BROWN MOSS
MANAGEMENT PLAN
2014 – 2018

Shropshire Council
Outdoor Recreation Service
Parks & Countryside Team

Shropshire County Council Management Plan
BROWN MOSS

1: CONTENTS

2: PREFACE

The effective management of Countryside Heritage Sites requires a framework within which the correct management decisions for the site and for the public can be taken. This framework is provided by the site management plan. Once a management plan has been agreed, it should provide the basis for all work carried out on the site. It is the policy of Shropshire County Council that every site should have such a plan.

In addition to fulfilling legal obligations to maintain national and international conservation status of habitats and species, site management plans will be expected to contribute to the achievement of the Council's Corporate Plan. This framework is provided by the Council's vision and strategic aims, which have themselves been adopted from the Shropshire Community Plan 2002.

Vision: To improve the Quality of Life for Shropshire People

Aims:
1. Improving well-being, care and health
2. Improving the environment
3. Promoting lifelong learning for all
4. Stimulating a thriving economy

These aims are supported by 16 priority areas for improvement.

Responsibility for the Council's Countryside Heritage sites lies with the Countryside Service, itself part of Cultural Services and the Community and Environment Directorate. The acquisition and management of sites contributes to the Countryside Service's mission and aims.

Mission

To work with local communities to enhance and promote the enjoyment of the countryside and to conserve and enhance Shropshire's landscape, wildlife and cultural heritage

Aims

- To encourage and support the involvement of communities and individuals in exploring, understanding, managing and conserving their local countryside and greenspaces
- To develop and promote opportunities for informal recreation and enjoyment of the countryside
- To enhance and conserve the landscape, wildlife and cultural heritage

Countryside Heritage Sites are managed both to protect and enhance their wildlife and heritage interest and to provide opportunities for learning and enjoyment to as wide a range of people as possible. The Council views its sites as 'gateways to the countryside' encouraging people to visit them and to use the sites as a base from which to explore the local area. Their acquisition will be governed by an "Acquisition and Disposal Policy" (in preparation).

In drawing up the site management plan, sites will also be expected to contribute to the achievement of local priorities, for example though the following plans:

- Shropshire Cultural Strategy
- Shropshire Tourism Strategy
- Shropshire Biodiversity Action Plan
- Countryside Access Strategy

The site management plan falls into three parts:

Part 1 - The Description: Collates together information on the site under standard headings that conveys to site managers an account of the site at the time the plan was completed.

Part 2 - The Evaluation: Provides an assessment of the importance of the various aspects of the site, and a resulting summary of the important features.

Part 3 - The Management: Describes the Objectives, desired conditions of the features and the monitoring projects and prescriptions. The projects and prescriptions form the action part of the plan. The project register lists the projects and how and when they will be carried out. Proper management of the site requires monitoring and detailed record keeping linked to those projects listed within the plan. The management planning cycle will normally be five years and at the end of this period, a major and critical review of the plan will be undertaken.

The **Conservation Management System**, a computerised project based management planning and reporting system, is used to store and manage project information. Its use will also facilitate the exchange of site information within and out side the council.

3: INTRODUCTION

3.1: PURPOSE OF PLAN

- To state the long term vision for the site.
- To be a collation of all relevant information about the site.
- To be a record of proposed management and development of the site which has been agreed by the key stakeholders.
- To be an action plan detailing monitoring projects and management prescriptions for a 5 year period. To be a record of work and surveys carried out during the period of the plan.
- To be a consultation document.

3.2: POLICY STATEMENTS & LEGAL OBLIGATIONS

The governing policies which set the context for the ownership and management of Countryside Heritage Sites are the Corporate Mission and Aims of Shropshire County Council and the Mission and Aims of the Countryside Service. These are stated in the Preface.

The Policy Framework for the Future Development of the Countryside Service should also be referred to. This document summarises the policies and documents which provide the framework for the current and future work of the countryside service, i.e:
Government Rural White Paper 2000
Shropshire County Council Corporate Plan
Shropshire Cultural Strategy
Sustainable Shropshire 2000
Biodiversity Action Plan
Shropshire Tourism Strategy 2003
Shropshire Structure Plan 1996
Health Strategy 2000
Lifelong Learning Strategy 2002
Local Transport Plan 2001

<u>Other Relevant Documents:</u>

Countryside Service Development Plan, May 2003.
Countryside Service Best Value Review Final Report, September 2004.
Shropshire's Countryside Access Strategy 2007 (currently in draft form and yet to be consulted on)
Biodiversity Action Plan
Meres and Mosses Strategy - English Nature
Nitrate Vulnerable Zones - Environment Agency
Commons Act
North Shropshire Local Plan - policy D21, sites of conservation value
Countryside Development Plan - community plan (improving the environment)

Corporate Plan (access to the countryside)
Cultural Strategy
Draft Shropshire County Council terms and conditions for contracts - sustainability statement

LEGAL OBLIGATIONS:
The designation of Site of Special Scientific Interest (SSSI) requires the authority to manage the site in an appropriate manner in order to maintain the interest for which it was designated.

The Countryside and Rights of Way Act 2000, under section 28(g), there is a legal obligation on the owners of SSSIs to manage the site towards favourable status. Under the same act Brown Moss is now Open Access Land due to its status as a Common.

As owners of the Common Land the County Council has an obligation to protect the rights of the registered commoners of Brown Moss.

The Natural Environment and Rural Communities (NERC) Act 2006, now imposes a duty on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity. Section 40 of the act states that:
"Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity."

National Planning Policy for biodiversity and geological conservation (PPS9) has been revised with a greater emphasis on conserving, enhancing and restoring biodiversity through the planning system. Public bodies now must "have regard to biodiversity in carrying out their functions".

The Habitats Directive 1992 aims to protect the most seriously threatened habitats and species across Europe. Under this directive Brown Moss is designated a 'Special Area of Conservation' (SAC).
Annex IIa and IVa identify Floating Water-plantain and Great-crested Newts as protected species.

Local Nature Reserve status recognises the site for its importance for nature conservation and education

Ramsar status identifies the site as an area of Internationally Important Wetlands

Under the Wildlife & Countryside Act, 1981, the Authority needs formal consent from Natural England in order to carry out any of Operations Likely to Damage the Special interest (previously Potentially Damaging Operations) listed in the SSSI notification, within the boundary of the SSSI.
The act also offers protection to a number of species found on site.

Under the Occupiers' Liability Act, 1957, the Authority has a common duty of care for the Health & Safety of the public.

Under the Health & Safety at Work Act, 1974, the Authority has a responsibility to ensure that employees, contractors and volunteers are not exposed to risks to their health and safety.

4: PLAN SUMMARY

Brown Moss Management Plan – Brief Summary

Vision

Brown Moss will be a site where scientifically important species and habitats are conserved.

This will be a site where visitors can enjoy quiet walks around a number of pools which will be surrounded by some muddy margins, marshy vegetation, and fringed by heathland, grassland and woodland. These pools and marshy areas will support a range of plants, a variety of amphibians, including newts, frogs and toads in addition to a host of aquatic insects, such as dragonflies and damselflies.

There will be open habitat across the site which will have a variety of low growing plants typical of heathland and grassland.

Woodland will have trees of different ages and will support a variety of birds, mammals and insects and will have open glades where herbs and young trees will grow.

Visitors will have the opportunity to explore and learn about the rich diversity of life which this mosaic of habitats provides.

All management will be sustainable and will aim to preserve the conservation value of the site for future generations.

Description

Brown Moss is a 32 hectare site situated in North Shropshire and is part of the larger Meres and Mosses Natural Area which covers Shropshire, Cheshire, Staffordshire and Clwyd.

The site has a number of designations associated with it which reflect its national and international importance as a wetland area. Amongst these is its status as a Site of Special Scientific Interest, notified because of its scientifically important wetland plant communities. The most significant is its SAC (Special Area of Conservation) designation due to the presence of *Luronium natans* (Floating Water-plantain).

The following are species and habitats which occur at Brown Moss and are considered priorities in the Shropshire Biodiversity Action Plan:
Luronium natans (floating water-plantain)
Riccia canaliculata (a bryophyte)
Great Crested Newt

Lowland Heathland
Peat Bog (this will include the schwingmoor)
Standing open water (meres, pools, canals and ponds)

There are a number of pools scattered around the site, most are shallow and in years of low rainfall often dry up leaving areas of damp mud. The pools differ in pH value and nutrient status and are surrounded by secondary woodland, or in some cases have become overgrown with scrub. This, along with an apparent reduction in water levels, has contributed to a reduction of the ecologically important aquatic plant and animal communities to be found in the draw down zones around the pools. Fluctuating water levels are a feature of the site and these draw down zones provide suitable conditions for a number of interesting wetland plant species. All three native species of newt have been found breeding in the pools, including the Great Crested Newt, a protected species.

A small schwingmoor (quaking bog - pool 9), existing near the western edge of the site, has seen a gradual encroachment of soft rush and shading from the surrounding trees.

Since the cessation of grazing during the 1960s, once large areas of heathy grassland have now been succeeded by birch and oak woodland and only small patches of relic heathland/acid grassland remain. There are, however, two small areas of restored heathland to the west of the large pool (pool 6) which were re-created during the 1990s

The natural island on pool 6 has been extended by the excavation of a ditch across a peninsula of land which protruded out towards the original island. The original ditch which separated the island from the mainland has become silted up over the years and remains as a boggy depression between the two

There is a small car park and some road-side parking to the east of pool 6 and a larger car park within the wooded area between pools 5 and 6.
The site is a registered common for which a number of individuals still hold rights. There is open public access across the site. A Public Footpath (legal Right of Way) starts adjacent to The Boathouse (bungalow) and through the wooded area, leaving the site and crossing the fields beyond. The Shropshire Way long-distance path now also crosses the site.

There are a number of ditches around the site, some of which drain surrounding farmed land. Others appear to have linked various pools. Many of these ditches have become silted up, in-filled with vegetation or in some cases diverted elsewhere. As the hydrology of the site is critical to its future integrity, on-going investigation into the quality and quantity of water coming into the site will be essential.

The site is popular for quiet recreation such as walking, bird watching, dog walking and feeding the wildfowl. It is often visited by botanists, and students studying a range of wetland related subjects. There is occasional use by horse riders although there is no registered public bridleway.

Management

The plan identifies 7 key features and describes the proposed management for each over a 5 year period between 2014 and 2018. These are summarised below.

Feature 1 - Open water, marsh, swamp and fen communities
and
Feature 2 - Heathland/acid grassland

Long-term objectives:

To achieve, and then maintain, the wetland and heath/grassland (open) habitats in a favourable status including restoration (expansion) of these open habitats. The definition of favourable status for each feature is described in section 7 below.

Current area: Approx. 12.5ha, of which 5ha is scrubbed/tree-ed
Area at end of 5 year plan period: Approx. 16ha

Proposed Management Projects – next 5 years

- Grazing – re-establish a grazing regime at a level which controls/slows scrub, bracken and bramble encroachment and creates acceptable levels of disturbance/poaching.

- Control/remove scrub/shrubs and trees growing within and at the immediate margins of wetland, heathland and grassland (open) habitats (approx. 5ha). Methods as appropriate including pulling/digging (small saplings), cutting and treating stumps (larger shrubs and trees), weed wiping (scrub on drier land). Leave some cut timber in situ and remove the rest, leaving some in appropriate areas to be collected by local residents and site users.

- After open habitats have been cleared of woody growth as described above, and grazing is established, reduce transpiration, shading and leaf deposition and extend the area of open habitats by removing trees/woodland to a distance of 5-10m around the open habitat area (see map – total area approx. 3.5ha). Retain selected occasional mature trees taking the following factors into account:
    - potential screening role (in discussion with neighbouring residents);
    - size (eg: girth of 2m+), age, form and features taking into account species;
    - presence of other notably large/mature trees in the vicinity.

  Provide an opportunity to discuss the rationale for removal/retention of trees with site users prior to each stage of woodland removal (see also Feature 7 below). Treat all cut stumps chemically to discourage regrowth. Leave some cut timber *in situ* and stack the rest to be removed and used by local residents. The resulting woodland margin should be scalloped/irregular including light thinning of birch (no other species) beyond 10m where appropriate to encourage a natural and shrubby woodland edge habitat.

- Manage nutrient flow onto the site by testing water quality at the points where water runs onto the site and liaise with adjacent landowners based on the results of testing.

- Increase understanding of water flows and roles played by ditches. Maintain ditches which are important in draining adjacent land (taking into account nutrient levels as discussed above) and important for water flow across the site (selected internal ditches to drain surface water into the wetland habitats). Otherwise non-intervention for ditches where nutrient enrichment may be an issue or where water movements are not considered important or desirable to maintaining the wetland habitat.

- Experimental/small-scale de-silting in selected pools taking into account pool profiles and avoiding damage to water retaining properties. This will comprise small patches in pool 6 (see also feature 4 below) plus selected area(s) of pools 3, 4 or 5. Silt/litter to be disposed off-site if possible. Natural England to oversee this project.

- Manage bulrush (*Typha*) in pool 5 by pulling to prevent encroachment into sedge beds.

- Manage bracken within and at the margin of heathland/grassland habitat using a variety of methods (grazing, bruising, cutting, pulling, chemical treatment).

- Heather management – non-intervention proposed subject to monitoring effects of grazing and review of heather structure/condition after 3-4 years.

- Non-intervention proposed for *Crassula* – subject to monitoring and review. Remove polythene used to experimentally control this species in the past.

- Review results of study on impact of waterfowl on aquatic nutrient levels and aquatic vegetation and consider appropriate actions, if required.

<u>Feature 3 - Schwingmoor (quaking bog or peat bog)</u>

<u>Longterm Objective:</u>
To achieve, and then maintain, the quaking bog at favourable status.

<u>Proposed Management Projects – next 5 years</u>

- Extend pilings to block outflows more efficiently (make wider).
- Control/remove any woody species from within the bog habitat – annual pulling of seedling trees/shrubs.
- Reduce surrounding tree cover/woodland habitat linking open habitat from the schwingmoor through to pool 2 to the north-west (approx. 10m) and the heath habitat to the south-east (approx. 30m). Methods as for woodland clearance elsewhere, including retention of a small number of mature trees (see Features 1 & 2 above).
- Continue to cut rushes removing cut material (to areas of retained woodland). Cut as much as possible each year (resource dependent), commencing in June so that cattle may graze regrowth during the summer. Start in same place each year so that as much as possible is cut annually.

Feature 4 *Luronium natans*

Longterm Objective:

To create conditions favourable to the growth of *Luronium* so as to achieve and maintain the plant at a favourable status.

Proposed Management Projects – next 5 years

- Manage wetland habitat as in Feature 1 including scrub control, removing trees/woodland at wetland margins and small scale de-silting in pool 6.

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Feature 5 - Access and recreation

Longterm Objective:

To facilitate and encourage public access and informal recreation on the site appropriate to its nature conservation status and in keeping with other site objectives.

Proposed Management Projects – next 5 years

- Maintain paths in a suitable condition (eg: cutting/strimming vegetation, using woodchip)
- Maintain bridges, boardwalks, kissing gates and other access furniture in good condition
- Maintain traditionally used parking places in usable condition
- Install additional seating as opportunities arise
- Display bye-law notices
- Maintain existing dog litter bins (one at main central carpark and one at N end of site).

Feature 6 – Interpretation, education and information

Longterm Objective:

To develop interpretation and information so that visitors have the opportunity to be aware of the nature conservation significance of Brown Moss and to encourage use of the site for education and research.

Proposed Management Projects – next 5 years

- Develop appropriate interpretation, including on-site panel(s).
- Keep visitors informed regarding on-going management through on-site signage and events. This should include an opportunity to review woodland clearance and rationale for felling or retaining mature trees prior to each phase of felling.
- Encourage educational visits and research on site. Ensure that results of visits and research projects are received and used to inform future management.

Feature 7 - Involvement of local residents, local communities and site users

Longterm Objective:

To maintain good relations with local residents, local communities and site users, encouraging active involvement, to secure the achievement of other long term management objectives.

Proposed Management Projects – next 5 years

- Liaise with, and inform, key stakeholders (including Commoners, neighbouring residents and landowners, residents of Ash village and other site users – groups and individuals) regarding the site's key features and site management. This should include an opportunity to review woodland clearance and rationale for felling or retaining mature trees, prior to each phase of felling.
- Provide opportunities for direct community involvement with the management and monitoring of the site, eg: water quality sampling, cattle spotting, wildlife surveys etc.
- Hold occasional public events to publicise key features and site management and to give the public a chance to feedback regarding their views of the site.
- Re-instate a community noticeboard (adjacent to the road) as a local community resource.
- Regularly provide information to the wider public eg: through local Parish newsletters, local press (Whitchurch Herald, Shropshire Star) and on-site signs.

Management proposed for other features of nature conservation interest and to fulfil legal obligations

Semi-natural broadleaved woodland (including a few mature trees)

Current area: Approx. 18ha
Area at end of 5 year plan period: Approx. 14.5ha

- Non-intervention proposed in majority of retained woodland.
- Along road side, fell leaning and overhanging trees where these pose a perceived or actual safely issue or might be hit by tall vehicles. NB: trees need not be left until they are a confirmed safety risk since removal of individual trees does not conflict with other objectives at Brown Moss.
- Retain occasional significant and over-mature trees of all species to develop veteran status.
- Retain deadwood – standing (subject to health and safety below) and fallen. NB: Leave where fallen if possible (subject to access, health and safety constraints) since whole trees provide better deadwood habitat resource than cut "habitat piles".

Protected and notable species

Great Crested Newt

- Manage wetland as Feature 1.
- Apply for appropriate licences and follow appropriate method statements/best practice when carrying out management.

Water vole

- Non-intervention – occasional monitoring.
- Discourage dogs accessing wetland habitat.

Badger

- Protect setts from potential damage by stock.
- Have regard for legal status and apply appropriate methods (and/or apply for licenses) when managing the area around the sett.

Silver-studded Blue butterfly

- Invite and encourage Prees Heath warden, or other surveyors, to check site annually for this species.

Legal obligations

Health and safety

- Carry out site safety surveys, risk assessments, inspections and works in compliance with health and safety legislation and Shropshire Council policy.

- ***Other obligations***: Ensure all other legal obligations are met with regard to licences required (eg: felling licences, Environment Agency licences, protected species licences etc.)

5: DESCRIPTION (Part 1)
5.1: GENERAL INFORMATION

5.1.1: Location and Status

5.1.1.1: Location
Situated approximately 3km south-east of Whitchurch, 1km east of the A49 Shrewsbury road off the Whitchurch by-pass, close to the village of Ash. See Map 1.

5.1.1.2: Area
The total site is approximately 32 hectares (76.5 acres).
"Open habitats" (wetland, heathland and grassland) currently occupy some 12.5ha, although approximately 5ha of this had become scrubbed/tree-ed by 2013. The Schwingmoor is less than 0.05ha and semi-natural broadleaved woodland covers approximately 18ha. The remainder is made up of tracks, paths and car parks.

5.1.1.3: OS Grid Reference
SJ 562395 (centre of the site)

There are numerous historic maps covering Brown Moss. These can be found at the Records and Research Library in Shrewsbury, copies of some of these are also held in files at the Northern Shropshire Countryside Service office at Swan Hill, Ellesmere.
Comparisons of some of these maps may be useful in demonstrating the extent of changes across the site, particularly with reference to water levels.

1841 tithe map
1879 ordnance survey
1899 ordnance survey
1926 ordnance survey
1970 ordnance survey
1987 ordnance survey
+ subsequent dates

More recent mapping of the site has been included in various reports, including the Brown Moss Management Plan (Jones 1987), Brown Moss Rehabilitation Plan (Whild 1996) and the report A Botanical Survey of Brown Moss 2003 (Lockton and Whild 2003)

5.1.1.4: OS Sheet Number
Explorer 241

5.1.1.5: Council and Planning Authority
Shropshire Council is the Unitary Planning Authority.

5.1.1.6: County Electoral Ward
Prees.

5.1.1.7: Access
The site is signposted off the A41 (heading south along the dual carriageway towards Prees). Turn left off the A41 onto Hospital Lane, take the left fork in the road. This is the main lane which runs through the site. There is a small pull-in area by the left hand side of the road for 3 or 4 vehicles, a small car park on the right and further down the lane on the left is a woodland car parking area with parking for around 10 vehicles

The site has open public pedestrian access. Four Public Footpaths enter the site and the Shropshire Way also crosses the site.

Emergency and management vehicular access is via the main lane and the two tracks leading into the site.

See Map 2 for a summary of access.

5.1.1.8: Facilities
There are three main car parking areas and additional roadside parking. There are a few benches and picnic tables provided.

5.1.1.9: Contacts
The site is managed by Shropshire Council, Outdoor Recreation Team, Swan Hill, Ellesmere, Shropshire SY12 0DQ
Telephone (01691) 624448

5.1.2: Designations
The site has numerous designations which reflect both the international, regional and local importance of Brown Moss for nature conservation.

Site of Special Scientific Interest (SSSI) - notified in 1953 (and as a key site for conservation in 1977), re-notified in 1984.

The site is part of the nationally important series of meres and mosses in the north-west Midlands and has associated wetland communities which are of particular interest. Certain works carried out on site may require prior consultation with Natural England as they may be deemed Operations Likely to Damage (OLD's).
A copy of the notification and a list of OLD's can be found in Appendix A

Under the Countryside and Rights of Way Act 2000 (CRoW), section 28(g), the landowner has a statutory responsibility to manage the SSSI towards 'favourable status' - see main planning element of the management plan for criteria.

It was listed as a **Grade 2 Nature Conservation Review Site** by Ratcliffe in 1979.

Ramsar - notified in 1994

This identifies the site as part of the Midlands Meres and Mosses complex of internationally important wetlands under a convention signed in Iran in 1971 by the British Government

Special Area of Conservation (SAC) – designated under the European Habitats Directive 1992 - confirmed August 2001
The site was recommended as it was one of the few areas in Shropshire where Floating Water-plantain *(Luronium natans)* has been recorded. This species is a nationally scarce plant and is rare or threatened within a European and indeed a global, context.

Local Nature Reserve - designated September 2000
This recognises the site as one of local importance for nature conservation and education

Common Land - registration finalised 1st August 1972
As a registered common permission is required from DEFRA before the site can be fenced off or anything which may be considered an obstruction is placed on site. A number of adjacent residents still hold commoners rights as well as the owners of property at Tilstock Park.
As a common, the land was registered as Open Access Land in October 2005

5.1.3: Land Tenure, Legal Agreements & Buildings

5.1.3.1: Owners

Shropshire Council, Shirehall, Abbey Foregate, Shrewsbury, SY2 6ND. (01743 251000).
Managed by the Outdoor Recreation Team, Swan Hill, Ellesmere, Shropshire SY12 0DQ (01691 624448).

5.1.3.2: Type of Holding

Freehold

Brown Moss is registered Common Land for which there are existing commoners' rights although these are not currently regularly exercised. A copy of the registration document is kept at the offices at Swan Hill. Permission is required via DEFRA before any obstructions can be placed on site. Clarification should be sought regarding what may constitute an obstruction.

5.1.3.3: Acquisition

The freehold to the site was jointly purchased by a local authority consortium from the Brownlow Estate in 1952. In a Deed of Revocation, signed in 2000, Brown Moss became the sole responsibility of Shropshire Council. The extent of land ownership is shown on Map 3.

5.1.3.4: Byelaws

Made under Section 90 of the National Parks and Access to the Countryside Act 1949, these came into force on 1st August 1955.

A copy is shown in Appendix B.

5.1.3.5: Agreements

A grant of easement was granted September 2000 to allow the owners of Ash View, vehicular access to their property along the trackway and to allow them to make repairs to any potholes in the track, provided that the nature of the infill is first agreed with Natural England. An agreement was also made with the landowner of the field behind Pool 10 to give access across the small car park and trackway to his land.

A management agreement previously existed with English Nature under the Wildlife Enhancement Scheme which ended on 31st October 2006 The site is now entered into a Higher Level Stewardship Scheme with Natural England.

5.1.3.6: Services

None known.

5.1.3.7: Buildings / Structures

There are no buildings on site but a number of privately owned houses exist around the boundaries.

During 2013, fencing and cattle grids were erected to allow re-establishment of grazing. Consent for the works were granted by DEFRA.

A brown sign indicating 'Brown Moss Nature Reserve' on the A49/41 Whitchurch by-pass is the only obvious signage to the site

A welcome sign was erected in March 2005 by the entrance to the woodland car park.

Two of the car parking areas have some stone surfacing.

There are 3 boardwalks with handrails around the main pool which were installed to enable easier access for all abilities over the wetter sections of the path. These appear to be in good condition although the placement of these needs reviewing as they can be partially submerged during wet periods. Another boardwalk, which was re-sited in 2004 now spans the ditch between pools 7 and 8. Additional sleeper bridges can be found around the site providing access across various ditches.

There was formerly a road-side community notice board which the local community would like to see restored.

There are 8 permanent piezometers (dipwells) around the site in addition to 6 water monitoring boards and a water level logger in Pool 6. These are generally in good condition although subject to occasional vandalism. It should be noted that students carrying out research occasionally put up temporary structures, such as fencing or water monitoring pipes. All of these should be agreed with both Shropshire Council and Natural England prior to any work being undertaken.

5.1.3.8: Principal Neighbours
There are a number of private residences situated around the boundaries of the site along with agricultural properties. A minor road runs through the eastern part of the site and two tracks, one to the north-west and the other to the south-west allow access to a number of private properties adjacent to the site. See Map 2.

5.1.4: Management Responsibilities
The site is owned and managed by Shropshire Council's Outdoor Recreation Team based at Swan Hill, Ellesmere.

From 2013 to 2018 the site falls within the Meres and Mosses Landscape Partnership Scheme which will be responsible for funding much of the management required.

Other key stakeholders with an interest in the management of the site include:
- The registered Commoners;
- Neighbours, local residents and site users who play an important role by, amongst other tasks, reporting problems, helping with some of the practical work and surveys on site and collecting litter;
- Volunteers who are involved in assisting with the same from time to time.

5.1.5: Photographic Coverage

5.1.5.1: Aerial Photographs
Some aerial photographs are held on file at the Swan Hill office and show the extent of tree cover across the site, the latest of these were taken in 2004. These need to be dated and catalogued. Some of these photographs have copyright on them and permission will be required if they are to be published or used for public events.

5.1.5.2: General Photographs
A selection of original photographs, photocopies of photographs, slides and a digital database of pictures are held at the office at Swan Hill, Ellesmere. These date from the beginning of the 1900s to the present day (2006). A number of the older photographs (and copies) are in black and white and vary in quality. The slides are mostly colour and are of reasonable quality. All need to be sorted and catalogued properly.

Natural England at Attingham Park, Shrewsbury hold a reasonable number of well catalogued slides and pictures on computer. Records and Research at the library in Shrewsbury also have a selection of catalogued photos/pictures although most of these are copies of Natural England 's collection.

Individuals, groups and organisations who have used Brown Moss over the years may well be a useful source of photographs and information on the site. This could be worth investigating in order to build a unique pictorial history of the development and change at Brown Moss.

5.1.5.3: Fixed Point Photography

There are currently no fixed point photographic points

5.1.6: Compartments

The site can be broken down into four main compartments which identify specific habitats for the purposes of management. These are marked and identified on the attached Map 4.

C1 Wetlands
This is the largest and most significant feature of the site and the reason for most of the designations which the site holds. Some of the flora found in the pools, the draw down zones between high and low water levels, and the surrounding marshy areas, are of particular interest. The 13 pools on site are numbered (as devised by Sinker in 1962) and are marked as sub-compartments for the purposes of management. (C1a, C1b etc).

C2 Schwingmoor
This compartment is an important feature of the site as it is one of the few remaining quaking bogs left in Shropshire.

C3 Semi-natural broadleaved woodland and trees
This consists largely of trees which have grown up since the cessation of grazing in the 1950/60s. There are some a few older, larger oaks, birch, rowans and beech scattered around the site. A number of Scot’s pine and Noble Firs were planted in 1967 adjacent to pool 4 by the area of acid grassland.

C4 Heathland/acid grassland
These two habitats form a mosaic within the drier areas of “open” habitat and include areas of heath which were created in the 1990s.

5.2: ENVIRONMENTAL INFORMATION

5.2.1: Physical

5.2.1.1: Climate

The nearest weather station is at RAF Shawbury. The average annual rainfall for the Whitchurch area recorded between 1960 and 1992 was 709mm (Aspinwall 1993) Brown Moss is thought to exhibit below average length of growing season for the region as frosts and ice have been observed throughout most of the day when in adjacent areas there is no occurrence after late morning (Jones 1987).

5.2.1.2: Hydrology
The hydrology of Brown Moss has proved to be complex and is significant to the scientific interest of the site. The fluctuating water levels, differing pH and nutrient status of individual pools are key to the diversity of plant communities to be found around the site.

A series of comprehensive studies were carried out by Aspinwall & Company during the 1990s and 2000. These determined that Brown Moss has a layered sequence of aquifers which are perched upon underlying boulder clay units. The shallow groundwater aquifer which maintains open water areas within the moss is considered to be distinct and local to the site, with rainfall and surface water run-off from the local catchment area affecting levels (Aspinwall 1993). In conclusion, the reduction of water levels in the pools is likely to be related to the reduced long term rainfall (Aspinwall 2000). There is potential for monitoring data to be used to predict future water levels and therefore the possible requirements for groundwater augmentation.

There are a number of ditches/drains (some defunct) which flow onto the site from the surrounding catchment area. Some of these connect one pool to another, see Map 5. A comprehensive review of the function of these ditches is required in addition to a monitoring programme of the water quality both on site and via the catchment areas.

Piezometers(dipwells) and water gauge boards have been installed around some of the pools and regular recording of the water levels from these points and some of the wells within the considered catchment area has been carried out over a period of years. Natural England is currently monitoring water levels in Pool 6.

Map 5 shows the ditches and piezometers

5.2.1.3: Topography / Geomorphology
Created by glacial deposits, the landscape and depressions of the pools are the main features of the site. Levels vary between approximately 110m and 92m Above Ordnance Datum (AOD) - estimated level to bottom of main pool 6.

5.2.1.4: Geology
The surface consists of drift deposits made up largely of gravely sands with impermeable clay deposits in the depressions. These overlay a junction of New Triassic Red Sandstone and Jurassic Lias. The Institute of Geological Sciences carried out borehole drillings on site in 1981, the findings are presented in appendix 1 of Jones (1987).

5.2.1.5: Soils
Sinker (1962) described these as acid podzolic over the drier parts of the site with depressions suffering from impeded drainage. He also suggested that there may have been peat deposits which have since been removed.

5.2.2: Biological

5.2.2.1: Ecological Position

Brown Moss sits within the Meres and Mosses Natural Area as illustrated in English Nature's Natural Area Profile document from 1998. Many of these wetlands are of international importance and provide evidence of glacial retreat in their mineral soils with records of vegetation colonisation in peatland layers from across the region.

Prees Heath Common is the nearest area of large heathland and is home to the Silver-studded Blue butterfly, a threatened species of conservation concern. The closest significant moss is Fenns and Whixhall Moss, a National Nature Reserve home to numerous rare and significant flora and fauna.

5.2.2.2: Vegetation Communities and Flora

Surveys

Botanical recording on the site goes back to1846. Records have been collected by numerous individuals, the Fields Studies Council, the Universities of Birmingham and Wolverhampton and by the Shropshire Flora Group, (now the Shropshire Botanical Society). Many of these records are mentioned in the document, A Botanical Survey of Brown Moss (Lockton and Whild 2003) and so are not individually mentioned here.

It should be noted that over 230 species of higher plant have been recorded over the years on site, ten species are county rarities (Lockton and Whild, 1995) and three are considered to be nationally scarce or rare.

Vegetation Communities

The site can be divided into seven principal habitat types (as per Jones 1987) consisting of:-

1. open water
2. peripheral mud (draw down zones around edges of the pools)
3. marshland (fen/swamp)
4. scrub, mainly willow
5. bog (the schwingmoor)
6. heath and acid grassland
7. woodland

Habitats found at Brown Moss which are mentioned in the Shropshire Biodiversity Action Plan 2002 and 2006 include:-

Standing open water
Semi-natural broadleaved woodland
Fen, marsh and swamp
Peat bogs
Acid grassland
Lowland Heathland

These habitats can be divided into a number of vegetation communities as follows - (analysis using Match - reference A Botanical Survey of Brown Moss 2003, Lockton and Whild)
N.B. The areas where the vegetation has been mapped are not necessarily the only areas on the site where they occur.

NVC CLASSIFICATION		AREAS RECORDED/MAPPED
W6e	*Alnus glutinosa-Urtica dioica* woodland, *Betula pubescens* subcommunity	- secondary woodland on much of site
A10	*Persicaria amphibia* community	- pool 6
A2	*Lemna minor* community	- pool 6
OV30	*Bidens tripartita-Persicaria amphibia* community	- margin pool 4, 5 & 6
OV31	*Rorippa palustris-Gnaphalium uliginosum* community	- margin pool 4 & 6
S12d	*Typha latifolia* swamp, *Carex rostrata* subcommunity	- margin pool 1
S12	*Typha latifolia* swamp	- margin pool 3b/3a and pool 2
S14c	*Sparganium erectum* swamp, *Mentha aquatica* subcommunity	- margin pool 3b
S17	*Carex psuedocyperus* swamp	- margin pool 3b
A2b	*Lemna minor* community, *Lemna trisulca* subcommunity	- pool 3b
S27	*Carex rostrata-Potentilla palustris* tall-herb fen	- margin pool 3b/3a & 5
M4	*Carex rostrata- Sphagnum recurvum* mire	- pool 2
M2b	*Sphagnum fallax* lawn	- pool 9
U2	*Deschampsia flexuosa* grassland	- heath area
U5	*Nardus stricta-Galium saxatile*	- relic heath area
MG5	*Centaurea nigra- Cynosurus cristatus* grassland	- area by Ash View
W1	*Salix cinerea-Galium palustre* woodland	- around number of pools
W10	*Quercus robur-Pteridium aquilinum-Rubus fruticosus* woodland	- around edge of site and some pools

<u>Vascular plant species</u>
Lists of some of these, and references to other sources, can be found in numerous documents and papers including the Brown Moss Management Plan (Jones 1987), Brown Moss Rehabilitation Plan (Whild 1996) and A Botanical Survey of Brown Moss 2003, (Lockton and Whild). Some records are listed in the Shropshire Flora Group Newsletter, Autumn 1996 and Spring 1997 and there are notes written by botanists visiting the site including Anne Daly (University of Birmingham) in 1991.

Copies of all of these are in the files at the Northern Shropshire Countryside Service offices at Swan Hill, Ellesmere.

<u>Key Species recorded in the past at Brown Moss (but not all currently present) include;</u>
Cross-leaved heath *(Erica tetralix)* - last seen 1965
Floating club-rush *(Eleogiton fluitans)* - recorded 2006
Floating Water-plantain *(Luronium natans)* - latest record 2006, previous last official record 1986
Lesser water-plantain (*Baldellia ranunculoides*) - latest record 2006, previously last seen 1996 (now extinct?)
Least bur-reed (*Sparganium natans*) - last recorded 2001 (now extinct?)
Lesser marshwort (*Apium inundatum*) - recorded 2004 (now extinct?)
Marsh St. John's-wort (*Hypericum elodes*) - last recorded 1999 (now extinct?)
Orange foxtail (*Alopcurus aequalisi*) - recorded 2006
Pillwort (*Pilularia globulifera*) - last seen prior to 1976
Round-leaved sundew (*Drosera rotundifolia*) - last recorded 1992
Shoreweed (*Littorella uniflora*) - recorded 2006
Small-fruited yellow sedge (*Carex viridula ssp. viridula*) - seen 2006
Small water-pepper (*Persicaria minor*) - recorded 2006
Tubular water-dropwort (*Oenanthe fistulosa*) - last recorded 2006
White sedge (*Carex curta*) - recorded 2006

<u>Potentially invasive plants</u>
The non-native plant New-Zealand Pygmyweed (*Crassula helmsii*) was recorded by Ian Trueman in 1990 in and around Pool 6. It has since expanded its cover at Pool 6 and spread to other parts of the site. Thought to have been an escapee (or clearance) from a garden pond, concerns were raised as it colonised significant areas of the draw down zones and fringes of this pool and was thought to be out-competing many of the less vigorous native species. There are currently differences of opinion amongst ecologists as to how competitive and damaging this plant may be to our native flora in the long term. A programme of control was undertaken during the last plan period but this did not eradicate the species.

Bracken (*Pteridium aquilinum*) exists in parts of the woodland and on the fringes of the heathland and has extended its cover in recent years.

Birch is another invasive species of the heathland and requires controlling in order to conserve the heathland/acid grassland interest.

<u>Bryophytes, lichens and fungi</u>
An annotated list of some of these can be found in 'A Botanical Survey of Brown Moss 2003', by Lockton and Whild and in various records held at the Countryside Service offices.

Of particular note is Channeled crystalwort (*Riccia canaliculata*), a liverwort - recorded 1977, 1978, 1981 and 2003, when it was found in the draw down zone around pool 6. This is a Red Data Book species and is listed in the Shropshire Biodiversity Action Plan 2006

Fossombronia foveolata and *F. incurva* are both regionally important species of liverwort which have been recorded at Brown Moss in recent years. These species are also found in the drawn-down zones.

A number of lists for fungi exist in the files at the Countryside Service offices at Swan Hill, Ellesmere. Records were made in 1988/89 by an unknown author and by Roy Mantle in 1990. Harvey Morgan provided further lists in 2000 and 2001.

5.2.2.3: Fauna

<u>Surveys</u>
12 species of dragonfly (Lockton et al 1996) and one Red data book freshwater snail *Lymnaea glabra* (Jones 1987) have been recorded on site.
Great Crested Newts have been found breeding in the various pools (Viv Geen) and bats have been seen hunting over the site although roosts/ hibernaculae have not been recorded,
Bird surveys have been undertaken by Gareth Egarr on the main pool 6 over 2004/5

Species included in the Shropshire Biodiversity Action Plan 2002 -
Great Crested Newts
Pipistrelle bats
Water voles

Further surveys are required to bring information up to date and to add to the species recorded. Records of the aquatic invertebrates and reptiles are particularly poor.

<u>Invertebrates</u>
Although there have been no regular surveys carried out individuals have provided occasional records.
A list of spiders was made by E Duffey in 1963
Various records for Dragonflies, Bugs, Butterflies and Moths, Flies, Hoverflies and Beetles are noted in the previous management plan (Jones 1987) and in The Dragonflies of Shropshire by Lockton, Bellis, Cheeseborough and Whild. In addition some records have been made by visiting university students/researchers (i.e. Liverpool University)

<u>Amphibians</u>
Common frog (*Rana temporaria*), Toad (*Bufo bufo*), Smooth newt (*Triturus vulgaris*), Great Crested Newt (*Triturus cristatus*) and the Palmate newt (*Triturus helveticus*) have all been found on site.
Recent surveys have been undertaken to determine the breeding status of the newts (Viv Geen, Sian and Pete Edwards and Lynne Pope in 2004/5/6) and a toad

count has been carried out over 2005/6 (Sian and Pete Edwards and Jude Ashley et al)
All information on these can be found in the files at the /offices at Swan Hill, Ellesmere.

Reptiles
The body of a young grass snake (*Natrix natrix*) was discovered on the lane running through the site in September 2006. Ranger, F. Tanner recorded a grass snake swimming across Pool 6 in 1987. No other records have presently been found. Surveys of these would be useful to broaden the knowledge of fauna on the site

Fish
Fish were removed from the site during rescue operations in the 1990s when the pools dried up. No recent surveys have been undertaken to establish if fish exist in any of the pools.

Mammals
Frank Tanner (previous countryside ranger for the site) made informal notes in the late 1980s. Species recorded were Badger (*Meles meles*), Rabbit (*Oryctloagus cuniculus*), Fox (*Vulpes vulpes*), Yellow-necked mouse (*Apodemus flavicollis*), Grey squirrel (*Sciurus carolinensis*), Field vole (*Microtus agrestis*). Bats have been noted but not formally recorded

The latrines of Water voles were spotted around Pool 2 in March 2007 by Dan Wrench, verified by John Mackintosh and Malclom Monie.

Further surveys would be useful to add to the above.

Birds
Jones 1987 has a list in the appendices of the management plan. Surveys have been undertaken by Gareth Egarr on the main pool 6 over 2004/5 and by Sharon Garforth in 2005/6. Records are on file in the offices at Swan Hill, Ellesmere.

5.2.3: Cultural

5.2.3.1: Archaeology / Heritage / Past Land Use

Brown Moss is included in The North West Wetlands Survey 5, The Wetlands of Shropshire and Staffordshire. Produced by Lancaster University Archaeological Unit and carried out in 1990s, it describes the results of a two year survey of the archaeological and palaeoecological significance of lowland peatland. No earthworks were found in the areas surveyed and little information of its palaeoecology has been recovered.

Comments made by local people to F. Tanner suggested that the may have been a Second World War trench in the dip within the wood between Pool 3b and the road. Further investigation may be necessary to establish whether or not there is anything of importance on the site.

Records and maps of Brown Moss which date back to 1876 show the site as a series of pools surrounded largely by heathland and marshy ground.

Re-registered as a common in 1972, the site has had commoner's rights which allows for grazing, cutting of peat, the taking of sand and gravel and collection of

firewood by the registered commoners.
Some peat cutting and extraction of sands and gravel are thought to have taken place in the past although the extent to which this was carried out is not clear (Jones 1987)

The site was grazed up until the 1960s when changes in agricultural practices and in legislation re TB meant that grazing largely ceased, (although one of the adjacent neighbours grazed goats until recently on the grassy area close to Pool 2). Since the reduction in grazing the trees have encroached onto the site and much of the heathland has now disappeared. In addition, a proportion of the wetland fringes and small pools have become scrubbed over with willow carr.

Tickets for day fishing were issued in the past, however, this ceased when the pools dried up and the fish were rescued and relocated to other sites, under the supervision of the National Rivers Authority (now Environment Agency).

5.2.3.2: Past Management

Many of the records of past management are very sketchy. Approximate dates for some of the management have been noted from the memory of the previous ranger for the site, Frank Tanner or from references in other documents. The following list is therefore not comprehensive.

- planting of pine trees on 'open green heath' (1960s?)
- some dredging on pool 6 , 3b, 2 and 4 (3b,6,4 1976 dredged to maintain depth for fish) additional dredging done to pools 3b,2 (in 1996?) when water levels were very low/non-existent
- ditch dug across peninsula to existing island to extend and isolate island during low seasonal water levels, mid 1980s?
- restoration/creation of two areas of heathland (1985 and 1997/8)?
- scrub and woodland removal throughout the 1980s to 2013
- bracken control by pool 6 during the late 1980s through to 2002
- boardwalks installed to enable all ability access and to limit trampling of sensitive areas, 1990s
- removal of Reedmace (*Typha latifolia*) from Pool 6 in 1996
- rush cutting on bog - carried out in sections yearly from 2000
- scrub cutting around pool 6 - carried out in 1996, 1999, 2003/4 and 2005
- *Crassula* control around pool 6 - a major programme was carried out during the winter 2003 and beginning of 2004.

5.2.3.3: Past Interest

In addition to the site's use as a grazing common, there has been a long-standing interest in the site for both its botany and recreational use, such as dog walking and duck feeding.
A collection of photographs over the last one hundred years shows people fishing, walking and skating on the main pool during hard winters.
There are also many references to amateur and professional botanists who have undertaken surveys on the site.

5.2.3.4: Landscape

Shropshire's Landscape Character Assessment (c.2000) states:
‘A gently rolling landscape overlain by sandy brown soils giving rise to an intensive system of mixed farming. Pastoral farming systems predominate in many localised areas although throughout the unit intensity is high which has resulted in hedge and tree loss together with a general decline in natural habitats. The settlement pattern is clustered, with the principal settlements being those of Whitchurch and Tilstock, which is consistent with the irregular field pattern which is evident through out the unit. Hedgerow trees are very sparse in some areas whilst field trees are apparent throughout the unit. The small areas of woodland tend to be secondary on areas of previously open heath and moss, which are undergoing natural succession’

5.2.3.5: Interpretation

There is no on-site interpretation. A number of wooden signs and waymark posts exist, although most are now rotten. The interpretive leaflet which helped to illustrate the route is out of print.

5.3: SUMMARY OF THE RELATIONSHIPS WHICH MAY HAVE IMPLICATIONS FOR MANAGEMENT

5.3.1: Environmental

Succession
If left unmanaged scrub and ultimately woodland, will become established on the heathland and wetland areas. This will mean a loss of these habitats resulting in a loss of botanical and ecological diversity.

Hydrology
The amount of water making its way onto the site appears to have reduced considerably over the years. Aspinwalls report (1993) concludes that there is is a direct link with rainfall and therefore successive years of low rainfall will result in periodic drying up of the pools. In addition changes in ditch management adjacent to the site and further afield could be a factor in less water actually reaching the site from the surrounding catchment area. This occasional drying up of the wetland is thought to be an important feature of the site, exposing muddy areas and seed banks from which rarities may re-appear after a dormant period. However, long term drought conditions would seriously affect the plant communities and the conservation value of the site.
Further investigation and action is vital to ensure that maximum use can be made of any water draining from surrounding land. However, consideration will have to be given to the problem of excessive nitrates flowing onto the site. As Brown Moss sits

within a Nitrate Vulnerable Zone it should be possible to get assistance from the Environment Agency in developing a strategy for this.

Invasive Plants

Crassula helmsii is a non-native plant which can form dense carpets, particularly where there is organically rich substrate, and may dominate the less vigorous, low growing native marginal vegetation (pers com. ECUS and ref. Natural Environment Research Council 2002). Research by various organisations and individuals is being carried out to determine the long-term effect of this plant on other plant communities.

Azolla filiculoides is another non-native, introduced from America, and has been recorded on Pool 3b in past years (1990s) and in 2006. It has since disappeared again so it is hoped that any future re-appearance may be equally short lived.

Around the areas of heathland and in some parts of the woodland bracken could become a problem if not controlled.

Rabbits

There is a large and established warren adjacent to the area of acid grassland. The sward is currently being kept very short due to their grazing. In the absence of any other forms of grazing, the rabbits are not considered to be a particular problem and are likely to have been useful in maintaining an open area

5.3.2: Cultural

Farming

The small areas of heathland and acid grassland are what is left of what 50 years ago was a much larger heathland. The cessation of grazing is the main reason for the loss of this habitat to scrub and woodland. Any significant restoration of the site to heathland would require the re-introduction of grazing without which management is likely to be costly and labour intensive.

Commoners Rights

If those who currently hold rights decided to exercise them it may, in some cases, compromise the management of the site, i.e. the right to cut of peat, the taking of sand and gravel. Other rights such as grazing could compliment management providing levels did not exceed those required to manage the available sward (which they would if all rights were exercised).

Access

Although erosion is not a particular problem on the site, some areas, particularly within the wetter parts of the woodland, are becoming wide muddy paths. These are more noticeable where there are, or were, ditches. Where this has happened people have often created walkways using logs. This can, and has, had the effect of preventing the water from flowing directly into the pools and instead expands the area of wet woodland.

Dog faeces are considerable problem, principally around the heathland/grassland areas and around the main pool 6. Apart from the nutrient enrichment, which changes the plant communities (often more nettles) dog faeces has well reported health risks to people. Out of control dogs have also been reported chasing the wildfowl.

Health and Safety

There is a potential conflict in balancing the management of the site for its biodiversity, wetland interest and public access and managing the site for health and safety.

The wetland areas, which have open water and boggy, marshy ground could present a problem to the uninformed as could the number of rotten trees, many of which are invaluable to invertebrates and birds. With open public access it is not possible to restrict people to paths, although the majority of people do use the main paths. Trees which are close to main paths and other obviously public areas need to be surveyed and managed in order to be safe whereas trees in less accessible areas can be allowed to retain dead wood and be left to rot down naturally. Interpretation could also be another useful way to inform people.

Interpretation

There is a need to interpret the important features of the site, however any placement of panel or other media should be sited carefully so as not to detract from the landscape or natural interest of the site.

Relationship with the local community

There is a potential for conflict between the nature conservation objectives for the site and peoples views on how they would wish to use the site. Better information and regular liaison with visitors would help to ensure that conservation objectives can be met whilst concerns are addressed wherever possible.

The Brown Moss Nature Reserve Users Association is a local group concerned with the management of the site. Made up principally from people living adjacent to the site, they have been invaluable in assisting with some of the management such as keeping a number of the ditches open, collecting litter, reporting vandalism and dealing directly with the police on occasion. They have also been actively involved in helping to carry out biological surveys, both from their own interest and those linked to monitoring requirements. A lot of useful information about the site has been acquired from various local people’s knowledge.

Litter / vandalism.

The provision of access, particularly a number of open car parks, brings antisocial problems such as litter and vandalism. Fly-tipping is a regular problem on the site.

6: EVALUATION (Part 2)

6.1: PROVISIONAL LIST OF FEATURES, WITH EVALUATION

Provisional List of Features.

The following habitats and species are considered to be of nature conservation value at Brown Moss:

- Aquatic & wetland habitats – including swamp, fen, marsh and open water
- Heathland and acid grassland habitats
- Schwingmoor habitat (floating bog)
- *Luronium natans* (floating water-plantain)
- Semi-natural broadleaved woodland including a few mature trees
- Specially protected species including water vole and great crested newt

The following features are considered to be of amenity interest:

- Access and recreation
- Interpretation, education and information
- Involvement of local residents, local communities and site users.

Evaluation of provisional features

The proposed features will be largely evaluated using criteria from the following: **formal status, size, rarity, fragility, diversity, condition, naturalness, typicality** and **potential**.

Aquatic and Wetland Habitats

Brown Moss has numerous conservation designations which identify the wetland habitats and plant communities as being of particular importance both nationally and locally and therefore have **formal status**. As the site receives much of its water through surface runoff from the surrounding land, or movement through the ground, the quality can be variable and long term water levels uncertain. This vulnerability to outside influences means that this habitats are **fragile**. The **diversity** of plant species associated with the wetland, some of which are **rare**, is high. In the absence of appropriate management the wetland communities on site are threatened as trees and scrub encroach, shade, drop leaves and increase transpiration from the site.

Heathland / Acid Grassland.

Lowland heath is a UK BAP Priority Habitat owing to both its significant decline (at least 75% lost over the last 200 years) and the proportion of the European habitat that occurs within the UK (20%). Therefore, any lowland heath habitat can be said to be **rare**. There are 46 sites in Shropshire that support lowland heathland, covering an area of approx. 900 ha. Although there are some large heathland sites, occurring mainly in South Shropshire, most other sites are small and fragmented (SBAP 2002).

The nearest area of lowland heathland to Brown Moss is at Press Heath, less than one mile south of the site, home to the last surviving colony of Silver-studded Blue butterflies in the Midlands, a single individual of which was noted on Brown Moss in 2005.

The objectives for lowland heath in the Shropshire BAP are to ensure that there is no further loss or degradation, to improve the quality of existing habitat and to increase the extent of it. It is **fragile** in that without management, it will soon succeed to scrub and woodland. Whilst its current condition is far from favourable, given adequate resources and support it has the **potential** to achieve a favourable condition.

Acid grassland is also a UK BAP Priority Habitat with similar objectives in the Shropshire BAP to lowland heath.

Luronium natans (Floating Water-plantain)
This plant has **formal status** being listed in annexes II and IV of the Habitats Directive and in Appendix 1 of the Berne Convention and as such is of international importance. It is Nationally Scare and can therefore be considered **rare**. *Luronium* is **fragile** due to its complex life history and ecology. With appropriate management there is **potential** to secure its long term future.

Schwingmoor (peat bog)
Identified in the Shropshire Habitat Action Plan, this recognises that it is a **rare** habitat. It can also be considered **fragile** as its small size means it could be rapidly over-grown with scrub and trees if not managed and could be affected by nutrient enrichment and persistently low rainfall. There is **potential** to improve its condition through appropriate management

Semi-natural broadleaved Woodland.
The woodland at Brown Moss has a degree of **naturalness** - most of it has developed by natural succession since grazing ceased. However, birch-dominated recently developed secondary woodland is not a rare habitat in comparison with the open heathland, wetland and acid grassland habitats that it has replaced. A few individual trees are of larger size and greater age – these have potential to develop into veterans which are a priority feature in the Shropshire Biodiversity Action Plan.

Protected species
The Great Crested Newt (*Triturus cristatus*) has **formal status** as a priority species for conservation action in the UK and is listed on Annexes II and IV of the EC Habitats Directive and Appendix II of the Bern Convention. It is protected under Schedule 2 of the Conservation Regulations 1994 and under Schedule 5 of the Wildlife and Countryside Act 1981. Britain is the stronghold for newts in Europe where their numbers are threatened. Newts can be considered **fragile** as their numbers can fluctuate considerably from year to year due to the drying out of breeding ponds, predation, competition and loss of suitable terrestrial habitat.

Badger, bat species and water vole are also protected under UK law (**formal status**).

Access and recreation.

The provision of access is one of the prime reasons for Shropshire Council owning and managing countryside and heritage sites. Although the site's conservation designations dictate that its primary importance is for nature conservation, this need not be at odds with its use for recreation. Most visitors enjoy the **naturalness** of the site enjoying quiet walks and bird watching. The site has **formal status** as Common Land and a Public Footpath comes through part of the site on the eastern edge.

Interpretation, information and education

The site is of international importance for its wetland plants and is of particular interest to individuals and groups for both formal and informal study. The site has **potential** to highlight the wonderful diversity of flora and fauna to be found in the mosaic of habitats found on site and to provide a low key educational resource for local schools and colleges. There are opportunities for research which may be of significant value to this and other sites.

Involvement of local residents, local communities and site users.

A good relationship with the local community is particularly important to ensure the long term future of the site. Awareness of the conservation value of the site is crucial to engendering respect and understanding for the need to manage this internationally important site appropriately. There is great **potential** for further strengthening existing relationships and in ensuring that more visitors are given the opportunity to become involved.

6.2: LIST OF CONFIRMED KEY FEATURES

FEATURE	I.I	N.I	R.I	L.I	P
1. Aquatic and wetland communities, including swamp, fen, marsh and open water	X	X			
2. Heathland and acid grassland			X		
3. Schwingmoor		X			
4. Luronium natans		X			
5. Access and recreation				X	
6. Interpretation, information, education				X	
7. Involvement of local residents, local communities and site users				X	
Other Features					
semi-natural broadleaved woodland				X	
great-crested newts	X	X			X
bats					X
badger					X
water vole					X

I.I – International Importance
N.I – National Importance
R.I - Regional Importance
L.I - Local Importance
P – Protected species

X indicates level of importance

7: MANAGEMENT OBJECTIVES (Part 3)

Feature 1 – Aquatic and wetland habitats including swamp, marsh, fen and open water

Description

The wetland habitats, and the species they support, are the main reason for Brown Moss's international and national nature conservation designations.
There are 13 pools which vary in size from about 3 square metres to about 4 hectares. These vary in pH value from 3.8 to 8.9 (Lockton and Whild 2003). Most are shallow and in years of low rainfall often dry up leaving areas of damp mud. Fluctuating water levels are a feature of the site and the draw down zones provide suitable conditions for a number of interesting wetland plant species.

(The schwingmoor, which is marked as pool 9 on the maps and plans will be dealt with under a separate feature – see Feature 3 below).

Favourable Status (Long Term Objective)

The wetland habitat will be at favourable status when:

a) Total extent of open habitat (wetland and heath/acid grassland combined) is at least 50% of the total site. This is equal to approximately 16 hectares.

b) Tree and scrub cover is <5% cover in wetland habitat

c) The following species are widespread and viable in the long term

Water pepper	- *Percicaria hydropiper*
Amphibious bistort	- *Persicaria amphibia*
Marsh cinquefoil	- *Potentilla palustris*
Skullcap	- *Scutellaria galericulata*
Marsh bedstraw	- *Galium palustre*
Water plantain	- *Alisma plantago-aquatica*
Marsh pennywort	- *Hydrocotyle vulgaris*
Gypsywort	- *Lycopus europaeus*
/Water mint	- *Mentha aquatica*

d) Populations of the following species are localised but viable in the long term

Water crowfoot	- *Ranunculus aquatilis agg*.
Orange foxtail	- *Alopecurus aequalis*
Small-fruited yellow sedge	- *Carex viridula ssp. viridula*
Floating club-rush	- *Eleogiton fluitans*
Shoreweed	- *Littorella uniflora*
Floating water-plantain	- *Luronium natans*
a liverwort	- *Riccia canaliculata*

a liverwort - *Ricciocarpos natans*

e) Populations of protected and notable wetland species are present:
water vole
great crested newt

<u>Objective 1:</u>
To achieve, and then maintain, the wetland habitats in a favourable status including restoration (expansion) of these open habitats.

Factors and Limits (these affect the feature)

1. Hydrology
This is the single most critical factor affecting the wetland habitats, and therefore the overall nature conservation status of the site. However, water levels have always fluctuated, often with long periods of drying up, and long periods of flooding. Hyrdological studies have shown that Brown Moss is isolated from the local water table, being fed by precipitation and surface water from surrounding agricultural land. Therefore, water levels primarily reflect local rainfall patterns. Drains both leading onto/off the site and within the site also play a role in the hydrology - when functioning (cleared), some drains will enhance water levels in specific pools and some may lower them.
Limits – none specified since water levels fluctuate and cannot be controlled.

2. Eutrophication
Agricultural run off, septic tank overflows and excessive numbers of wildfowl will alter the vegetation composition in and around the pools. Brown Moss is within a Nitrate Vulnerable Zone, as determined by the Environment Agency, and as such the surrounding land is required to have limited use of fertilisers.
Limits – none specified since this Factor cannot be fully monitored or controlled.

3. Tree and scrub encroachment
Trees/shrubs affect the wetland habitats through leaf deposition, shading and increased transpiration.
upper limits - no more than 5% of wetland habitat area to be shaded
lower limits - none set

4.Siltation of pools
The build up of leaves and silt are decreasing the depth of the pools and therefore their viability to retain water long-term. Leaf litter is changing the nature of the substrate which impacts on the aquatic macrophytes, (pers comm. S Whild)
Limits: none specified as difficult to monitor accurately

5. Non-native species

Crassula helmsii exists in and around pool 6 and has been recorded elsewhere. At high covers, this species may limit the diversity of wetland plants, particularly in the draw down zones.
upper limits – Cover should not be at an extent which reduces the botanical diversity and viability of notable species around any pool.
lower limits - none

6. Stakeholders and visitors
A lack of information and contact with neighbours, commoners and visitors can lead to difficulties in implementing work needed to maintain the wetland. Removal of larger trees is a particularly emotive issue and needs to be handled sensitively. Visitors to the site, especially with dogs, have potential to reduce the nature conservation value of the wetland habitat, eg: through dog fouling and disturbance to species (watervole, breeding birds).
See Feature 7.

7. Grazing
A lack of livestock grazing over the last 40 or so years has led to the encroachment of trees and scrub which affects nutrient levels and plant communities in and around the pools. Grazing by wildfowl and rabbits has had a positive effect on some areas. Livestock grazing is the preferred option to maintain the diversity of vegetation around the site. Stocking levels, times of year of grazing and livestock breeds will all affect the impacts on the vegetation.
Upper limit: Acceptable levels of poaching, average sward height over 5cm.
Lower limit: Average sward height at end of growing season under 15cm.

8. Wildfowl
Large numbers of wildfowl may affect the quality of the water through excess nutrients and the growth of the vegetation by over-grazing. Long-term research is needed to determine what effect the wildfowl may have on the site.
Limits: none set as insufficient data.

9. Commoner’s Rights
If all Commoners Rights were exercised there would be an impact on the wetland habitats (eg: over grazing).
Limits: As per Factor 7 above.

Attributes and Limits (these are used to monitor the feature)
a) Total extent of open habitat (wetland and heath/acid grassland combined) is at least 50% of the total site. This is equal to approximately 16 hectares.

1. Extent of the open habitat (wetland and heath/acid grassland combined).
Upper limit - none
Lower limit - 50% of total site (16ha)

2. The condition of the marsh/fen sward should be such as to achieve favourable status with a diverse range of wetland plants which should include the indicator species as laid out in Favourable Status above.
Upper limit – none
Lower limit – favourable status (as described above)

Factor Monitoring Projects
1 - hydrology/water levels

RP10/1-Collect data, hydrological – investigate water flow from ditches onto site from catchment area
Liaise with Environment Agency and local landowners to determine whether historic drainage ditches are still in use or are able to be used, with appropriate management. Also investigate drains which act as links between pools to determine whether restoration will increase water levels. This project needs to link closely with the monitoring of nutrient levels to ensure that ditches with a potentially heavy flow of nutrients do not drain onto the site, (see factor 2)

RP13/1-Collect data, hydrological, monitor - monitor water levels using existing dipwells and gauge boards and Natural England equipment in pool 6.
Water levels were monitored on a weekly basis from c. 1993 up until 2003 and intermittently since then.
It will be useful to continue to monitor water levels as management of the site changes, particularly with regard to future ditch management and maintenance. Recording carried out on a monthly basis at selected pools (and schwingmoor) where dipwells and boards are already installed should provide sufficient data: - 2, 3a, 3b, 4, 6, and 9 plus Natural England are now monitoring pool 6.

2 - nutrient loading/eutrophication

RH07/1- Liaise with Environment Agency to determine the nutrient loading and eutrophication impact from surrounding catchment area of the pools and existing ditches which feed onto the site.
Monitor nutrient levels in the pools and ditches, particularly those flowing into the site, to determine whether management to encourage water flow onto the Moss is desirable or undesirable.

3 - tree and scrub development

RF13/1-Collect data, trees/shrubs, monitor - monitor tree and scrub encroachment
Map areas of wetland habitat with >5% scrub annually - add information to management prescription database as necessary.

4 - siltation of pools

RP42/1-Collect data, pedological, survey - assess depths of siltation in pools prior to management

Core sampling of pools prior to desilting to ensure appropriate material and depth are removed during management.

XXX (CMS number required)
Monitor effects of de-silting – survey incl. photos and species lists before and after management and on annual basis thereafter.

5 - non-native species

RF03/1-Collect data, vegetation, monitor - monitor extent of *Crassula* cover

Visual inspection and description and fixed point photography twice annually in March/April and August/September to assess changes, particularly in response to grazing.

XXX (CMS number required)
Gain results of on-going monitoring from SBS to assess rate of spread (if any) across site.

6 – stakeholders and visitors

See Feature 7 – no separate monitoring.

7 - grazing

RP55/1-Collect data, landscape, research project - monitor grazing impacts

Monitor sward condition & height & levels of poaching – annual inspections (with records kept) in September. Include information on which areas are most heavily grazed.

RP55/1-Collect data, landscape, research project - monitor grazing impacts

Permanent quadrat monitoring to assess impact of grazing and review grazing regime – needs to commence BEFORE grazing, then initially annually.

8 - effects of wildfowl

RB04/1-Collect data, biological, count/estimate/measure/census – monitor number of wildfowl

Gain results of Liverpool University studies (2004-2006) carry out monitoring of wildfowl numbers (via a volunteer?)
WEBS counts can be done on a monthly basis.

<u>Attribute Monitoring Projects</u>

1 - extent of the wetland area

RF03/2-Collect data, vegetation, monitor - monitor extent of wetland area

Annual mapping of the extent of wetland habitat (at the same time as mapping areas >5% scrub cover). Aerial photos will also be useful to monitor the extent of wetland.

2 – Favourable status of wetland habitats

RF04/1-Collect data, vegetation, count/estimate/measure/census - survey and compile species list

Annual walk-over survey specifically recording plant species listed above as indicators of Favourable Habitat (this can be done at the same time as recording extent of wetland and mapping areas with >5% scrub. Permanent quadrats set up to monitor grazing impacts will also provide data.

Survey for Luronium natans is covered under Feature 4 below.

Survey to confirm presence of water voles and great crested newt is covered under “Unassociated Objectives”.

Current Status

25/08/06 – Unfavourable –Recovering

Since the felling of trees around pools 3b, 4, 5 and 6in the mid 1990s, there has been a recovery of marsh/fen vegetation recorded. The Shropshire Botanical Society holds a note of some of the plants recorded.
Luronium was re-discovered in Pool 6 in May 2006 and confirmed in August 2006. However, scrub and woodland cover is currently >5% and several indicator species are rare. Scrub encroachment is an on-going threat in the absence of grazing.

Management Rationale

Water level fluctuations are now accepted as natural phenomena but where possible, and where nutrients will not cause detrimental impacts on the wetland ecology, drains should be managed to encourage higher water levels and retention of water on site.

Other sources of potential nutrient loading (eg: waterfowl, dogs) should be monitored and managed if necessary.

Since the cessation of grazing c.1960 there has been a significant increase in tree cover across much of the site resulting in shading, leaf deposition, silting and increased transpiration. Where woodland has become established, wetland habitat has been lost. Therefore management of scrub encroachment and prevention of scrub and woodland development remains a high priority. Grazing will be re-established in 2014 and the impacts of this management monitored so that the grazing regime can be adjusted for maximum benefits.
The management of the wetland habitats via cutting or grazing is critical in order to maintain a diversity of vegetation and to restrict the re-growth of tree and scrub seedlings.

It is now accepted that it is unlikely that *Crassula helmsii* can be eradicated. However, the extent and impact of the species will be monitored and management undertaken if it is seen to have a detrimental impact on key species at the site. It is critical to maintain a relationship with the local community and visitors to the site in order to promote a better understanding of the work needed to restore and maintain the various habitats. Feature 7 deals subject in more detail.

Proposed Management Projects – next 5 years

- Grazing – re-establish a grazing regime at a level which controls/slows scrub encroachment and creates acceptable levels of disturbance/poaching.

- Control/remove scrub/shrubs and trees growing <u>within and at the immediate margins</u> of wetland, heathland and grassland (open) habitats (approx. 5ha). Methods as appropriate including pulling/digging (small saplings), cutting and treating stumps (larger shrubs and trees), weed wiping (scrub on drier land). Leave some cut timber *in situ* and remove the rest, leaving some in appropriate areas to be collected by local residents and site users.

- After open habitats have been cleared of woody growth as described above, and grazing is established, reduce transpiration, shading and leaf deposition and extend the area of open habitats by removing trees/woodland to a distance of 5-10m around the open habitat area (see map – total area approx. 3.5ha). Retain selected occasional mature trees taking the following factors into account:
    - potential screening role (in discussion with neighbouring residents);
    - size (eg: girth of 2m+), age, form and features taking into account species;
    - presence of other notably large/mature trees in the vicinity.

  Provide an opportunity to discuss the rationale for removal/retention of trees with site users prior to each stage of woodland removal (see also Feature 7 below).
  Treat all cut stumps chemically to discourage regrowth. Leave some cut timber *in situ* and stack the rest to be removed and used by local residents. The resulting woodland margin should be scalloped/irregular including light thinning of birch (no other species) beyond 10m where appropriate to encourage a natural and shrubby woodland edge habitat.

- Manage nutrient flow onto the site by testing water quality at the points where water runs onto the site and liaise with adjacent landowners based on the results of testing.

- Increase understanding of water flows and roles played by ditches. Maintain ditches which are important in draining adjacent land (taking into account nutrient levels as discussed above) and important for water flow across the site (selected internal ditches to drain surface water into the wetland habitats). Otherwise non-intervention for ditches where nutrient enrichment may be an issue or where water movements are not considered important or desirable to maintaining the wetland habitat.

- Experimental/small-scale de-silting in selected pools taking into account pool profiles and avoiding damage to water retaining properties. This will comprise small patches in pool 6 (see also Feature 4 below) plus selected area(s) of pools 3, 4 or 5. Silt/litter to be disposed off-site if possible. Natural England to oversee this project.

- Manage bulrush (*Typha*) in pool 5 by pulling to prevent encroachment into sedge beds.

- Non-intervention proposed for *Crassula* – subject to monitoring and review. Remove polythene used to experimentally control this species in the past.

- Review results of study on impact of waterfowl on aquatic nutrient levels and aquatic vegetation and consider appropriate actions, if required.

Feature 2 - Heathland/acid grassland

Description

Heathland/acid grassland is believed to have been an extensive habitat at Brown Moss until the mid 1900s when the cessation of grazing and subsequent encroachment of bracken, scrub and trees led to a reduction in its extent. This Feature is identified as C4 on Management Compartments Map 4.

The current areas of heathland and acid grassland run in a strip to the west of pool 6 and run north from here towards pools 4 and 5. A further area of grassland/heath exists over the road, south-east of pool 1.

The areas currently dominated by heather were created in 1997/98 by the digging of shallow scrapes with the spoil being dumped along the edge of the woodland. Heather seed was imported from The Stiperstones in South Shropshire and spread on the prepared site covered by heather brash was to provide a micro climate suitable for germination. Due to the absence of grazing, or any formal cutting regime, birch seedlings and bracken have encroached the heath. However, areas of acid grassland are mostly grazed by rabbits including areas of bare soil due to digging activity.

Favourable Status

The heathland/acid grassland will be in favourable status when:

a) The total extent of open habitat (wetland and heath/acid grassland combined) is at least 50% of the total site. This is equal to approximately 16 hectares.

b) There is a varied age structure of heather, with all stages of growth (pioneer, building and mature) present over the extent of the heathland

c) The following species are widespread in areas of heathland/grassland habitat: Common heather (*Calluna vulgaris*), Heath bedstraw (*Gallium saxitile*), Bird's foot trefoil (*Lotus corniculatus*), Bilberry (*Vaccinium myrtillus*), Wavy hair grass (*Deschampsia flexuosa*), Bents (*Agrostis spp.*), Sedge (*Carex spp.*), Common cat's ear (*Hypocaeris radicata*), Ribwort plantain (*Plantago lanceolata*), Tormentil (*Potentilla erecta*), Common sorrel (*Rumex acetosa*), Heath wood rush (*Luzula multiflora*).

d) Negative indicator species are no more than localised or occasional in heath/grassland habitats:

Negative indicator species:

Nettle	- *Urtica dioica*
Ragwort	- *Senecio jacobaea*
Thistle	- *Cirsium spp*
Cocksfoot	- *Dactylis glomeratua*

e) Tree and scrub cover on areas of heathland/grassland habitat is <5%.

f) Bracken cover on areas of heathland/grassland habitat is <10%

g) Poaching/erosion/over-grazing do not threaten the long-term viability of the heath/grassland – bare ground <5%.

Objective 2: To achieve, and then maintain, the heathland/acid grassland habitats in a favourable status including restoration (expansion) of these open habitats.

Factors and Limits (these affect the feature)

1. Fragmentation of habitat and succession.
The growth of shrubs/trees on the open habitats is threatening the viability of the heathland/acid grassland through shading and leaf deposition (leading to nutrient enrichment).
upper limit - no more than 5% of heathland/grassland habitat to be shaded
lower limit - none set

2. Encroachment of bracken
Bracken is expanding into the heathland and can threaten the viability of this habitat if not controlled.
upper limit – no more than 5% bracken cover in heathland/grassland habitats
lower limit - none set

3. Negative indicator species nettles, ragwort, thistles and cock's foot should constitute <1% of total sward in heathland/grassland habitats.
upper limit - 1% cover of each of these species.

lower limit - none set

4. Soil erosion
Bare soil is an essential element of a heathland, both for the invertebrate interest and as areas for plants to seed into. However, excessive erosion caused by trampling or over-grazing could be a problem.
upper limit - <5% of the heathland/grassland habitats comprising bare groundlower limit - none set

5. Grazing
As for the wetland habitats, lack of livestock grazing over the last 40 or so years has led to the encroachment of trees and scrub which affects nutrient levels and plant communities in all the open habitats. Grazing by wildfowl and rabbits has had a positive effect on some areas. Livestock grazing is the preferred option to maintain the diversity of vegetation around the site. Stocking levels, times of year of grazing and livestock breeds will all affect the impacts on the vegetation.
Upper limit: Acceptable levels of poaching, average sward height over 5cm.
Lower limit: Average sward height at end of growing season under 15cm.

6. Stakeholders and visitors
As for the wetland habitats, lack of information and contact with neighbours, commoners and visitors can lead to difficulties in implementing work needed to maintain the heathland/grassland. Removal of larger trees is a particularly emotive issue and needs to be handled sensitively. Visitors to the site, especially with dogs, have potential to reduce the nature conservation value of the wetland habitat, eg: through dog fouling. Dog fouling is particularly noticeable on the area of acid grassland adjacent to the woodland car park. Apart from the known dangers to people's health, significant fouling in a given area can lead to an enrichment of the soil and subsequent changes to the vegetation community.
Upper limit: Fouling not affecting sward composition
Lower limit: None
See also Feature 7.

7. Commoner’s Rights
If all Commoners Rights were exercised there would be an impact on the heathland/grassland habitats (eg: over grazing).
See Factor 5 above.

Attributes and Limits (these are used to monitor the feature)

1. Extent of the open habitat (wetland and heath/acid grassland combined) upper limits - none
lower limits - 50% of total site (16ha)

2. Structural diversity of heather
pioneer phase - upper limit - 40%; lower limit - 10%
building/mature phase - upper limit - 80%; lower limit - 20%

degenerate phase - upper limit - 20%
dead - upper limit - 5% of plants

3. The species composition, scrub cover and extent of bare ground should be such as to achieve favourable status as described above.
upper limits – none
lower limits – favourable status (as described above)

Factor Monitoring Projects

1 - Habitat succession

RF13/11-Collect data, trees/shrubs, monitor - monitor extent and spread of tree/scrub growth
Map areas of heathland/grassland habitat with >5% scrub annually - add information to management prescription database as necessary.

2 - encroachment of bracken

RF03/9-Collect data, vegetation, monitor - monitor extent and spread of bracken
Map areas of heathland/grassland habitat with >5% bracken annually in July/August - add information to management prescription database as necessary.

3 - spread of negative indicator species

RF23/1-Collect data, other vascular plants, monitor - monitor extent and spread of negative indicator species
Every two years, between June and September, walk a series of W shaped transects across the heathland/grassland, with at least 10 stops within each assessment block. At each stop assess the percentage cover and/or presence of relevant species (as listed in Favourable Status) in a 4m quadrat.
This monitoring can be carried out at the same time as the vegetation composition monitoring requirements for attribute 3.

4 - soil erosion

RP43/1-Collect data, pedological, monitor - monitor soil erosion
Record bare ground during monitoring of negative species (see monitoring of Factor 3 above).

5 - grazing

Record sward height during monitoring of negative species (see monitoring of Factor 3 above).

6 – stakeholders and visitors

RH07/3-Collect data, human impact, pollution - record levels of fouling

A visual inspection of the grassland during peak times of visitor use (summer/weekends) will be the most effective way of carrying out recording of fouling and considering whether it is an issue affecting either peoples enjoyment of the site or eutrophication of the grassland then action will need to be taken.

<u>Attribute Monitoring Projects</u>

1 - extent of the heathland/grassland

RF03/10-Collect data, vegetation, monitor - monitor extent of heathland /grassland area

Annual mapping of the extent of heathland/acid grassland habitats (at the same time as mapping areas >5% scrub cover). Aerial photos will also be useful to monitor the extent of open habitat.

2 - structural diversity of heather

RF23/2-Collect data, other vascular plants, monitor - monitor stages of heather growth

Every two years, walk through the main areas of heathland, record presence and proportions of the different growth stages of heather present on site.

3 - vegetation composition

RF03/11-Collect data, vegetation, monitor - monitor compostition of heathland/grassland sward

Every two years, between June and September, survey for plant species listed above as indicators of Favourable Habitat (this can be done at the same time as survey for Factor monitoring). Permanent quadrats set up to monitor grazing impacts will also provide data.

Current Status

Unfavourable – recovering

Work carried out in the heathland/acid grassland has been an important step forward in the restoration of these habitats. Further work is needed to extend and link the areas of heath and acid grassland and to prevent scrub and tree encroachment. It is expected that more varied plant communities will develop over time.

Management Rationale
Heathland/acid grassland are believed to have been extensive habitats at Brown Moss until the 1960s when the cessation of grazing and subsequent encroachment of scrub and trees led to a reduction in the extent of open habitats at the site. Bracken is also expanding into the heathland areas. Management of scrub and bracken encroachment are therefore a high priority including the removal of the majority of trees/scrub currently growing on these habitats. Grazing will be re-established in 2014 and the impacts of this management monitored so that the grazing regime can be adjusted for maximum benefits.
The areas of heathland and acid grassland comprise a mosaic and are managed together.

It is critical to maintain a relationship with the local community and visitors to the site in order to promote a better understanding of the work needed to restore and maintain the various habitats. Feature 7 deals subject in more detail.

Management List

- Grazing – re-establish a grazing regime at a level which controls/slows scrub, bracken and bramble encroachment and creates acceptable levels of disturbance/poaching.

- Control/remove scrub/shrubs and trees growing <u>within and at the immediate margins</u> of wetland, heathland and grassland (open) habitats (approx. 5ha). Methods as appropriate including pulling/digging (small saplings), cutting and treating stumps (larger shrubs and trees), weed wiping (scrub on drier land). Leave some cut timber in situ and remove the rest, leaving some in appropriate areas to be collected by local residents and site users.

- After open habitats have been cleared of woody growth as described above, and grazing is established, reduce transpiration, shading and leaf deposition and extend the area of open habitats by removing trees/woodland to a distance of 5-10m around the open habitat area (see map – total area approx. 3.5ha). Retain selected occasional mature trees taking the following factors into account:
    - potential screening role (in discussion with neighbouring residents);
    - size (eg: girth of 2m+), age, form and features taking into account species;
    - presence of other notably large/mature trees in the vicinity.

  Provide an opportunity to discuss the rationale for removal/retention of trees with site users prior to each stage of woodland removal (see also Feature 7 below).

Treat all cut stumps chemically to discourage regrowth. Leave some cut timber *in situ* and stack the rest to be removed and used by local residents. The resulting woodland margin should be scalloped/irregular including light thinning of birch (no other species) beyond 10m where appropriate to encourage a natural and shrubby woodland edge habitat.

- Manage bracken within and at the margin of heathland/grassland habitat using a variety of methods (grazing, bruising, cutting, pulling, chemical treatment).

- Heather management – non-intervention proposed subject to monitoring effects of grazing and review of heather structure/condition after 3-4 years.

Feature 3 - Schwingmoor (quaking bog or peat bog)

Description

This Feature is identified as C2 on the Management Compartments Map 4.

The area of schwingmoor, or quaking bog, at Brown Moss is a shallow pool which has become completely overgrown with a sphagnum lawn thought to be about 1.5m thick having free water beneath it.

Over the years, the bog has suffered from reduced water levels, shading by trees, leaf deposition, nutrient enrichment and rush invasion, leading to a somewhat degraded habitat from that which was noted by Sinker in 1962
There are a number of records for plant species to be found on the bog. A summary of these can be found in the document ' A Botanical Survey of Brown Moss, 2003' by Lockton and Whild (Whild Associates)

Favourable Status

The quaking bog can be considered as being in favourable condition when:

a) Extent of schwingmoor is 0.1ha (approx 30m x 30m).

b) Tree and scrub cover is <1% and the habitat is not shaded by surrounding woodland.

c) Sphagnum moss is dominant over 0.04ha (40% - approx. 20mx20m) and present throughout.

d) At least three of the following additional species are present and viable in the long term

Common cottongrass - *Eriophorum angustifolium*
Many-stalked spike rush - *Eleocharis multicaulis*
Polytrichum sp
Carex spp (Carex rostrata, Carex nigra)
Round-leaved sundew - *Drosera rotundifolia*
Cross-leaved heath - *Erica tetralix*
Ribbed bog moss - *Aulacomnium palustre*

Objective 3:To achieve, and then maintain, the quaking bog in favourable status

Factors and Limits (these affect the feature)
1. Hydrology
Water levels across the whole site are an issue – see Feature 1. It appears that the bog acquires most of its water via direct rainfall and percolation through the surrounding soil.
Limits – none specified since water levels fluctuate and cannot be controlled.

2. Water quality/eutrophication
The quality of the water running into the bog from may be enriched as it percolates through the woodland soils. However, the bog habitat is isolated from direct flow from surrounding agricultural land so it is unlikely that nutrients flowing onto the site in ditches are a major issue. Aerial pollution, through direct rainfall may be a factor but not one which we are able to influence.
No limits can be set.

3. Encroachment of scrub and trees
Species such as willow and birch can quickly establish a foothold in the bog creating shade and nutrient enrichment from the leaf fall. The build up of leaf litter and enrichment from surrounding trees is resulting in changes in the vegetation and a loss of the valuable bog community plants.
upper limit - 1% cover of the bog habitat
lower limit - none set

4. Competition and encroachment by rushes
Rushes dominate the edges of the bog and are contributing to the loss of bog plants.
upper limit – dominant over <25% of the total area of bog habitat.
lower limit - none set

Attributes and Limits

1. Extent of the quaking bog
upper limit - none set
lower limit – 0.1ha

2. The species composition and scrub cover/shading should be such as to achieve Favourable Status as described above.
upper limits – none
lower limits – Favourable Status (as described above)

Factor Monitoring Projects

1 - hydrology/water levels – as per Feature 1, factor monitoring project 1

2 - water quality/eutrophication - no monitoring (no limits)

3 - encroachment of scrub/trees – annual inspection for seedlings/saplings of woody species.

4 - competition and encroachment by rushes

RF03/6-Collect data, vegetation, monitor – monitor extent of rush cover
Measure and estimate cover of Soft Rush (*Juncus effusus*) for whole area of pool 9 on an annual basis.

<u>Attribute Monitoring Projects</u>

1 - extent of the quaking bog

RF03/7-Collect data, vegetation, monitor – monitor extent of the quaking bog
Annual mapping of the bog habitat (at the same time as other open habitat and Factor/Attribute monitoring).

2 - condition of the quaking bog

RF03/8-Collect data, vegetation, monitor – record species present on quaking bog
Botanical survey/search for indicator species (as listed in favourable condition above) every 2 years.

Current Status

Unfavourable - recovering
The condition of the bog has declined over recent decades according to botanical surveys carried out. The principle problems are water levels and nutrient build up caused by the build up of leaf litter and shading from surrounding trees. However, management over the past 5 years has removed woody species, reduced shading, blocked water outflow from the habitat and weakened the dominance of rushes around the margins.

Management Rationale
A build up of organic materials, primarily due to leaf deposition from the surrounding trees, has resulted in a change of vegetation on the schwingmoor. Changes in the water levels have also contributed to a decline in the overall interest in this area, though the outflow ditches have been partially blocked in the past few years. Soft Rush (*Juncus effusus*) dominates the edges of this pool and there are scattered seedlings of willow and birch.

In order to restore this pool to favourable status further removal of trees will be beneficial to reduce litter deposition and transpiration in the vicinity. Any regenerating shrubs/trees should be removed from within and around the bog.

The outflow ditches should be blocked off more completely.

Continued cutting of rushes will further weaken their dominance All cut material should be removed from the habitat and piled in adjacent woodland or taken off site.

Management List

1. Hydrology – retain water in quaking bog habitat

- Extend pilings to block outflows more efficiently (make wider).

2 - manage tree and scrub encroachment

MH42/1-Manage habitat, bog/mire/flush, by tree/scrub control - cut/weed-wipe tree/scrub saplings

Control/remove any woody species from within the bog habitat – annual pulling of seedling trees/shrubs.

3 - Extend open habitat around quaking bog

MH42/2-Manage habitat, bog/mire/flush, by tree/scrub control - thin/reduce trees around edge of the bog

- Reduce surrounding tree cover/woodland habitat linking open habitat from the schwingmoor through to pool 2 to the north-west (approx. 10m) and the heath habitat to the south-east (approx. 30m). Methods as for woodland clearance elsewhere, including retention of a small number of mature trees (see Features 1 & 2 above).

4 - cut rushes around quaking bog

MH49/1-Manage habitat, bog/mire/flush, by other activities - cut rushes on rotation

- Continue to cut rushes removing cut material (to areas of retained woodland). Cut as much as possible each year (resource dependent), commencing in June so that cattle may graze regrowth during the summer. Start in same place each year so that as much as possible is cut annually.

Feature 4 - *Luronium natans*

Description

General Information

Floating Water-plantain *(Luronium natans)* is an aquatic plant endemic to Europe. It is listed in annexes II and IV of the Habitats Directive and in Appendix 1 of the Berne Convention and as such is recognised as being of international importance. Brown Moss was nominated a Special Area of Conservation (SAC) under the Habitat Directive due to its presence.

However, the species is notoriously difficult to identify when not in flower and some site records for Brown Moss collected over the years have been disputed because of lack of a specimen voucher or photographic proof. It can be mistaken for similar looking species such as *Alisma plantago-aquatica* or *Baldellia ranunculoides*. The last confirmed record is from 2006.

Ecology

Although some populations occur in various canals, *Luronium* is thought to exist in only 6 sites in England in what may be considered natural habitats.

The plant has a complex life history and ecology including a number of discrete reproductive strategies identified as annual flowering, perennial flowering and perennial vegetative. In addition it is thought to occur as dynamic metapopulations that contain different populations with different reproductive strategies. There is also some suggestion that in some circumstances *Luronium* may not grow every year and may have some capacity for extended dormancy, (perhaps up to 12-16 years), (Lansdown and Wade 2003).

The documents produced by English Nature et al on the Ecology of Floating Water-plantain and Monitoring the Floating Water-plantain have some good photographs and points out the diagnostic features of the plant (refer to bibliography for details).

Luronium natans at Brown Moss

It was noted in pools 3b, 4 and 6 in 1985 by Chris Walker and photographed on site by Mary Fuller in 1986. Jones and Trueman recorded it in 1987, although this is an unconfirmed report. Darwell and Wade apparently recorded it in 1999 off the island on pool 6 after extensive surveying. No voucher was taken.

It was recently discovered in Pool 6 in May 2006 by Mike O'Connor (University of Liverpool) who also photographed it. This was confirmed by Sarah Whild who also recorded it in a different area of pool 6 in August 2006.

Favourable Status (Long Term Objective)

Luronium natans will be in Favourable Status at Brown Moss when:

a) All conditions suitable for its growth are in place ie: open water and unshaded marginal silt and sand, occasionally exposed and dried and with some areas of substrate occasionally slightly disturbed.

b) The species is recorded regularly at the site – at least once every 5 years.

Objective 4: To create conditions favourable to the growth of Floating Water-plantain, *Luronium natans*, so as to achieve and maintain the species in Favourable Status on site

Factors and Limits (these affect the feature)

1. Hydrology and habitat availability
The extent of suitable habitat (which appears to include marginal wetland with stable sand or silt subject to occasional exposure and summer drying) depends on fluctuating water levels and vegetation growth, especially scrub and tree encroachment which results in shading, siltation and increased nutrient levels arising from litter deposition and which contributes to drying out the wetland habitat.
Upper limits – none site
Lower limits – wetland habitat in Favourable Condition (see Feature 1)

2. Water quality
The exact water quality conditions required by this species are not known but it is possible that eutrophication, pH, atmospheric and agricultural pollution and leaf deposition could have an affect on the growth of the *Luronium natans.*
Limits – not possible to set since requirements of species unknown.

3. Grazing
Grazing wildfowl could impact on Luronium natans but there is insufficient information to know if this impact is likely to be significant. Limits: None set.

4. Competition
The spread of fringe and aquatic plants, particularly *Crassula helmsii*, may limit the distribution and growth of *Luronium natans* but there is insufficient information to know if any impact might be significant.
Limits: None set.

Attributes and Limits (these are used to monitor the feature)
1. Presence of *Luronium natans*
Upper limits: none set
Lower limits - *Luronium natans* recorded at least every 5 years.

Factor Monitoring Projects

1. Hydrology and habitat availability
See Feature 1, Factor 1.

2 - water quality

RP13/3-Collect data, hydrological, monitor - monitor pH and nutrient levels in 'known' pools

Liaise with Environment Agency and Universities undertaking research (i.e Liverpool, Lancaster). Data may help to determine requirements of the species in future.

3 - grazing by wildfowl

RA13/1-Collect data, birds, monitor - monitor effects of grazing on vegetation by wildfowl
Review results of the Liverpool University study (2006).

4 - competition
No monitoring recommended at present.

Attribute Monitoring Projects

1 - confirmation of presence on site

RF02/1-Collect data, vegetation, survey - survey for presence and location of *Luronium* natans
Surveys can be carried out from April -October. A good level of botanical expertise will be required as *Luronium natans* is not easily identifiable. It can be seen in different forms depending on whether it is found growing along the margins of the pool or in open water.

A light rigid inflatable craft is recommended in order to assess cover in the deeper areas of the pools where deep silt would be a safety issue. Waders would be suitable in shallow areas around the margins but care is needed as a number of the pools have deep silt/mud and in some places trenches have been excavated in the past.

Consent from English Nature will be required as disturbance and voucher collection will comprise a potentially damaging operation.

Since it is already 8 years since Luronium natans was last recorded on site, survey should be taken annually until the species is re-recorded. Then survey can be repeated after 5 years.

Current Status

Unfavourable – unknown
Although *Luronium* was discovered in pool 6 in May 2006 and confirmed in June the long term status of the plant in not clear.

Management Rationale
Although *Luronium* (Floating Water-plantain) has recently been recorded in pool 6 its long-term status at Brown Moss is uncertain.

Various people have recorded its presence over the years, however not all have either photographed or taken samples to verify that it is *Luronium*.
It has been suggested that some populations may have long periods of dormancy, therefore surveying and monitoring will need to take place over a long period of time to confirm the presence of *Luronium*.

Luronium has three basic reproductive strategies, perennial vegetative, perennial flowering and annual flowering. Although exact requirements for germination/growth are not known, maintaining a variety of suitable wetland habitats will maximise the chances of survival of the species at Brown Moss.

Marginal areas with stable sand or silt which are subject to exposure and summer drying provide conditions suitable for seedling recruitment. Accumulations of organic matter encourage taller more competitive species and eutrophication of the water could lead to an expansion of these fast growing competitive plants at the expense of *Luronium natans*.
Fluctuating water levels are an important feature of the site, creating conditions suitable for a number of less competitive species and as for the wetland habitat above, management is important to prevent scrub encroachment.

Therefore management of wetland habitat as prescribed under Feature 1 is likely to provide the conditions favoured by *Luronium natans*.

Management List

Proposed Management Projects – next 5 years

- Manage wetland habitat as in Feature 1 including scrub control, removing trees/woodland at wetland margins and small scale de-silting in pool 6.

Feature 5 - Access and recreation

Description

Shropshire Council’s Countryside Service mission statement aims are:
- To encourage and support the involvement of communities and individuals in exploring, understanding, managing and conserving their local countryside and greenspaces
- To develop and promote opportunities for informal recreation and enjoyment of the countryside
- To enhance and conserve the landscape, wildlife and historic heritage

As registered Common Land, Brown Moss was designated as an area of 'Open Public Access' under the Countryside and Rights of Way Act 2000. However, as the site is of international importance for nature conservation, maintaining the site's ecological value will be essential when considering access and recreational use of the site.

There is a network of un-surfaced paths and tracks which have largely been created through desire routes. The main path around pool 6 has a number of boardwalks which enable access when water levels are high (though these boardwalks were flooded during the high water levels of 2013). There are some boggy areas along some of the well used paths within the woodland.
The two car parks, and small lay-bys and other informal parking areas allow for a limited amount of parking.

Occasionally activities which are considered undesirable, or even illegal, have been reported in the past. These activities have included motor bikes or quads using the site, air-rifles being used, trees cut down, fallen wood removed and posters pinned to trees.

At an Open Day, held on October 26th 2003, a survey of visitor demographics was carried out in addition to a consultation exercise to find out what people felt were the problems/interest of the site. More information on the community work carried out can be found in Feature 6.

Apart from people living around Brown Moss and some walkers from Ash, most other visitors come by car, or in the case of organised groups (i.e. colleges), by minibus.
Other than the private access to properties on the site, the only legal rights to access are by foot unless there has been a specific agreement (i.e. contractor's machinery) or by prior arrangement. There is no registered bridleway but occasional horse use is tolerated around the site perimeter.

There is no current data on visitor numbers. Countryside Rangers have noted some of the different reasons people visit the site -walking the dog, exercise, bringing the family out for quiet recreation, botanising and bird watching being the most popular.

Favourable Status
Access will be in favourable status when:

a) Public access is being facilitated for a wide range of abilities and activities appropriate to the site.

b) Recreation activities do not compromise the nature conservation interest of the site or the public's ability to enjoy a quality experience on the site

c) Any conflicts between different user groups have been addressed

<u>Objective 5: Access and Recreation:</u>
To facilitate and encourage public access and informal recreation on the site appropriate to its nature conservation status and in keeping with other site objectives.

Factors and Limits (these affect the feature)

1. Health & safety

Whilst older trees are a valuable ecological asset, the safety of the public needs to be considered where the trees present a danger. If possible paths should be diverted away from any ailing veteran trees so that the trees and deadwood can be retained.

Pools and boggy areas may also be considered hazardous. Visitors can be encouraged to stay on marked routes rather than littering the site with warning signs at every pool and wet area.

Health and Safety is dealt with in more detail under Feature 8.

Upper Limit: Health and Safety issues should not significantly impact on nature conservation interest of the site.
Lower Limit: Site meeting recommended health and safety guidelines for a natural site (note there will always be some hazards especially away from paths).
2. Nature conservation interests
Activities should not be detrimental to the nature conservation interest of the site. Current bye-laws need to be displayed.

Upper Limit: None
Lower Limit: Access and recreation should not impact negatively on nature conservation and bye-laws displayed.

3. Condition of access paths.
This will affect the numbers and type of visitors and the routes they use. Many of the paths are wet and muddy throughout parts of the year. This can be prohibitive for less mobile visitors and family groups. A balance needs to be achieved where the natural state/appearance of the paths remains but the poorest areas are improved to a minimum standard with boardwalks or natural materials.
There is currently no path which is wheelchair accessible.

Upper Limit: The appearance and scale of paths should not detract from the nature conservation and amenity interests of the site.
Lower limit: The width of the path not being exceeded by people by-passing wet patches.
4. Car parking.
The capacity and location of car parking may affect the number and type of visitors. The current provision is felt to be adequate but in places the condition of the ground means that it cannot sometimes sustain heavy car traffic. Therefore there is a need

to review the condition of parking areas and close them off temporarily or permanently if necessary.

Upper Limit: The appearance and scale of car parking should not detract from the nature conservation and amenity interests of the site.
Lower limit: The carparks should be in suitable condition for parking.

5. Vandalism / Litter.
The level of vandalism will affect the provision of infrastructure in terms of its location and design. Any furniture will need to be robust and away from vandal hotspots such as the car park. Litter is detrimental to people's enjoyment of the site. Vandalism of fencing will have significant impacts when stock are on site.

Upper Limit: Vandalism and litter should not detract from the nature conservation and amenity interests of the site or affect management (eg: fencing).
Lower limit: none.

6. Provision and condition of furniture (seats etc)
The provision and maintenance of seats or picnic tables may effect the number and types of visitors. Provision could be made for further seats in appropriate areas. Monitoring through the annual furniture survey and site checks should pick up on most potential problems.

Upper Limit: Seating and furniture should not detract from the nature conservation and amenity interests of the site.
Lower limit: Sufficient furniture should be present to allow occasional rests around the site.

7. Perception of safety.
Relatively quiet, enclosed areas can cause some people to feel vulnerable. People may also feel that their cars are at risk in the car parks as they are is not over-looked by anyone. Liaison with the local police and appropriate information and warning signs could help.

Upper Limit: none
Lower limit: There should be a perception of safety amongst visitors.

8. Marketing.
The way the site is marketed will affect visitor numbers and visitor profile. It is important that the objectives and desired outcomes of any marketing campaign are clear.
Upper Limit: Marketing should not detract from the nature conservation and amenity interests of the site.
Lower limit: Marketing should be effective in attracting visitors and informing the public.

9. Commoners rights
Although none of the commoners currently exercise their rights it is worth noting that these still exist. If those with rights decided to make use of them their activities, or those of their stock, it could make a difference to how the recreational and amenity values of the site.

Upper Limit: Common Rights holders not impacting negatively on other site users.
Lower limit: none.

10. Dog fouling
The majority of the fouling is found around the grassland area by the main car park. This can be a problem where people wish to sit and where children may play. Dog waste bins are expensive to maintain and there are currently only 2 on site.

Upper Limit: Dog fouling should not detract from the nature conservation and amenity interests of the site.
Lower limit: none.

11.Grazing
People may have concerns about grazing animals on the site and how this would affect their ability to use the site and their personal safety. It is important to choose stock which are quiet andnot easily frightened by people or dogs. Conflicts should be resolved but the importance of grazing to the nature conservation interest is an over-riding factor.

See Feature 1, factor 7
Upper Limit: Conflicts resolved.
Lower limit: none.

12. Provision of information/orientation and waymarking
Information board(s) and waymarkers enhance visitors' experience but should be in keeping with the site's natural appearance and nature conservation significance. See also Features 6 and 7.

13. Conflicting user interest
People's differing recreational uses of the site may conflict. Whilst it may not be possible to solve all of the issues appropriate routes, signage, implementation of bye-laws and management could help. Differerent users should liaise with the Council and they should inform the Council of any proposed event dates.
Upper Limit: No significant conflict issues
Lower Limit; None.

Attributes and Limits (these are used to monitor the feature)

1. Numbers of visitors.

An aim of Shropshire Council is to encourage visitors to their countryside sites and provided it doesn't impact significantly on nature conservation and amenity values of the site, higher numbers of visitors are desirable. However, an upper limit will occur when the numbers of visitors detract from a visit.

Upper Limit: Numbers of visitors do not impact negatively on the nature conservation or amenity value (enjoyment) of the site.
Lower Limit: Visitors feel welcome and visits are facilitated.

2. Diversity of visitors.
It is important that a range of people of all ages, social groups and abilities have the opportunity to enjoy the site. However, provision of all ability access may not be compatible with the nature conservation and amenity value of this particular site.

Upper Limit: Access provision to all abilities should not conflict with nature conservation and amenity values of the site.
Lower Limits: All age classes and relevant interest groups, and a range of abilities, should be represented at the site.

3. Quality of visit.
Understanding how people view the site will ensure that an appropriate service is being delivered to meet their needs. A level of satisfaction with visits is the target.
Upper Limit: none.
Lower limit: 95% overall satisfaction with visit.

<u>Factor Monitoring Projects</u>

1. Health & safety
See Feature 8.

2 - conservation interests

RH36/1-Collect data, public use, unplanned/undesirable activities - record any detrimental public use on site
Activities which may be thought to have a detrimental impact on the sites integrity should be noted, and if appropriate, mapped. Monitoring should be undertaken during ad hoc visits and reports of regular site users.

3 - condition of access paths
AI40/1-Implement inspection, other - monitor condition
Carry out regular site checks (for example monthly) to assess the condition of the paths and record any work required.

4 - Car parking.
Carry out regular site checks (for example quarterly) to assess the condition of car parking areas and record any work required.

5. Vandalism / Litter.
Carry out regular site checks (for example monthly) to assess extent of vandalism and litter. Note that fencing will require more regular checks when stock are on site.
Display byelaws.

6. Provision and condition of furniture (seats etc)
Carry out regular site checks (for example quarterly) to assess the condition of furniture and record any work required.

7. Perception of safety.
Visitor surveys should be undertaken every 3 years to include this topic.

8. Marketing.
Monitor marketing and the effects of marketing (through visitor survey or at specific events).

9. Commoners rights
Monitor the activities (if any) of Commoners.

10. Dog fouling
Carry out regular site checks (for example quarterly) to assess the extent of dog fouling and consider ways to address this if considered to be at levels which are negatively affecting either the nature conservation or amenity values of the site.

11.Grazing
Monitor any conflicts reported.

12. Provision of information/orientation and waymarking
Carry out regular site checks (for example quarterly) to assess the condition of waymarking/information and record any work required.

13. Conflicting user interest
Visitor surveys should be undertaken every 3 years to include this topic.

<u>Attribute Monitoring Projects</u>

1 - number of visitors

RH34/2-Collect data public use, count visitors - carry out visitor count
It is considered impossible to get meaningful counts at this site due to the multiple entry points, use of the site by walkers as well as people arriving in cars, variation in use according to day and time and the fact that annual counts could be significantly affected by weather.

Records can be kept of numbers of visitors attending any events plus ad hoc records of numbers of visitors seen during other activities on site. Or a local resident could be asked to keep records or estimates.

Monitor visitor enjoyment through visitor survey – every 3 years. This should identify any conflicts between enjoyment and numbers of visitors and between different activities.

2. Diversity of visitors.
   RH30/2-Collect data, public use, research - record information about visitors

During visitor surveys and events, record features such as age and ability.

3. Quality of visit.
   RH30/3-Collect data, public use, research - record information about visitor perceptions and their quality of experience

During visitor surveys and events, record perceived quality of visit.

/

Current Status

Unknown

Management Rationale

Management needs to be informed by regular surveys of amenity provision on site, reports to the Council by site users and at events and periodic surveys of visitors.

Paths need to be maintained to provide access without visitors having to erode further parts of the site. Some paths are strimmed at least once a year where the vegetation impedes access.

Waymorking should provide basic directions on the site without littering the site with too many posts.
The car park surfacing and post and rail fencing need to be maintained.

A dog mess campaign, supported by the dog warden, would highlight the problems and encourage dog owners to clear up. Provision of additional dog bins needs to be given on-going consideration.

The possibility of a wheelchair accessible path from the woodland car park around pool 6 should be considered but any conflict with nature conservation and amenity interests would be of concern.

On-going maintenance includes litter clearance, especially in the car parks, and repairs to signs, paths, seats and fences.

Management List

1 - manage paths by cutting/strimming vegetation

ME40/1-Provide/maintain paths/rides/roads - maintain paths

- Maintain paths in a suitable condition (eg: cutting/strimming vegetation, using woodchip). The main paths around the site are to be cut annually in June and again if necessary in September. The monthly site checks will determine if additional work is needed.

2 - maintain bridges and boardwalks and install new ones where appropriate

ME02/1-Other structures – maintain, repair and install bridges and boardwalk

- Maintain bridges, boardwalks, kissing gates and other access furniture in good condition. Works should be carried out as necessary. The monthly site safety checks should determine what works are required - see also Feature 8 Health and Safety

3 - maintain surfacing on car parks and trackways

ME40/2-Provide/maintain paths/rides/roads - maintain surfacing

- Maintain traditionally used parking places in usable condition

Works should be carried out as necessary. The monthly site safety checks should determine what works are required - see also Feature 8 Health and Safety

4 - install additional seating

ME00/1-Estate fabric, general - put in seats

Install additional seating as opportunities arise. Consultation in 2013 suggested that just 1-2 additonal seats would be appreciated, situated around Pool 6 at locations to allow resting during a walk round the poolSource appropriate style of seats and agree positioning. These should be of solid construction to prevent easy vandalism or removal.

5 - install bye-law notices

MI10/5nform visitors, general - display current bye-laws

Display copies of the bye-laws on the reverse of the Welcome signs and information notice boards.

6 - organise dog fouling campaign

MI20/2-Inform visitors, educational - inform visitors about dog fouling issues Maintain existing dog litter bins (one at main central carpark and one at N end of site). During the current Meres and Mosses Landscape Partnership project hold an event in partnership with the District Council's Dog Warden to inform dog walking visitors of the problems associated with dog fouling.

Feature 6 – Interpretation, education and information

Description

The Shropshire County Council Local Strategy on Lifelong Learning, aims to encourage people to have awareness and appreciation for their living landscape and to enable access to same.

Currently there is no on-site interpretation at Brown Moss and trail leaflets are out of date and out of print.
Over the years guided walks and talks and visits to the site by local schools and colleges have been useful in informing people about the value of the site for wildlife and people.
Schools have, in the past, used the site (and the expertise of a ranger) to help teach elements of the national curriculum. This has been an excellent opportunity for encouraging interest and respect in nature conservation as a whole. Various botanical groups and universities also use Brown Moss for recording and research.

Favourable Status

This Feature will be in favourable condition when:

a) All visitors have the opportunity to be informed about the significance of the various habitat types for nature conservation.

b) Interpretation media is in place on-site and via internet, leaflets etc.

c) There are a variety of educational opportunities available to people/groups wishing to access the site

Objective 6:

To develop interpretation and information so that visitors have the opportunity to be aware of the nature conservation significance of Brown Moss and to encourage use of the site for education and research.

Factors and Limits (these affect the feature)

1. Site naturalness/landscape
It is important to ensure that the placement of any interpretative panels, or the materials which they are made from, does not have a negative impact on the natural landscape or visitors visual experience of the site.
Upper Limit: Interpretation should not detract from the site's naturalness.
Lower Limit: None

2. Vandalism
The likelyhood and levels of vandalism should be taken into account when deciding upon the style and design, location and nature of interpretation to be erected on site.
Upper Limit: Interpretation should be maintained in good condition and not vandalised.
Lower Limit: None

3. Resources
The design and type of interpretation and information provided will be influenced by available resources.
No limits set.

Attributes and Limits (these are used to monitor the feature)

1. percentage of visitors aware of the significance of the site for nature conservation
Upper Limit: None
Lower limit - 80% of visitors

2. number of formal visits by groups to learn about the site
Upper Limit: Numbers of visits do not conflict with nature conservation objectives or detract from the quiet recreational value of the site.
lower limit - 2 per year

3. number of interpretive events and people participating
Upper Limit: Numbers and types of events do not conflict with nature conservation objectives or detract from the quiet recreational value of the site.
Lower Limit: 2 per year with 25 people attending each year

4. condition of site interpretation.
This needs to be maintained in order to ensure that visitors have a quality experience.
Upper Limit - None.
Lower limit - judged as fair during annual furniture survey

Factor Monitoring Projects

1. Site naturalness/landscape
No regular monitoring required

2. Vandalism
Record incidents of vandalism reported by site users or noted during monthly path/site inspections..

3. Resources
No monitoring required.

Attribute Monitoring Projects

1 - visitor awareness of the conservation value of the site

RH31/4-Collect data, public use, education - record levels of awareness of the conservation value of the site
This can form part of the same survey as for numbers and diversity of visitors, see Feature 5. A suitable questionnaire will need to be developed.

2 - formal visits by groups

RH33/3-Collect data, public use, recreation - record number of visits
Encourage reporting & recording of visits
All reports should be logged in the Project Report Diary and added up and analysed at the end of each year.

3 - interpretive events

RH31/3-Collect data, public use, education - record information about interpretive events
The number of interpretive events and people attending should be logged in the Project Event Diary as they occur, then totalled at the end of each year.

4 –
Condition of on-site interpretation.
Carry out regular site checks (for example quarterly) to assess the condition of interpretation and record any work required.

Current Status

26/08/04 – Unfavourable – no change
There is no on-site interpretation so oopportunities to learn are currently limited unless people are visiting with botanical groups or for research purposes. The number of educational visits is unknown. There are no regular events.

Management Rationale
Although Brown Moss is appreciated for its quiet natural beauty by many of the visitors who have given their views in the past, there is a need to ensure that a significant proportion of visitors are aware of the need for continued management in order to maintain the site for its plant and animal interest. There is a need to develop an interpretation plan which will decide on key messages and how they are to be delivered.

Management List

1 - develop appropriate interpretation, working with groups using/likely to use the site

MI50/1-Provide interpretative material - develop and produce interpretive material

- Develop appropriate interpretation, including on-site panel(s).

- Keep visitors informed regarding on-going management through on-site signage and events. This should include an opportunity to review woodland clearance and rationale for felling or retaining mature trees prior to each phase of felling.

- Encourage educational visits and research on site. Ensure that results of visits and research projects are received and used to inform future management.

Feature 7 - Involvement of local residents, local communities and site users

Description
Local residents' concerns over previous plans for the site led to some differences of opinion, principally because of lack of consultation as well as past proposals to fell most of the woodland. An Advisory group was set up which enabled dialogue between the managing organizations and site users. Further recent efforts have considerably improved channels of communication and encouraged exchanges of ideas. The group is now known as the Brown Moss Nature Reserve Users Association. Many of these people value the site very highly and this has been demonstrated by their keen interest in management issues. Individuals within the group provide an invaluable source of knowledge on the site, both past and present and are the eyes and ears, regularly collecting the litter left by others and reporting problems when the occur.

It is essential to the management of Brown Moss that interested local residents and site users are kept informed and involved. Management requires explanation and publicity so that everyone understands the reasons for the proposed works.

Although there are commoners rights across the site none are currently exercised.

Many people use the site for walking their dogs and also inform the Council of any problems which they encounter.

Few visitors to the site from further afield have been involved in the discussions held on site management. It may be that additional efforts need to be made to ensure that they are made aware of the opportunities.

On the whole there appears to be a good relationship with botanists and university researchers. It would however, be useful to cultivate a stronger rapport to ensure a better exchange of information and assistance with monitoring projects.

Some past and current measures to improve relationships with site users include:

- Setting up of the advisory group – now the Users Assocaiton
- Consultation over site management (for example grazing and the revision of the management plan)
- Open days/events
- Environmental education days with local schools
- Species and survey events
- Guided walks to inform interested parties of management
- Information posters on site
- Press releases to inform of planned works
- Regular contact with BMUA over any works/incidents on site

The involvement of the Meres and Mosses Landscape Partnership presents a number of opportunities to involve local volunteers.

Favourable Status

This Feature will be in favourable status when;

a) A good dialogue exists between site managers and the local community. All neighbouring landowners have a rapport with the Council.

b) There is a mutual understanding and agreement of the management required to maintain the sites conservation interest.

c) 80% of stakeholders feel informed about the management of the site

d) Visitors, neighbours and local people have opportunities to be actively involved with the management of the site.

<u>Objective 7: To maintain good relationships with local residents, local communities and site users, encouraging active involvement, to secure the achievement of other long term management objectives.</u>

Factors and Limits (these affect the feature)

1. Concerns and views of stakeholders

It is critical that any communication with groups and individuals is done with sensitivity for the concerns of those people. Frank and open discussions are useful when discussing management proposals.
Upper Limit: None
Lower Limit: Stakeholders should feel involved and their concerns considered.

2. PR & resources for communication
The Council needs to take care over communications and the ability of a facilitator to communicate is critical. Sufficient resources/time need to be allocated to ensure that stakeholders are kept informed and their views are taken into account.
Upper Limit: None
Lower Limit: Sufficient resources and PR to ensure the stakeholders are fully engaged.

3. Availability of experts
Due to its internationally important features there are many people whose expertise would provide useful when considering stakeholders' concerns. Communication and guided walks/talks with these groups/individuals would be helpful.
Upper Limit: None
Lower Limit: Experts are invited to be involved whenever possible.

4. Accessibility to events/meetings
Consultation events should be undertaken at a range of venues so encourage anyone to be able to attend.
Upper Limit: None
Lower Limit: All stakeholders feel included.

5. Availability of local skilled people
There are a number of interested and willing local visitors to the site who may be keen to assist with a range of surveys and practical management. Wherever possible these people should be supported and given the opportunity to be involved.
Upper Limit: None
Lower Limit: Anyone keen to assist in site survey and management should have opportunities to do so.

6. Adjacent landowner contact
Better contact with all landowners who live or manage land adjacent to the site would be desirable. A number of the adjacent property owners already involve themselves with work on site and give invaluable information and assistance in an informal way, such as policing, litter collection and maintenance of some of the ditches.
Some landowners are already 'managing' part of the site adjacent to their property boundary and official agreements need to be drawn up to ensure that any work is in keeping with the conservation and recreational interests of the site and does not conflict with Natural England's list of Operations Likely to Damage.

Landowners who manage adjacent fields, or whose property may affect the water quality on site, need to be brought into the discussions with Natural England and the Environment Agency over hydrology and nutrient loading - see Feature 1.
Upper Limit: None
Lower Limit: A rapport between the Council and all adjacent landowners

Attributes and Limits (these are used to monitor the feature)

1. Numbers of people involved in the management of the site
Encouraging visitor involvement will help to establish good relationships and is a useful way to inform people about the value of the work needed on site.
Upper Limit: None
Lower Limit: Any person who wants to become involved has that opportunity and is encouraged and welcomed.

2. Stakeholder liaison
The Council needs to have regular contact with all neighbours and main stakeholders.
Upper Limit: None
Lower Limit: A rapport between the Council and all adjacent landowners exists.

Factor Monitoring Projects

1 - Stakeholder survey

RH33/1-Collect data, public use, recreation - record information about visitors views

Undertake stakeholder survey every 3 years to include:
Concerns, views, satisfaction and involvement.

Attribute Monitoring Projects

1 - numbers of local people/users involved in the management of the site

RH31/2-Collect data, public use, education - collect data/numbers of people

Record numbers of volunteers assisting with tasks on site.

2 – Stakeholder liaison

Record communications/liaison with neighbours, local communities and other stakeholders.

Current Status

Unfavourable –recovering
Although good relationships have been established with the Brown Moss Nature Reserve Users Association there is still much to be done to ensure that the majority

of visitors and all the people living near to the site feel included in discussions, are aware of the conservation value of the site, feel included/involved and have confidence in the Council's management of Brown Moss.

Management Rationale
Maintaining good relations with, and the support of, the local community, neighbours, Commoners and other stakeholders (visitors and site users) is essential if the future of the site is to be secured.

Due to the site's international importance as a wetland and the various protected species to be found at Brown Moss, there are legal obligations which determine how the site is managed. Nevertheless, management needs to be explained and justified and stakeholders need to be given an opportunity to comment on aspects of management.
The site is well used by small groups and individuals who should be encouraged to be involved in discussions wherever possible, to ensure the long term appreciation of the site and to instill a sense of stewardship for the site. They will be able to assist with some elements of practical management and will be encouraged to share their experience and knowledge of the site and to become involved with surveys and monitoring projects.

Objective 7:
To maintain good relations with local residents, local communities and site users, encouraging active involvement, to secure the achievement of other long term management objectives.

Proposed Management Projects – next 5 years
Management List

1 - maintain liaison with user groups/individuals

ML50/1-Liaise, local community/groups - liaise with user groups

- Liaise and inform key stakeholders (including Commoners, local residents and neighbouring landowners, residents of Ash village and user groups/individuals) regarding site management and key features through notices, publicity and regular meetings. This should include an opportunity to review woodland clearance and rationale for felling or retaining mature trees, prior to each phase of felling.

3 - provide opportunities for direct involvement with the management of the site

AT60/1-Liaise/supervise voluntary/other working groups - organise and supervise work parties

- Provide opportunities for direct community involvement with the management and monitoring of the site, eg: water quality sampling, cattle spotting, wildlife surveys etc.

4 - make contact and develop relationships with landowners within catchment of site

ML30/1-Liaise, neighbours - contact landowners/adjacent property owners
Contact adjacent landowners/property owners at least once every 6 months to keep them up to date with planned work and progress. Ensure that individuals up to date contact details are on office data base (unless they say otherwise) and that the areas of land/property owned are noted.

Also –

- Hold occasional public events to publicise key features and site management and to give the public a chance to feedback regarding their views of the site.
- Re-instate a community noticeboard (adjacent to the road) as a local community resource.
- Regularly provide information to the wider public eg: through local Parish newsletters, local press (Whitchurch Herald, Shropshire Star) and on-site signs.

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UNASSOCIATED OBJECTIVES

These are additional objectives which although not directly related to any of the key features for the site, are important as they affect features of some nature conservation value and/or relate to legal obligations.

Semi-natural broadleaved woodland

Much of the present woodland is of recent origin having developed after grazing was reduced and ceased during the 1950's and 60's. The wood is dominated largely by birch, both Silver and Downy (*Betula pendula* and *B. pubescens*) with Pendunculate Oaks (*Quercus robur*) and Rowan (*Sorbus aucuparia*) throughout. There are some mature birch, rowan and some very large oaks scattered around parts of the site, including veteran rowan and alder trees, in addition to an understorey of holly, honeysuckle and ivy. Willow carr and alders persist in the damper areas of the woodland and pools, as do communities of little recorded bryophytes, lichens and fungi.

The ground flora is relatively species poor and is dominated in places by bracken (*Pteridium aquilinum*). A number of ancient woodland indicators remain, perhaps as a testament to the sites past wooded history prior to its clearance and subsequent colonisation by heathland vegetation. These species include Bluebell (*Hyacinthoides non-scripta*), Narrow Buckler fern (*Dryopteris carthusiana*) and Dog's Mercury (*Mercurialis perennis*)

The features of greatest nature conservation value in the woodland are:

- Fallen and standing dead wood
- The largest, maturest trees (of all species).

Objective: To maximise the nature conservation value of semi-natural woodland and mature trees present on site.

Management Projects

- Non-intervention proposed in majority of retained woodland.
- Along road side, fell leaning and overhanging trees where these pose a perceived or actual safely issue or might be hit by tall vehicles. NB: trees need not be left until they are a confirmed safety risk since removal of individual trees does not conflict with other objectives at Brown Moss.
- Retain occasional significant and over-mature trees of all species to develop veteran status.
- Retain deadwood – standing (subject to health and safety below) and fallen. NB: Leave where fallen if possible (subject to access, health and safety constraints) since whole trees provide better deadwood habitat resource than cut “habitat piles”.

Protected and notable species

Great Crested Newts

The Great Crested Newt (*Triturus cristatus*) is a priority species for conservation action in the UK and is listed on Annexes II and IV of the EC Habitats Directive and Appendix II of the Bern Convention. It is protected under Schedule 2 of the Conservation Regulations 1994 and under Schedule 5 of the Wildlife and

Countryside Act 1981. A national species action plan was published in 1995 and it is a target species in the Shropshire Biodiversity Action Plan 2002

NOTE - licences are required from Natural England before work can be undertaken in areas known to have Great Crested Newts. Additional licences are needed in order to handle or disturb the newts and to carry out surveys using nets, torches and bottle traps.

Great Crested Newts were recorded on the site in 1997 (Geen V 1999-2000 report). During surveys of pools 4, 3a, 3b and 6 in April/May 2004 eggs were found and numerous adults were seen in and around pool 6. Efts were bottle trapped in pool 4 in June 2004. Both Common and Palmate newts have also been found on site during the same visits (ref Geen. V and Edwards S). Further surveys have been carried out over 2005 and 2006 and showed a breeding presence in pools 2, 3b, 4, 6 and 7.
The periodic drying out of some of the pools known to have breeding populations of newts is not seen as a problem as this can reduce the abundance of some of the newts predators without having a significant impact on the long-term viability of the species. However, several consecutive years of dry pools will have an impact on populations.

Objective: To maintain a long-term viable population of Great Crested Newts on site

Management and Monitoring Projects

- Manage wetland as Feature 1.
- Apply for appropriate licences and follow appropriate method statements/best practice when carrying out management.
- Survey every 2-3 years to confirm presence.
- Survey every 5 years to confirm population size class.

Water vole (*Arvicola terrestris*)

The water vole is a UK Biodiversity Action Plan Priority Species

In March 2007 water voles latrines and runs were noted around Pool 2. Any management of the marginal vegetation and banksides should therefore take account of the possible presence of water voles.

Objective: To maintain a viable population of water vole at Brown Moss

Management and Monitoring Projects

- Habitat management under Feature 1 will retain suitable habitat on site.
- Non-intervention – occasional monitoring.
- Discourage dogs accessing wetland habitat.
- Survey every 2-3 years to confirm presence.

Badger

- Protect setts from potential damage by stock.
- Have regard for legal status and apply appropriate methods (and/or apply for licenses) when managing the area around the sett.

Bats

No action required.

Silver-studded Blue butterfly

This butterfly is a UK Biodiversity Action Plan Priority Species.

Prees Heath reserve is part of an area of Common Land which covers 310 acres in North Shropshire and is home to the last surviving colony of Silver-studded Blue in the West Midlands. Butterfly Conservation have recently purchased 148 acres of the common in an effort to better protect the site and the butterflies.

The site is only one mile from Brown Moss and in 2004 a single male was recorded on the heathland area at Brown Moss. Although this was probably an errant butterfly it would be useful, as restoration and expansion of the heathland on Brown Moss takes place, to see if further sightings are made.

Objective: Monitor for presence of Silver-studded Blue butterfly

Projects

- Invite and encourage Prees Heath warden, or other surveyors, to check site annually for this species.

Legal obligations

Health and safety

Objective: To fulfil Heath and Safety obligations at Brown Moss

Management & Monitoring Projects List

1 - carry out site safety surveys

MS00/1-Manage species, tree/shrub - carry out dangerous tree survey

Tree inspections can be carried out by trained rangers annually and once every two years by a professional arboriculturist or tree expert. Trees around car parks, main paths and seating areas will be of high priority, as will adjacent private property.
Wherever possible Veteran trees should be maintained and paths re-routed to ensure public safety.
All records to be kept at the office at Swan Hill, Ellesmere.

AP50/1-Prepare/revise plan, safety - update site safety plan and risk assessments
The Site Risk Assessment for Brown Moss needs to be reviewed annually to determine whether there are any new hazards or whether there are any changes needed to the existing control measures.
Completed forms should be filed at swan hill office and any immediate problems prioritised and highlighted for action where necessary.

AI10/1-Implement inspection, site equipment - annual furniture survey
Each year, a survey needs to be carried out to inspect the condition of all site infrastructure. This includes fencing, walls, steps, signs, seats, post and rail and any interpretation structures. Items are given a rating of Poor, Fair or Good. Anything poor should be addressed in the same year of the inspection.
All records to be kept at the office at Swan Hill, Ellesmere.

AI30/2-Implement inspection, site safety - carry out site safety checks
These should be carried out on a monthly basis. Checks should be carried out on seating, boardwalks, bridges, information/orientation boards and signs, path condition, car park surface condition, post and rail fencing. Items are given a rating of Poor, Fair or Good. Anything poor should be addressed as soon as possible.
All records to be kept at the office at Swan Hill, Ellesmere.

<u>Other Legal obligations</u>:

- Ensure all other legal obligations are met with regard to licences required (eg: felling licences, Environment Agency licences, protected species licences etc.)

BIBLIOGRAPHY AND REFERENCES

SCC, *Countryside Access Strategy* (in preparation).
HMSO, *Health & Safety at Work Act*, 1974.
HMSO, *Highways Act*, 1980.
HMSO, *Wildlife & Countryside Act*, 1981.
Rose, F., 1981, *The Wildflower Key, British Isles - N.W.Europe.*

Sinker, C.A., Packham, J.R., Trueman, I.C., Oswald, P.H., Perring, F.H. & Prestwood, W.V. 1985, *Ecological Flora of the Shropshire Region.* Shropshire Trust for Nature Conservation, Shrewsbury

Jones, N, *Brown Moss Management Plan,* 1987, Shropshire County Council (SCC)

Aspinwall & company, 1993, *Hydrological and Hydrogeological Study of the Brown Moss Wetland*

UK Biodiversity Partnership, 1994, *Biodiversity: The UK Action Plan*

Jones, N, *Brown Moss Management Plan,* 1993, SCC

Jones, N, *Shropshire Meres and Mosses,* 1993, Shropshire Books, Shrewsbury

Willby, N J,& Eaton, J W, 1993, *The Distribution, Ecology and Conservation of Luronium natans in Britain*, Journal of Aquatic Plant Manage report

Whildscan Ecological Consultants, 1996, *Brown Moss Rehabilitation Plan*

Lockton, A J & Whild, S J, *Rare Plants of Brown Moss.* 1996, Shropshire Flora Group Newsletter

English Nature, 1996 *Site Management Statement.* EN internal report

Lockton, A.J., Whild, S.J., 1996, *Brown Moss Monitoring*

Leah, M.D., et al, 1998 *The Wetlands of Shropshire and Staffordshire*. Lancaster University Archaeological Unit

English Nature, 1998, *A Strategy for the Conservation of the Meres and Mosses of Cheshire, Shropshire and Staffordshire*

English Nature, 1998, *Natural Area Profile, Meres and Mosses 27*

Joint Nature Conservation Committee, 1998, *Herpetofauna Workers Manual*

HMSO, *Countryside and Rights of Way Act*, 2000.

Enviros Aspinwall & company, 2000, *Brown Moss Hydrogeological Monitoring Programme*

Environment Agency, 2000, *Water Framework Directive*

Conserving Natura 2000, *Key monitoring targets for Luronium natans*

English Nature, *Brown Moss Wildlife Enhancement Agreement.* 2000, English Nature

Langton, T, Beckett, C & Foster, J, 2001, *Great Crested Newt Conservation Handbook.* Froglife publication

English Nature, 2001, *Great Crested Newt Mitigation Guidelines*

Environment Agency, 2002, *Upper Severn Area Hydrogeological and hydrological assessment of selected wetland sites, Brown Moss*

SCC, *Lifelong Learning Strategy*, 2002.

SCC et al, *Shropshire Biodiversity Action Plan*, 2002.

SCC, *Countryside Service Development Plan*, 2003.

SCC, *Shropshire Cultural Strategy*, 2003.

Lansdown, R V and Wade, P M, 2003, *Ecology of the Floating Water-Plantain*, Conserving Natura 2000 Rivers Ecology Series No.9, English Nature, Peterborough

Willby N, Eaton J and Clarke S, 2003, *Monitoring the Floating Water-Plantain*, Conserving Natura 2000 Rivers Ecology Series No.9, English Nature, PeterboroughJoint Nature Conservation Committee, 2004. *UK Guidance on Conservation Objectives for Monitoring Designated Sites.*

Joint Nature Conservation Committee, *Common Standards Monitoring Guidance*. 2004

Neilsen, U N, Riis, T & Brix, H, 2005, *The effect of weed cutting on Luronium natans*, Wiley InterScience

ECUS, 2005, *Control of Australian Swap Stonecrop,* report for English Nature

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