in the Common Provisions). However, the reasons for using contractors in this specific context is so compelling that we feel that this is justified. We hope that the Commission agrees and would be pleased to discuss this issue if necessary.

Sub-action E.1.03: Hold regular meetings of the Project Groups

The Project Steering Group will meet at the start of the project and every 3 months thereafter. It will also convene for additional 'extraordinary' meetings if this becomes necessary. Meetings will be organised by the Project Manager and held at a location convenient for all participants. In general, they will involve a review of progress and expenditure over the previous 3 - 6 months, and a preview of expected progress and expenditure over the forthcoming 3 - 6 months, and a discussion of any specific issues or problems that arise. Most issues for discussion at Project Steering Group meetings will be identified by the Project Manager and Project Management Group. However, all members of the group; and sub or advisory groups will be given the opportunity to specify agenda items for each meeting.

All Project Steering Group meetings will have written agendas and minutes. These will be circulated to all group members and will be included as annexes in reports to the Commission.

The decision-making mechanism within the Project Steering Group will operate on the basis of discussion and consensus. Based on our experience from a number of previous complex and large-scale projects, we are confident that this will be effective and that there will be no need for a more formal voting process. In the highly unlikely event that consensus cannot be reached within the group on a particular issue, the Chair will be responsible for resolving the impasse; this will probably involve consulting additional experts and/or board-level staff from the participating organisations. All Project Steering Group decisions will be reported in the minutes, and (unless otherwise specified) the Project Manager will lead on their implementation.

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The Project Steering Group will be responsible for reviewing, updating and actioning the project risk register; and will be responsible for ensuring that when the project is under threat, or needs putting back on course that relevant members are tasked to deal with the issue. This may involve extraordinary meetings, or sub groups.

Establishment of a Project Steering Group increases the number and variety of senior staff and experts involved directly in the management of the project and creates a formal mechanism by which the Project manager can consult and inform all of the organisations taking part in the project.

The Project Management Group will meet every 2 weeks at the start of the project, and will keep a standing meeting set every 2 weeks, although it is expected that some of these will be very brief, or not required. It will ensure that operational and expert staff from all the partners can help manage the project and ensure regular commitment from all partners.

Both the Project Steering Group and Project Management Group will call on other advisory members when required eg CCW Conservation management team, CCW Interpretation, Communication and Education team, EAW farming advisory team etc

In addition to the Project Steering Group and Project Management Group the project will establish a local farming liaison group that will help embed the project and its aims and objectives into the local land managing community (see Action E2)

Sub-action E.1.04: Produce technical activity reports

Progress reports, a mid-term report and a final report will be produced according to the timetable within the bid document and the requirements laid down by Article 11 of the Common Provisions. These reports will be submitted to the Commission and circulated among project partners and other relevant bodies.

Sub-action E.1.05: Conduct financial monitoring and reporting

Thorough financial monitoring will be carried out throughout the project. A financial summary will be included in each progress report and statements of expenditure and income will be included with the mid-term and final reports, as required under the Common Provisions. The statements of expenditure and income will be accompanied by indications of the amount of payment requested.

An independent auditor will be appointed to verify that the financial statements provided to the Commission comply with national legislation and accounting rules and to certify that all costs incurred are eligible under the Common provisions. The auditor will be asked to check partners' project-related documentation.

Reasons why it is necessary:

Effective project management is obviously essential to ensure that project objectives are achieved in full, on time and within budget, and that all project monitoring and reporting obligations are met.

This action directly addresses threat 0 (poor project management and delivery structures). In addition, it addresses indirectly all other threats, as it underpins the implementation of the entire project.

Beneficiary responsible for implementation:

Project management will be carried out by the Project Manager, and project team, assisted by the Project Management Group, Project Steering Group etc. It will be the responsibility of the coordinating beneficiary.

Expected results:

The smooth and efficient delivery of the LIFE+ project

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ACTION E.2 –

Name of action: Establish farming liaison group

Relationships are critical to the success of the project. Throughout the project staff will develop and maintain links with local landowners and farmers within the project site. Details of how this will be achieved are given under action D, specifically D.8 and D.10.

Reasons why it is necessary (ref. to threat being addressed):

This is necessary to ensure that the farming community is able to contribute to project delivery by recommending modifications to the Management Agreement Scheme (C.8) and by resolving issues of common interest and concern, particular with respect to water management, grazing levels and burning management.

Responsible for implementing it:

The Project Manager and project team.

Expected results:

The primary aim of this work will be to bring about a major change in attitude among the 120 landowners within the project area. We hope that by the end at least 50% of these land managers will have a positive attitude towards conservation-based land management – specifically hydrological repair and appropriate grazing, mowing and burning. This will represent a significant advance from the current situation, where the majority of landowners view such practices negatively or as activities with little relevance to modern farming.

Action E.3

Name of action: Monitor project progress through delivery of actions.

Description:

We will monitor closely progress with the delivery of actions as measured against targets for each action on each site. Progress with actions will be checked through a continuous programme of site visits and dialogue with contractors and other land managers subject to management agreements. Progress will be recorded on data sheets and through plotting on a GIS. Quality of delivery will also be assessed.

This action will be carried out on all project sites continuously throughout the project.

Reasons why it is necessary:

Regular activity monitoring is essential to ensure deadlines are met and that actions are applied to the required standard, and where necessary to ensure that necessary changes to the character of the actions or mode of implementation are made.

Beneficiary responsible for implementation:

The main beneficiary will undertake this work, with the Project Manager assuming overall responsibility.

Expected results:

Regular activity reports to feed into Action E.1.04.

Action E.4

Name of action: Undertake scientific monitoring of response of alkaline fen and calcareous fen to applied management.

Description:

Detailed monitoring is necessary to assess the response of Annex I features, and the critical environmental factors which affect them, to applied management carried out in the project.

Sub-action E.4.01: Condition monitoring.

This will be undertaken to monitor attainment of the overall project objective, and objectives for individual project sites and compartments. This will follow establishment of baseline monitoring (Action A.3) and use the same methodology, conservation and restoration objectives, performance indicators and

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monitoring plot locations. One full round of post restoration monitoring will be undertaken in year 5, but monitoring of a selection of plots will be undertaken early in the field season of year 3 to provide information on the effectiveness of restoration and management actions.

Sub-action E.4.02: Vegetation response to applied management.

More detailed assessment than that in E4.01 is required to determine the ecological result of the project actions, particularly the demonstration elements. Attributes reflecting vegetation composition and structure will be assessed in permanently marked and relocatable plots before and after applied management, and where relevant in control plots. The design of the project will be statistically rigorous. This sub-action will be confined to the National Nature Reserves included in the project to ensure long-term security and guaranteed access to plots. The experimental design of plots will ensure assessment of the effects of different regimes of cutting height (C.1), depth of peat removed (C.13) and hydrological pathway repair (C.11). Baseline assessments will be undertaken in year 1 (A.4), with follow up recording in year 4 & 5.

Sub-action E.4.03: Hydrological monitoring

This will assess the success of actions taken to raise water levels (C. 10), restore hydrological pathways (C.11), create peat cuttings (C.13) and stabilise water levels in the main drain at Cors Erddreiniog (C.14). A variety of methodologies will be employed, including manually read dipwells, self-logging water level recorders, water level range gauges (WALRAGs), staff gauges for measurement of open water levels, flow monitoring equipment, and also observational evidence. The methodologies employed under this action will be similar to those used for the detailed design of individual actions (A.5). Hydrological monitoring will take place in years 4-5, mostly within the NNRs.

Sub-action E.4.04: Water quality monitoring

This will assess the success of actions taken to reduce nutrient income resulting from adverse management of catchments. Analysis of water quality will focus on plant macronutrients (K, SRP, total P, NH₄-N, NO₃, NO₂, N tot), base cations (Ca, Mg), markers of organic pollution, suspended solids, pH, EC and T. Dissolved organic carbon will be monitored at selected stations. Water quality monitoring will focus on the eight constructed wetlands (C.14), on selected hydrological pathway restoration projects (C.11) where water quality benefits are expected to have resulted from the use of this action, and selected locations down-gradient of land where reductions in nutrient application have been achieved through use of the Management Agreement Scheme (C.9). The latter two actions figure as demonstration

elements, and monitoring the effects of these will be especially significant. Water quality monitoring will take place in the last two years of the project.

Reasons why this action is necessary:

This action is needed to assess changes in feature condition, vegetation composition and structure, and hydrological and hydrochemical variables following the application of restorative management. This information will be used to gauge attainment of the overall project objective, and the success of specific conservation actions. Sub-action E.4.04 will be used to assess whether reductions in nutrient loading achieve beneficial reductions in dissolved organic carbon in receiving waters.

Beneficiary responsible for implementation:

Project staff will design the monitoring scheme and oversee its implementation in collaboration with academic partners. Field work and reporting will be undertaken by contracted staff.

Expected results:

Condition assessment data (sub-action E.4.01) will provide information on the overall success of project access, and will be summarised as a report. Detailed vegetation monitoring results (E.4.02) will provide information on the effectiveness of specific restoration and management actions – this will be published as project reports and papers in the scientific literature. Hydrological monitoring data will establish the success of all hydrological repair actions. Water quality data will feed into the overall evaluation of the project and interim reports, and for the demonstration elements into published accounts of the work in the refereed literature. All of this information combined will be of significant transfer value to other projects.

Action E.4.05: Monitoring the impact of species actions**Description:**

Action C.15 describes action that will be undertaken to restore populations of four Annex II species to favourable condition on each of the sites at which they occur. Site specific objectives which define favourable condition for each species at each site will first be written according to the model format presented below which represents an actual example for one of the targeted species (*Vertigo geyeri*) on one of the project sites. Comparable model format conservation objectives for the other three species targeted by Action C.15 are also available. Monitoring attributes will include direct assessment of species populations and the quality of their supporting habitat within sample plots or transects, as illustrated in the example below. This action will take place during the field season (second and third calendar quarters) of years 4 and 5.

Reason why this action is necessary:

Monitoring is necessary to assess whether the objectives of action C.15 have been attained.

Beneficiary responsible for implementation:

CCW will devise the methodology for this action and coordinate its implementation, using a combination of contracted and in-house staff.

Expected results:

Monitoring will establish whether suitable habitat conditions have been established and species populations restored to favourable condition. The results of this monitoring will be produced as a report.

Addendum to Action E.4.05. Example conservation objective that defines favourable condition for *Vertigo geyeri* at Waun Eurad, Anglesey Fens SAC. Conservation objective written by Adrian Fowles, Senior Invertebrate Ecologist, CCW.

Conservation objective (for when the feature is in favourable condition)	To maintain <i>Vertigo geyeri</i> at Waun Eurad in favourable condition where:
Lower limit	Adult or sub-adult snails are present in 50% of samples in Transect A and 50% of samples in Transect B
	And
Habitat extent Lower limit	45m of habitat along Transect A and 60m of habitat along Transect B is classed as suitable (Optimal or Sub-optimal habitat), and 35m of habitat along Transect A and 35m along Transect B is Optimal
Habitat quality	Soils, at time of sampling, are saturated for 40m along Transect A and for 35m along Transect B
Definition of Optimal habitat	Flushed rich-fen vegetation with sedge/moss lawns 5-15cm tall, containing species such as <i>Carex viridula</i> subsp. <i>brachyrrhyncha</i> , <i>Pinguicula vulgaris</i> , <i>Briza media</i> , <i>Cirsium dissectum</i> , <i>Equisetum palustre</i> , <i>Juncus articulatus</i> and the mosses <i>Drepanocladus revolvens</i> , <i>Campylium stellatum</i> , with scattered tussocks of <i>Schoenus nigricans</i> no greater than 80cm tall. During sampling the water table should be between 0- 5cm of the soil surface, but not above ground level.
Definition of Sub-optimal habitat	Vegetation composition as above but either vegetation height is less than 5cm or greater than 15cm, or the water table is below 5cm or ground is flooded at

the time of sampling.

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Action E.5: Production of After-LIFE Conservation Plan

Description:

This plan will detail the transition from the intense LIFE funded phase, and the longer term maintenance phase after 2013. It will specify how actions initiated by the LIFE project will be continued and developed after 2013, and how the longer-term management of the sites and their habitats and species will be assured. The plan will contain targets, objectives and milestones for all of the habitat and species features targeted by the LIFE-funded project, and where relevant other associated actions from the project. It will also identify the factors which influence these features and prescribe relevant management responses. Prescriptions detailing the management actions required for each feature will be produced for each site, and where necessary compartment. These prescriptions will include targeting resources from the beneficiaries onto long term management activities such as grazing and appropriate catchment management .

The plan will follow the standard management planning format employed by CCW and will draw upon the recently published SAC management plans produced in 2008 for both SAC sites. The plan will be reviewed at six year intervals to coincide with the statutory feature status reporting timetable. It will also include a long-term monitoring plan for the sites/features and will allocate responsibilities and timescales against each action, as well as required budgets.

The plan will be written during 2013 and finished for inclusion in the final report in the first quarter of 2014.

Reason why this action is necessary:

The plan is required to ensure the continuation of conservation and restoration management needed to maintain (or in some cases deliver) favourable condition for the Annex I habitat and Annex II species features within the two SACs.

Beneficiary responsible for implementation:

The project steering group will be responsible for ensuring the plan is produced by the co-ordinating beneficiary.

Expected results:

An agreed, written plan incorporated into the work plans of CCW and relevant partners. The written plan will feature as a separate chapter of the final report.

DELIVERABLE PRODUCTS OF THE PROJECT

Name of the Deliverable	Code of associated action	Deadline
Composting Feasibility Study	A12	30/09/09
NNR Management Plans reviewed and updated	A1	31/12/09
Baseline condition Assessment	A3	31/12/09
NVC Survey for sites	A2	31/03/10
Marketing report produced	D3	30/06/10
Carbon budget calculated	A14	01/12/10
DVD	D9	30/09/12
All photographs taken and collated	D6	30/06/13
Technical Activity Reports	E1.04	30/06/13
Layman's report	D5	30/08/13
Technical monitoring reports produced	E4.01 – E4.05	30/11/13
Publish Workshop Proceedings	D12	30/11/13
Final Audit report	E.105	31/12/13
Produce after LIFE conservation plan	E5	31/1/14

MILESTONES OF THE PROJECT

Name of the Milestone	Code of the associated action	Deadline End of month unless stated
Project Manager in place	A7	30/03/09
Specification for the Wetland Harvester	A8	30/04/09
Announcement press release	D7	14/05/09
1 st photographs taken	D6	14/05/09
First project steering group meeting held	E1.02	14/07/09
Project Team in Place	A7	30/08/09
Farming Liaison/User Group	E2	07/09/09
Composting feasibility completed	A12	30/09/09
First Sensitive hand mowing carried out	C2	30/10/09
Management Agreements Planned and visits started	C9	30/10/09
Baseline surveillance plot and condition established	A3 & A4	31/12/09
Project website goes live	D1	31/01/10
Purchase first stock	A10	31/03/10
NVC Survey completed	A2	31/03/10
Final equipment purchased	A8	31/05/10
Finish access infrastructure	A15	30/07/10
Procure Wetland Harvester	A8	30/07/10
Establish Access infrastructure	A15	31/07/10
1 st species colony action commenced	C15	15/07/10
2 nd year sensitive hand mowing	C2	20/08/10
1 st peat cut	C13	14/08/10
Harvester First used	C1	31/08/10
2 nd year Scrub removal started	C7	01/10/10
2 nd year Burning finished	C8	31/03/11
Automate main sluice at Cors Erddreiniog	C12	14/02/11
Access infrastructure upgraded	A15	31/05/11

School designed gates installed	A15	20/06/11
Year 3 Harvester mowing commences	C1	31/07/11
Year 3 peat cutting commenced	C13	14/08/11
3 rd year Faming Liaison/User Group	E 2	14/09/11
Demonstration day held	D10	14/09/11
Produce conservation management cards for neighbouring landowners.	D13	31/10/11
Investigations to support detailed design of actions	A5	14/12/11
Signs updated	D2	14/05/12
Start condition and vegetation response monitoring	E4.01 & E4.02	30/06/12
Year 4 Mowing with tracked machinery	C1	31/07/12
Year 4 Mowing with hand-held machinery	C2	31/07/12
DVD produced	D9	30/09/12
4 th year Newsletter issued	D4	12/12/12
Purchase stock	A10	31/03/13
Complete peat cutting	C13	31/03/13
Installation of constructed wetlands	C14	31/03/13
Wind up land purchases	B1	30/06/13
Raise water levels.	C10	30/06/13
Restore hydrological pathways	C11	30/06/13
Management agreement scheme	C9	30/09/13
Final mowing with hand-held machinery	C2	30/11/13
Final mowing with tracked machinery	C1	30/11/13
Publish proceedings of end of project workshop	D12	30/11/13
Finalise maintenance of ongoing items such as website, wrap up final monitoring reports	E3, E1.05, E1.01	31/12/13

ACTIVITY REPORTS FORESEEN

Please indicate the deadlines for the following reports:

Progress Reports n°1, n°2 etc. (if any; to ensure that the delay between consecutive reports does not exceed 18 months);

- Mid-term Report with payment request (only for project longer than 24 months)
- Final Report with payment request

Type of report	Deadline
Inception Report	31/01/10
Progress Report 1	30/07/11
Progress Report 2	31/01/13
Final Report	31/01/14

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TIMETABLE – April 2009 – June 2014

Action Number/Name	2009				2010				2011				2012				2013			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	iv
A. Preparatory actions, elaboration of management plans and/or action plans:																				
A1 Management Plans		√	√	√																
A.2. NVC survey		√	√	√	√															
A.3. Baseline condition assessment		√	√	√																
A.4. Establish baseline surveillance plots		√	√	√																
A.5. Investigations to support detailed design of actions		√	√	√	√	√	√	√	√	√	√	√								
A.6. Work to inform constructed wetlands design		√	√	√																
A.7. Recruit & train staff	√	√	√																	
A.8. Procure machinery		√	√	√	√	√														
A.9. Procure non-machinery items		√	√	√																
A.10. Procure stock				√	√			√	√			√	√			√	√			
A.11. contract specifications for contracted elements.		√	√	√					√											
A.12. Composting feasibility study		√	√																	
A.13. Apply for mineral extraction & waste exemption licences		√	√	√																
A.14. Calculate carbon budget					√	√	√	√												
A.15. Establish access infrastructure		√	√	√	√	√	√			√				√						
B. Purchase/lease of land and/or rights:																				
B.1. Land purchase		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			
C. Concrete conservation actions:																				
C.1. Mowing with tracked machinery							√	√			√	√			√	√			√	√
C.2. Mowing with hand-held machinery				√			√	√			√	√			√	√			√	√
C.3. Biomass removal				√	√		√	√	√		√	√	√		√	√			√	√

C.4. Grazing					√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
C.5. Permanent fencing			√	√	√	√							√						
C.6. Temporary fencing			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
C.7. Scrub management				√	√		√	√				√	√			√	√		
C.8. Controlled burning				√	√			√	√			√	√			√	√		√
C.9. Management agreement scheme				√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
C.10. Raise water levels.					√	√		√	√	√		√	√	√		√	√	√	
C.11. Restore hydrological pathways					√	√		√	√	√		√	√	√		√	√	√	
C.12. Automate main sluice at Cors Erddreiniog						√	√	√	√										
C.13. Peat cutting							√	√	√	√	√	√	√	√	√	√	√	√	
C.14. Installation of constructed wetlands					√	√	√	√	√	√	√	√	√	√	√	√	√	√	
C.15. Species actions							√	√	√			√	√			√	√		
D. Public awareness and dissemination of results:																			
D.1. Website			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
D.2. Signs		√	√	√	√				√					√				√	
D.3. Marketing			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
D.4. Newsletters				√				√				√				√			√
D.5. Layman's report																		√	√
D.6. Photographs			√				√				√				√			√	
D.7. Media releases		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
D.8. Inform & include local people		√	√			√	√			√	√			√	√		√	√	
D.9. DVD													√	√					
D.10. Demo day											√								
D.11. Workshop																	√	√	
D.12. Publish workshop proceedings																		√	√
D.13. Advisory & advocacy		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
E. Overall project operation and monitoring:																			
E. 1. Overall Project Operation & monitoring	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
E.1.01. Establish/maintain project framework	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
E.1.02. Select contractors		√	√		√	√	√						√	√					
E.1.03. Project Steering Group			√		√	√			√		√		√		√		√		√
E.1.04. Technical Activity Reports									√	√							√	√	

E. 1.05. Audit					√			√	√			√					√	√		√
E. 2. Farming Liaison/User Group			√				√				√			√					√	
E. 3. Monitor Project Progress		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
E. 4. Monitor Water Quality						√	√	√	√	√	√	√	√	√						
E. 4. 01. Monitor Condition of Fen						√	√	√		√								√	√	
E4.02 Vegetation response to applied management														√	√			√	√	
E4.03 Hydrological Process impact monitoring														√	√			√	√	
E4.04 Water Quality Nutrient Reduction impact monitoring														√	√				√	√
E4.05 Species Actions impact monitoring														√	√			√	√	
E.5. Production of after LIFE conservation plan																	√	√	√	√