



A Proposed Biodiversity Work Program for the Limestone Landscapes 2010-2015

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Executive Summary

Limestone Landscapes is a landscape-scale partnership of a broad range of public, voluntary and private sector organisations across a number of diverse sectors aiming to promote integrated management and project delivery across a whole landscape. The Partnership offers an opportunity to coordinate activities and resources in a long-term and purposeful way to significantly enhance quality of life, the environment of the Durham Magnesian Limestone Plateau and the well-being of its communities.

Currently, Natural England, Durham County Council, Durham Biodiversity Partnership, Durham Wildlife Trust, Durham Rural Community Council, the Woodland Trust, Groundwork East Durham and the Architectural & Archaeological Society of Durham & Northumberland are represented on the partnership's Task Group. In total 29 organisations, fora and other partnerships were involved in shaping and setting up of the partnership.

This management plan outlines a future ecological network and provides a long term vision for habitat management, creation and restoration in the Durham Magnesian Limestone Plateau National Character Area (DMLP). As well as providing this long term structure for biodiversity management planning, the plan also provides a menu of costed projects, some of which will form part of a three year Heritage Lottery Landscape Partnership Project and others will inform work going beyond the initial three years. The production of this management plan was overseen by a steering group consisting of representatives from Durham County Council, Natural England, Durham Wildlife Trust and the Grassland Trust.

The basis of the plan has been the combined expertise of the authors (experienced local ecologists), steering group members and other local partners, alongside a theoretical analysis of the opportunities for habitat creation or restoration.

All the existing information on the important grasslands, wetlands and woodlands in the DMLP has been collated and presented in the Habitat Inventory in appendix E and suggestions for further survey work are made.

We emphasise that a fundamental principle of conservation management is that resources should be allocated to conservation and restoration of important habitats before habitat creation is considered as an option.

An opportunity map which identifies and prioritises areas with the greatest potential for the conservation, enhancement, restoration and creation of important grassland, wetland and woodland habitats is presented in appendix F.

The opportunity map is constructed from a theoretical model using the habitat data, habitat permeability information, the mapping of constraints, and drawing on ecological inputs directed by the authors.

Five areas with distinctive ecological and landscape character within the DMLP were chosen as foci for the development of landscape-scale management recommendations. These areas were labelled Escarpment Ridge, Escarpment Spurs, Central Clays, Coastal Denes, and Coast, and are shown in appendix H. Each of these areas was chosen because of the significant opportunities for habitat conservation, restoration and creation demonstrated by the habitat inventory and opportunity map.

A series of management recommendations has been made for each of these areas by the authors (and in the case of the Coast project area, by Durham County Council and Durham Wildlife Trust staff), based on their knowledge, conversations with partners and landowners, and on site visits. These recommendations take the form of overall objectives for these landscape areas, and also detailed prescriptions for individual sites which, taken together, will make a significant ecological difference on the landscape-scale. The individual site based projects were then ranked and the top five priority projects are as follows;

Priority 1- Escarpment Spurs- Coxhoe to Kelloe project

Priority 2- Escarpment Ridge- Ferryhill area project

Priority 3- Escarpment Ridge- Fishburn area project

Priority 4- Escarpment Ridge- Bishop Middleham area project

Priority 5- Central Clays- South Hetton area project

The biodiversity gains represented by the management recommendations is quantified for the first three focus areas for BAP habitats, and can be summarised as follows. No figures were produced for the Coastal Denes project area which focussed on woodland potential only, or for the Coast project area, which was produced independently by Durham County Council.

Magnesian Limestone Grassland

Achieve condition 57ha

Restore 17ha

Expand 15ha

Lowland Meadows and Pasture

Achieve condition 8ha

Restore 29ha

Expand 5ha

Lowland Fen

Achieve condition 9ha

Restore 17ha

Expand 3ha

Woodland

Achieve condition 51ha

Restore 0ha

Expand 20ha

A number of other site based recommendations were submitted by partners for Sunderland and South Tyneside. These were checked and amended by the authors before inclusion in this plan.

In addition to the site-based management recommendations, a number of other recommendations are made in relation to overarching management issues and in relation to community access to, learning about and involvement in the biodiversity of the DMLP. They are summarised as follows:

We recommend using the expertise of the Flexigraze project to co-ordinate conservation grazing across the area for the duration of the project as a way of ensuring appropriate grazing management now, but also to build capacity and sustainability of a north-east grazing project for the longer term.

We reference the existing good advice on collecting, growing or buying seed for grassland restoration and list some potential sites for seed or green hay collection.

We propose an annual fortnightly festival in the middle two weeks in June to showcase the special qualities of the DMLP - a series of interpretive events, walks and open days led by experts in their field, appealing to a wide range of audiences, advertised widely and free to all.

We propose the creation of a new long distance footpath using existing rights of way which stretches approximately from South Shields to the Bishop Middleham area with a link back to the Durham Coastal Path. The new Magnesian Limestone Way would be a vehicle for the promotion of the DMLP and its special qualities

We recommend using the expertise of Flexigraze to tackle some of the issues relating to dog walking and conservation grazing which might otherwise prevent appropriate grassland and wetland management, and we make some project suggestions.

We recommend using the relevant local expertise to promote and draw up appropriate group HLS schemes for grassland and wetland management amongst targeted landowners and tenants.

We suggest an interpretive framework for biodiversity, within which new interpretation could be developed, and take a brief look at what is already on the ground. We suggest some future mechanisms for delivering interpretation, and make some specific recommendations for interpretive themes on particular sites and in particular areas.

We review the provision of training for the skills need locally to conserve and enhance biodiversity in the DMLP, comprising taxonomy, biodiversity surveying, ecological restoration, land management and outreach communication skills, and identify large gaps within.

Several recommendations for projects to fill those gaps are made under the following headings: Training for existing volunteers and professionals; Training for new audiences; Maximise the potential of existing awareness and training projects for local residents; Best practice dissemination on site management and restoration; Developing venues for training; Develop ongoing support for schools which neighbour key biodiversity sites.

A Proposed Biodiversity Work Program for the Limestone Landscapes 2010-2015

1. Introduction

1.1 Objectives and constraints

1.1.1 Objectives

The objectives of this plan are, following the clients brief, to outline a future ecological network and provide a long term vision for habitat management, creation and restoration in the DMLP.

We have broken this task down, following the brief, into three components:

Collate existing information on the important grasslands, wetlands and woodlands in the DMLP, to identify gaps in knowledge and suggest further survey work. **(see section 3 and appendix E)**

Produce an 'Opportunity Map' which identifies and prioritises areas with the greatest potential for the conservation, enhancement, restoration and creation of important grassland, wetland and woodland habitats. **(see sections 2 & 3 and appendix F)**

Produce a series of management recommendations which could be prioritised, based on the collated data, opportunity analysis, and ground truthing by ecologists. **(see sections 4 & 5 and appendix H)**

We were also asked to suggest a series of community projects which could;

Increase access to and learning about the biodiversity of the area.

Increase community participation in biodiversity projects and management.

Developing training and skills relating to biodiversity projects and management.

(See section 6)

1.1.2 Scope

Timescale

Although the management plan timescale was labelled as 2010-2015 in the brief, many of the projects which are listed are longer term, and many, if not taken up in the short term, could still be considered at a later date. The opportunity analysis and maps also provide a long term vision for the potential for habitat restoration and creation across the area.

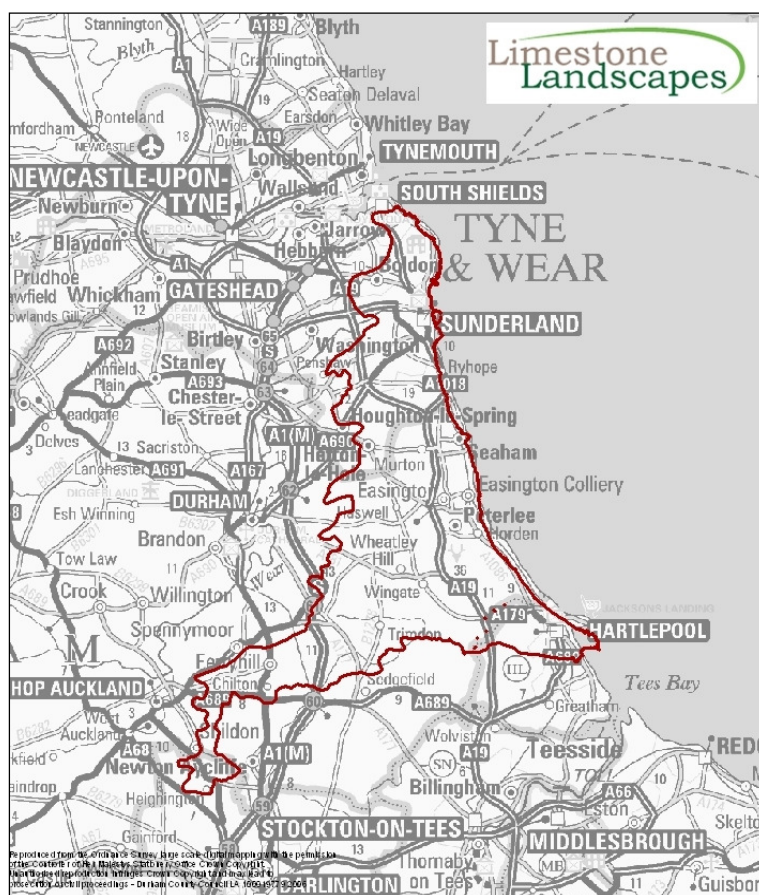
Location

The Management Plan is restricted to the National Character Area known as the Durham Magnesian Limestone Plateau (DMLP). This is approximately 207 square kilometres and currently covers all or part of the following Local Authorities:

- South Tyneside
- City of Sunderland
- Durham County Council
- Darlington Borough Council
- Hartlepool Borough Council

Figure 1 shows the boundary of the DMLP

Figure 1



1.1.3 Constraints

The main constraints on this work, in addition to available time, were the availability of data and the timescale of the work, which took place between October 2009 and February 2010.

Happily, the data sets available for the three main habitat groups are relatively comprehensive and accurate, compared to other areas within the region, thanks to recent work in this area by the Durham Biodiversity Partnership. (see section 3.1)

However, where data was inadequate there was not the opportunity, due to the season in which the work took place, to gather additional information. Where there are significant gaps in data or knowledge these are identified in section 5.1.

1.2 The authors

There are six members of the team responsible for writing this plan.

Ian Craft: Ian is a Principal Ecologist at DWS and has extensive experience of project management and ecological survey. Ian is the lead contact for the Magnesian limestone grassland habitat action plan in the Durham BAP and has worked in Durham for the last 8 years gaining an insight into the issues facing the project area. Ian has first-hand experience of the Limestone Landscapes programme through his previous role as Conservation Manager for the North of England at the Grasslands Trust.

Clare O'Reilly: Clare is a Partner at Ptyxis Ecology, an ecological and educational consultancy. She is a national referee for the Botanical Society of the British Isles, with particular experience of fen, mire and pond habitats, being one of very few charologists in the UK. She lectures in ecology and countryside management at Newcastle University and runs training courses on aquatic plant ecology and identification.

Her recent experience includes the Fen Inventory Project for Durham Biodiversity Partnership, NVC surveys of a suite of SSSI fen meadows in North Yorkshire and the Yorkshire Moors National Park for Natural England.

John Durkin: John is an ecologist with a background of working in local government. He has been running an independent consultancy for the last eight years, working mainly with public and voluntary sector organisations in North-east England.

John is the representative for County Durham for the Botanical Society of the British Isles, and manages the database of botanical records for the county. He is chairman of the Woodland committee of the Durham Biodiversity Partnership, and the author of the recent inventory of woodland in the DMLP.

Andy McLay: Andy is an experienced ecological surveyor on a wide range of habitat types from lowland fen to upland hay meadows in the region, and undertook the recent survey of designated non-statutory grasslands within the DMLP for the Durham Biodiversity Partnership.

Andy has a particular interest in grassland habitats and is currently the DBAP lead partner for Lowland Meadow and Pastures and Waxcap Grasslands. He has been closely involved with the Local Wildlife Site designation process in County Durham, sitting on the advisory panel.

Mark Parnell: Mark Parnell is an ecologist who specialises in the use of GIS to address ecological questions and has spent the past seven years working as a GIS specialist in ecology, initially working as a GIS analyst in the Wildlife & Ecology Management Team at FERA before moving to a research post at the University of Birmingham.

Mark is experienced in managing, manipulating and reporting spatial data and has recently completed projects for the Forestry Commission (data capture and bespoke software development), Yorkshire Wildlife Trust (data collation and demographic analyses) and the University of Sheffield (network analysis).

Andy Lees: Andy has 12 years experience of urban wildlife conservation, ecology, community engagement and education and regeneration programmes, including 6 years as the Conservation Team Manager for Environ in Leicester.

He was the Co-ordinator of the Durham Biodiversity Partnership for a further 4 years, developing a number of projects, including Magical Meadows which aimed to conserve important habitats in the DMLP, and which commissioned the surveys which form the basis of this management plan. Andy is currently engaged in wildlife conservation in the North Pennines with the North Pennines AONB Partnership.

2. Conservation Objectives in the DMLP

2.1 Prioritising resource use

There are limited resources available to conserve biodiversity and they need to be used effectively. Various options exist for the deployment of these resources, including the conservation of existing habitats, restoration of degraded habitats or the creation of new ones.

When considering the options we should remember that semi-natural habitats such as ancient woodlands and grassland or fens, which have developed or survived over hundreds of years, are, effectively, irreplaceable. Their longevity gives rise to complexity which is impossible to reproduce artificially over short periods of time. These semi-natural habitats also support the vast majority of our specialist (and therefore often threatened or rare) wildlife.

Other more recent habitats, such as the grasslands developing on brownfield sites or new woodland plantations can, and do, make a contribution to biodiversity by mimicking some of the characteristics of semi-natural sites, and they support some of the same species. These more recently developed habitats sometimes also provide earlier stages of ecological succession, such as scrub or open ground which might otherwise be scarce in our contemporary landscape.

Our priorities therefore should be (UK BAP terminology in parentheses):

- 1 conservation of semi-natural habitats (maintain & achieve condition)
- 2 conservation of other species-rich habitats (maintain & achieve condition)
- 3 restoration of semi-natural habitats
- 4 creation of new habitat.

In other words habitat creation should be considered as an option only when appropriate resources have already be allocated to conservation and restoration. A fundamental principle of conservation management is that, for any site, the first step should be to make incremental changes to the management regime, and assess the results, before any habitat creation is considered.

2.2 Habitat conservation and restoration

Various bodies have produced guidelines for the conservation of woodland, wetland and grassland habitats. For the most part we recommend that the guidance documents referred to here are used as a basis for management advice. Where we consider that this advice is too generic, or where there is a confusing array of advice available we make additional recommendations.

We make an additional recommendation that any management changes undertaken are carefully planned and the effects monitored.

2.2.1 Woodland management

For comprehensive guidance on woodland management and restoration specific to the DMLP there is no better source than the guidance published by Durham County Council – *Landscape Guidance Woodland & Forestry*. Although the guidance is specific to County Durham, the sections relating to the DMLP will also be applicable across the DMLP outside of the county.

<http://www.durham.gov.uk/PDFApproved/LandscapeGuidelinesWoodlandForestry2009.pdf>

2.2.2 Wetland management

Wetlands include a diverse range of habitat types, including wet woodlands and carr, ponds, reedbed, swamp, submerged aquatic habitats, tall herb fen, marginal vegetation, seepages/flushes, and types of wet grassland and rushy vegetation, which traditionally have been called marshes. For each of these habitat types, there are many specific management principles, but in summary, the following generic principles apply to most wetland types:

Wetland habitats are generally characterised by their botanical composition and moisture levels, therefore both vegetation and hydrological management is required.

Wet woodland such as alder or willow carr is traditionally coppiced or pollarded in many parts of Britain but not in East Durham. Wet woodland in the DMLP should be managed by selective thinning to promote development of ground flora and shrub layer, by maintenance of open spaces within the wood, and of woodland edge scrub habitat to maintain diversity of structure.

Many wetlands are not botanically species-rich, being relatively homogenous, and therefore are comparatively straight-forward to manage. By contrast, lowland fen habitat typically has complex mosaics of many different vegetation types. It is not unusual for a high quality SSSI lowland fen in Durham to include up to 20 NVC communities and sub-communities per hectare, at least partly because these habitats are now condensed into very small areas of land that have avoided agricultural improvement.

Cattle are generally best suited to grazing wetlands. Attention to animal health is particularly important, as animal health problems are more likely to occur on wetland than drier sites. Substantial handling facilities are required. Lie-back areas will need to be available for when the weather is very wet and/or water levels on site are too high for grazing to be maintained. Any feed concentrates and feeding rings should be located away from botanically rich areas and avoided if possible. Poaching levels will need regular monitoring and grazing intensity and duration adjusted as required.

Grazing of wetlands is usually seasonal. Light grazing in the autumn and spring is most likely to produce and maintain species-diverse swards, as trampling helps create regeneration niches, as long as grazing intensity is not too high to suppress seedling growth. Rotational grazing should be considered as this may be

appropriate for some sites where there is a need to maintain a variety of sward heights and to avoid certain areas during certain animal or plant species life stages. On wetlands there may be a conflict between spring grazing and breeding waders and other ground nesting birds, but delaying turning-out and rotational grazing avoiding dense bird breeding areas can ameliorate this issue. In dry winters, autumn grazing can be extended and spring grazing limited. However, late turning-out may be damaging to botanical diversity if the mature vegetation is less palatable so not grazed off and more rank vegetation starts to dominate. As with any grazing regime, flexibility and careful sward monitoring is essential.

Water management needs to take into account the seasonal water regimes and supply, the distribution on site & control of water levels.

Water management infrastructure needs to be assessed, maintained and where required extended, including management of drainage channels, bunds, and sluices etc.

Any planting to wetlands should be avoided. Certain native plant species may become highly invasive and destroy fen vegetation. Native invasives that should be avoided in the DMLP include common reedmace/bulrush *Typha latifolia* and willows *Salix* species. Planting also risks introducing non-native invasive plant species. From 5th April 2010, it will be a criminal offence to introduce to the wild any of 41 plant species and their hybrids listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), many of which are aquatic or marginal plants.

The optimal management of wetland vegetation may sometimes apparently conflict with preferred habitat management for other species, particularly water vole, and invertebrates. However, these issues can be resolved by rotational management regimes and, in any event, without any management the consequent loss of botanical diversity will adversely impact these animal groups.

In particular, in the DMLP, the following wetland types have specific management issues and requirements:

Seepages, springs and flushes are usually small-scale patches of vegetation that are often botanically species-rich, including for bryophytes, and are also especially valuable for invertebrates. They need to be kept open by light grazing and some trampling, to prevent shading by rushes or other tall vegetation or scrub.

Species-rich fen vegetation needs some form of regular management to retain its biodiversity value. Traditionally, in the DMLP, this would have been light grazing, using light-weight cattle breeds and moderating grazing frequency and intensity over the winter, avoiding wetter periods to prevent over-poaching.

Swamp vegetation, including reedbed, is often characteristically botanically species-poor, and often only one plant species will dominate stands. Reedbed and some other types of emergent swamp provide specialist habitat for a range of endangered and rare bird species. In the DMLP, common reedmace/bulrush *Typha latifolia* swamp is widespread and abundant and highly invasive around ponds and in fens. *Typha* swamp should be controlled by mechanical cutting and

removal combined preferably with cattle grazing to prevent re-growth, as it is particularly palatable to cattle and they will poach water body margins to promote seed bank development in its place.

Ponds are scarce in the DMLP and therefore there may be a perception that ponds are more important than other types of wetland. With the exception of species-poor swamp that has grown over a pond, this is often not the case. A pond that has naturally filled-in to create fen is a highly valuable habitat. In many cases, pond restoration, by clearing out a pond, is inappropriate and may be highly detrimental to both botanical and invertebrate diversity. It would normally be more beneficial to wildlife to create a new pond as an alternative to dredging an existing pond.

If digging a new pond is not possible and open water is thought to be important then dredging or de-silting work should be conducted over two or three years (different section each year), in the autumn or winter while the pond is less active. Material removed should be placed alongside the pond for at least twenty-four hours to allow invertebrates to climb back in.

Pond management should take into account any uncommon species with particular habitat requirements (such as great crested newts, water vole, plants or invertebrates). Periodic management may be required to maintain optimal conditions for these species, subject to prior specialist advice because some of these species have legal protection.

Thinning out overhanging trees and scrub from around the edge of a pond will reduce shading, which inhibits plant growth.

Fluctuating water levels with an exposed drawn-down area of marginal mud in summer are a natural and important part of pond ecosystems and should be maintained.

Further information on wetland management and restoration

The New Rivers & Wildlife Handbook¹ & The Wet Grassland Guide² from the RSPB

Wetland Restoration Manual³ from the Wildlife Trusts

Re-wetting land⁴ from OnTrent

Guidance for the Control of Invasive Weeds in or Near Fresh Water⁵ from the EA

Further information for pond management is available from Pond Conservation:

<http://www.pondconservation.org.uk/advice/pondmanagement>

and *The Pond Book* by Williams et al⁶ is an important reference guide.

2.2.3 Grassland management

All conservation grasslands require active management in order to maintain a species-rich sward and prevent the spread of tall rank vegetation and scrub. Grasslands are traditionally managed by grazing or annual cutting depending on whether the grassland is maintained as a **pasture** (permanently grazed) or as a **meadow** (ungrazed in the summer).

Grazing is the most effective method of managing grasslands and even grasslands that are cut for hay are traditionally winter grazed. Pastures that are managed for nature conservation are usually left ungrazed or only lightly grazed during the main flowering period. As a rule this takes place between March and September and this period should see most grassland plants complete their growth and set seed before the renewal of close-grazing.

Grassland cutting as a conservation tool is often used to mimic the effects of grazing when the latter is not a practical option. This is usually carried out from late summer onwards to again allow most plant species to seed. All arisings are removed promptly from the grassland area to prevent nutrification from decomposed clippings. Grasslands traditionally managed for hay are cut no earlier than mid July and this practice favours ground-nesting birds and animals such as skylark, grey partridge and brown hare. All of these species have suffered severe declines throughout the UK as a result of changing grassland management practices such as the earlier and more frequent cutting of grasslands for silage instead of hay.

Grasslands are often important for invertebrate conservation and cutting regimes should take this into account. Cutting on rotation, leaving un-cut refugia and cutting to maximize habitat structure should all be considered as part of the management regime.

Most conservation grasslands are unimproved by modern agricultural standards and remain low in nutrients such as nitrogen and phosphorus. Any artificial fertiliser or herbicide applications would greatly increase the nutrient status of the soil and have a profound effect on the species composition of grasslands. Their use should therefore be avoided. This is particularly relevant to unimproved pastures known to be rich in grassland fungi such as waxcaps.

Grasslands by nature are open well-lit habitats and their associated biodiversity has evolved to meet these conditions. Whilst some shade from scrub and woodland is acceptable around the margins, too much scrub or tall rank vegetation within grassland can render the habitat inhospitable to many shade-intolerant species. Any form of grassland management will fail if it allows the continued spread of scrub and other woody vegetation to go unchecked.

It should be stressed that the above generic prescriptions will vary for individual grassland sites and that management practices will always be dictated by local conditions. The nature of the grassland will determine factors such as the type, frequency and intensity of grazing. A wet rush-dominated pasture for example may be unsuitable for sheep grazing and better suited to grazing by cattle or ponies. Traditional hardy breeds like Exmoor ponies and highland cattle may be more effective than domestic breeds on some grassland types. Any grazing should aim to remove the build up of dead litter from the previous season's growth but should avoid excessive poaching of the turf by trampling. Poaching will rupture the sward and create areas of bare ground suitable for colonisation by thistles, docks and ragwort. On the other hand moderately heavy grazing of marshy pastures by cattle and ponies can be effective in reducing the dominance of tussock-forming grasses and rush species.

In some cases grasslands may not be suitable for livestock grazing at all due to factors such as their proximity to residential areas, heavy use by dog walkers or problems associated with anti-social activity. Annual cutting may then sometimes be the best option.

Although grassland management for conservation purposes usually advocates non-interference during the main flowering season it will be necessary at times to increase grazing or cutting frequencies in order to control the growth of coarser grasses and weed species. Milder winters in recent years have significantly extended the active growing season and meadow management by annual cutting alone is often insufficient to maintain or restore a species-rich sward. In some cases two or even three cuts per year may be necessary to achieve the desired result. Such apparently intensive management would, if required usually prove beneficial in the long term.

Finally, it is important to stress that plant species introductions as part of grassland creation projects should not be carried out on existing grasslands of conservation importance as most such introductions benefit neither the habitat nor the species. An exception to this would be a scientifically planned and monitored restoration programme with a defined end point such as the Hay Time project co-ordinated by the North Pennines AONB Partnership⁷, which aims to restore MG3 haymeadows from semi-improved grasslands by careful selection of donor and receptor sites for green hay strewing.

More information on grassland conservation is contained in *The Lowland Grassland Management Handbook* from Natural England⁸.

2.3 Habitat creation

2.3.1 Survey first

Even when the habitat creation option is chosen, a great deal of caution must be applied before proceeding. There have been many recent examples of new habitat being 'created' on top of existing semi-natural habitats which were somehow overlooked. 'Woodlands' have been planted on top of species-rich grasslands or have shaded out water vole habitat, 'Wildflower meadows' have replaced existing waxcap grasslands and new ponds dug in existing fen, for example.

The first requirement, therefore, before undertaking any habitat creation is appropriate survey. In the DMLP there is a reasonable dataset for semi-natural habitat, but is unlikely ever to be fully comprehensive, and there is no adequate substitute for ground survey at the appropriate time of year.

There are two aims of a site survey: The first is to establish that the existing biodiversity value of the site on which habitat creation is proposed would not be compromised. This does not just mean species-rich vegetation, but the use of the site by invertebrates, amphibians, reptiles and so on.

Secondly the survey should establish what kind of creation project is most appropriate and whether or not it is likely to succeed. The opportunity analysis

presented here is a first step towards deciding on the most appropriate habitat for a particular area, but detailed decisions about the design of a creation project require knowledge of the site, including its hydrology, slope and aspect, presence of non-native species, disturbance factors and so on.

There are some general principles which can be applied to any habitat creation scheme which are outline below, followed by reference to more specific guidance for the different habitat types.

2.3.2 Some general principles

The purpose of habitat creation is usually to enhance the biological functioning of a system, including its ability to provide ecosystem services and enhanced biodiversity. Other functions include facilitating better access to wildlife by people.

The DMLP contains many areas of high conservation value but these biologically important areas tend to be fragmented and isolated.

It is an established principle of island biogeography that small isolated areas of semi-natural habitat are likely to be less species rich than larger more connected ones. Species in small isolated areas are more prone to local extinctions, poor re-colonisation rates and gene flow⁹¹⁰.

It is, therefore, a strong principle of habitat creation, that new created habitat should enhance exiting semi-natural habitat either by extending it or connecting it to other semi-natural habitats. For some more mobile species this will not need to be an adjacent physical connection, but could be a series of islands. However many of our most vulnerable species tend to the less mobile ones, and for these species the ability to move over small distances into new habitat is important.

Isolated new habitat is less likely to be colonised by less mobile species than new habitat created adjacent to existing semi-natural sites.

Another useful function of habitat creation is to buffer existing semi-natural sites from damaging external influences. This might be to protect ground nesting animals in woodland from disturbance by people and dogs or to protect sensitive fens from nitrate run-off.

These principles which apply in a stable climate are even more important in a changing one. Climate change is affecting our wildlife in a way which is often unpredictable.

2.3.3 Climate change

Climate change scenarios

Climate change scenarios have been developed for the UK by the UK Climate Impact programme¹¹. Predictions differ between low and high emission scenarios and between the northwest and southeast of the UK, however all the scenarios agree on the following:

- Average minimum temperatures will increase in both summer and winter.

- Average maximum temperatures will increase in both summer and winter.
- Precipitation will rise in winter and fall in summer.
- Snowfall will decrease significantly in winter.
- Absolute humidity will rise in summer and winter.

Extreme weather events are also a prediction of the climate change models. Predictions of future climate scenarios are inherently uncertain, but climate change is already taking place.

Response of biodiversity to climate change

Key impacts of climate change on wildlife include¹²:

Changes in timing of seasonal events (phenology), leading to loss of synchrony between species and the availability of food and other resources.

Changes in species abundance and range through changes in suitable climatic conditions.

Changes in habitat preferences as microclimates in preferred habitats alter.

Wide scale losses from extreme weather events

Increased survival or spread / new arrival of pests and diseases.

Indirect effects on wildlife from changes in land use induced by climate change, such as different or reduced livestock distribution, new crops for bio fuels and so on.

Modelling the effects of climate change on different species in the UK shows that there will be winners and losers. Many northern or upland such species may contract in range or even disappear as the suitable climate space contracts, whereas many southern species may move into newly suitable habitat further north. The ability of many species to disperse and expand into this new climate space will, however, be limited by a number factors including the species' dispersal ability and the proximity of suitable habitat. Fragmentation of habitat is an important obstacle to be overcome on a national, regional and local level to help species adapt to climate change. The ability of less mobile species to adapt to a changing climate will depend to some extent on the availability of varied and suitable microclimates within habitat patches.

Helping biodiversity adapt to climate change

The uncertainty surrounding climate change scenarios themselves, and the even greater uncertainty surrounding the reaction of different species and ecosystems to change means that the best we can do is to plan for an uncertain future¹³.

In practice this means:

Protecting what biodiversity we have, i.e. all protected sites and other semi-natural habitats.

Reducing pressures on biodiversity from sources not linked to climate change, i.e. abandonment of traditional management, over-grazing, nutrient enrichment, invasion by non-natives etc.

Developing ecologically resilient and varied landscapes and sites

Developing and protecting ecological networks of high quality habitats.

It is the second two of these actions which can be delivered by habitat creation.

Resilient and varied landscapes

Resilience is the ability of a landscape to maintain its functions after being disturbed or damaged. The maintenance of species diversity within a landscape is essential for it to be considered resilient and it is therefore vital that species are able to disperse to a more suitable location should their existing localities become unsuitable under a changing climate.

This needs to work on a variety of scales and so opportunities to conserve and create diversity within sites, between sites and within broader ecological networks should be found and taken.

The following characteristics are worth maintaining and enhancing in the DMLP:

Diverse and structurally varied vegetation

Different vegetation types have different micro-climates and some species can adjust simply by moving from one vegetation type to another (this is true of some butterflies for example).

Semi-natural habitat on a range of slope and aspect

Microclimate varies considerably with topography, and could provide areas for some species to move if the change is not too extreme.

Uninterrupted semi-natural vegetation over a range of altitude

Allowing some species to move to higher areas.

Diverse water regimes

Rainfall patterns will change and rainfall may become less evenly distributed. The most complex range of habitats will survive in landscapes where there is variation from open water to dry land, which persists during weather extremes. This variation is most likely to be sustained where wetlands are fed by a combination of surface drainage, ground water and aquifers.

On a small scale, new civil engineering projects such as embankments and quarry restorations should be encouraged to create new landforms with slopes of different aspects and gradients and a variety of hydrological regimes. Brownfield sites should be treated similarly to retain or create a variety of topographic features. Retention of small areas of scrub or unmanaged vegetation should be considered on or adjacent to grassland sites.

On a larger scale, the creation of transitional habitats such as scrub, rough grassland or newly exposed bare ground should be explored to enhance existing habitat networks.

2.3.4 Habitat-specific guidance

Grasslands

For Magnesian limestone grassland we recommend the series of technical notes produced as part of the Magical Meadows project by the Durham Biodiversity Partnership.

<http://www.durhambiodiversity.org.uk/pdfs/MagMeadows/MLGNote1.pdf>

<http://www.durhambiodiversity.org.uk/pdfs/MagMeadows/MLGNote2.pdf>

<http://www.durhambiodiversity.org.uk/pdfs/MagMeadows/MLGNote3.pdf>

<http://www.durhambiodiversity.org.uk/pdfs/MagMeadows/MLGNote4.pdf>

<http://www.durhambiodiversity.org.uk/pdfs/MagMeadows/MLGNote5.pdf>

These cover the basic steps to take when considering this work.

More generally *The Lowland Grassland Management Handbook*¹⁴ from Natural England, a series of technical advice notes from the RDS¹⁵ are all also helpful, and Flora Locale's *Bringing Back the Meadows*¹⁶ is one of a series of helpful technical notes available in their on-line 'Knowledge Base' at <http://www.floralocale.org>

Woodlands

Again the best source for locally specific advice on planting design for woodland creation is the guidance published by Durham County Council – *Landscape Guidance Woodland & Forestry*.

<http://www.durham.gov.uk/PDFApproved/LandscapeGuidelinesWoodlandForestry2009.pdf>

Wetlands

Pond creation is sensibly and comprehensively treated on the Pond Conservation Trust website in their Pond Creation Toolkit.

<http://www.pondconservation.org.uk/millionponds/pondcreationtoolkit>

It is not possible to give generic advice on the creation of other wetland habitats. Each potential project will need the input of an ecologist and usually also a hydrologist. Wetland creation is regarded by leading wetland ecologists as “still in its infancy”¹⁷.

Reedbed creation and re-wetting of land to benefit bird populations is often successful in terms of creating habitat, although the faunal components may not be as predictable.

By contrast, creation of species-rich fen vegetation is much more problematic. Most attempts at fen vegetation creation are experimental projects outside of the North of England (particularly from East Anglia, and central Europe). The techniques employed are similar to those for grassland creation using green hay strewing, but the additional environmental variables involved, especially hydrochemical conditions and topographic constraints, make this approach as observed so far, generally less effective than for dry grassland.

Eutrophication of supplying water generally limits the scope of developing fen vegetation to species-poor swards rather than mesotrophic fen. Restoring seepage zones/flushes is particularly difficult even where fertility levels are apparently relatively low and re-wetting with mesotrophic water is achieved, the vegetation dynamic has changed to effectively prevent recreation of the species-rich flush communities.¹⁸ However, some studies postulate the long-term potential for regeneration of species-rich fen on river floodplains if eutrophic river water is stripped of nutrients via filtration through reedbed.

The key guidance is in A. Bardsley, L. & Giles, N. 2005. *Wetland Restoration Manual*. The Wildlife Trusts, Peterborough. There is apparently no fen restoration or creation guidance specific to the vegetation found in the north-east of England.

3. Opportunity Analysis for Habitat Creation and Restoration

The opportunity analysis presented below, and in accompanying electronic formats, is an attempt to use our current knowledge of existing semi-natural and species rich habitats to provide a tool for decision making about habitat restoration and habitat creation. Opportunity mapping techniques have gained prominence in recent years when targeting investment in conservation projects within the UK^{19 20 21}. An opportunity map is simply the visual manifestation of the opportunity analysis.

The opportunity map developed here shows locations which represent theoretical opportunities for habitat restoration or creation based on our most current habitat and species datasets, other physical data and the knowledge of our habitat specialists. It does not take into account land ownership or tenure, political boundaries or political constraints.

The opportunity analysis is based on data relating to the location of the three broad priority habitats - grassland, wetland and woodland. This project was not commissioned to collect new data, and given the timing of this report, this would not have been feasible in any case. Happily, however, the available data on these habitats is recent, spatially explicit and relatively comprehensive. The data combined with theoretical modelling (as detailed in this chapter) indicates where opportunities for investment in habitat restoration and habitat creation exist in the DMLP.

3.1 Data sources

Habitat data used in the assessment and modelling phase of the project has been obtained from the following statutory and non-statutory organisations that are active within the area:

- Durham Biodiversity Partnership
- Durham Wildlife Trust
- Forestry Commission
- Hartlepool Borough Council
- National Trust
- Natural England
- Northumberland Wildlife Trust
- Tees Valley Wildlife Trust
- Woodland Trust

The data required to locate semi-natural and species rich habitats in the DMLP are now relatively comprehensive, compared to most other areas in the north-east of England, due to the work of the MAGical Meadows project developed by the Durham Biodiversity Partnership and Durham Wildlife Trust. This project has added significantly to the data existing in 2006 which mostly related to SSSIs or was out of date. The project undertook a review in 2006 and 2007 of the existing register of country wildlife sites through field survey, and also looked at non-designated sites,

including road verges, which surveyors identified as having potential to meet the designation criteria. The sites were surveyed and mapped, and condition assessments were conducted for the wetlands and woodlands.

Data for SSSIs is taken from the Natural England condition assessment provided for each SSSI within the DMLP. Further data is taken from the Forestry Commission, local authorities, and the habitat inventories of sites managed by the National Trust and Woodland Trust (see **Appendix A** for data breakdown).

Together these datasets provided us with habitat information for nearly all of the Local Nature Reserves, National Nature Reserves, SSSIs, Local Wildlife Sites (formerly County Wildlife Sites or Sites of Importance for Nature Conservation) in the national character area, as well as a number of undesignated sites. Although there are partial gaps in the data set, and without scope to collect new data, the dataset is deemed sufficiently complete and accurate for the needs of the project.

Because of the varying remits of the organisations supplying data, the level of information and spatial accuracy differ. We have prioritised the datasets in accordance with our confidence in them.

3.2 Standardising data

After collating the geographical data it has been combined and standardised in a GIS. Because habitat data is from a variety of different sources it has been categorised using different schema, including NVC community type, JNCC phase 1 habitat types, and national or local BAP habitat definitions. We have deemed it appropriate to apply the JNCC phase 1 categorisation to all data as this accommodates all other categories, even if some sub-categorisation is lost in translation.

Some datasets overlap and some habitats have several designations (e.g LNR and Local Site). In removing these overlaps we observed that the spatial accuracy of most of the data was poor and captured at a coarse resolution (in that it was mapped poorly to the habitat boundary). This has not negatively affected the study, however, because the boundaries still represent the approximate area covered by each habitat, and the model is working at a landscape scale.

3.3 The theoretical model

An opportunity map is constructed from a theoretical model using the habitat data and drawing on ecological inputs. It is therefore objective with regard to site selection, the only bias being that provided by the constraints/variables chosen by our ecologists.

The following two sections describe the two stage process used to create the opportunity map; the first looks at the functional permeability of the landscape, and the second identifies the opportunities based on the known distribution of physical and ecological constraints.

3.4 Habitat permeability model

The DMLP is a mosaic of different landscape classes and features which present differing levels of impedance to the spread of species and, as such, affect the way in which species can propagate through the landscape.

A habitat permeability model based on the levels of impedance was constructed before running the opportunity model. The permeability model ensures that the sites identified in the opportunity map will be located in areas which best connect the presently fragmented areas of semi-natural or species-rich habitat, along corridors where we expect species to be able to propagate most easily.

In order to accurately assess permeability for each of the three habitat types (grasslands, wetlands and woodlands), it was deemed appropriate to split the grassland category up into magnesian limestone grassland and lowland meadows and pastures (according to the local BAP nomenclature – or calcareous and neutral grasslands using Phase one nomenclature). These habitats have specific and differing requirements for successful establishment. There are therefore four habitat types in the model.

The permeability model for the four habitat types is constructed in a GIS. The impeding factors used in the model are drawn from the Ordnance Survey Mastermap data series. This is the only available data series for the area which contains at least basic information on all landscape features. The features are then attributed a level of impedance based on the principle that a landscape can affect a species in three ways: (i) it can completely impede spread (a barrier); (ii) it can impede spread partially (i.e. a surface that has an additional cost to movement); or (iii) it cannot impede spread at all (there are no additional costs to species in moving through environment, above the normal costs).

The addition of impedance levels to landscape features (see **Appendix B**) allows us to model the connectivity between established habitats and potential sites (opportunities) for habitat creation, where the degree of connectivity is dependent on the cumulative level of impedance between established and potential sites.

The points (for each of the four habitat types) at which cumulative impedance reached a value where the new habitat creation would be effectively disconnected from the established site, were set through discussion with our habitat specialists and are expressed as a maximum distance from the habitat boundary through a low impedance land use. These artificial cut-off points are set at 100m for lowland grasslands, 300m for magnesian limestone grasslands, 300m for wetlands and 150m for woodlands. These may be conservative values, but give us increased confidence that habitat opportunities are creating an ecologically meaningful network.

After establishing impedance values for landscape features and setting maximum distances for connectivity, the Mastermap data was converted to a raster with a 10 metre pixel resolution. Each pixel is assigned the value of the underlying landscape feature which has the highest cost in each 10m square. As you move away from the known habitat edge, the cost can then be calculated. The model stops at the maximum distance (set by the ecologists) (**fig 2**).

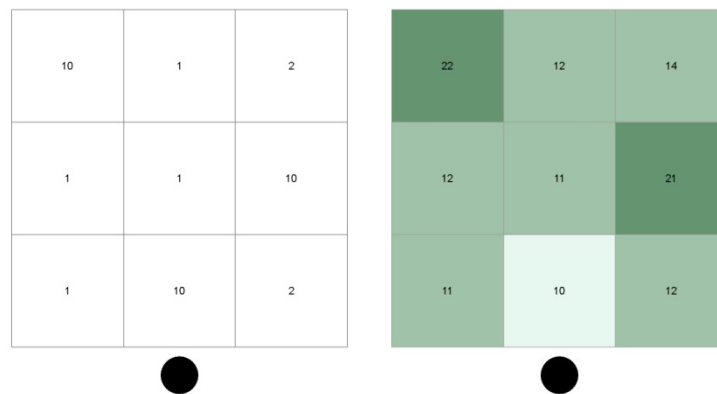


Fig 2. Habitat permeability model. Image (left) displays how the landscape feature class data appears after it has been converted to a raster and attributed with the impedance cost. Image (right) describes the minimum cumulative cost in travelling from the black circle to any of the nine squares of the raster.

The cumulative score is then calculated for each pixel, determining least cost values using every possible route, until a complete and enclosed polygon can be drawn around the habitat patch (see fig 3). The output from the permeability mapping exercise provides the basis for stage two of the opportunity mapping because we have identified the polygons in which there is the least cost for species dispersal from known habitats and where habitat creation is likely to have the most benefit.

The next stage is to remove those areas within the polygons where creation would not be feasible either because of physical or ecological constraints.



Fig 3. Habitat permeability limits. The image represents the maximum distance that a species could theoretically move from the above three sites. The distance travelled is influenced by the impedance values attached to each underlying pixel.

3.5 Constraints mapping

The constraints mapping exercise follows on from the permeability mapping and allows further refinement of suitable opportunity areas. In this section the landscape is not treated as a surface which species move across, but as locations at

which species can exist. In this section, therefore, physical environments such as roads become constraints whereas before they were surfaces which impeded the movement of species to some degree.

Constraints are either physical boundaries or ecological assumptions regarding locations deemed suitable/unsuitable for habitat creation and all of the constraints used in the model are available in a geospatial format. We can, therefore, drape the different constraints over the areas identified in the habitat permeability mapping exercise, and obtain a map of areas with no constraints present.

To carry out this process of draping, all the constraints used in this analysis are mapped at a 10 metre scale and stored as a raster, matching the raster set used in the habitat permeability model. Each constraint layer includes pixels mapped with a value either of -1 for a constraint or 0 for none. The raster constraint maps are subsequently added together and only those pixels within the raster with value 0 (and not a negative integer) are deemed to represent a realistic opportunity for habitat creation (**fig 4**).



Fig 4. Constraints mapping. Landscape features are either suitable or unsuitable for habitat creation and this image represents how an unsuitable location (grey area on the left), has a score of -1 in the model and as such is removed from the mapping exercise and that area is not considered as suitable for habitat creation. This process is calculated for all of the layers described in **Appendix C**, which make up each habitat specific opportunity map.

As described above, we look at physical constraints and ecological constraints in this model. The physical constraints are all derived from the Ordnance Survey Mastermap data series and include physical structures such as roads, buildings, private gardens and other physical boundaries that are beyond the scope of this project for development (a complete list is given in **Appendix C**).

The ecological constraints are based partly on the Ordnance Survey Mastermap data series along with other national datasets described in **Appendix A** (either as provided by the data custodian or manipulated, for example, to extract a slope or buffer the data). Information on local species distributions have been obtained from the Durham Biodiversity Data Service & Butterfly Conservation. The ecological parameters used as constraints have been selected by the habitat specialists employed on this project and the parameters are based on publicly available GIS datasets at the time that the modelling was conducted. No additional data has been collected and so some parameters could not be included. All assumptions made by

the ecologists are presented alongside the models in **Appendix C**, along with the specific geographic dataset used to model that parameter.

The selected physical and ecological constraints are then combined into four separate models which are specific to the four habitat types. The models are constructed and implemented in GIS and therefore provide a raster map which identifies the idealised opportunities within the DMLP for restoration or creation of the four habitat types.

An example of the process followed by the theoretical model is outline for wetlands in **Appendix D**.

3.6 Mapping

The habitat data which forms the basis of the opportunity analysis is presented as a habitat inventory, showing our current state of knowledge about important woodland, wetland and grassland habitats in the DMLP, including their condition (based on Natural England or local BAP condition assessments depending on the data source) where known. The Habitat Inventory is presented in **Appendix E**.

The results of the Opportunity Analysis are presented in map form in **Appendix F** and are shown in tabular form in table 3.1 below.

Both the habitat inventory and opportunity analysis maps are divided into sections for ease of use in this document, and the whole map and the underlying GIS data is provided on the accompanying CD.

Table 3.1 The total opportunity area (suitable area based on input parameters) for each of the four classifications segmented by cluster and in the overall project area

	Lowland meadows and pastures (ha)	Magnesian limestone grassland (ha)	Wetland (ha)	Woodland (ha)
Central Clays	17.0	1.1	19.2	179.8
Escarpment Ridge	77.0	60.0	5.8	271.0
Escarpment Spurs	16.4	27.0	5.3	894.5
Coast	103.8	0.0	0.0	21.3
Project Area	360.1	155.5	62.6	5865.9

4. Management Proposals

Although the habitat inventory and the opportunity map together suggest countless possible project opportunities, it has been necessary to focus on a few areas where, in the opinion of our ecologists and the steering group, we can make the most positive impact with limited resources.

Four large areas with their own distinct landscape and biodiversity characteristics have been chosen as a focus for area management plans (See Overview Map in Appendix H). Additionally we have looked at the Coastal Denes as a priority area for conservation management. Information for the Coast plan in 4.5 is provided by Durham County Council and Durham Wildlife Trust.

Finally there have been a number of projects put forward by project partners which did not fall into these larger focus areas, and they are listed below for the South Tyneside and Sunderland areas.

Clearly there are many more projects which could be developed within and outside these focus areas, and we hope that the habitat inventory and opportunity maps will be used in the future by those interested in conserving biodiversity in the DMLP.

4.1 Escarpment Ridge

Maps and aerial photographs to accompany area projects are in Appendices H & J respectively.

4.1.1 Introduction

Outline of management area

The area of limestone country that lies between the former mining towns of Ferryhill and Fishburn has long been known for its important wildlife habitats associated with the underlying magnesian limestone rock. Sites such as Thrislington NNR, Bishop Middleham SSSI and part of The Carrs SSSI were originally designated to conserve nationally important examples of the rare habitat type – *magnesian limestone grassland*. County Durham and Tyne and Wear collectively holds more than two thirds of the UK's remaining resource of this grassland type and Thrislington itself supports the largest and most important surviving fragment in the UK.

Perhaps less well known is the collection of smaller so-called second tier wildlife sites (Local Wildlife Sites) which recognises priority habitats outwith the SSSI series. Examples in this area include Ferryhill Cut, Island Farm and the proposed Fishburn Cokeworks Local Wildlife Site. These sites contain examples of a variety of key wetland, grassland and woodland habitat types supporting a diverse flora and fauna.

Non-statutory sites receive less attention through funding than those sites managed as nature reserves or SSSI's and many have therefore deteriorated in quality over the years due to lack of management. The project area contains a higher than average number of Local Wildlife Sites and other sites of wildlife importance all of which are located within a relatively short distance of each other.

Located within a glacial meltwater channel, the important wildlife habitats contained within Ferryhill Carrs and Cut together with Coxhoe Junction have been somewhat overshadowed by the nationally famous Thrislington NNR nearby. This is particularly relevant to grassland habitats including magnesian limestone grassland where several important remnants have received little or no management in recent years. Lowland meadows (unimproved neutral grasslands) have been particularly undervalued and yet this grassland type is in fact even scarcer than limestone grassland locally. Important examples of damp unimproved lowland meadow are present at Ferryhill Carrs and alongside Coxhoe Junction.

As its name would suggest, the Carrs is perhaps better known for its wetland habitats which include large areas of lowland fen with associated willow carr. An extensive *Typha latifolia*-dominated swamp is now the principal feature of the wetland but this is associated with more species-rich areas of marsh and wet grassland habitat together with stands of open water. Ferryhill Carrs LNR also contains areas of developing and remnant limestone woodland with a typically species-rich ground flora including early purple orchid (*Orchis mascula*), woodruff (*Galium odorata*) and moschatel (*Adoxa moscatellina*). This woodland habitat is more extensively developed across the valley on the slopes below Thrislington

quarry. The ash-dominated limestone woodland at Ferryhill Cut is rich in ancient woodland indicator species including the local rarity herb Paris (*Paris quadrifolia*).

The area alongside the east coast railway line also contains important brownfield communities which have developed over thin nutrient-poor soils associated with former coal and limestone quarrying operations. This habitat is botanically diverse and particularly rich in invertebrate species such as butterflies including dingy skipper (*Erynnis tages*).

To the east the large active quarry workings at Thrislington and Bishop Middleham should in future offer the greatest opportunity for magnesian limestone grassland creation yet seen anywhere in the UK. The owners Lafarge Aggregates and W & M Thomson (quarries) Ltd have both produced quarry restoration plans incorporating the creation of significant areas of this grassland type together with wetland features, retained cliff faces and new woodland creation.

The Bishop Middleham area itself is also one of large potential for both habitat restoration and creation opportunities. To the north of the village, the splendid Bishop Middleham quarry nature reserve owned and managed by Durham Wildlife Trust should act as a template for all future magnesian limestone quarry restoration schemes. Less well known but important remnants of magnesian limestone grassland are also found to the south and east of the village at Island Farm and Island Farm Railway Local Wildlife Sites. These sites display similarities with the nature reserve but have remained unmanaged for many years resulting in extensive scrub encroachment of the grassland habitat. The Island Farm Railway LWS lies at the southernmost edge of the project area and supports important species-rich grassland and scrub communities for its entire 2.5km length. Although the south western end of the railway lies outside of the current project area it should be stressed that this part of the site contains a particularly important example of unmanaged magnesian limestone grassland habitat.

The proposed restoration works at Bishop Middleham quarry would provide an important link between the DWT quarry nature reserve and the Island Farm sites to the south.

The low-lying ground around Bishop Middleham village has always traditionally flooded in winter but this phenomenon has markedly increased in recent years due to land subsidence following the cessation of minewater pumping. There is now an established series of permanent and semi-permanent wetland features which have rapidly become regionally important for migratory and overwintering bird populations. Durham Bird Club has worked closely with landowners to establish a nature reserve centred on the Castle Lake with associated bird hide (funded by Northumbrian water Ltd) and site interpretation. There are records of both water vole and otter from the nearby river Skerne.

The historic landscape of the Bishop Middleham area also contains a significant number of traditionally managed pastures some of which display the ridge and furrow pattern representative of ancient field cultivation. Some of these pastures are known to support waxcap fungi which only grow in unfertilised grasslands of low nutrient status. Such waxcap grasslands are now rare in the Durham lowlands and

their conservation value has been recognised by inclusion within the Durham BAP. Their regional distribution is however still largely unknown.

The Island Farm Railway forms a link running east towards Holdforth Bridge where it connects with the extensive Fishburn Cokeworks site east of the A177. Recent surveys have highlighted the considerable wildlife importance of this large brownfield site which supports extensive areas of species-rich sparsely-vegetated grassland together with a sizeable naturally developing wetland area. The majority of the cokeworks site has however been planted up with non-native tree species. The river Skerne forms the southern boundary of the site and its banks support a more semi-natural woodland community including some fine old crack willows.

Several road verges in the intensely-farmed Fishburn area act as important refuges for limestone grassland communities but their condition has deteriorated in recent years due to under-management.

Important habitats

Introducing the recommended management proposals set out below will contribute towards the delivery of the following national and local Biodiversity Action Plans.

UK BAP Priority Habitats – lowland calcareous grasslands, lowland meadows, lowland fens, ponds, native woodland, open mosaic habitats on previously developed land.

Durham BAP Priority Habitats – Magnesian limestone grasslands, lowland meadows and pastures, lowland fens, ponds, broadleaf woodland, early successional brownfield, waxcap grasslands.

Important species

Introducing the recommended management proposals set out below will contribute towards the delivery of the following national and local Biodiversity Action Plans.

UK BAP Priority Species – northern brown argus, dingy skipper, frog orchid, water vole, common toad, brown hare, grey partridge, lapwing, skylark, reed bunting, grasshopper warbler.

Durham BAP Priority Species – northern brown argus, dingy skipper, white-letter hairstreak, brown hare, water vole, lapwing, linnet, reed bunting, skylark, snipe.

Dingy Skipper (Erynnis tages)

A UK BAP species which is restricted to sunny sheltered locations where its foodplant birdsfoot trefoil grows in abundance. Habitats include unimproved species-rich grassland, dunes and coastal cliffs but in our region it is particularly associated with brownfield habitats such as disused railways, former colliery spoil heaps and waste land. Formerly widespread, the dingy skipper is now one of the UK's most rapidly declining butterfly species and its distribution has become highly fragmented by habitat loss. Important populations are present at Fishburn Cokeworks and in the Coxhoe Junction area.

Frog Orchid (Coeloglossum viride)

This orchid was formerly more widespread across the magnesian limestone area but its relatively recent sharp national decline has contributed to its present inclusion within the UK BAP. In our region it requires short unimproved limestone grassland habitat and is unable to survive in unmanaged swards or shaded sites. Its more recent decline from within its extant locations may be due to loss of habitat quality resulting from a decrease in habitat management works.

Blue Moor Grass (Sesleria caerulea)

Although blue moor grass is not UK BAP-listed it is a nationally scarce species which characterises a grassland community (CG8) that is unique to the Durham Magnesian Limestone Natural Area. Important examples of CG8 *Sesleria*-dominated grassland are found at Thrislington NNR and Bishop Middleham Quarry but smaller fragmented pockets of this habitat can be found scattered across the management area.

Table 4.1 Site designations in the Escarpment Ridge project area

Site	Designation	Habitats	Condition
Thrislington Plantation	NNR / SSSI	Magnesian limestone grassland / lowland calcareous grassland	Favourable
Bishop Middleham Quarry	SSSI	Magnesian limestone grassland / lowland calcareous grassland	Favourable
The Carrs	SSSI	Magnesian limestone grassland / lowland calcareous grassland	Favourable
The Carrs	SSSI	Fen, marsh and swamp – lowland	Unfavourable - recovering

Local Nature Reserves

Ferryhill Carrs

Local Wildlife Sites

Ferryhill Stell and Grassland, Ferryhill Cut, Rough Furze Quarry, Island Farm, Island Farm Railway, New Pond, Bishop Middleham Pond, Bishop Middleham Deer Park Lake Fishburn Cokeworks site (proposed), Coxhoe Junction (proposed).

4.1.2 Management proposals

Aims and Objectives

The restoration, creation and linking together of species-rich lowland grassland, wetland and woodland habitats within the project area is the principal aim of this project plan.

The key management objectives are:

- Restoration and creation of magnesian limestone grasslands.
- Restoration and creation of lowland fen habitats.
- Restoration and creation of lowland meadows.
- Enhancement and creation of habitats for dingy skipper butterfly.
- Enhancement and creation of native woodland habitats.
- Identification of the waxcap grassland resource within the DMLP.
- Achieve favourable condition status on all BAP habitats within Local Wildlife Sites.
- Maintain access to existing footpaths.
- Where appropriate, promote site access and interpretation.

The re-introduction of habitat management practices such as grazing and annual meadow cutting will considerably contribute towards this. In particular the project aims to restore, increase and link together the resource of priority habitats contained within the second tier Local Wildlife Site series.

Habitat reduction and consequent fragmentation has led to a sharp decline in grazing as a grassland management tool and a number of conservation grasslands in the project area have been under-managed for some time now, requiring scrub control measures before grazing can be re-instated. The widespread perception that certain sites are no longer viable for livestock grazing may be a barrier to finding suitable graziers locally. Sites within the Fishburn and Ferryhill areas are undoubtedly prone to vandalism and misuse and in some cases the introduction of livestock grazing might well prove unfeasible. However it can be argued that certain sites which are underused by the public and therefore more susceptible to anti-social activity, would be enhanced by access improvements, site interpretation and the positive spin-offs resulting from regular habitat management.

Summary of potential delivery

Delivery against UK BAP priority habitat targets for the Escarpment Ridge project area is set out in Table 4.2. below:

(Note – Table below includes the Durham BAP Priority Habitat *Waxcap Grasslands*)

Table 4.2: UK BAP priority habitat delivery categories in hectares (ha) per habitat type for each management compartment in this project area

UK BAP Habitat	Maintain (ha)	Achieve condition (ha)	Restore (ha)	Expand (ha)	Data deficient (ha)	Comments
Lowland Meadows		AB – 2.7 S – 2.8	O – 2.8 Z – 4.9	F – 5.1		
Lowland calcareous grassland		H – 2.8 I – 0.5 K – 0.4 M – 1.2 S – 2.0 AE – 0.5	X – 1.1 AC – 1.3 AD – 1.1			
Lowland fen		Q – 1.2 R – 1.6 AB – 2.0 AJ – 3.2	Y – 2.6 Z – 1.3			
Ponds		Q – 1.2 R – 2.6		AA – 0.5		
Native woodland		B – 5.3 D – 8.2 E – 0.9 AI – 6.5		B – 4.5 U – 4.0 AG – 4.9 AH – 1.5		
Open mosaic habitats on previously developed land		R – 0.3	A – 6.3 G – 0.6 S – 0.9 AF – 5.0			
Waxcap Grasslands (Durham BAP Priority habitat)					J – 0.6 L – 6.2 N – 5.7 P – 5.6 Q – 1.7 V – 9.3	Survey required to ascertain current extent and condition of this habitat.

Potential barriers to management

- Co-operation of landowners – the greater portion of land included in this project plan is council-owned or within the ownership of Lafarge Aggregates Ltd but a small area is leased to tenant farmers. It is difficult to say how amenable these tenants will be to proposed management prescriptions.
- East Coast Main Railway – the close proximity of the railway to sites in the Ferryhill area may make it difficult to attract suitable graziers where this is required. There is also a current issue of public access across the railway at Ferryhill.
- The perception of certain sites being “ungrazeable” because of their proximity to residential areas could also be a potential barrier to management.

Access and interpretation potential

The main populated areas of Ferryhill and Fishburn are those most wanting in terms of access infrastructure for visitors. The key sites of Ferryhill Carrs LNR and Fishburn Cokeworks contain little or no parking facilities for visitors and at the latter site the car park has recently been closed down.

Site interpretation is largely absent other than at the nature reserves of Thrislington and Bishop Middleham. Both Ferryhill Carrs LNR and Fishburn Cokeworks are well-used by the local communities and would lend themselves ideally to on-site interpretation which could include elements of site history, biodiversity and management. Land to the south of Bishop Middleham village also contains a number of information panels relating to the castle site and other historical interest features. More recently the area around Castle Lake has been promoted as an informal nature reserve with information panels on birdlife and the construction of a bird hide. An interpretation panel beside Carr Pond has been either removed or vandalised. A possible replacement should focus not just upon the historical and open water (and largely bird) interest of the site but should also acknowledge the high conservation importance of the surrounding fen and species-rich grassland communities. In particular the panel should relate to natural succession and the essential requirement of habitat management.

The adjacent Island Farm Railway (disused) is a key access feature linking the Bishop Middleham sites with the Fishburn project area to the east. A large part of the former railway line is also a Local Wildlife Site and supports important remnant unimproved grassland communities along much of its length. The current condition of the track surface is perfectly sufficient for low key use as a public footpath, with the exception of one shaded area east of Holdforth Bridge which is highlighted in the section below. The habitat management proposals detailed below would also improve access for walkers by controlling the spread of scrub and bramble. Any major track re-surfacing works would be likely to impact upon the grassland habitat and should therefore be avoided.

Public access in the Bishop Middleham area is generally very good and this is due in part to provision within Countryside Stewardship agreements where a number of permissive paths have previously been established. At Ferryhill however there is an

ongoing issue with public access across the east Coast Railway line. The public footpath crossing point between Ferryhill and Cornforth has currently been closed to the public for safety reasons and this is effectively preventing public transport between Ferryhill Carrs LNR and the Coxhoe Junction sites east of the railway. This situation will only be fully resolved by the provision of a public footbridge allowing safe passage across the railway.

4.1.3 Detailed management proposals

Fishburn area project (Map 1, Appendices H and J)

Compartment A

Fishburn Cokeworks proposed LWS. Three areas of species-rich brownfield grassland partly planted up with scots pine and grey alder. The main central area includes a sizeable developing wetland including a pond, *Phragmites* reedbed and surrounding marshy grassland. The adjacent species-rich slopes of the spoil heap are planted up with young scots pine but a small area of trees was removed in 2007 as part of work for the MAGical Meadows project. It is recommended that the three highlighted areas are maintained as open grassland / wetland habitat **Restoration** of species-rich brownfield habitats.

Management prescriptions

- Removal of all planted non-native tree species.
- Stump treatment of planted grey alder (*Alnus incana*) to prevent regrowth.
- Annual monitoring of dingy skipper population.

Compartment B

Fishburn Cokeworks proposed LWS. An area of more mature densely planted Scots pine plantation which could be managed as open mixed woodland with wide sunny rides and open clearings. Plantation woodland **enhancement** and native woodland **creation**.

Management prescriptions

- Thinning of Scots pine throughout and partial replacement with native broad-leaved species.
- Leave 10m unplanted strip on both sides of all major footpaths.

Compartment C

Fishburn Cokeworks proposed LWS. A large area of dense immature Scots pine on thin poorly-developed soils. Potential dingy skipper habitat. **Restoration** of species-rich brownfield grassland.

Management prescriptions

- Heavy thinning of planted Scots pine is advised whilst still at the immature stage.

- Annual monitoring of dingy skipper population.

Compartment D

Holdforth Plantation and wooded banks of river Skerne. Low key management to improve woodland structure and reduce the dominance of sycamore. **Restoration** of native woodland.

Management prescriptions

- Felling of selective mature sycamore to create gaps in woodland canopy.
- Stump treatment of sycamore to prevent regrowth.
- Removal and stump treatment of all sapling sycamore trees.

Compartment E

Disused railway east of Holdforth Bridge. This section of cutting is heavily shaded and the track surface somewhat waterlogged. The banksides support semi-natural native woodland with a high sycamore component. **Restoration** of native woodland.

Management prescriptions

- Selective removal of mature sycamores from railway embankment.
- Stump treatment of all felled sycamore.
- Coppicing of native tree species to improve public access along the railway line.

Compartment F

Large area of amenity grassland maintained by frequent cutting. There seems to be no apparent reason for this management as the car park is no longer operational – opportunity for conservation grassland **creation**.

Management prescriptions

- Potential to obtain green hay for strewing from compartment Z.

Compartment G

Species-rich margin of dense plantation containing a pyramidal orchid population. A 10m wide linear strip should be managed as a grassland community. **Restoration** of species-rich brownfield community.

Management prescriptions

- Removal of all existing tree and scrub species.
- Implementation of an annual cutting and raking regime when this becomes necessary.

Compartment H

Conservation road verge supporting magnesian limestone grassland. The length and width of this verge is notable and could potentially support a significant area of

species-rich grassland. Parts of the verge have been unmanaged in recent years and have become rank with some low scrub encroachment. **Restoration** of Magnesian limestone grassland.

Management prescriptions

- Define the boundaries of the verge with clearly marked posts.
- Formulation of an agreement with Highways to re-instate an annual cutting regime in September.
- Ensure all arisings are removed from the grassland area.

Compartment I

Conservation road verge supporting Magnesian limestone grassland. Unmanaged in recent years and has become somewhat rank. **Restoration** of Magnesian limestone grassland.

Management prescriptions

- Define the boundaries of the verge with clearly marked posts.
- Formulation of an agreement with Highways to re-instate an annual cutting regime in September.
- Ensure all arisings are removed from the grassland area.

Bishop Middleham area project (Map 2, Appendices H and J)

Compartment J

Island Farm LWS. Species-rich pasture with elements of magnesian limestone grassland. Heavily grazed by horses currently. This is one of a number of traditional pastures in the area which are potentially of high regional importance for declining grassland fungi such as waxcaps.

Management prescriptions

- Carry out full waxcap grassland survey before any modifications are considered to the current grazing regime. It is suggested that sites found to be significant for grassland fungi should receive no further management intervention as part of this project. The exception might be if a site has only recently undergone a potentially detrimental management change such as cessation of traditional grazing.

Compartment K

Island Farm LWS. Species-rich grassland that has been thinly planted up with ash and also includes some self-sown hawthorn. A small but significant grassland which requires urgent remedial action to prevent the loss of the herb-rich community. **Restoration** of Magnesian limestone grassland.

Management prescriptions

- Removal of all tree species

- Stump treatment of all tree species
- Implementation of an appropriate grazing regime.

The field is already fenced and requires grazing by no more than two horses or cattle (or six sheep) during the September to April period as required.

Compartment L

Island Farm LWS. Semi-improved permanent pastures grazed heavily by horses. A potential waxcap grassland.

Management prescriptions

- Carry out full waxcap grassland survey before any modifications are considered to the current grazing regime.

Compartment M

Island Farm LWS. Magnesian limestone grassland on well-vegetated quarry spoil heaps. Long unmanaged with developing woodland in places, the remaining areas of open grassland are still species-rich but becoming heavily scrubbed over.

Restoration of Magnesian limestone grassland.

Management prescriptions

- Initial scrub clearance with stump treatment.
- Core areas of grassland to be annually cut and raked.

Compartment N

Semi-improved permanent pastures containing pockets of unimproved turf on the steeper slopes. Heavily grazed by horses and cattle. Potential waxcap grasslands.

Management prescriptions

- Carry out full waxcap grassland survey before any modifications are considered to the current grazing regime.

Compartment O

An area of unimproved neutral grassland that appears to be no longer managed by grazing and has consequently become dominated by rank grass species. Waxcap fungi have been previously found here and the well-developed moss layer is still visible but much reduced. **Restoration** of lowland meadows.

Management prescriptions

- Strengthen boundary fencing.
- Re-instate an appropriate grazing regime.

Grazing should aim to achieve a tight sward between September and April but should avoid any excessive poaching of the turf. Summer grazing should be avoided if possible.

Compartment P

Site of Bishop Middleham castle and deerpark, a Scheduled Ancient Monument. The permanent pasture is close-cropped by grazing but the slopes support scattered pockets of unimproved magnesian limestone grassland and contain several outcrops of the limestone rock itself. An ancient grassland site with much potential for waxcaps and other grassland fungi.

Management prescriptions

- Carry out full waxcap grassland survey before any modifications are considered to the current grazing regime.

Compartment Q

Bishop Middleham Pond LWS. An area of semi-improved permanent pasture displaying the rigg and furrow pattern characteristic of ancient grassland sites. The grassland includes a former pond now largely infilled with lowland fen vegetation. Cattle and horses partially graze the wetland community and prevent dominance by rushes or *Typha*. The pasture is a potential waxcap grassland. **Maintain** pond and associated lowland fen communities.

Management prescriptions

- Scrub control around the pond area where necessary.
- Carry out full waxcap grassland survey.
- Monitor effects of grazing on lowland fen and pond habitats.

Compartment R

Carr Wood New Pond LWS. Created approximately 30 years ago on the site of a coke storage depot for Fishburn Cokeworks. Open water with small island now surrounded by substantial areas of lowland fen habitat, damp grassland and species-rich brownfield grassland. **Maintain** lowland fen, pond and species-rich grassland habitats.

Management prescriptions

- Rotational cutting and raking of wet grassland and lowland fen communities.
- Annual cutting and raking of species-rich dry grassland communities.
- Periodic removal of *Typha* to prevent loss of open water habitat.
- Replace interpretation signage at northern end of pond alongside disused railway.

Compartment S

Island Farm Railway LWS. Maintained as public walkway by DCC, the species-rich banks and verges are varied and include areas of orchid-rich brownfield habitat, remnant lowland meadow and an important area of magnesian limestone grassland at the south west end of the railway. **Restoration** of species-rich grassland habitats.

Management prescriptions

- Initial scrub clearance with stump treatment.
- Implementation of a suitable grazing regime (east side).
- Annual cutting and raking carried out in September (remainder)

Compartment T

Heavily grazed permanent pasture, historically known to support waxcap fungi. The west part of the field contains large areas of standing water in winter which is an attraction for wetland birds.

Management prescriptions

- Carry out full waxcap grassland survey before any modifications are considered to the current grazing regime.

Compartment U

A damp improved permanent pasture with areas of standing water in winter. Opportunity for wet woodland **creation** and hedgerow planting.

Management prescriptions

- Plant 4 hectares of new wet woodland habitat.
- Plant 160 m of new native hedgerow along existing fenceline.

Compartment V

Permanent pastures heavily grazed by sheep. Both areas display visible rigg and furrow features and contain grazed wet flushes. Potential waxcap grasslands.

Management prescriptions

- Carry out full waxcap grassland survey before any modifications are considered to the current grazing regime.
- Carry out full botanical survey.
- Plant 559m of new native hedgerow along existing fenceline.

Compartment W

Castle Lake (Bishop Middleham Deer Park Lake) and other seasonally inundated water bodies. **Maintain** as open water habitat.

Management prescriptions

- Liaise with Durham Bird Club, Environment Agency, DCC and private landowners with regard to potential wetland enhancement works.

Ferryhill area project (Maps 3 and 4, Appendices H and J)

Compartment X

Magnesian limestone quarry site within The Carrs SSSI. Owned and managed by DCC as part of Ferryhill Carrs LNR. Main grassland on quarry floor managed by annual cut and rake. Cliff faces and quarry margins heavily scrubbed over. **Restoration** of Magnesian limestone grassland.

Management prescriptions

- Removal of scrub and trees from around base of cliff face.
- Removal of Cotoneaster and other scrub from cliff face.
- All cut stumps to be treated with herbicide.
- Above areas to be incorporated into annual cutting and raking programme where appropriate.

Compartment Y

Area of unmanaged species-rich marsh/ marshy grassland now *Juncus*-dominated. Part of Ferryhill Stell and Grassland LWS and owned by DCC. Within Ferryhill Carrs LNR. Potential **restoration** of lowland fen and lowland meadow by re-introduction of grazing.

Management prescriptions

- Liaison with Network Rail with regard to fencing alongside railway.
- Secure boundary fencing and installation of access gate.
- Introduction of light grazing regime using Exmoor ponies or traditional breed of cattle. No water supply needed.
- Monitor impacts of grazing on plant communities.

Compartment Z

Species-rich grassland/marsh/scrub mosaic within Ferryhill Stell and Grassland LWS. Owned by DCC and part of Ferryhill Carrs LNR. Formerly grazed but this practice has now ceased and has allowed extensive areas of gorse scrub to colonise the slopes. Northern part of the grassland is currently managed by annual mowing. **Restoration** of lowland meadow, Magnesian limestone grassland and lowland fen.

Management prescriptions

- Extensive scrub control required.
- All stumps to be herbicide-treated
- Cleared areas to be incorporated where possible into existing annual cutting regime.

Compartment AA

Arable field beside railway line. Small wetland area has developed at base of slope and adjacent arable is frequently flooded in winter. **Creation** of pond/lowland fen habitat.

Management prescriptions

- Negotiate management agreement with tenant farmer.
- Excavation of shallow linear wetland feature.
- Allow natural colonisation to take place.
- Leave 10m uncultivated strip around wetland fringe.

Compartment AB

Privately-leased unimproved wet pasture grazed all year round by horses. Large wetland area is well developed adjacent to the main railway line. This is an important wetland series adjacent to Ferryhill Carrs LNR. **Restoration** of lowland fen and meadow.

Management prescriptions

- Negotiate management agreement with tenant farmer.
- Reduce grazing intensity during the summer months.
- Carry out full botanical survey.
- Carry out full waxcap survey.

Compartment AC

Species-rich area of Magnesian limestone grassland within the ownership of Lafarge Aggregates. Outside of the boundary of Ferryhill Cut LWS. Unmanaged for many years and extensively scrubbed over but has recently been overgrazed by horses. **Restoration** of Magnesian limestone grassland.

Management prescriptions

- Negotiate management agreement with Lafarge Aggregates Ltd.
- Extensive programme of scrub control with stump treatment.
- Securement of boundary fencing.
- Installation of access gate, stiles and water supply.
- Introduction of light grazing regime (no more than 10 sheep or two ponies at any given time).
- Monitor impacts of grazing on plant communities.

Compartment AD

Disused magnesian limestone quarry forming part of Ferryhill Cut LWS and currently within the ownership of Lafarge Aggregates Ltd. Unmanaged for many years.

Restoration of Magnesian limestone grassland.

Management prescriptions

- Negotiate management agreement with Lafarge Aggregates Ltd.
- Targeted scrub control with stump treatment.
- Annual cutting programme on core grassland areas.
- Ensure all arisings are removed.

Compartment AE

Conservation road verge supporting Magnesian limestone grassland. Appears to have been under managed in recent years. **Restoration** of Magnesian limestone grassland.

Management prescriptions

- Define the boundaries of the verge with clearly marked posts.
- Formulation of an agreement with Highways to re-instate an annual cutting regime in September.
- Ensure all arisings are removed from the grassland area.

Compartment AF

Disused railway with species-rich brownfield community and associated dingy skipper populations. Part of Coxhoe Junction proposed LWS. Southern end adjacent to main railway line includes derelict railway sidings partly planted up with species-poor stands of conifers. **Restoration** of species-rich brownfield community.

Management prescriptions

- Removal of scattered scrub along disused railway and adjacent sidings.
- Stump treatment of all felled trees.
- Removal of plantation woodland at southern end.
- Annual monitoring of dingy skipper population.

Compartment AG

A large re-seeded pasture managed for silage by tenant farmer. Situated adjacent to native ash-dominated limestone woodland which is part of Ferryhill Cut LWS. Native woodland **expansion** opportunity.

Management prescriptions

- Plant 4.9 hectares of new native woodland to complement the existing woodland area.

Compartment AH

Unmanaged area of land between the two railway lines containing scrub and wetland habitats. Part of the proposed Coxhoe Junction LWS. Future habitat management would be unlikely due to access difficulties. Opportunity for wet woodland **creation**.

Management prescriptions

- Plant 1.5 hectares of new wet woodland.

Compartment AI

Ash-dominated limestone woodland with small pockets of limestone grassland present along tracksides and clearings. Part of Ferryhill Cut LWS and owned by Lafarge Aggregates Ltd. **Maintain** native woodland habitat.

Management prescriptions

- Expand rides and enlarge clearings where practical to benefit butterflies and plant communities.
- Selective felling of mature sycamore trees followed by stump treatment.

Compartment AJ

Ferryhill Cut LWS. Wetland series adjacent to the Thrislington works and owned by Lafarge Aggregates. Includes a series of ponds and associated marsh, swamp and carr habitats. Part of Ferryhill Cut LWS. Long unmanaged and no prospect of grazing. **Restoration** of lowland fen habitats.

Management prescriptions

- Maintain open wet grassland communities by cutting and raking once every two years.
- Manage areas of willow carr by rotational coppicing.
- Keep remaining open habitats free of scrub encroachment.
- Periodic removal of *Typha* to maintain open water communities.

4.1.4 Delivery

Potential delivery organisations

- Durham County Council
- Natural England (through agri-environment schemes)
- Durham Wildlife Trust
- The Grassland Trust

Potential funding sources

Agri-environment potential

- 17 hectares are currently under CSS management
- 81.5 hectares are currently under ESS management

4.1.5 Costings

Estimated costings for delivery of the management prescriptions are set out in **Table 4.3** (Fishburn project area), **Table 4.4** (Bishop Middleham project area) and **Table 4.5** (Ferryhill project area) below.

Grazing Calculations

Grazing costs are based on current rates and formulas used by Flexigraze for providing grazing in the north east region. Grazing costs are worked out on the basis of grazing at a rate of 0.25 LU/ Ha/ Year for calcareous grassland, 0.5 LU/ Ha/ Year for species rich neutral grassland and 0.2 LU/ Ha/ Year for wet grassland and fen habitats. Costings are based on rates of £1 per cow equivalent per day (as per flexigraze charges) and a cow is as defined in the lowland grassland management handbook, ie 0.5 Livestock units which is equivalent to 4 sheep or 1 pony. Grazing rates are given as a rough guideline figure for costing purposes only and should be further advised following site specific assessments and based on desired sward heights.

Table 4.3: Estimated costings for management prescriptions in the Fishburn project area.

Site	Compartment	Ownership	Management Prescription	Ballpark Cost £k (exc. VAT)	Comments
Fishburn Cokeworks LWS (proposed)	A	DCC	Tree removal of 7.8ha @ £1000/ ha= £7800	£7800	Any stumps of grey alder (<i>Alnus incana</i>) to be treated with glyphosphate.
Fishburn Cokeworks LWS (proposed)	B	DCC	Tree thinning of 9.8ha @ £500/ha= £4900; tree planting of 9.8ha @ £500/ ha= £4900	£9800	Any stumps of grey alder (<i>Alnus incana</i>) to be treated with glyphosphate.
Fishburn Cokeworks LWS (proposed)	C	DCC	Tree removal of 8.3ha @ £1000/ ha= £8300	£8300	
Holdforth plantation and Skerne riverbank	D	DCC	Selective sycamore removal 8.2ha @ £2500/ha=	£20,500	
Disused railway east of Holdforth bridge	E	DCC	Thinning of canopy / coppice management 0.9ha @ £1000/ ha= £900	£900	
Amenity grassland	F	DCC	Lowland meadow creation 5.1ha using green hay @ £600/ha= £3060	£3060	
Fishburn Cokeworks LWS (proposed) – Dalveen Plantation	G	DCC	Tree removal of 0.6ha @ £1000/ ha= £600; annual cut and rake when necessary @ £400/ ha= £240	£600 + £240 ongoing	
Conservation road verge	H	DCC	Mark out boundary, agreement with Highways to manage by annual cut and rake (September) 2.8ha @ £400/ ha= £1120	£1120	
Conservation road verge	I	DCC	Mark out boundary, agreement with Highways to manage by annual cut and rake (September) 0.5ha @ £400/ ha= £200	£200	

Table 4.4: Estimated costings for management prescriptions in the Bishop Middleham project area.

Site	Compartment	Ownership	Management Prescription	Ballpark Cost £k (exc. VAT)
Island Farm LWS	J	DCC	Carry out waxcap grassland survey @ £600	£600
Island Farm LWS	K	DCC	Tree removal for 0.4 ha @ £1000= £400	£400
Island Farm LWS	L	DCC	Carry out waxcap grassland survey @ £600	£600
Island Farm LWS	M	DCC	Scrub control with stump treatment for 6.8ha @ £20,000/ha = £136,000; periodic cut and rake of grassland areas 6.8ha @ £400/ha= £2720	£138, 720
Grazed pastures	N	DCC/ Private	Carry out waxcap grassland survey @ £600	£600
Unimproved rank grassland	O	DCC	Fencing of 1125m@ £7/m= £7875; sheep grazing for 123 days pa 2.8ha @ £516.60	£8391.60
Bishop Middleham castle pasture	P	Private	Carry out waxcap grassland survey @ £600	£600
Bishop Middleham Pond LWS	Q	Private	Carry out waxcap grassland survey, monitor effects of grazing on pond vegetation £1200	£1200
Carr Wood New Pond LWS	R	DCC	Annual cut and rake of 4.5ha @ £400/ ha= £1800; <i>Typha</i> control @ £1500 production of interpretation panel @ £1200	£3500
Island Farm Railway LWS	S	DCC	Scrub control with stump treatment for 5.8ha @ £20,000/ha=	£116,000
Pasture adjacent to railway line	T	DCC	Carry out waxcap grassland survey @ £600	£600
Damp improved pasture	U	DCC	Wet woodland creation for 4ha @ £5250/ ha= £21,000 160 m of native hedgerow planting @ £6m= £960	£21, 960
Grazed pastures	V	DCC	Carry out waxcap grassland and botanical survey. £1200 559 m of native hedgerow planting @ £6/ metre	£4554
Bishop Middleham Deer park Lake LWS	W	Private		

Table 4.5: Estimated costings for management prescriptions in the Ferryhill project area.

Site	Compartment	Ownership	Management Prescription	Ballpark Cost £k (exc. VAT)
The Carrs SSSI – Magnesian limestone quarry	X	DCC	Scrub control with stump treatment for 2.6ha @ £20,000/ha= £52000	£52,000
Ferryhill Stell and Grassland LWS	Y	DCC	Fencing 700m @ £7/metre = £4900; traditional breed cattle or ponies for 123 days pa @ £479.70	£5379.70
Ferryhill Stell and Grassland LWS	Z	DCC	Scrub control with stump treatment for 8ha @ £20, 000= £160, 000; annual cut and rake for 8ha @ £400/ ha= £3200	£163, 200
Arable	AA	Private	Excavation of wetland feature,	£1500
Triangle pasture	AB	DCC (leased)	Establish suitable grazing regime via agri-environment scheme	£NA
Magnesian limestone grassland	AC	Lafarge	Scrub control with stump treatment for 1.3ha @ 20,000/ha= £26000; Fencing 500m x £7= £3500; water supply @£250, gate @£250, grazing (Exmoor ponies for 123 days pa @ £239.85	£30, 239.85
Ferryhill Cut LWS	AD	Lafarge	Scrub control with stump treatment for 1.1ha @ £20,000/ha= £22000; annual cut and rake (September) 1.1ha@ £400/ha= £440	£22, 440
Conservation road verge	AE	DCC	Mark out boundary, agreement with Highways to manage by annual cut and rake (September) 0.5ha x £400= £200	£200
Coxhoe Junction LWS (proposed)	AF	DCC	Scrub control with stump treatment for ?? @....., removal of plantation blocks?? 5ha total 5 x £1000	£5000
Improved pasture	AG	DCC	Deciduous woodland creation for 5.5ha @£5250/ ha	£28,875
Coxhoe Junction LWS (proposed)	AH	DCC	Wet woodland creation for 1.5ha @ £5250	£7875
Ferryhill Cut LWS (part)	AI	Lafarge	Woodland management – enlarge rides, create open glades, selective sycamore control 6.5ha @£2500/ha= £16250	£16250
Ferryhill Cut LWS	AJ	LaFarge	Scrub and vegetation control for 3.2 hectares @ £400 per hectare = £1280	£1280

4.2 Escarpment Spurs

Maps and aerial photographs to accompany area projects are in Appendices H & J respectively.

4.2.1 Introduction

Outline of management area

This area of the DMLP is characterised by the western scarp slope of the Magnesian limestone which outcrops to an elevation of 150-200m intermittently from Boldon to Ferryhill, and is a feature of this cluster area between High Moorsley and Coxhoe. Unlike further east, the limestone is generally not overlain by boulder clay. Limestone exposures are associated with both habitats of exceptional biodiversity value on a national scale, and also industrial use especially quarrying and landfilling of disused quarries.

Magnesian limestone grassland is a key feature of this area, but other species-rich lowland calcareous grasslands also occur. The Magnesian limestone grasslands support some of the few inland northern brown argus butterfly populations. Lowlands meadows are rare and are usually associated with damper grasslands in beck valleys where agricultural improvement has been limited by the topography. This project area also has some of the best waxcap grasslands in the DMLP, particularly in the Sherburn/Shadforth Beck area. Unfortunately the excellent waxcap site (with a UK BAP species) at Kelloe Law is outside this project area. Roadside verges also provide valuable unimproved grassland habitats.

The Escarpment Spurs area has few wetlands and ponds due to the porosity of the substrate, except where impeded drainage results from glacial till deposits in valley bottoms or land-use such as quarrying results in weathering of limestone to produce localised clay areas. Lowland fen habitat is scarce and species-rich fen is typically found in tiny pockets that are easily over-looked, especially where a site is designated primarily for its Magnesian limestone grassland habitat.

Disused quarries are particularly important sites for biodiversity because of the opportunity for Magnesian Limestone grassland and species-rich wetlands to develop on the exposed nutrient-poor substrates. Many reclamation schemes have in-filled quarries with non-limestone material, and sown rye-grass leys or planted (often non-native) trees. Therefore the important quarry sites with calcareous grassland creation potential in this project area are limited, including Raisby Quarries SSSI, and Crime Rigg Quarry SSSI. There is potential for the reclamation of Raisby Quarries to create a strong link between Raisby Hill Grassland and Trimdon LNR if the site has a bio-diversity end-use.

A few fragments of ancient woodland survive at Cassop Vale, Heugh Hall Wood, and parts of Elemore Woods. Other semi-natural woodland on limestone outcrops remains at the Woodland Trust site at Elemore Woods but it has been planted through with conifers. The Woodland Trust is undertaking a programme of conifer removal at this site. There are several large, developing mixed plantations on

restored land-filled quarry sites. Extensive broad-leaved native woodland creation is planned for the area north-east of Elemore by the Woodland Trust.

Cassop Vale NNR is the only site in the DMLP with the full range of important Magnesian limestone habitats of lowland calcareous grassland, ancient limestone woodland and lowland species-rich fen. The habitats here are grossly under-managed, although inclusion in a HLS agreement should improve the situation. The fen should be added as an interest feature for SSSI unit 4 as it is unmanaged, very over-grown, probably declining in plant diversity, and management implemented within the HLS agreement for the site. Notable species include the northern brown argus butterfly and frog orchid. The SSSIs designated for Magnesian Limestone grasslands are generally in need of scrub control and revised grazing management. Many sites are in the process of entering HLS agreements, which should improve the position. However, the Pittington Hill and High Moorsley escarpment SSSIs are in particularly poor condition, despite these having been in CSS agreements for some years. The LWSs in the area have received some management by DWT, which will continue with the Trust as holder of a landscape-scale HLS agreement in the Coxhoe-Kelloe area.

Important Habitats

The recommended management proposals set out below will contribute towards the delivery of the following national, regional and local Biodiversity Action Plans:

- *UK BAP Priority Habitats* – lowland fen, ponds, native woodland, lowland calcareous grassland, open mosaic habitats on previously developed land.
- *Regional BAP Priority Habitats* – native woodland, lowland fen, ponds, lowland calcareous grassland.
- *Durham BAP Priority Habitats* – early successional brownfield land, lowland fen, ponds, rivers and streams, lowland calcareous grassland, Magnesian limestone grassland, lowland meadows and pastures, broad-leaf woodland.

Important species

The recommended management proposals set out below will contribute towards the delivery of the following national, regional and local Biodiversity Action Plans:

- *UK BAP Priority Species* – Northern Brown Argus Butterfly, Dingy Skipper Butterfly, Frog Orchid, Skylark, Linnet, Reed Bunting, Bullfinch, Yellow Hammer, Grey Partridge, Song Thrush, Great Crested Newt
- *Durham BAP Priority Species* – Northern Brown Argus Butterfly, Dingy Skipper Butterfly, Skylark, Linnet, Reed Bunting, Great Crested Newt

Designations

Sites of Special Scientific Interest (SSSI) for the Escarpment Spurs area are set out in **Table 4.6** below. There are also the following sites designated as Local Nature reserves (LNRs) and Local wildlife Sites (LWS):

- LNRs: Crow Trees; Raisby Way & Trimdon Grange Quarry; Little Wood; Coxhoe Quarry Wood; Coxhoe Hall Wood
- LWSs: Raisby Pond; Kelloe Beck Valley; Quarrington Hill & Coxhoe Bank Plantation including Quarrington Hill Ponds; Coxhoe Ponds; Running Waters Quarry; Sherburn Hill.

Table 4.6: Sites designations in the Escarpment Spurs project area

Site	<i>Designation</i>	<i>Habitats</i>	<i>Condition</i>
Cassop Vale	NNR and SSSI	Magnesian limestone grassland / lowland calcareous grassland; also tall herb fen and swamp around pond	Unfavourable recovering due to lack of grazing or other management but going into HLS
Raisby Quarries	SSSI	Geology and lowland calcareous grassland	Favourable
Raisby Hill Grasslands	SSSI	Magnesian limestone grassland / lowland calcareous grassland	Unfavourable recovering as going into HLS
Town Kelloe Bank	SSSI	Magnesian limestone grassland / lowland calcareous grassland	Units 1 & 2: Unfavourable recovering
Trimdon Limestone Quarry	SSSI	Lowland calcareous grassland	Favourable
Quarrington Hill Grasslands	SSSI	Magnesian limestone grassland / lowland calcareous grassland	Unfavourable recovering
Sherburn Hill	SSSI	Magnesian limestone grassland / lowland calcareous grassland	Favourable
Crime Rigg & Sherburn Hill Quarries	SSSI	Geology	Favourable
Pittington Hill	SSSI	Magnesian limestone grassland / lowland calcareous grassland	Unfavourable recovering due to under-grazing and scrub encroachment
High Moorsley Escarpment	SSSI	Lowland calcareous grassland	Unfavourable recovering due to lack of/under-grazing but now in CSS agreement
Moorsley Banks	SSSI	Lowland calcareous grassland	Favourable – grazed by shire horses
Pig Hill	SSSI	Lowland calcareous grassland	Unit 1: unfavourable no change due to scrub invasion; unit 2: favourable

4.2.2 Management proposals

Aims & Objectives

The overall aim in this project area is the maintenance, restoration and creation of wetlands and grasslands to provide improved habitat connectivity on a landscape-scale.

The management objectives include to:

- Ensure the sustainable future of effective management at wetland and grassland sites.
- Achieve condition for degraded wetland and grassland habitat, which has been inadequately managed or unmanaged.
- Restore lowland fen habitat.
- Restore and expand Magnesian limestone grassland.
- Where practicable, link actual and potential Magnesian limestone grassland sites and fen sites on a landscape scale, using agri-environment schemes.
- Create and enhance northern brown argus habitat.
- Maintain access to existing footpaths.
- Where appropriate, promote site access and interpretation.

Existing management agreements and interests of landowners

- Pending HLS agreements for: the Raisby area with Durham Wildlife Trust as agreement holder; and Town Kelloe bank SSSI unit 2 with the landowner farmer as agreement holder.
- ELS agreement for southern part of Kelloe Plantation.
- CSS agreement for Crow Trees LNR, Quarrington Hill Grasslands SSSI and adjacent land.
- Town Kelloe Bank SSSI Unit 1 is owned and managed by Durham Wildlife Trust.

Summary of potential delivery

Delivery against UK BAP priority habitat targets for the Coxhoe-Kelloe project area is set out in **Table 4.7** below:

Table 4.7: UK BAP priority habitat delivery categories in hectares (ha) per habitat type for each management compartment A – S in this project area

UK BAP Habitat	Maintain (ha)	Achieve condition (ha)	Restore (ha)	Expand (ha)	Data deficient (ha)	Comments
Lowland Meadows			R – 2.0			
Lowland calcareous grassland		B – 0.7 C – 11.8 D – 2.6 H – 3.8 M – 1.06 N – 0.3 (10% of site) O – 30	G – 3.4 J – 4.2 M – 1.3 (estimate of Cotoneaster & scrub cleared area @ 25% of site) S – 1.7		L – 4 I – 2.4	
Lowland fen		K – no figure	E – 0.4 F – 1.4 J – 0.2 P – 0.7	Q – 1.4		
Ponds				O – 1 pond created	A – 1 pond M – 1 pond O – 3 ponds	Unable to determine on desk top info whether ponds in A, M & O are of UK BAP quality, so can't determine appropriate category here
Native woodland		B – 7.2 L – 7.3				
Open mosaic habitats on previously developed land		K – 3.5 N – 0.3 (10% of site)				

Potential barriers to management

The potential barriers to management are:

- Some of the land is in private ownership and it is difficult to say how amenable the landowners will be, although several private sites selected for this plan are within an agri-environment scheme.
- The limited number of suitable and accessible donor sites for green hay cutting.
- The fragmented and tiny size of fen sites may make grazing problematic and traditional breed cattle will be required. Access to some sites for grazing may require permission from third party private landowners.
- The perception that grazing schemes are incompatible with public access, particularly the use of sites to walk dogs.
- The desire expressed by local people to increase/encourage the amenity use of sites, for example, by providing car parks, when it may already be adversely impacting on wildlife and habitats, especially from erosion and dog fouling. Clearly, a fine balance needs to be achieved between sustainable enjoyment of sites by local communities and detrimental over-use.

Access & interpretation potential

Public access is already provided through most sites by a network of public and permissive footpaths and the disused railway line. There is potential to erect interpretation signage in the Raisby area, at Crow Trees LNR and to the footpath through Kelloe Beck Valley. Signage should also include advice to dog owners regarding keeping their pets on leads to avoid disturbance to wildlife, the need to remove dog faeces (including faeces in plastic bags) to avoid nutrient-enrichment damage to the fragile grasslands and wild flowers, and appropriate health and safety advice where animals are grazing (particularly cattle).

4.2.3 Detailed management proposals

Coxhoe-Kelloe area project (Maps 5- 8, Appendices H and J)

Compartment A

Raisby Pond LWS. Species-poor swamp and open water habitats. Currently cattle-grazed and no further management required as long as grazing continues. In private ownership and no public access. Insufficient invertebrate or aquatic macrophyte data to determine whether the pond qualifies as UK BAP habitat – **PSYM pond survey** required. Unable to determine category, as either **restoration** or **achieve condition** or **expansion** is possible, depending on current quality of the habitat.

Compartment B

Coxhoe Hall Wood LWS including small areas of lowland calcareous grassland becoming overgrown – **scrub control** required. No woodland condition assessment data is available, and the site was a low priority for a site visit and therefore could not be visited due to time constraints during the preparation of this plan. However, it is considered likely that some woodland management is required. **Achieve condition** for lowland calcareous grassland and for native woodland.

Compartment C

Raisby Hill Grassland SSSI unit 2 comprising unimproved species-rich lowland calcareous grassland in a mosaic with woodland and scrub. Partly grazed by ponies. To be within HLS agreement held by DWT. Currently no public access but potential for future access via disused railway footpath. **Achieve condition** for lowland calcareous grassland.

Management prescriptions:

Grazing regime with sheep and/or traditional breed ponies and additional fencing.

Scrub control to diversify structure.

Compartment D

Raisby Hill Grassland SSSI unit 1 with areas of calcareous grasslands, fen and scrub. Currently ungrazed and to be within HLS agreement held by DWT. DWT have recently carried out scrub control works to open up the fen habitat in this section. Open access. **Achieve condition** for lowland calcareous grassland and fen

- **Grazing regime** with sheep and/or traditional breed ponies.
- **Scrub control**
- **Lowland fen restoration** by cutting and grazing regime.
- **Implement lowland wetland baseline & monitoring** to assess progress of restoration.
- **Fencing** off disused railway path from management compartment.
- **Interpretation signage** located on the disused railway, including wheelchair user and regular height signs.

Compartment E

Raisby Fen SSSI (within the Raisby Hill Grassland SSSI Unit 1) comprises a mosaic of wetland habitats including species-poor sedge fen, *Typha* swamp, short fen marginal vegetation and ponds. The south-west end of the site is drier and more weedy particularly with greater willowherb *Epilobium hirsutum* being dominant and invasive here. The vegetation is rank, although there is a relatively interesting range of wetland and aquatic plants present and potential to improve the diversity of the vegetation. Apparently not condition assessed as the SSSI unit is primarily designated for its grassland habitat. To be within HLS agreement held by DWT. Currently no public access but potential for future access via disused railway footpath.

Restoration of lowland fen.

Management prescriptions:

- Pond restoration/enhancement.
- Lowland fen restoration by cutting and grazing regime.
- Weed control as required once cutting regime implemented.
- Implement lowland wetland monitoring to assess progress of restoration using 2007 Fen Inventory survey as baseline.

Compartment F

Field either side of footpath with rank tall herb fen. Apparently unmanaged and in private ownership. **Restoration** of lowland fen.

Management prescriptions:

- Consider **designation as a LWS**.
- **Lowland fen restoration** by cutting and grazing regime.
- **Implement lowland wetland baseline & monitoring** to assess progress of restoration.

Compartment G

Semi-improved pastures on steep slopes of the Magnesian escarpment, identified as having Magnesian grassland creation potential by the opportunity mapping. The site is probably owned by East House Farm and is not within any agri-environment agreement so the landowner should be approached in this regard. Sporadically grazed by horses, whereas sheep/cattle/traditional breed ponies would be preferable. The site's fencing is stockproof, but new fencing desirable. There is no public access. **Restoration** of lowland calcareous grassland.

Management prescriptions:

- **Revised grazing regime** with sheep and/or traditional breed ponies and new fencing.
- Some **scrub control** required.
- **Botanical survey** during the summer season and soil assessment to properly assess potential for grassland restoration.
- **Green hay strewing** from Town Kelloe or Raisby grasslands donor site, if appropriate.
- **Implement monitoring** of developing grassland.

Compartment H

Semi-improved pasture on steep slopes of the Magnesian escarpment, with extensive scattered gorse scrub. Potential for lowland calcareous grassland and/or Magnesian limestone grassland restoration (exact type of habitat restoration depends on the current vegetation composition, which is unknown as it cannot be properly assessed in the winter). Apparently currently unmanaged but fenced, although replacement fencing would be desirable. The site ownership is private and it is not within any agri-environment agreement. A public footpath crosses the site north-south linking to the disused railway path. **Restoration** of lowland calcareous grassland.

Management prescriptions:

- **Grazing regime** with sheep and/or traditional breed ponies and new fencing.
- **Interpretation signage** to explain grazing scheme to people using the footpath.
- Extensive **scrub control** required.
- **Botanical survey** during the summer season and soil assessment to properly assess potential for grassland restoration.
- **Green hay strewing** from Town Kelloe or Raisby grasslands donor site, if appropriate.
- **Implement monitoring** of developing grassland.

Compartment I

Dismantled railway owned by DCC with rank overgrown semi-improved grassland margins which would benefit from **cutting bi-annually on rotation** leaving refugia with removal of cuttings and some **scalloping of encroaching scrub** areas. The site is heavily fouled by dogs and **dog bins** and advisory **signage** at entrance/exit points should be considered. Unable to determine category, as either **restoration** or **achieve condition** or **expansion** is possible, depending on current quality of the habitat.

Compartment J

Church Kelloe Village Valley site owned by DCC. Partly improved grassland beside the Beck, with some semi-natural habitat with records of blue moor-grass, so potential for Magnesian limestone grassland restoration/creation. The site also includes some unmanaged wetland and *Typha* swamp. Currently over-grazed and heavily poached by horses. **Restoration** of lowland fen and lowland calcareous grassland.

Management prescriptions:

- **Revised grazing regime** to reduce grazing pressure and new fencing and if possible replace horses with sheep and/or traditional breed ponies.
- **Cut fen/wetland vegetation** and allow grazing animals access.
- **Botanical survey** during the summer season and soil assessment to properly assess potential for grassland restoration.
- **Green hay strewing** from Town Kelloe or Raisby grasslands donor site, if appropriate.
- **Implement monitoring** of developing grassland.

Compartment K

Kelloe Beck Valley LWS is an area of reclaimed former colliery valley side with diverse wetland and early successional brownfield habitats developing on the nutrient-poor colliery shale substrates. Species-rich lowland calcareous grassland is developing on the slopes. The wetland vegetation comprises reedbed, *Typha* and sedge swamps, and species-rich small sedge fen. Charophyte species are present in the Beck, indicating good water quality. The site margins have been planted with trees. The herb-rich slopes are potential dingy skipper habitat. The site is open access and currently unmanaged. **Maintain** open mosaic habitat and **achieve condition** for lowland calcareous grassland and lowland fen.

Management prescriptions:

- **Grazing scheme** to maintain lowland fen and developing grassland habitats.
- **Conifer and broadleaved plantation removal** to extend areas of lowland calcareous grassland and small sedge fen.
- Some **scrub control** required to maintain scrub cover below 10%.
- **Removal of concrete channel** from beck to allow a natural stream-bed to develop.
- **Implement monitoring** of grasslands and wetlands.
- **Link to the Town Kelloe Bank SSSI** in the north-east via the valley section at Kelloe Plantation, which is privately owned but in an ELS agreement.
- **Interpretation signage** to explain grazing scheme to people using the site.

Compartment L

Kelloe Plantation. This is a linear broad-leaved woodland along the valley sides with a central open semi-improved grassland strip along the valley bottom. The site is partly in an ELS agreement (central grassland and southern valley side) and habitat restoration could be implemented if the site was brought within HLS. Restoration objectives would include to open out and widen the grassland area by scalloping scrub, implement woodland management, and connect the site at the east end with Town Kelloe Bank SSSI. The site has a footpath running along the valley bottom east-west. **Achieve condition** for native woodland and possible **restoration** of lowland calcareous/neutral grassland (unable to determine category due to lack of botanical data).

- Tree thinning and scalloping of scrub edge habitat
- Grazing regime without internal fences to link the SSSI to the east with Kelloe Beck Valley LWS to the west.
- Botanical survey to determine management prescriptions for grasslands.
- Implement monitoring of developing grasslands.
- Interpretation signage to explain grazing scheme to people using the footpath.

Compartment M

Raisby Way & Trimdon Grange Quarry LNR owned by Durham County Council with the quarry area leased and managed by Durham Wildlife Trust. Trimdon Quarry is a SSSI and the site is also subject to a Woodland Grant Scheme. The site includes a

pond and associated small area of wetland, lowland calcareous grasslands include Magnesian limestone grassland, and scrub/developing broad-leaved woodland. Frog orchid, dingy skipper, northern brown argus, song thrush, bullfinch, linnet, yellowhammer, grey partridge, reed bunting, great crested newt and a badger sett are present. The site has been well-managed with scrub control but this has been moderately successful and further scrub removal to open up more grassland areas, combined with a grazing regime for the quarry area, would be preferable. There is an on-going problem with invasive *Cotoneaster* species. There has been some common rock-rose plantings, and a green hay strewing approach would be more successful in establishing a more semi-natural grassland community. The site is open access and Raisby Way in particular is popular with local people walking dogs. A detailed Management Plan is in place and the following prescriptions should be regarded as a priority. **Achieve condition** for lowland calcareous grassland. Pond is **data deficient** for determining a category.

Management prescriptions:

- Further scrub removal & control required.
- *Cotoneaster* removal and stump treatment.
- Consider grazing regime for quarry area only, with traditional breed ponies (in view of site amenity use)
- Green hay strewing approach to Magnesian limestone grassland restoration/creation of areas cleared of *Cotoneaster* from Town Kelloe or Raisby grasslands donor site.
- Invertebrate (including *Lepidoptera*) survey required.
- Pond restoration to extend open water area, subject to a prior pond PSYM survey and with all operations requiring great crested newt licence.
- Implement monitoring of developing grasslands (more detailed monitoring needed than delivered by SSSI CSM condition assessment).
- Interpretation signage to explain grazing scheme to people using the footpaths, including wheelchair user and regular height signs.

NB: At present the restoration plan for Raisby Quarry proposes that the central quarry area is restored to agricultural land, which leaves two conservation areas divided in two, fragmenting habitat. A stronger link should be created between Raisby Hill Grassland SSSI and Trimdon Grange Quarry LNR.

Compartment N

This part of Raisby Way has developing lowland calcareous grassland and associated species-rich vegetation developing on brownfield habitat. This section of the former railway does not currently form part of the managed walkway. The site has potential habitat for dingy skipper butterfly and other invertebrates - **scrub control** required. **Achieve condition** for lowland calcareous grassland and open mosaic habitat.

Compartment O

Crow Trees LNR includes unit 1 of the Quarrington Hill Grasslands SSSI with the key habitat being Magnesian limestone grassland, but there is also some wetland, several ponds and extensive areas of scrub. Notable species include great crested

newt, reed bunting, yellow hammer, linnet, bullfinch, and there are historic records of northern brown argus but the butterfly has not been recorded since the decline in the botanical diversity of the grasslands at the site. The site has been managed by grazing since 1999/2000 as part of the DCC Five Villages project and the HLF-funded Crow Trees Heritage Trails project. It is in a CSS agreement and a Woodland Grant Scheme. The Crow Trees Heritage Group has been consulted regarding management requirements. The site is open access. A detailed Management Plan is in place and the following prescriptions should be regarded as a priority. **Achieve condition** for lowland calcareous grassland. **Achieve condition** and potential **expansion** of pond habitat.

Management prescriptions:

- Pond restoration subject to a prior pond PSYM survey.
- Pond creation and boardwalk subject to prior full botanical (including lower plants) and fungi survey on the wetland area to be used.
- Revised grazing units, to combine several existing compartments and if practicable, allow grazing of pond margins – requiring replacement fencing and associated infrastructure.
- Scrub control required.
- Botanical monitoring required on grassland areas outside of the SSSI (no botanical monitoring is included in the Management Plan) – site-wide NVC survey desirable due to the complexity of vegetation present and monitoring scheme.
- Interpretation signage at site entrances and visitor bench – signage to integrate biodiversity with archaeological interest at site.

Compartment P

This is an area of unmanaged tall herb fen along the Beck banks, located to the east of the sewage works. The surrounding land is improved pasture, although there is possibility of linking the site up with compartment Q (below). It is in private ownership and not in any agri-environment scheme – **potential fen restoration** with cutting or grazing regime. **Restoration** of lowland fen.

Compartment Q

An improved pasture adjacent to the Beck, in private ownership and not in any agri-environment scheme. This compartment could be re-wetted by diverting the stream flow, to provide habitat continuity to link wetland compartments F and P – **potential wetland creation**, subject to **hydrological assessment** and full **botanical and fungi survey** of the site. Wetland vegetation development could be enhanced by strewing cuttings from tall herb fen compartments F and/or P and would require temporary removal of grazing during vegetation establishment. **Expansion** of lowland fen.

Compartment R

This area is currently horse grazed pasture but with potential to restore to MG5 lowland haymeadow habitat (Mark Richardson, pers. comm.). **Botanical survey** required to advise on potential and management prescriptions.

Compartment S

This area is currently horse grazed pasture but there are records of blue moor grass and the site has potential to restore to CG8 magnesian limestone grassland (Mark Richardson, pers. comm.). **Botanical survey** required to advise on potential and management prescriptions.

4.2.4 Delivery

Potential Delivery Organisations

- Durham Wildlife Trust as: leasee of Trimdon Grange Quarry LNR and unit 1 of Town Kelloe Banks SSSI; and as agreement holder for HLS agreements for Raisby Fen and Raisby Hill Grasslands.
- Durham County Council
- The Grassland Trust

Potential Funding Sources

Agri- environment potential

The use of the fen restoration (HQ7), wetland cutting (HQ11) / grazing (HQ12) options and the species-rich semi-natural grassland restoration and creation (HK7 & 8) options of Environmental Stewardship will be the main mechanism by which this project can be delivered.

Coxhoe-Kelloe project area

- 55.6 hectares are currently under CSS management
- 5.6 hectares are currently under ELS management
- 14.8 hectares are currently under HLS management

4.2.5 Costings

Estimated costings for delivery of the management prescriptions are set out in **Table 4.8**.

Grazing calculations

Grazing costs are worked out on the basis of grazing at a rate of 0.25 LU/ Ha/ Year for calcareous grassland, 0.5 LU/ Ha/ Year for species rich neutral grassland and 0.2 LU/ Ha/ Year for wet grassland and fen habitats. Costings are based on rates of £1 per cow equivalent per day (as per flexigraze charges) and a cow is as defined in the lowland grassland management handbook, ie 0.5 Livestock units which is equivalent to 4 sheep or 1 pony.

Grazing rates are given as a rough guideline figure for costing purposes only and should be further advised following site specific assessments and based on desired sward heights.

Table 4.8: Estimated costings for management prescriptions in the Escarpment Spurs area.

Site	c p t	Ownership	Management Prescription	Ballpark Cost £k (excl. VAT)	Comments
Raisby Pond LWS	A	Private	None recommended as long as cattle grazing maintained; PSYM pond survey @£ 600	£600	
Coxhoe Hall Wood LNR	B	DCC	Scrub removal for 0.7ha@ £20k/ha= £14,000; woodland tree thinning 5% of 7.2ha @£ 2500 /ha= £900	£14,900	Area of grassland for scrub control estimated from aerial
Raisby Hill Grassland SSSI Unit 2	C	DWT HLS agreement	Sheep or traditional breed ponies via Flexigraze for 11.8ha for 168 days pa =£1982 ; fencing x1560m@£7/m= £10,920; water trough @£105; 500m water pipe @£2/m= £1000; 4m field gates @£250= £1000; scrub control for 20% of site area = 2.4ha@£20k/ha= £48,000	£63,007	Assumes whole boundary needs fencing and gates needed
Raisby Hill Grassland SSSI Unit 1	D	DWT HLS agreement	Sheep or traditional breed ponies via Flexigraze for 2.6ha for 168 days pa = £436.80; fencing x 1000m@£7/m= £7000; water trough @£105= £105; 100m (extension from unit 2) water pipe @£2/m= £200; 4m field gates @£250= £1000; scrub control for 33% of site area = 0.86ha@£20k/ha= £17,200 ; interpretation signage x 2 (wheelchair users & regular height) @£1200= £2400	£28,341.80	Assumes whole boundary needs fencing
Raisby Fen SSSI	E	DWT HLS agreement	Cut in yr 1 for 0.4ha@£ 500 /ha= £200; traditional breed cattle via Flexigraze for 0.4ha for 123 days pa =£175 minimum charge; fencing x 300m@£7/m= £2100; 4m field gate x 1 @£250= £250; pond restoration/ Typha removal@£1500; sporadic weed wipe control with knapsack sprayer over c.0.4ha@£120/ha= £48; monitoring + report @ £250/day + expenses = £650 x 2 over 5 years= £1300 (allow cattle access to ponds for water so no troughs)	£5,573	Monitoring required as site currently not an interest feature on the SSSI designation so not monitored
Raisby Fen – non-SSSI area north of dismantled railway line	F	Private	Cut in yr 1 for 1.4ha@£500 /ha= £700; then traditional breed cattle via Flexigraze for 1.4ha for 123 days pa= £246; fencing x 700m@£7/m= £4,900; 4m field gates x 2 @£250= £500; 2 styles @ £120 each= £240; water troughs @£105= £105; 250m water pipe @£2/m= £500; monitoring + report @ £250/day + expenses = £650 x 2 over 5 years= £1300	£8,491	

Land at East House Farm	G	Private	Sheep or traditional breed ponies via Flexigraze for 3.4ha for 168 days pa= £588; scrub control 10% of 3.4ha = .34ha @£20k/ha= £6800; vegetation survey & soil assessment @£500; substrate preparation & green hay strewing over 25 % of 3.4ha @£600 /ha= £510; monitoring + report @ £250/day + expenses = £650 x 2 over 5 years= £1300	£9698	Assumes green hay over 25% of compartment; cost / ha to include equipment, harvesting from donor site, ground preparation & strewing
Land at Sharon Avenue	H	Private	Sheep or traditional breed ponies via Flexigraze for 3.8ha for 168 days pa = £638.40; fencing x 800m@£7/m= £5600; water trough @£105= £105; 100m water pipe @£2/m= £200; 4m field gates x 2 @£250= £500; 2 styles @£120 each= £240; vegetation survey & soil assessment @£500; substrate preparation & green hay strewing over 25 % of 3.8ha @£600 /ha= £570; scrub control for 50% of site = 1.9ha @£583/ha= £1107.70; monitoring + report @ £250/day + expenses = £650 x 2 over 5 years= £1300	£10,761.10	Assumes green hay over 25% of compartment; cost / ha to include equipment, harvesting from donor site, ground preparation & strewing
Dismantled railway corridor	I	DCC	Cutting & disposal of arisings for 50% of site area = 1.2ha @£400/ha/annum x 5years= £2400; scrub scalloping 10% of site = 0.2ha @£20,000/ha= £4000; dog bins x2 @£250= £500; dog advisory signage x 2 @£1200	£8100	
Land at Church Kelloe	J	DCC	Cutting fen & disposal of arisings for 0.2ha @£500/ha/annum x 5years= £500; sheep or traditional breed ponies via Flexigraze for 4.2ha for 168 days pa @ £705.60; vegetation survey & soil assessment @£650; substrate preparation & green hay strewing over 25 % of 4.2ha @£600 /ha= £630; monitoring + report @ £250/day + expenses = £650 x 2 over 5 years= £1300	£3785.60	4.2ha with boundary 1400m; looks like amenity grassland with scrub and some semi-natural grassland (from aerial)
Kelloe Valley Beck LWS	K	DCC	Traditional breed cattle via Flexigraze for 6ha for 123 days pa @ £492; fencing x 1600m@£7/m= £11200; water troughs @£105= £105; 100m water pipe @£2/m= £200; 4m field gates x 2 @£250= £500; 2 styles @ £120 each= £240; removal of conifers over 4ha@£1000/ha= £4000; scrub control over c.2ha@£20k/ha= £40,000; concrete channel removal x 750m@£5000; monitoring + report @ £250/day + expenses for £650 x 2 over 5 years= £1300; interpretation signage x 1 @£1200	£64,237	Assumes whole boundary needs fencing - may already be fenced; scrub control area guessed – site visit needed
Kelloe Plantation	L	Private partly in ELS	Tree thinning over 3ha@£2500 /ha= £7500; scrub scalloping over 0.5ha@£583 /ha= £291.50; sheep or traditional breed ponies via Flexigraze for 4ha for 168 days pa @£672; water trough @£105= £105; 300m water pipe @£2/m= £600; 4m field gates x 2 @£250=	£12,408.50	

			£500; 2 styles @ £120 each= £240; monitoring + report @ £250/day + expenses for £650 x 2 over 5 years= £1300; interpretation signage x 1 @£1200		
Raisby Way & Trimdon Quarry LNR	M	DCC leased to DWT	Scrub control for 30% of site = 1.6ha @£20k/ha= £32,000; sheep or traditional breed ponies via Flexigraze for 5.3ha for 168 days pa @ £890.40;; water troughs @£120= £120; 200m water pipe @£2/m= £400; 4m field gates x 2 @£250= £500; 2 styles @ £120 each= £240; substrate preparation & green hay strewing over 1.6ha@£600/ha= £960; monitoring & report @ £250/day + expenses for £650 x 2 over 5 years= £1300; pond restoration @£1500; PSYM pond survey @£650; interpretation signage x 2 (wheelchair users & regular height) @£ £2400	£39,460	Area of calcareous grassland unknown (no habitat map with MP) calculations based on aerial scrub cover and total compartment size of 5.3ha
Raisby Way West Section	N	Private	Scrub control/scalping over 20% of site area = 0.6ha @£20k/ha= £	£12,000	
Crow Trees LNR	O	DCC in CSS	Fencing x 2660m@£7/m= £18620; water troughs x 4 @£105= £420; 800m water pipe @£2/m= £1600; 4m field gates x 2 @£250= £500; excavate & insert pipe to divert stream under bridge for livestock: excavation@£2500, 10m pipe @£100 & livestock bridge@£ 500 ; scrub control/coppicing over total of 9.5ha @£20k/ha £190,000; pond creation @£2500; botanical & fungi assessment prior to pond creation @£ 650; NVC survey & report 40ha@ £3000; vegetation monitoring & report @ £250/day + expenses for £650 x 2 over 5 years= £1300; interpretation signage x 2 @£1200= £2400; bench x 1 @£115	£224,205	
Wetland east of sewage works	P	Private	Cutting 0.7ha @£500/ha= £ 350; fencing 550m @£7/m £3500; water trough @£105; 200m water pipe @£2/m= £400; 4m field gates x 1 @£250; sheep or traditional breed ponies via Flexigraze for 0.6 ha for 168 days pa @£175	£4780	
Pasture west of sewage works	Q	Private	Hydrological assessment 1.4ha @ £1000; botanical & fungi assessment prior to re-wetting @£ 600; stream re-profiling & substrate preparation excavator @£250/day for 4 days= £1000; strewing cuttings from other fen compartments 1.4ha @£600/ ha= £840	£3440	
Parcels south of sewage works	R	Unknown	Carry out botanical survey to advise on potential and future work program £600	£600	
Sloping field east of parcel E	S	Unknown	Carry out botanical survey to advise on potential and future work program £600	£600	

4.3 Central Clays

Maps and aerial photographs to accompany area projects are in Appendices H & J respectively.

4.3.1 Introduction

Outline of management area

The central clays area of the DMLP features distinctive former mining villages interspersed with expansive farmland and a linear network of wildlife habitat along hedges, watercourses and disused railway lines. Intensive land-use for agriculture and urban settlement has fragmented and reduced semi-natural habitats. Here and there pockets of semi-natural woodland, heathland and diverse wetlands remain, isolated within the landscape. Most semi-natural grasslands are found along roadside verges and in a few unmanaged or over-grazed fields and there is a notable scarcity of lowland meadows. There is no ancient woodland and the few semi-natural woodlands are generally unmanaged. The sense of fragmentation and loss is reflected by the fact that there are no outstanding examples of semi-natural habitat designated as National Nature Reserves in this area, but it is ameliorated by the high quality habitat developing on disused colliery and quarry sites.

The Central Clays area features several disused colliery sites and pit spoil heaps, including the former Hawthorn combined colliery now owned by Durham County Council. These former industrial sites support grasslands, wetlands and scrub of high biodiversity value in a regional context. In the past, there has been a tendency to see these sites as eye-sores demanding landscaping and tree planting. Their intrinsic value is now recognised, and habitats on previously developed land are protected from inappropriate use and degradation by designation as UK Biodiversity Action Plan ('BAP') Priority Habitat. These sites require little or no management while in early successional phases of habitat development, therefore their current quality reflects this, but this diversity will decline in future if grazing management is not available. Therefore there is a need to start medium and long-term management planning for these valuable sites.

The Central Clays area also has examples of a wetland habitat that is rare in the North-east: intact basin mires with associated species-rich fen meadow. The type of fen present in the Central Clays area of the DMLP has a distinctive regional character that does not match existing vegetation classification of mires (O'Reilly 2009). The major threat to this habitat is neglect due to lack of grazing or cutting, and in particular, invasion by *Typha* swamp. There has been some pond creation in this area in recent years, but most ponds are suffering from neglect including invasion by *Typha* swamp, and ponds remain uncommon on a landscape scale. By contrast to other wetlands, reed-bed is reasonably widespread in the DMLP region and is not considered a priority for conservation action.

The few Sites of Special Scientific Interest (SSSI) in this area are mostly either under-managed or over-grazed, although improvement is expected with the negotiation of new agri-environment agreements. Almost all of the LWS in the area have received

little or no management in recent years, a situation which is compounded by the fact that the ownership of many sites is unknown. The notable exceptions tend to be LWS on farms – Duncombe Moor Farm and Carr’s Farm in particular, but even here there are still problems with under-management of some sites.

Important habitats

The recommended management proposals set out below will contribute towards the delivery of the following national, regional and local Biodiversity Action Plans:

- *UK BAP Priority Habitats* – lowland fen, ponds, native woodland, lowland calcareous grassland, lowland meadows, lowland acid grassland, lowland heathland, open mosaic habitats on previously developed land, hedgerows.
- *Regional BAP Priority Habitats* – native woodland, lowland fen, ponds, lowland calcareous grassland, lowland heath, lowland acid grassland, lowland meadows.
- *Durham BAP Priority Habitats* – early successional brownfield land, lowland fen, ponds, rivers and streams, waxcap grassland, lowland calcareous grassland, lowland meadows and pastures, lowland heath, lowland acid grassland, broad-leaf woodland, wet woodland, scrub.

It should be noted that lowland fen creation is still very much “in its infancy” (Wheeler 2004). Therefore, maintaining and achieving condition for existing lowland fen sites is of paramount importance, which is reflected in the UK BAP targets and the focus on neglected or under-managed fen sites in this management plan.

Important species

The recommended management proposals set out below will contribute towards the delivery of the following national, regional and local Biodiversity Action Plans:

- UK BAP Priority Species – Water Vole, Dingy Skipper, Curlew, Lapwing.
- Durham BAP Priority Species – Water Vole, Water Shrew, Farmland birds on wetlands (Snipe, Redshank, Lapwing, Curlew).

Designations

There are no national Nature Reserves (NNR) or Local Nature Reserves (LNR) in the Central clays area. Sites of Special Scientific Interest (SSSI) are set out in **Table 4.9** below.

There are also the following Local Wildlife Sites (LWS):

Duncombe Moor Farm Marsh, Pesspool Lane Ponds, South Hetton Pond, Cooper’s Pond (Carr’s Farm), Hesledon Moor West, Coop House Wood, Hesledon Moor East, Pesspool Wood, Ludworth Pit Heap, Wheatley Hill Ditches.

Table 4.9: Site designations in the Central Clays project area

Site	Designation	Habitats	Condition
Hesledon Moor West	SSSI	heathland, swamp, lowland fen	unfavourable recovering
Hesledon Moor East	SSSI	lowland neutral grassland, fen	favourable but fen unfavourable due to scrub encroachment
Tuthill Quarry	SSSI	magnesian limestone grassland	unfavourable no change, due to inadequate grazing

4.3.2 Management proposals

Aims & objectives

The overall aim in this project area is the restoration and creation of wetland, grassland and woodland habitat to provide improved habitat connectivity on a landscape-scale.

The management objectives include to:

- Ensure the sustainable future of effective management at wetland, grassland and woodland sites.
- Restore degraded wetland, grassland and woodland habitat, which has been inadequately managed or unmanaged.
- Restore lowland fen habitat on sites that were formerly fen.
- Create ponds with potential to develop high biodiversity value.
- Create and enhance water vole habitat.
- Balance the habitat needs of water vole with the need to manage vegetation to maintain habitat diversity.
- Create or diversify field boundary native species hedges.
- Implement native broad-leaved woodland management, including creating woodland edge habitat.
- Create native broad-leaved woodland where this is not replacing other habitats of conservation value, particularly grasslands or wetlands which are, or could be with appropriate management, species-diverse.
- Maintain access to existing footpaths.
- Where possible, re-create historic field boundaries.
- Where appropriate, promote site access and interpretation.

Existing management agreements and interests of landowners

- Pending HLS agreement for Duncombe Moore Farm.
- Pending HLS agreement for the Hesledon Moor West area to be held by the Grassland Trust.
- ELS agreement for Carr's Farm. The landowner Dave Cowton is highly supportive of biodiversity conservation and a DWT member.
- Carr's Farm own Pesspool Lane Ponds and the site is within an CSS agreement.
- Hesledon Moor East Farm owns Coop House Wood and other parts of their landholding are in an ELS agreement.

- Ownership of South Hetton Pond LWS is unknown (it is not owned by Low Fallowfield Farm and the pumping station is not owned by Northumbrian Water).
- Compartments G and H are privately owned/leased by local people.

Summary of potential delivery

Delivery against UK BAP priority habitat targets for the Central Clays project areas is set out in **Table 4.10** below:

Table 4.10: UK BAP priority habitat delivery categories in hectares (ha) per habitat type for each management compartment A – U in this project area

UK BAP Habitat	Maintain (ha)	Achieve condition (ha)	Restore (ha)	Expand (ha)	Data deficient (ha)	Comments
Lowland neutral meadows		A – 1.9	L – 1.9			Estimated as 50% of railway corridor area
Lowland calcareous grassland			U – 1.6			
Lowland heathland		P – 5.6				Area from SSSI unit data
Lowland acid grassland		P – 1.1 (estimated at 20% of heathland area) Q – 1.6				Area for Q estimated using aerials and site description only
Hedgerows			A – 200m I – 400m	B – 300m C – 200m I – 930m M – 400m		
Lowland fen	E – 1.7	G – 0.6 P – 0.4	E – 0.4 H – 3.6 K – 5 M – 0.6	B – 0.5 F – 0.5 M – 0.9		Total for green hay fen restoration project 12.1 ha
Ponds			F – 1 pond	C – 1 created pond	A – 3 ponds J – 2 ponds M – 1 pond P – 1 pond	Unable to determine on desk top info whether ponds in A, J, M & P are of UK BAP quality, so can't determine appropriate category here
Native woodland (broad-leaved dry woodland unless otherwise stated)	Q (wet woodland) – 0.4	O – 13 P – 1.6		S – 4.5		Assumes all woodland in Q is wet woodland following LWS description
Open mosaic habitats on previously developed land & lowland calcareous grassland	R – 16 (estimated at 20% of site area) T – 3					These habitats are grouped together as it is not possible to apportion areas to each from aerials or on site visits during January

Potential barriers to management

The potential barriers to management are:

- Some of the land is in private ownership and it is difficult to say how amenable the landowners will be.
- The fragmented and tiny size of some fen sites may make grazing problematic – traditional breed cattle will be required.
- Some amenity use is incompatible with biodiversity conservation, such as over-grazing by riding school horses and use of sites unofficially by dog walkers.
- Lack of scientific knowledge about how to restore species-rich fen. More research is needed into nutrient stripping techniques, the role of seed banks and seeding techniques.
- Inadequate donor sites for fen restoration – green hay may need to be obtained from outside the local project area, but it has to be harvested and spread the same day.

Access & interpretation potential

Although access is an important aspect of any management plan, the location of many sites on private farmland means that access arrangements will be limited. However, there is open access to a key project site, Ludworth Pit Heap.

4.3.3 Detailed management proposals

South Hetton Area project area (Maps 9- 11, Appendices H and J)

Compartment A

Pesspool Lane Ponds LWS comprises three ponds and a range of relatively species-rich habitat, including neutral semi and unimproved wet grasslands, waxcap grassland, burr-reed *Sparganium* swamp and ditches with relatively species-rich vegetation including the nationally scarce aquatic liverwort *Ricciocarpos natans*, which indicates good water quality. Water vole is present in these ditches. Some scattered scrub and the two ponds in the south-west corner of the site are densely shaded by overhanging scrub. Managed by cattle grazing but in recent years the site has been under-grazed because the substrate has been too wet for the cattle and the grasslands are becoming rank, risking a loss of plant species diversity. There is a need to ensure the bankside does not become shaded and to maintain diversity of water vole food plants. The site is in a CSS agreement. There is no public access.

Achieve condition for lowland fen and **restore** hedgerow.

Management prescriptions:

- **Revised grazing regime** required, preferably using lighter, traditional breed cattle as under-grazed due to concern that the stock may cause excessive poaching. Areas of waxcap grasslands need mapping and grazing regime considered in light of their management needs.

- Maintain scrub cover at 10%.
- **Gap-up boundary hedges.**
- Remove fence to allow grazing access to 2 overgrown ponds in south-west.
- **Pond restoration** by swamp control and removal of over-hanging scrub, and a prior **PSYM pond survey** to establish whether ponds qualify as UK BAP ponds.
- Management of **water vole habitat**: Cut ditchside vegetation bi-annually on rotation to leave refugia and remove cuttings.
- Water shrew survey.

Compartment B

Wetland creation potential identified by Opportunity Mapping. Strip along eastern boundary of LWS of species-poor semi-improved wet grassland/ permanent set-aside - **fen meadow creation potential** and new **boundary native hedge planting** depending on owner consent and incorporation of area into grazing unit. Site is in an ELS agreement. No public access. **Expand** lowland fen and hedgerow.

Compartment C

Wetland creation potential identified by Opportunity Mapping. Site of former pond in arable field to north-west, where the crop is not growing due to the water-logged soil over approximately 0.3ha - **pond creation** and new **boundary native hedge planting** depending on owner consent and incorporation of area into grazing unit. Site is in an ELS agreement. No public access. **Expand** ponds and hedgerow.

Compartment D

Ditch flowing south-north through arable fields with water vole present. Ensure bankside does not become shaded and maintain diversity of water vole food plants. Site is in an ELS agreement but no 6m margins apparent from aerial.

Management prescriptions:

- Management of **water vole habitat**: Cut ditchside vegetation bi-annually on rotation to leave refugia and remove cuttings.
- **Create buffer zone** between ditch and arable crop by allowing semi-natural vegetation to develop along 6m ditch margins.
- Water shrew survey.

Compartment E

Duncombe Moor Farm marsh LWS is a basin mire with associated rich fen meadow. It is a rare example of a species-rich intact basin mire of which few examples remain in the DMLP and is of SSSI quality. Currently well-managed and management to continue through an HLS agreement. No public access. **Maintain** lowland fen. **Restore** lowland fen around basin mire margins.

Management prescriptions:

- **Document** existing recent management regime.
- **Recreation of fen** to the south on wet grassland strip and possibly to west, to link with the pond (in compartment F – see further below).
- Use as **donor site** for fen restoration elsewhere.

- **Implement monitoring** to assess impacts of use as donor site (CSM methodology is inadequate).

Compartment F

Improved pasture sloping up to a pond and relic hedgerows. No public access.

Expand lowland fen. **Restore** and **expand** hedgerows.

Management prescriptions:

- Potential for **fen restoration**, depending on topography (although this vegetation type is typically on gently sloping mire margins).
- **PSYM pond survey** to establish whether pond qualifies as UK BAP pond.
- Restore **hedgerows** by planting up gaps and, where possible, laying.

Compartment G

Unimproved species-rich pasture, probably formerly part of the adjacent basin mire, but currently over-grazed by horses and owned by a local village family. Originally part of the LWS. High potential for restoration of rich fen vegetation and species-rich neutral grassland and, despite its small size at 0.7 ha, of high conservation value in a regional context. Land purchase and lease back with management agreement on grazing levels would be optimal. **Achieve condition** for lowland fen.

Management prescriptions:

- Fen meadow restoration by **reduction in grazing** intensity
- **Negotiate replacement grazing** elsewhere (e.g. compartment H) in partnership with local landowners.
- Document baseline & implement **monitoring**.

Compartment H

Semi and unimproved pasture, section south of the stream formerly part of the semi-natural habitat associated with the adjacent basin mire and originally part of the LWS. Ownership and current management unknown. High potential for restoration of rich fen vegetation and species-rich neutral grassland of high conservation value in a regional context. Land purchase and lease back with management agreement on grazing levels would be optimal. **Restore** lowland fen.

Management prescriptions:

- Fen meadow restoration by **reducing grazing** intensity.
- Likely need for further restoration measures in area north of stream e.g. by **green hay/seed introduction** once effects of relaxation of grazing are monitored.
- Document baseline & implement **monitoring**.
- Water shrew survey.

Compartment I

Areas of more intensively-managed improved pasture and arable with relic hedges.

Restore and **expand** hedgerow.

Management prescriptions:

- **Restore hedgerows** by planting up gaps and, where possible, laying.
- **Plant new native hedgerow.**

Compartments J

South Hetton Pond LWS comprises two ponds, probably created by drainage of this area by the pumping station to the south-west. The pond area has been landscaped with ornamental non-native trees and shrubs. There are historical records of a good range of wetland plant species in this area (Graham 1988). Much of the grassland is improved. The pond areas are currently unmanaged, and *Typha* swamp is spreading. There is horse grazing in the surrounding improved fields, which are over-grazed, and horses cannot access the pond margins. Water vole is present. There is some amenity use, as a footpath crosses the site. **Restore ponds.**

Management prescriptions:

- Remove non-native trees and shrubs.
- Control invasive *Typha* swamp.
- PSYM pond survey to establish whether ponds qualify as UK BAP ponds.
- Reduce intensity & extend horse grazing.
- Habitat creation potential for water vole excavating new ditch west-east with bridge for grazing animals.
- Water shrew survey.

Compartment K

Wetland creation potential identified by Opportunity Mapping. A former marsh and semi-improved wet grassland 5 ha site which has been partly drained. Currently heavily grazed by horses. There are historical records of a good range of wetland plant species in this area (Graham 1988). Suitable for wetland creation with intact and controllable hydrology and semi-natural vegetation. There is an unofficial footpath traversing the site probably used by local people walking dogs. **Restore lowland fen.**

Management prescriptions:

- Potential for fen meadow creation
- Reduce grazing levels

Compartment L

Disused railway corridor with rank unmanaged semi-improved grassland with pockets of more diverse unimproved grassland and ditch network. Water vole is present. Ensure ditch bankside does not become shaded and maintain diversity of water vole food plants. Diversify grassland to benefit a range of wildlife. **Restore lowland meadows/neutral grassland.**

Management prescriptions:

- **Management of water vole habitat:** Cut ditchside vegetation bi-annually on rotation to leave refugia and remove cuttings.
- **Grassland cutting regime:** cut annually leaving refugia for invertebrates and remove cuttings.

- Water shrew survey.

Compartment M

Wetland creation potential identified by opportunity mapping. This site is probably part of a former area of marsh that was drained for arable farming and includes Cowton's Pond LWS (at Carr's farm). The hydrology remains intact, channelled through a recently created pond and ditch network. Habitats include scrub, rank neutral species-poor semi-improved grassland and *Typha* swamp but also localised patches of more uncommon vegetation including sedge mire, but this is relatively species poor. Management objectives include to diversify the existing vegetation using light grazing or cutting depending on what is practicable, and subject to landowner consent, could include re-creation of the former extent of the wetland by re-wetting arable land if the farm was brought within HLS. **Restore** and **expand** lowland fen.

Management prescriptions:

- **Cutting regime** throughout semi-natural habitat around pond.
- **Weed control**, as required.
- Potential for **wetland recreation** of former wetland extent and planting of native hedge boundaries. If implemented, grazing regime required for all of compartment as a grazing unit, including installing fencing, water supply etc.
- **Native scrub planting** to connect woodland area to the north-west to the scrub in this compartment.

Compartment N

Carr's Farm ditches through arable fields with a 6m margin, which have good potential for water vole habitat.

Management prescriptions:

- Consider off-site **ditch connection scheme** to Pesspool Lane Pond ditches to south (compartment D), requiring hydrological assessment.
- Water shrew survey.

Compartment O

Coop House Wood. The broad-leaved semi-natural woodland includes some streamside wetland habitat and is a valuable conservation unit at 12.3 ha but is unmanaged and the stream banks overgrown. There are no signs of any former coppice management. Water vole is present. There is a wayleave strip for pylons running through the wood north-south, where some woodland edge habitat has developed. There is no public access. The landowner is in an ELS agreement but this site is not included. **Achieve condition** for native woodland.

Management prescriptions:

- **Thinning of woodland** in stream corridor area to reduce shading and promote ground flora development.
- **Creation of woodland glades** to promote ground flora development.

Compartment P

Hesledon Moor West SSSI. This site comprises lowland heathland, wet woodland and wetlands developed on an acidic substrate including open water, Typha swamp, lowland fen, and wet heath with Sphagnum species. Some lowland Durham notable plant species include globe flower *Trollius europaeus* and pepper saxifrage *Silene acaulis*. The site is within a CSS agreement and past management includes *Typha* control to extend the fen habitat, although inappropriate management since has resulted in overgrazing of the heathland and grassland together with scrub invasion. There are problems with vandalism and in 2006 a fire destroyed part of the dry heathland. The site will be included in an HLS agreement to be held by the Grassland Trust (except for a small area of scrub in the south-east corner). Monitoring of this SSSI will continue under the HLS and using CSM methodologies. **Achieve condition** for lowland fen, lowland heathland, lowland acid grassland and native woodland.

Management prescriptions:

- **Document baseline** – NVC survey and invertebrate survey desirable due to the complex nature of the site, if not already conducted.
- **Restoration of dry heathland** including scrub and birch control.
- Major **scrub control** and **scrub coppicing** to diversify structure required.
- **Revised grazing regime** using Flexigraze traditional breed cattle, if possible.

Compartment Q

Hesledon Moor West LWS. The site includes acid grassland to the south, some pockets of heathland, and areas of wet woodland and carr along ditches to the north. It is currently sporadically grazed and scrub is encroaching on the grassland. The site will be included in an HLS agreement to be held by the Grassland Trust. **Achieve condition** for lowland acid grassland, lowland heathland and wet woodland.

Management prescriptions:

- **Scrub control** and **scrub coppicing** to diversify structure required.
- **Revised grazing regime.**
- **Document baseline** and implement **monitoring** scheme.

Compartment R

This comprises the former Hawthorn combined colliery (closed 1992) over an area of some 75 ha. In places, the spoil heaps have naturally developed into species-rich unimproved lowland calcareous and neutral grasslands. There are ponds and associated wetland on the south-facing slopes above Hesledon Moor SSSI. There are also likely to be localised species-rich small sedge mires or flushes and other highly valuable small-scale wetland habitats. Dingy skipper butterfly is present and the site is likely to be of high value for a range of invertebrates. The site is to be developed as for the A182 East Durham Link Road and an associated business park, therefore there will be an opportunity to provide habitat mitigation and enhancement on the site to connect with the habitat creation and management proposed in this Plan. Opportunity to **maintain** and **expand** lowland calcareous grassland, lowland fen, and open mosaic habitats on previously developed land. In particular, mitigation proposals for the development should address:

The need to minimise impacts, where practicable, to lowland calcareous and neutral unimproved grassland and areas of localised species-rich wetland habitats, including avoiding these areas when locating any tree or shrub plantings or other habitat creation.

The need to provide compensatory habitat for water vole, and preferably to extend water vole habitat, subject to hydrological assessment, by linking the stream at the small woodland to the south of the site to the Hesledon Moor east ditch network to the north of the site.

Providing mitigation for loss of ponds but to ensure that pond creation is located away from any vegetation of high botanical value (which should be assessed by including lower plants and fungi).

The need for all proposals to be designed in light of appropriately detailed botanical survey, to ensure than all UK BAP habitat is correctly identified, particularly small sedge mires and other small-scale fen habitat that is easily over-looked and under-valued as it does not 'fit' into the NVC system. The habitats may support a range of lower plant and fungi species and scoping should also be conducted, to assess whether or not any lower plant surveys should be included in the site ecological surveys.

Linking any proposed native woodland planting with that proposed for compartment S (section 3.1.19 below).

Compartment S

This area is apparently improved or semi-improved pasture owned by DCC and, subject to a prior **botanical survey**, could be used for **native woodland creation** and development of woodland edge habitat. This woodland creation would link both the isolated small woodland parcel around the stream to the north-east, and any tree plantings on compartment R, with Coop House Wood. **Expand** native woodland.

Compartment T

This is an area of spoil heaps which have naturally developed into species-rich unimproved lowland calcareous and neutral grasslands in a mosaic with other habitat typical of open habitats on former industrial land. Several orchid species are present. The site is privately owned and will be impacted by the East Durham A182 Link Road development, although the development plan 616/00037/OL/01 shows that the road corridor only crosses the northern edge of this site. There is opportunity as part of the development mitigation to **maintain the lowland calcareous and species-rich neutral developing grasslands** at this site by minimising the area lost to the development footprint and ensuring that the area is not used for any planting of trees/shrubs or other habitat creation.

Compartment U

The former Ludworth Pit Heap LWS has been planted with trees, mostly pines and other non-native species, which are now fairly mature. Some small areas have either been left as open ground or else the planting has failed. There are very mixed

conditions of soil pH and moisture levels, resulting in a surprising variety of habitats. These include heath, mostly along ditch banks and on woodland edges; calcareous grassland, mostly in a large clearing; wet woodland with native and exotic alders; and pine woods, rather dark and gloomy with few shrubs and an impoverished ground flora. The site is quite well used by local people for dog walking etc, but also abused by fires and off-road motorcycles. The adjoining street is Pinewood View and there is a sports field and children's play area adjacent to the site.

Management prescriptions:

- Prior **public consultation** on the proposed management scheme.
- Document the **baseline habitats & vegetation** with NVC survey.
- **Manage the pine wood** by selective thinning of conifers and planting of native shrubs and ground flora, to improve the shrub and ground flora layers.
- **Manage the alder wood** by planting native shrubs and ground flora to improve the shrub and ground flora layers. **Achieve condition.**
- **Cut and rake off grasslands** to retain species-rich sward. **Achieve condition and restore.**
- Implement site **monitoring** after 3 years of revised management regime.
- **Improve site access and other infrastructure**, including removal of derelict interior fencing, and fencing the site (probably including the sports and play areas, along the main road edge), and replace the gates and stiles. **Maintain.**

4.3.4 Delivery

Introduction

The South Hetton area has exceptional opportunities for an ambitious community-wide wetlands conservation project. It is recommended that the entire scheme is community-led with a built-in consultation process.

The Ludworth area lends itself to a smaller scale habitat restoration project focussed around Ludworth Pit Heap LWS. However, this project would link with the similar habitats at other former colliery sites in the Central Clays area and promote a wider appreciation of the importance of former colliery sites for biodiversity conservation.

Potential Delivery Organisations

- Delivery via HLS agreements for Duncombe Moore Farm and Hesledon Moor West. The use of the fen restoration (HQ7), fen creation (on arable) (HQ8) and wetland cutting (HQ11) / grazing (HQ12) options of Environmental Stewardship will be the main mechanism by which this project can be delivered.
- Delivery via ELS agreements for compartments G and H.
- Durham County Council
- Durham Wildlife Trust
- The Grassland Trust

Potential funding sources

Agri- environment potential

South Hetton project area

- 1.9 hectares are currently under CSS management
- 4.1 hectares are currently under ELS management
- 11.1 hectares are currently under HLS management

Ludworth project area

- 0 hectares are currently under CSS management
- 0 hectares are currently under ELS management
- 0 hectares are currently under HLS management

4.3.5 Costings

Grazing Calculations

Estimated costings for delivery of the management prescriptions are set out in **Table 4.11** below.

Grazing costs are worked out on the basis of grazing at a rate of 0.25 LU/ Ha/ Year for calcareous grassland, 0.5 LU/ Ha/ Year for species rich neutral grassland and 0.2 LU/ Ha/ Year for wet grassland and fen habitats. Costings are based on rates of £1 per cow equivalent per day and a cow is as defined in the lowland grassland

management handbook, i.e. 0.5 Livestock units which is equivalent to 4 sheep or 1 pony.

Table 4.11: Estimated costs for management prescriptions in Central Clay project area

Site	Cmpt	Owner-ship	Management Prescriptions	Ballpark Cost £k (excl. VAT)
Pesspool Lane Ponds LWS	A	Private in CSS	Traditional breed cattle via Flexigraze for 2.7ha for 123 days pa @£498.15 (site already sometimes grazed so assume fencing, water trough etc in-situ); hedge planting 200m@£6/m= £1200; fence removal for 70m @ £1/m= £70; pond restoration/ Typha removal@£1500	£2348.15
Pesspool Lane Ponds LWS	B	Private in ELS	Fen creation: soil strip x 0.5ha@ £3000/ ha= £1500; fence x300m@£7/m= £2100; native hedge planting x 300m@£6/m= £1800;	£5400
Pesspool Lane Ponds LWS	C	Private in ELS	Pond & wetland creation on arable x 0.3ha @£3000/ ha= £900: pond creation @£2500; fencing 200m@£7/m= £1400; native hedgerow planting x 200m@£5/m= £1000;	£5800
Pesspool Ditches	D	Private in ELS	Ditch bank cutting x 500m@ £2.90/ m x 5yrs= £7250	£7250
Duncombe Moor Farm Marsh LWS	E	Private in HLS	Fen expansion x 1ha using donor seed/grown on plants from community project @£600	£600
Duncombe Moor Farm	F	Private in HLS	Fen creation: soil strip x 0.5ha@ £3000= £1500; pond restoration@£1500; native hedge planting x 200m@£6/m= £1200.	£4200
North-west part of Duncombe Moor Farm Marsh LWS	G	Private	Monitoring based on £300/day incl expenses @ £600 per annum x 2 visits over 5 years= £1200; grazing agreement costs covered by getting site into ELS.	£1200
Field adjacent to Duncombe Moor Farm LWS	H	Private	Fen meadow creation: substrate preparation & green hay strew for 3.6ha@£600/ha= £2160 ; grazing agreement costs covered by getting site into ELS; monitoring (required even if not within green hay project) based on £300/day incl expenses @ £900 x 2 visits over 5 years= £1800.	£3960
Duncombe Moor Farm LWS	I	Private in HLS	Native hedgerow planting x 930m @£6/m= £5580; native hedge diversification & laying x 400m @£6/m= £2400	£7980
South Hetton Pond LWS	J	Private	Non-native tree and shrub removal x 5 days@£400/day= £2000; Typha removal@£1500; ditch creation x 130m@£4/metre+ £520 plus livestock bridge @£500	£4520
South Hetton Pond LWS	K	Private	Fen meadow creation: substrate preparation & green hay strew for 5ha @£600/ ha= £3000 (grazing with horses already but will need to control this with grazing agreement)	£3000
Disused railway	L	Local Authority	Grassland cutting over 50% of site = 1.9ha@£400/ha= £760 pa x 5yrs= £3800	£3800

Cowton's Pond LWS	M	Private in ELS	Cutting x c.0.6ha @£500/ ha= £300 (large pond in centre of area; assumes unit too small for grazing but would need to add grazing medium term if site extended by wetland creation); native scrub planting x 0.2ha@£5250/ha= £1050; fen creation: soil strip x 0.9ha@ £3000/ha= £2700; fencing x 550m@£7/m= £3850; native hedge planting x 400m@£6/m= £2400	£10,300
Carr's Farm ditches	N	Private in ELS	Ditchbank cutting x 550m@£2.90/m= £1595; water vole culvert under road for 25m@£5000; ditch creation x 70m@£4/m= £280; hydrological assessment re ditch creation @£1000	£7875
Coop House Wood & stream	O	Private	Woodland management: glade creation & thinning beside stream over 13ha@£1000/ha= £13000	£13000
Hesledon Moor West SSSI	P	Private in HLS	NVC survey@£1500; invertebrate survey@£2500; scrub removal + herbicide over 50% of site = 4.3ha@£20000/ha= £86,000; traditional breed cattle via Flexigraze for 8.6ha for 123 days pa @£1586.70; fencing x 1600m@£7/m=£11200; water troughs x 2 @£105= £210; 500m water pipe @£2/m= £1000; 2 x 4m field gates @£250= £500	£104,496.70
Hesledon Moor West LWS	Q	Private	Scrub control and scrub coppicing x 2 ha @£20k/ha= £40,000; traditional breed cattle via Flexigraze for 2ha for 123 days pa @£369; fencing x 800m@£7/m= £5600; water troughs x 2 @£105= £210; 500m water pipe @£2/m= £1000; 2 x 4m field gates @£250= £500; document baseline and monitoring scheme @£1200.	£48,879
Hawthorn Colliery site	R	DCC	Ditch creation x300m @ £4/ m = £1200; hydrological assessment re ditch creation @£1000	£2200
Land north-east of Coop House Wood	S	DCC	Prior site survey + report 2 days incl expenses @ £600; native woodland creation x 4ha@£5250/ha= £21,000; edge habitat native shrub planting x 0.5ha@£5250= £2625.	£24,225
Land on colliery spoil heap at South Hetton	T	Private	None required.	n/a
Ludworth Pit Heap LWS	U	DCC	Public consultation; pre-works survey £800; monitoring based on £300/day incl expenses @ £1200 x 2 visits over 5 years= £2400; fencing x 250m @£7/m= £1750; remove derelict fencing 100 metres @£1/m= £100; replace two stiles @ £120= £240; replace two gates @ £ 250= £500; thin 5.2 ha of pines by 50% (cost neutral), under plant with native trees and shrubs and ground flora seed mix over £600/ ha= £3120; remove 0.9 ha of pines (cost neutral), cut and rake off grassland annually over 1.6ha @£400/ha= £640; under plant 0.9 ha of alders with native trees and shrubs and appropriate wetland plants @ £600/ha= £540 .	£10,090
Generic costs for fen restoration project for 12ha			Substrate preparation & green hay cutting & strewing over 12ha@£600 per ha= £7200; donor/receptor monitoring design @£1500; donor site monitoring & reporting for £2400pa (based on £300/day incl expenses) with monitoring in yrs 1&2 and 5&8 after harvest event @£9600; monitoring x 4 receptor sites & reporting, allow 12 days pa in yrs after strewing 1,2, 5&8 @£14,400.	£35,100

4.4 Coastal Denes

4.4.1 Introduction

The woodland habitats of the DMLP are some of its most striking features. Best known are the large coastal denes at Castle Eden, Hawthorn and Crimdon, but the smaller denes add considerably to the landscape and wildlife of the area. Inland, the woodlands are smaller and often not accessible to the public, but still prominent as features of the scarp landscape.

The current broadleaved semi-natural woodland resource amounts to 1.23% of the Natural Area, only 543 ha. This habitat type is restricted to woods that have largely survived agricultural pressures and as a result often have a continuous history of at least 400 years. There are approximately 24 ancient semi-natural (ASN) woodlands within the DMLP, most of which are concentrated along the steep-sided coastal denes. Although the unique *Sesleria* grasslands are perhaps the most diagnostic feature of the DMLP, in terms of area these ASN woodlands are the largest single type of semi-natural habitat present. One such woodland is found at Castle Eden Dene National Nature Reserve, the most important woodland on the magnesian limestone in Britain (Ratcliffe, 1977). It is the largest and biologically richest area of ancient semi-natural woodland in the Natural Character Area, covering 193ha.

A number of other sites, smaller than Castle Eden Dene, but still of considerable size, form an important series of coastal magnesian limestone woodlands. These include Hawthorn Dene, Ryhope Dene, Crimdon/Hesleden Dene and Seaham Dene.

Ancient semi-natural woods inland on the magnesian limestone are much more localised as a result of extensive agricultural improvements over the centuries. A few small hanger woodlands occur on the scarp, namely Penshaw Wood, Herrington Hill Wood, Elemore Wood, Heugh Hall Wood and woods at Cassop Vale and Thrislington/Ferryhill Cut. These also hold the typical limestone ash wood, although the stands tend to be less structurally complex and less species-rich than the coastal denes.

Woodlands on the open plateau are rare and almost never ancient; where ancient woodland does occur as at Ferryhill Carr Wood or Thornley Dene, they are for the most part W8 ash woods in poor condition associated with the sides of shallow dry valleys that penetrate the plateau; the oakwoods one might expect on the neutral drifts which blanket the limestone appear to have been almost completely destroyed, other than where they occur as a thin belt on the shoulders of the incised denes, as mentioned above.

Scrub covers approximately 0.5% of the Natural Area and is frequently encountered within the DMLP as an intermediate stage of natural succession from grassland to ash woodland. Scrub can be a positive or negative aspect of the habitat mix. Many grassland sites have become overgrown with scrub because they are no longer grazed, and under ideal management the scrub would be cleared. A small amount of scrub is, however, desirable for the Argus butterfly

At the denemouths, blackthorn scrub dominates where succession is halted by sea spray. This habitat is particularly important for landfall migrant birds.

Hawthorn scrub is particularly common on shallow rendzinas, along with hazel, whereas privet *Ligustrum vulgare* and creeping willow *Salix repens* can form low scrubby areas along the coastal belt. One shrub of particular note is the regionally centred dark-leaved willow *Salix myrsinifolia*, which is found amongst damp woodland along the coast and occasionally colonises limestone quarries. The flora of wild roses has been well studied and is known to be locally diverse. In recent years, cotoneasters of several species and wayfaring trees have become dominant in some locations at the expense of native species.

Scrub in association with calcareous grassland and semi-natural woodland is often important to invertebrates and birds.

4.4.2 Important habitats and species

Introducing the recommended management proposals described below will contribute towards the delivery of the following national, regional and local Biodiversity Action Plans.

UK BAP Priority Habitats

- Woodland, lowland yew woodland

UK BAP Priority Species

- Bats, particularly Noctule
- Hedgehog
- Otter (the denemouths will be important habitats for otters in the near future)
- Song Thrush
- Spotted Flycatcher
- Tree Pipit
- Tree Sparrow
- Wood Warbler
- Slow Worm

Durham BAP Priority Habitats

- Ancient semi-natural woodland, including plantations on ASN sites.
- Other broadleaved woodland
- Scrub
- Native hedgerows
- Veteran trees

Durham BAP Priority Species

- Badger
- Water Shrew

Other important species

Ladies' Slipper Orchid (Cypripedium calceolus)

This nationally rare orchid was once present in Hawthorn, Hesleden and Castle Eden Denes, but became extinct due to collectors and habitat change around 1920. It has recently been re-introduced to some of its former habitats. While this is an attractive and striking species, it is only one of a number of plants that have been lost from the coastal denes.

Downy Currant (Ribes spicatum)

A nationally scarce shrub, with its centre of distribution in northern England, downy currant is found in Horden, Hawthorn and Castle Eden Denes.

4.4.3 Designations

National Nature reserves

- Castle Eden Dene
- Cassop Vale
- The Durham Coast NNR includes some of the small coastal denes

Sites of Special Scientific Interest

- The Carrs
- Hetton Bogs
- Hawthorn Dene

Local Wildlife Sites

- Wear Bank Woods, north
- Wear Bank Woods, south
- The Clouds
- Ryhope Dene
- Seaham Hall Dene
- Seaham/Dawdon Dene
- Hazel Dene
- Horden Dene
- Hesleden Dene
- Headshope Dene
- Pesspool Wood

There are several proposed local wildlife sites, recommended in the 2007 Durham BAP woodland survey.

4.4.4 The overall aims of the woodland management proposals

The restoration, creation and increased connectivity of species-rich woodlands and their associated wetland and grassland habitats within the project area is the principal aim of this management plan. The re-introduction of habitat management practices such as coppicing and thinning will considerably contribute towards this. In particular the project aims to restore, expand and to increase the connectivity of the resource of priority habitats within the Local Wildlife Sites.

Most of the woodlands are in “unfavourable condition”. This is most commonly because of conifers or other non-native species. Some woods are damaged by grazing, or inappropriate uses or by appropriate but excessive access. The management plan seeks to address the main management problems of the woodlands-

- Fragmentation
- The reduced area of some woods
- Coniferisation
- Non-native species
- Grazing
- Adverse effects of excessive usage of some woodlands
- Adverse effects of misuse of some woods, for example by motor bikes.
- Footpath management
- Interpretation

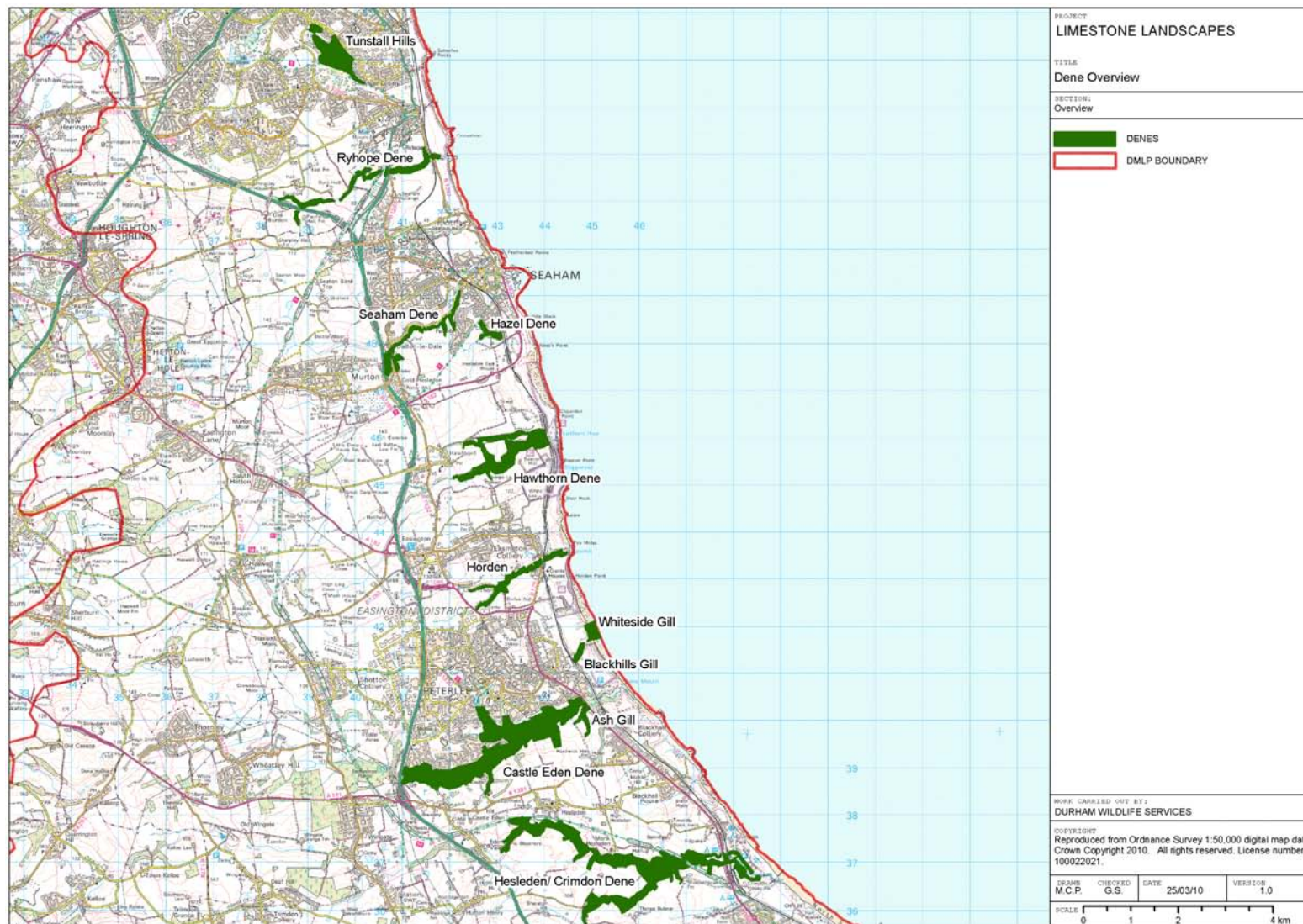
The steep, linear nature of most of the woodlands makes their management particularly difficult. Felling and extracting timber for commercial or nature conservation purposes is made difficult by the terrain, and in many areas would cause undue damage to parts of the woodlands. Footpath maintenance is more frequent and more expensive than it would be in level conditions, as the paths are regularly damaged by falling trees or minor landslips. Fencing on steep slopes to exclude stock is also more expensive than on level ground. This results in a lack of management in many woods, as the costs are prohibitive even with help from Woodland Grant schemes.

4.4.5 Management proposals for the woodlands

For the locations of the woodlands please refer to Dene Overview map overleaf. Currently several of the denes are under agri-environment scheme management as outlined in table 4.12 below.

Table 4.12: Area of Denes under agri- environment management

Name	Coastal	Area_ha	CSS	ESS	EWGS
Wear Banks	N	21.2		4.3	
Ryhope Dene	Y	30.9		0.3	
Tunstall Hills	Y	40.9		40.8	
Cassop Vale	N	24.7		15.0	
Ash Gill	Y	5.7			
Thornley	N	16.4			
Horden	Y	22.2			
Blackhills Gill	Y	4.1			
Hesleden/ Crimdon Dene	Y	162.6	7.6	12.3	7.7
Hazel Dene	Y	5.8			
Whiteside Gill	Y	7.7			
Hawthorn Dene	Y	63.0		49.4	54.9
Seaham Dene	Y	22.7			
Castle Eden Dene	Y	189.0		0.4	



Wear Banks

These woods have good structure, good connectivity and good footpath access. The main management requirements are a reduction in the proportion of non-native species, mainly sycamore, and an increase in fallen dead wood habitats. It would be difficult to extract felled timber, so these could possibly be achieved at the same time by leaving the fallen timber in safe locations.

Tunstall Hills

The important limestone grassland and woodland habitats here have adjoining rough grassland and scrub habitats which are unmanaged. A decision needs to be made as to which areas are to be restored to managed grasslands and which may be used to extend the woodland.

Ryhope Dene

The Ryhope Dene complex has scope for new woodland planting in the Cherry Knowle area.

The main dene has a serious motorbike problem, which could be solved with fencing and gated access points.

A permissive footpath along the northern side of the main dene would be an asset.

Seaham Hall Dene

The edges of this wood have been reduced, and much of this could be re-instated. There are very large areas of Japanese Knotweed and Giant Japanese Knotweed, perhaps the most extensive in the region. These would be difficult to remove, but should at least be prevented from spreading further.

A derelict boarded footpath in the upper part of the dene needs to be repaired or removed.

Seaham/Dawdon Dene

There is scope for extensive new woodland planting on the southern side of this wood, and a new permissive footpath would enable a circular walk.

Small patches of Japanese Knotweed along the Seaham Burn should be controlled.

Hazel Dene

This small wood is damaged by its popularity and over-use. New woodland planting, perhaps in association with the golf club, would improve this situation. East of the railway, rough grassland areas need to be assessed and allocated either for grassland management or new woodland planting.

Hawthorn Dene

Because this dene is managed as a nature reserve with public access, there is a footpath network that needs regular management. Over 1000 metres of footpath needs improving for visitors. The access route from the Dene into Hawthorn Hive will soon need to be replaced, as the sea and the stream remove both the coal mining deposits and the footpaths.

There is inadequate car parking at the main entrance, where a proper facility should be installed.

The main woodland and the northern areas alongside Hawthorn Quarry would benefit from the removal of conifers and sycamores.

There is scope for hedges on farmland north of the wood to be re-instated. There may also be scope for new woodland planting here.

Horden Dene

The Foxholes Denemouth area has a very intrusive pipe along its length, the removal of which would greatly benefit the dene.

The main dene has little public access, but this is of benefit to the wildlife and the quiet character of this wood.

There is scope for new planting to extend the Foxholes woodland.

Ash Gill-Warren House Denes, Whitesides Gill and Blackhills Gill

These small woodlands would greatly benefit from new adjacent planting to expand and connect the existing stands. A linking planting area parallel and close to the railway line would be ideal, with additional planting beside Warren House Gill and possibly elsewhere. Some of the existing woodland would benefit from fencing to exclude public access.

Some of the grassland here is possibly restorable to species-rich magnesian limestone grassland, so a decision would have to be made on how best to allocate the resource.

There may also be possibilities for small ponds or other wetlands here.

Castle Eden Dene

The National Nature Reserve has similar problems to Hawthorn Dene, namely the terrain-associated high maintenance of footpaths and the difficulty of reducing the proportion of non-native tree species.

The Edderacres woodlands, west of the A19, are very mixed in nature. The main benefit here would be to remove planted conifers, as a priority from along the lengths of the burns.

Hesleden/Crimdon Denes

This large woodland complex has extensive areas of planted conifers, and little public access. Long term aims would be to restore the conifer areas to native broadleaved woodland, and to improve the public access network.

There is scope for new woodland planting along the north side of the dene and in the Headshope Dene area.

Cassop Vale

Some of the woodlands in the NNR would benefit from fencing to exclude livestock.

The Heugh Hill woodland would also benefit from fencing, and from reducing the proportion of non-native species.

Thornley

These small copses would also benefit from fencing, and from reducing the proportion of non-native species.

4.4.6 Access and interpretation

There is good access to most of the coastal dene woodlands, in fact in some cases there is too much access, and restorative management is needed. There are some locations which would benefit from better access, particularly at Ryhope Dene, Hesleden Dene and Edderacres. The two denes with high public usage, Hawthorn and Castle Eden, could both do with a larger budget for footpath repairs and improvements.

Hawthorn Dene and the adjacent area of coast would benefit from parking facilities at the edge of Hawthorn village. Similarly, a formal parking area near Warren House Dene is needed.

Site interpretation is largely absent other than at the nature reserves of Castle Eden Dene, Cassop and Hawthorn Dene. On-site interpretation which could include elements of site history, biodiversity and management could usefully be added to a great number of sites, notably Tunstall, Foxholes, Warren House, Hetton Houses Wood, Hesleden and the Carrs.

4.4.7 Summary of management costs

Detailed proposals with costs allocated for each wood will require further survey and liaison with land owners. The following table shows the summary management proposals and estimated costs for the desirable and practically achievable management of the woodlands as a whole.

Table 4.13: Estimated costs for management prescriptions in Coastal Denes

Management	Area/ length	Costs
Pre-works survey	X 20	£12,000
New planting	50 Ha	£262,500
Fencing for new planting	10,000 metres	£70,000
Removal of conifers	40 Ha	£40,000
Reduction of sycamore and beech	60 Ha	£150,000
Fencing for exclusion of grazing livestock	3,000 metres	£21,000
Fencing for exclusion of public access to sensitive areas	2,000 metres	£6,000
Footpath management	4,000 metres	£20,000
Access point improvements	X 8	£25,000
Total		£606,000

4.4.8 Hawthorn Dene example

Hawthorn Dene is owned and managed as a nature reserve by the Durham Wildlife Trust and the National Trust. It is a popular visitor attraction in itself, as well as an important access point to the coastal footpath and to the shore. Most of the woodland is an SSSI, and is in unfavourable condition, mainly because of the proportion of non-native trees.

Compartment A

There is no formal car parking facility at present. Cars are parked on the verge close to a private house, and turn in gateways. There is a need for a small formal car park in this area.

Estimated cost: £20,000

Compartment B

Expand, 3 Ha

There is an area of disused farmland north of the existing woodland which could be planted as new woodland.

Estimated cost: £15,750

Compartment C

Achieve condition, 8 Ha

Two areas of woodland are predominantly sycamore and conifers. It would be feasible to extract timber from these areas, so there would be some defrayment of costs. Sycamore stumps would have to be treated to prevent regeneration, and saplings would have to be removed subsequently. These areas would require re-planting with whips of native species, mainly ash.

Estimated cost: £8,000

Compartment D

Achieve condition, 54 Ha

In the main dene the proportion of sycamore would be reduced by felling (close to paths) and by ring-barking (away from paths). Stumps and ring-barked trees would have to be treated to prevent regeneration. Sycamore saplings would have to be removed subsequently. Extracting timber would not be cost-effective and would be damaging to the wood. Natural regeneration of ash and other native species should be sufficient.

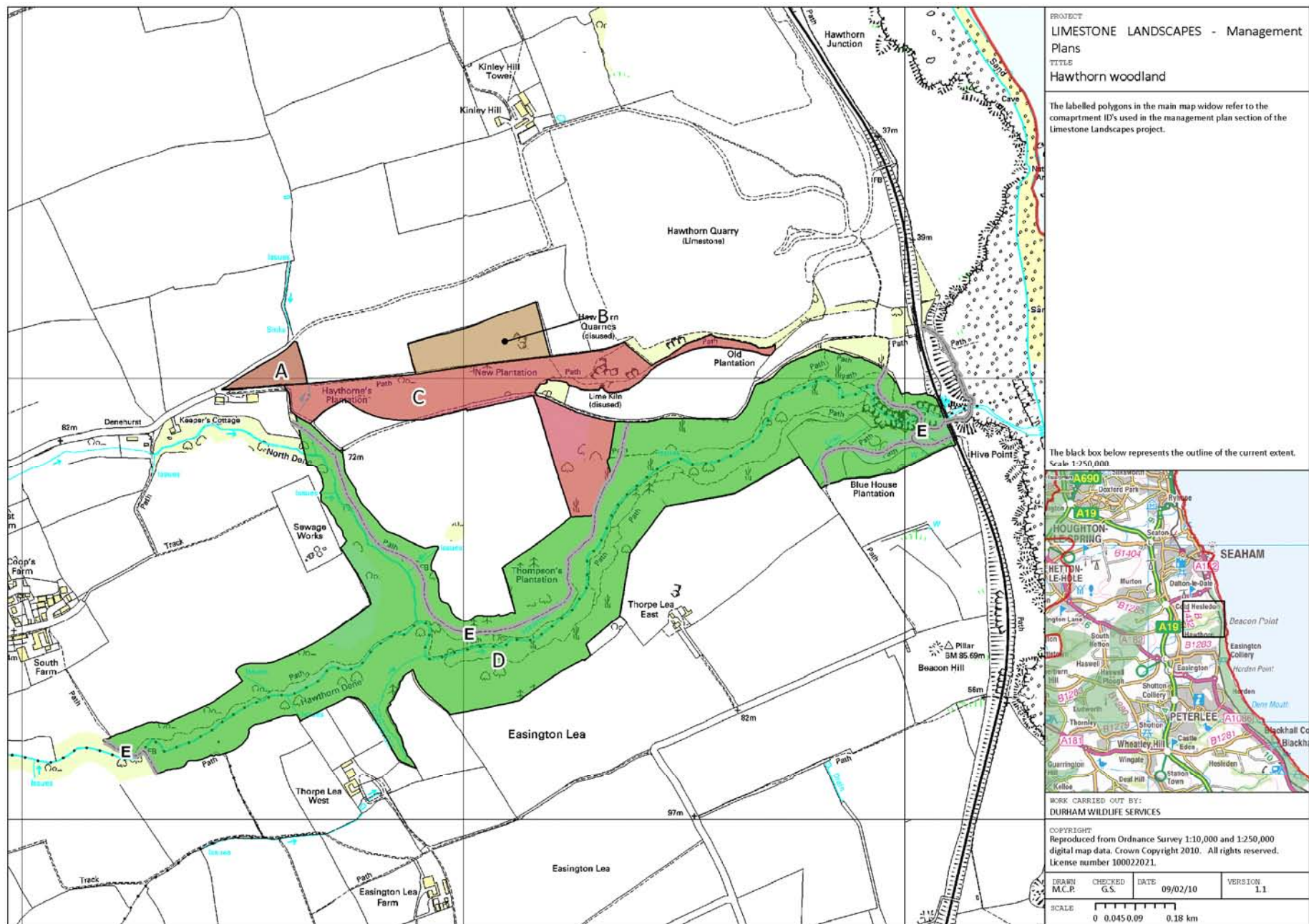
Estimated cost: £135,000

Compartment E, 2000 metres

The footpath network is well used, but the paths are on steep and unstable ground and have high maintenance requirements.

There are three lengths of footpath where improvements are needed; the path from South Farm across the dene, the main nature trail and the dene mouth paths. The dene mouth path to the beach may need to be completely re-instated as the beach erodes.

Estimated cost: £10,000



4.5 Coast

4.5.1 Introduction

Outline of management area

The area of the Durham coastline that lies between Blackhall Rocks and Whitelea farm has long been highly regarded for its landscape and wildlife, despite decades of environmental damage caused by coal mining. The coastline of Durham gained its Heritage Coast status in 2001, and has been described as an ecologically distinct area, with the only para-maritime magnesian limestone sea cliffs in both Britain and Europe. As a result of this, The Durham Coast was designated as a Special Area of Conservation at a European level, in order to maintain the biodiversity value of the flora and fauna of this remarkable coastline. It is an area of high biodiversity value despite intensive arable agriculture occurring inland above the cliffs squeezing the natural vegetation into a relatively narrow strip over recent decades. The Magnesian limestone plateau dips gradually towards the east, finally resulting in its exposure at the coast; it is rare to find this so close to the surface in Britain, and it is uniquely found by the sea in Durham. This has resulted in a singular set of conditions (such as hollows, and seepage pools) producing internationally important grassland communities (calcareous flush communities) and associated fauna; and whilst some of the intimate mosaic of communities are quite good examples of types of mire, mesotrophic or calcareous grassland typical of inland areas, others, often those of a more maritime composition, are more unusual.

Underlying the magnesian limestone plateau are rich coal deposits which were mined extensively until the early 1990's. Colliery waste was dumped in the sea, dominating the substrate of the beaches and the intertidal and offshore sediments, and despoiling coastal habitats such as sea-cliffs and maritime grasslands. This waste caused the beaches to be unnaturally raised until the Turning-The-Tide project was launched in 1997 to clean up the coast by removing millions of tonnes of this waste. Natural erosion of the sea cliffs is still occurring however, and is leading to the loss of the relic grasslands found on these coastal cliffs, meaning sympathetic management is essential to ensure that these grasslands can survive.

Whilst there is no commercial forestry activity within the Heritage Coast management area, the woodland that does exist at the mouths of the valleys or denes (known locally as gills), has some of the oldest and most natural woodland in the North East of England; for example, Castle Eden Dene NNR, which is the largest area of semi-natural woodland in north-east England, and renowned for its yew trees on magnesian limestone. Cut during the last ice age 10,000 years ago, the small wooded valleys following the course of streams through the cliffs and onto the beaches are again unique to Durham's coast and support a wide range of wildlife. Blue House Gill, part of The Durham Coast SSSI, a National Nature Reserve and a Durham Wildlife Trust nature reserve is also actively managed for its rich botanical wildlife.

Other sites of particular interest are; Cross Gill, Limekiln Gill, Hawthorn Denemouth, Warren House Gill, Whitesides Gill and Blackhill Dene. The main threats to this coastal habitat occur through vandalism (such as repeated fires) and general misuse of the area. Motorbikes also cause serious erosion and disturbance, and damage species-rich turf. Disturbance like this to habitat and wildlife compromises the conservation value of these important habitats; For example, in 1997 a fire occurred in the vicinity of one of the largest colonies of the Durham Argus butterfly removing much of the habitat required by that species to survive. The main threats to the Durham Coast however, are coastal erosion (the land is currently being lost at about 0.5m/year) and encroaching scrub, brambles, gorse and bracken on the cliff-top grasslands due to undergrazing.

Important habitats

Introducing the recommended management proposals set out below will contribute towards the delivery of the following national, regional and local Biodiversity Action Plans.

- *UK BAP Priority Habitats* – Lowland Meadows, Maritime Cliff and Slopes
- *Regional BAP Habitat* – Lowland Meadows
- *Durham BAP Priority Habitats* – Coastal Soft Cliffs and Slopes, Maritime Grassland, Magnesian Limestone Grassland

Important Species

Introducing the recommended management proposals set out below will contribute towards the delivery of the following national, regional and local Biodiversity Action Plans.

- *UK BAP Priority Species* – Skylark, Grey Partridge, Brown Hare
- *Durham BAP Priority Species* – Brown Hare, Skylark

Designations

Table 4.14: Site designations in the coastal project area

Site	Designation	Habitats	Condition
Durham Coast	SSSI, NNR, Heritage Coast, SNCI, SAC	Vegetated sea cliffs on magnesian limestone exposures.	Unfavourable Recovering/ Favourable
Castle Eden Dene	SSSI, NNR	Yew woodland on magnesian limestone.	Unfavourable Recovering
Horden Grassland	LNR	Magnesian Limestone Grassland.	Needs grazing management
Blackhall Grassland	LNR	Mosaic of grassland communities as a consequence of unique geology and maritime influence.	Needs grazing management
Limekiln Gill	LNR	Magnesian Limestone Grassland.	Needs grazing management

Potential barriers to management

The barriers to management are a lack of infrastructure, some of the land is in private ownership and it is difficult to say how amenable the landowners are. Anti-social behaviour is perceived as a major factor in introducing grazing along the coastal strip. Vandalism has been a problem with the interpretation on the coast and is a problem for fencing areas off as fences are frequently cut to allow access over the grasslands to the beach. Access is an important aspect of any management plan.

4.5.2 Management Proposals

Overall aims of the management proposals

To restore traditional field patterns and grazing management along the coastal strip in conjunction with species rich grassland restoration, creation and management of existing high value sites.

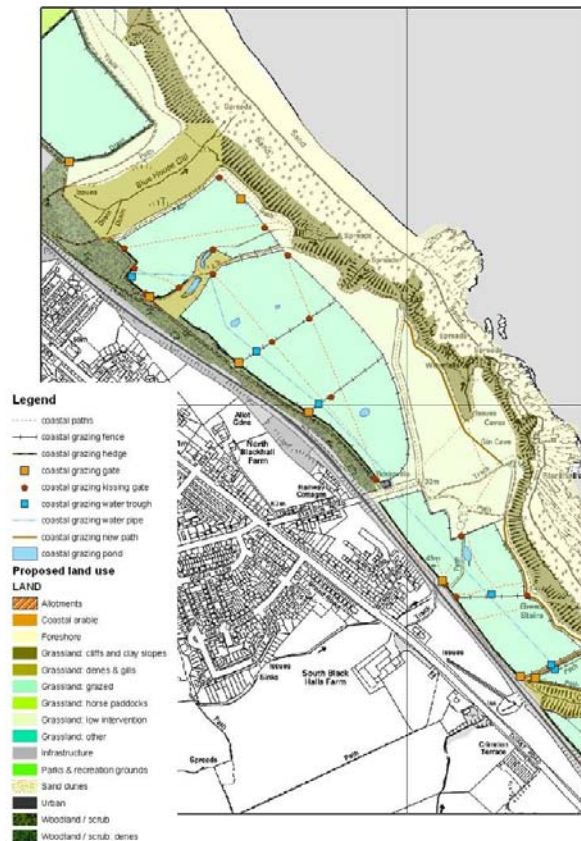
- No loss of access to existing footpaths and cliffs tops;
- Where possible historic field boundaries to be recreated;
- Field boundary hedges to be planted to enhance biodiversity,
- Stiles to be installed in field boundaries;
- Ponds to be created where possible to provide water for livestock, but drinking trough fed by mains to be installed in each grazing compartment.

Specifically the project aims to address the issue of erosion leading to the loss of the relic grasslands found on the coastal cliffs. Durham Wildlife Trust is working with partners to create the right conditions to allow coastal plant communities to retreat back as the cliffs erode, creating flower rich meadows along the coastal strip.

The project will also recreate some of the historic landscape features that existed before they were obliterated by the coal industry. Boundaries installed as part of the project will create a network of hedgerows and fences that follow field patterns of the 17th century.

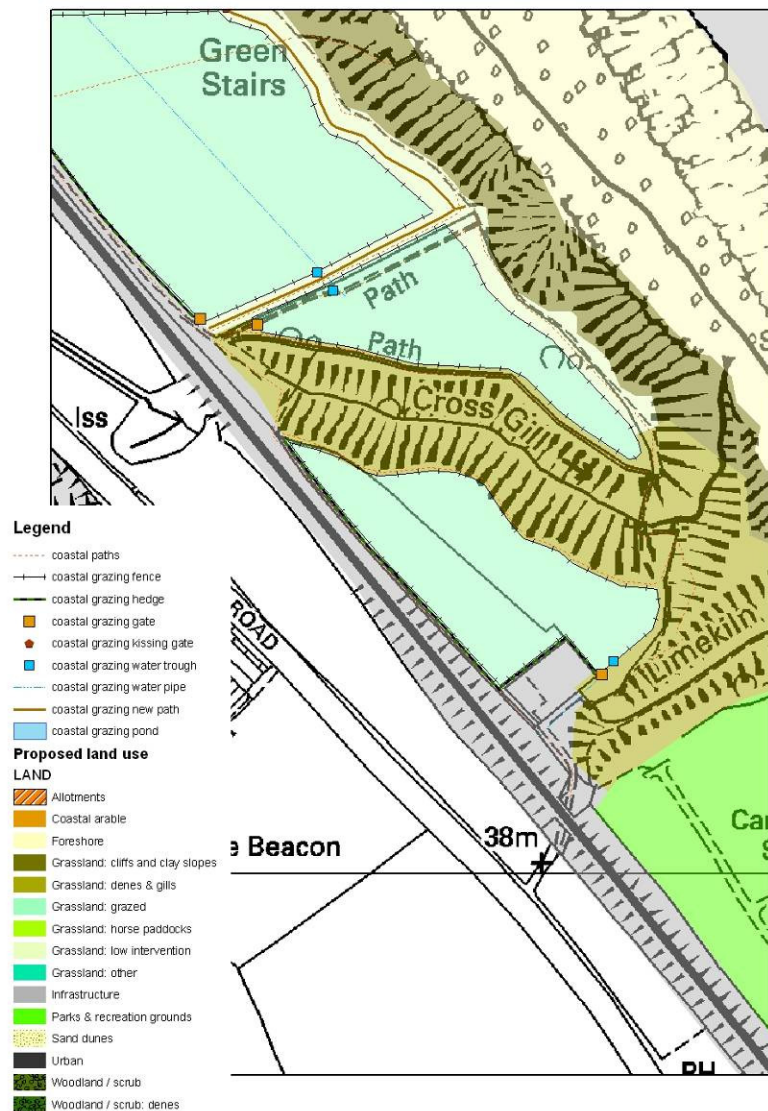
By creating stock proof enclosures and grazing native cattle a truly sustainable system of land management will be created on the Durham Coast, safeguarding the natural heritage of the area for generations to come and providing environment led regeneration for the communities along the coast. As part of the wider activities of the Coastal Grazing Group, funding has been secured to develop a marketing strategy to promote the produce derived from conservation grazing along the coast, helping to support local farmers. The biodiversity enhancements delivered by the implementation of the correct grazing regimes will also increase the landscape value of the coastal area and hopefully attract a greater number of visitors to the area.

Blackhall



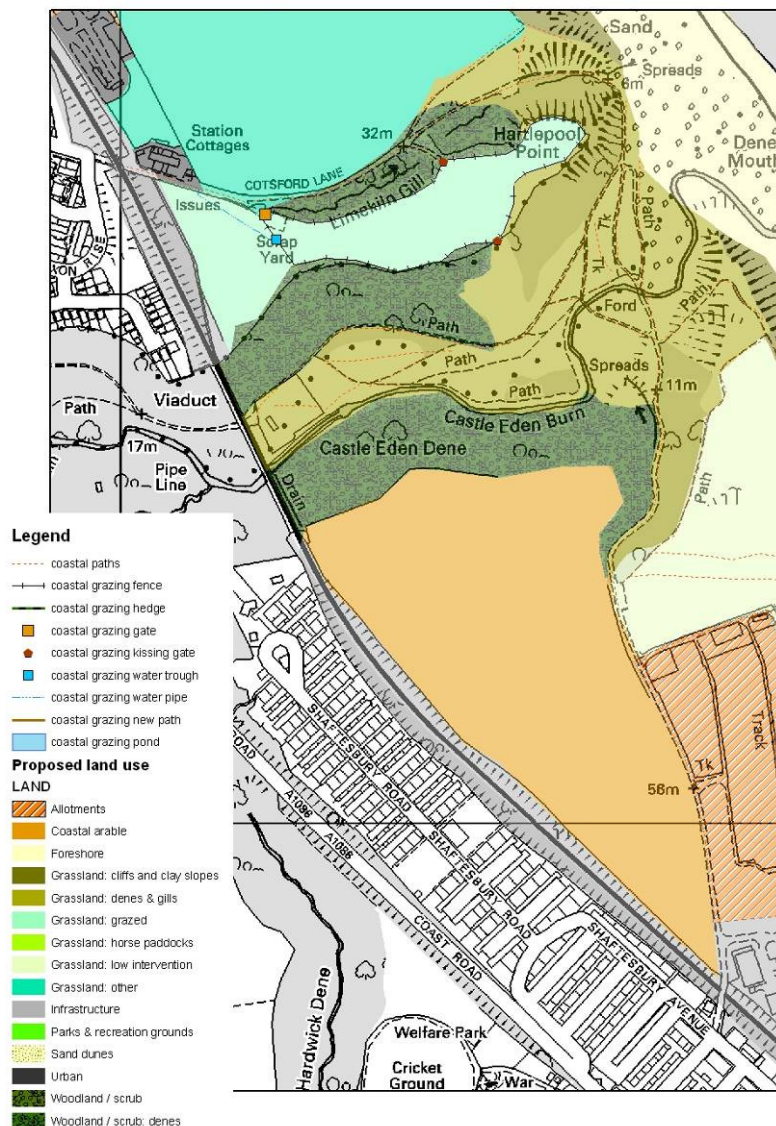
Existing woodland/scrub	4.5 ha
Proposed woodland /scrub	1.32 ha
Grassland: cliffs and clay slopes	8.20 ha
Grassland: denes & gills	5.79 ha
Grassland: low intervention	13.96 ha
Grassland: grazed	26.72 ha
Fence (m)	4251
Hedge (m)	1454
Kissing gate	21
Field gate	8
Water trough	5
New pond	4
New made path	1010
Notes	<p>Proposed woodland /scrub east off Blue House Gill optional & pending further survey otherwise remains low-intervention grassland.</p> <p>Additional works include extending existing car park and re-configuring coastal car park as viewing area.</p>

Blackhall South



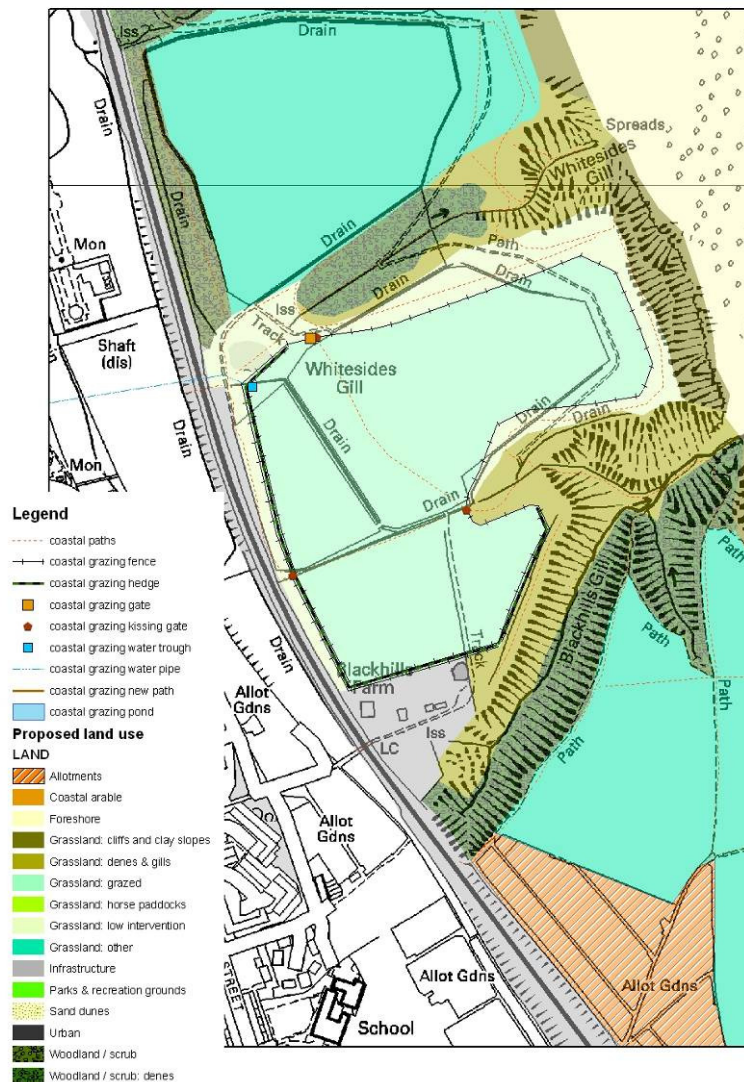
Grassland: cliffs and clay slopes		1.20ha
Grassland: denes & gills		4.04 ha
Grassland: low intervention		0.29 ha
	Northern compartment	Southern compartment
Grassland: grazed	1.10	1.46
Water trough	1	1
Water pipe	15m	67
Notes	Southern compartment detailed up in case works are required – currently subject to an existing agreement.	

Castle Eden Dene Mouth / Limekiln Gill



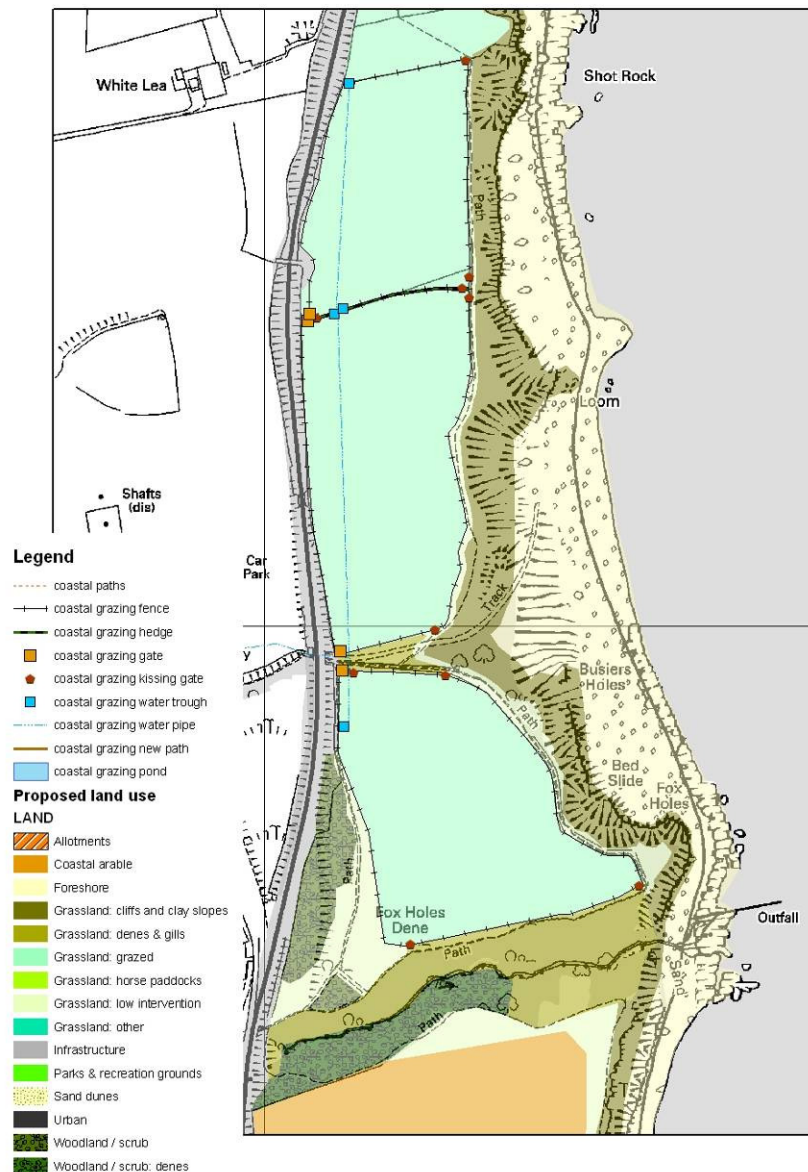
Existing woodland/scrub	6.96 ha
Grassland: denes & gills	11.48 ha
Grassland: grazed (2.23 proposed 1.29 existing)	3.52 ha
Fence (m)	869m
Kissing gate	2
Field gate	1
Water trough	1
Water pipe	124
Notes	

Horden Blackhills Gill to Whitesides Gill



Existing woodland/scrub	5.14 ha
Grassland: cliffs and clay slopes	1.6 ha
Grassland: denes & gills	6.77 ha
Grassland: low intervention	3.55 ha
Grassland: grazed	12.25
Fence (m)	2421
Hedge (m)	759
Kissing gate	3
Field gate	1
Water trough	1
Water pipe	285
Notes	Fencing could be reduced by 285m by single fence to hedge rather than double.

White Lea White Lea farm to Fox Holes Dene



Existing woodland/scrub	3.21 ha
Grassland: cliffs and clay slopes	8.00 ha
Grassland: denes & gills	4.08 ha
Grassland: low intervention	3.15 ha
Grassland: grazed	23.55 ha
Fence (m)	3528 m
Hedge (m)	207m
Kissing gate	10
Field gate	4
Water trough	4
Water pipe	1119 m

Potential Delivery Organisations

- Durham County Council
- Durham Wildlife Trust
- Heritage Coast
- Natural England
- The National Trust
- The Grassland Trust

4.6 Other projects outside main project areas (see Appendix N for maps)

Costs and projects in this section are provided by third parties and have not been checked by the consultants.

4.6.1 Cleadon Hills/South Tyneside Coast area

Table 4.15 Cleadon Hills projects

Site	Status	Grid ref NZ	Ownership	Project	Approx cost £k
Cleadon Quarry	Local Wildlife Site	388635	South Shields Golf Club	Remove gorse & treat with herbicide on magnesian limestone grassland site. 0.6ha @ £7k/ha. Install substantial fence/barrier and gate, to deter illegal vehicle access to LWS and prevent flytipping, arson and limestone wall theft. 80m @ £20/m plus gate £500.	4200 2100
South Shields Golf Club		392640	South Shields Golf Club	Repair and re-instate limestone walls to maintain favourable habitat for common lizard (and landscape feature). 200m @ £40 m. Create mixed native hedgerow say 200m @ £14/m, including fencing etc.	8000 2800
Cleadon Hills Farm		392629	Church Commissioners	Existing small great-crested newt population. Carry out renovation and enhancement to a series of small ponds and associated habitat management over 12ha. Excavator hire, fencing, vegetation management etc	5000
Marsden Limekilns (& Lizard Lane cutting LWS)	Local Wildlife Site	402645	Church Commissioners	Eradicate Japanese knotweed from two LWS. Substantial stands are currently threatening the two sites, both magnesian limestone grassland. 4 year herbicide treatment plan – two treatments in year 1, one treatment in years 2, 3 and 4. 0.7ha @ £600/ha	2100
The Leas, including Rocket Green	Local Wildlife Site	390660	National Trust	The Leas is a substantial area (85ha) of grassland with communities ranging from high quality magnesian limestone grassland to amenity grassland with calcareous/coastal elements. It is likely that its ecological potential is not being fully realised. To address this carry out a detailed review of ecological management priorities to include survey work as required. Implement action eg management of tor grass <i>Brachypodium pinnatum</i> at Rocket Green, plus measures to increase diversity across the Leas.	3000 5000

Comments from the consultants on Cleadon Hills/South Tyneside projects

No concerns raised by consultants

4.6.2 Sunderland projects

(Figures in Appendix N)

Table 4.16 Sunderland projects

Copt Hill	Quantity	Cost (£)	Notes
Grassland restoration and creation 15ha: stock fencing	610m	10,000	Council land. Partners: Friends of Copt Hill community group; Rights of Way Officer; Landscape Team.
Grassland restoration and creation 15ha: selective weed and scrub control		4,500	
Grassland restoration and creation 15ha: cut, rake, scarify and seed		2,200	
Access: path upgrade	40m2	3,800	
Access: path creation	1330m2	13,600	
Access: gates and barriers	50m/4no.	5,200	
Archaeological monitoring and survey (public event)		10,000	
Geological exposure		500	
Tree and bat surveys		1,200	
Interpretation/signage		1,700	
Contingency/fees		5,300	
Site Total		58,000	
Houghton Ridge			
Grassland and geological restoration 8ha: weed and scrub control		8,000	Council and private land. Partners: landowners; Landscape Team; RoW Officer; Friends of Hillside Cemetery
Access: paths/furniture	150m/4no.	2,500	
Hedgerow development		2,000	
Species survey: flora; invertebrates		1,500	
Contingency/fee		1,400	
Site Total		15,400	
Warden Law			
Grassland restoration 4ha: weed and scrub control		2,300	Council land. Partners: tenant; Landscape Team; RoW Officer
Wetland restoration: excavation		1,300	
Access: paths, furniture and fencing	300m/4no.	1,800	
Species survey: invertebrates, amphibians		1,000	
Contingency/fee		600	
Site Total		7,000	
Ford Quarry and South			
Grassland and geological restoration 5ha: weed and scrub control		9,000	Council land. Partners: Landscape Team
Grassland creation and restoration 5ha: cut, rake, scarify and seed		3,500	
Access: paths, furniture and fencing	400m/3no.	1,800	

Species survey: flora, invertebrates		1,000	
Contingency/fee		1,500	
Site Total		16,800	
Fulwell Quarry			
Grassland and geological restoration 12ha: weed and scrub control		7,000	Council land. Partners: Landscape Team; RoW Officer; Grasslands Trust
Grassland creation and restoration 12ha: cut, rake, scarify and seed		4,500	
Access: paths, furniture and fencing	800m/5no.	2,800	
Species survey: flora, invertebrates		1,000	
Contingency/fee		1,600	
Site Total		16,900	
Overall total		114,100	

Comments from the consultants on Sunderland projects

Wildflower grassland seeding

We have a concern that the use of seed at Ford, Fulwell and Copt Hill may not be the most appropriate option. Certainly the option of green hay spreading should be considered first (and see **section 4.8.3**). At Fulwell Quarry seeding may not be necessary given the proximity of the adjacent good quality habitat. With patience and management re-colonisation should occur naturally and this would be a preferable option.

Warden Law

A concern we would raise is the proposal for pond restoration and excavation at Warden Law. In the view of the consultants there are already several ponds present which are developing into fen habitats, and these should be allowed to do so. This is one of the better wetland sites in the area and does need management – ideally grazing. Any new pond should be excavated only on species poor habitat, after careful consideration of the implications for hydrology.

4.6.3 Land north of High Moorsley escarpment

This area of fen is just outside the project area boundary and technically on the coal measures but influenced by base-rich water emerging from below the Magnesian limestone escarpment. It is a large rank unmanaged M27 / OV26 stand of 2.6ha with drains that could be blocked. There are some interesting historical wetland plant records for this general area in Graham (1988). The site should be brought within the HLS agreement held by the landowner of the adjacent arable fields and Moorsley Banks SSSI. **Restoration** of lowland fen. Possible HLS scheme.

4.8 Overarching themes and projects

4.8.1 Grazing management

Grazing is a crucial and major component of any conservation management of grassland and fen sites. The difficulty for those managing these sites has been the lack of access to, and control over, appropriate stock for appropriate periods of time, particularly on small or hard to reach sites.

It has been possible on some larger and more accessible sites to make local arrangements for grazing with neighbouring farmers. Sometimes these arrangements work well, but often there is not as much control over timing as land managers would like, and the type of stock available is not always suited to the conservation objectives of the site.

Various solutions to these problems have been attempted in the north-east in the past but, with some localised exceptions, none have so far proved to be sustainable in the long term.

The current situation

Currently there is a community interest company called Flexigraze which provides grazing services to land managers in the North-east. In addition a number of land managers make their own arrangements for grazing with neighbouring land managers and farmers.

Flexigraze

Flexigraze is based at and hosted by Northumberland Wildlife Trust, and offers a service to members who join which includes:

- advice on stock type, timing of grazing, stock numbers and site infrastructure
- provision and transport of stock (charged at a stock/day rate)
- insurance for stock (either through Flexigraze or a third party owner)

Members need to provide the grazing infrastructure and some regular site presence to look out for stock. Members pay for grazing management on a head of stock per day basis as well paying a nominal annual membership fee.

Flexigraze was set up to serve the interests of conservation organisations across the north-east. However take-up of the scheme is patchy, and this limited support threatens its long term future. At one end of the scale Northumberland Wildlife Trust effectively uses Flexigraze as the grazing contractor for all of its sites, freeing up time for the Reserves Manager and taking advantage of the experience of the Flexigraze officer. Take up for the scheme in Durham, however, has been low.

Durham Wildlife Trust – East Durham Beef

Durham Wildlife Trust is establishing conservation grazing on large areas of land in partnership with the National Trust and aims to market 'East Durham Beef' as a

product of this scheme. Grazing will be provided by a local farmer/entrepreneur with a butcher's shop.

DWT aims to provide a sustainable grazing solution for land on the coast and to share any income from the sale of beef with the grazier.

Discussion

The ability of Flexigraze to establish an income to sustain its services is affected by the independent activities of other land managers, some of whom are, and many of whom might be members of Flexigraze. Because Flexigraze charges on a head of stock per day basis and because large areas of land requiring large numbers of stock/days are both relatively expensive to graze this way and relatively easy to graze using existing contacts with neighbouring landowners, Flexigraze loses out on income from these large areas of land and are left only with income (and higher expenditure) from the smaller, harder to graze pockets of land.

This situation, in which the community interest company set up to help land managers find appropriate grazing for all their conservation land is denied the income from the easier to graze sites and left with the more expensive to graze smaller sites, is not sustainable and clearly, therefore, not in the long term interests of grassland and fen conservation. A sustainable solution which covers all sites, however difficult to graze, would have to ensure that the cost of providing grazing on these more difficult sites is subsidised, preferably by the income from grazing and related meat marketing on the easier to graze sites.

Channelling all conservation grazing on publicly owned sites through a community interest company such as Flexigraze would allow cross subsidisation of the harder to graze sites, by those which were relatively straightforward and cost effective.

Obvious difficulties with this solution include the resistance to paying for grazing by organisations which have relatively large sites (and who have found local grazing solutions) and relatively few small sites (where solutions have not been found).

Recommendations

Given the number of potential grazing projects in the DMLP which are small and difficult to graze, and given the lack of expertise even amongst ecologists as to the best stock and timing required to achieve the desired results, we recommend that the Limestone Landscape Project buys in the expertise of the Flexigraze officer to co-ordinate conservation grazing across the area for the duration of the project on a two days per week basis. This would give us confidence that this essential component of grassland and fen management was being undertaken with the best advice.

In the longer term we would hope that all land managing partners in the Limestone Landscape Partnership would be members of Flexigraze and using the service for all grazing land. At this point if the pricing structure was right there would be no further need for the subsidy.

Ideally DWT could be persuaded to join in fully with Flexigraze, and for their coastal grazing scheme to form part of the Flexigraze workload. If this were the case then

any surplus could perhaps be shared between DWT and Flexigraze (which is also involved in meat marketing). Any surplus generated by Flexigraze would lead to reduced costs of grazing units for all members.

This is a political issue which the biodiversity community in the North-east needs to resolve in order to better conserve the smaller grassland and fen sites which are typical of the DMLP.

The approximate costs to have Flexigraze officer support over the three years of the project would be in the region of £60,000

4.8.2 Quarry restoration

There are currently 515.8ha of active quarries and 319.2ha of dormant quarries in the DMLP.

As part of the consultation process for this report the three largest quarry owners in the area were contacted; ie Lafarge, Sherburn Stone and Tarmac. Responses were received from Lafarge and Tarmac and follow up meetings were arranged with the relevant officers.

Lafarge are the owners of Thrislington quarry which is situated in the Escarpment Ridge Project Area. The current site restoration plan proposes around 80 ha of magnesian limestone grassland creation and the proposed eastern extension will add further area to this. As part of the proposed extension the area at Rough Furze is to be managed as part of the NNR and an arable field to the north is to be restored to magnesian limestone grassland.

Tarmac own a number of quarries in the DMLP including Cornforth East, Coxhoe, Hawthorn and Old Quarrington which also offer a significant area of potential magnesian limestone grassland recreation in the restoration plans.

Both Tarmac and Lafarge see seed sources as the major hurdle to their proposed restoration schemes and in principal are happy to help with any proposed seed growing projects or any other projects to help to address this issue for the future.

4.8.3 Seed sources for grassland restoration and creation

Magnesian limestone grassland is a key habitat feature of the DMLP and includes all the remaining examples of the internationally unique grassland community CG8²². Seeds used for creation or enhancement of Magnesian limestone grasslands should be of native origin and from a local source within the DMLNA. This poses problems for habitat creation work given the limited number of suitable sites for seed collection and the sensitivity of collecting from these sites. There are only approx 225ha of Magnesian limestone grassland in the DMLP a large proportion of which are confined to steep slopes and not suitable for seed collection.

There are currently no commercial sources of local provenance seed for this area. To obtain local provenance seed for magnesian limestone grassland it must be collected from an existing site and all known existing sites in the DMLNA are protected by law through various designations.²³

Guidance on best practice for collecting seed, contract growing seed, buying seed (where this is agreed to be acceptable), and appropriate seed mixes for different communities is available in the MAGical Meadows technical advice note *Seeds for Magnesian limestone grassland*²⁴, which also includes further references. This best practice must be followed.

As a supplement to that guidance we include here a list of sites which are potential seed or green hay collection sites

Magnesian limestone grassland

Thrislington (LeFarge has offered assistance)

Hawthorn Dene grassland (DWT)

Raisby (DWT)

Town Kelloe (DWT)

Wingate Quarries LNR (DCC)

Ferryhill Carrs LNR (DCC)

Crow Trees LNR (DCC)

Little Wood LNR (DCC),

Coxhoe Bank Plantation LNR (DCC).

Hylton Castle Pasture (Sunderland)

Neutral grassland (lowland meadow and pasture) is even rarer in the DMLP than its limestone equivalent. The same best practice applies to seed collection; however there may be regional provenance seed available commercially which is suitable for habitat creation in some instances.

Lowland meadows

The following sites have possibilities for seed collection/harvesting

Ferryhill Carrs LNR, (DCC) (large area of MG5, now managed by annual cutting),

Rainton Meadows LWS (DWT),

Aycliffe Nature Park (DCC),

Cotman Gardens (South Tyneside),

Tilsheds LNR (Sunderland),

Pesspool Lane Ponds LWS (private - sympathetic farmer)

4.8.4 Agri-environment funding

Much of the Limestone Landscapes project area is privately owned farmland. Farmers and landowners can apply to Natural England for grants to help supplement the cost of biodiversity work on their holdings. The latest agri-environment scheme from Natural England is Environmental Stewardship. The primary objectives of which are to:

- conserve wildlife (biodiversity)
- maintain and enhance landscape quality and character
- protect the historic environment and natural resources
- promote public access and understanding of the countryside
- protect natural resources.
- The secondary objectives of Environmental Stewardship are:
 - genetic conservation
 - flood management.

Environmental Stewardship consists of three strands;

Entry Level Stewardship which is open to all farmers and requires a low level of works for a relatively low payment which is paid across the whole farm area.

Organic Entry Level Stewardship (OELS) is the organic strand of ELS. It is geared to organic and organic/conventional mixed farming systems and is open to all farmers not receiving Organic Farming Scheme aid.

Higher Level Stewardship is a much more targeted scheme and is now only open to those who have been invited to apply by Natural England, this scheme requires a much higher level of management but in return attracts higher payments.

The targeting of Higher Level Stewardship is set in targeting statements which are produced by Natural England and are regionally distinct. There is a targeting statement for the 'Durham Magnesian Limestone Target Area'²⁵ This targeting statement sets out the land management activities that applicants must perform in order to apply for the scheme, these are;

Maintain/Restore/Create the most important areas of the following important habitats: limestone grassland, wet grassland, fen, reedbed, native broadleaved woodland and maritime cliff and slope.

Arable Birds: Provision of nesting habitats, summer food and winter food wherever three or more of the following arable birds species occur – lapwing (breeding), grey partridge, yellow wagtail, tree sparrow & corn bunting or (with strong supporting evidence) the holding is known to support important regional breeding populations for any of these species.

Positive management of visible and below ground archaeological and historic features that are assessed as a priority in the region, such as prehistoric crop marks, bronze age ritual sites, and medieval settlements with ridge and furrow field systems, reducing cultivation depth on vulnerable below ground

archaeological sites or taking them out of cultivation, and maintaining prioritised historic features under permanent grass.

Protect, maintain and restore historic landscapes and their features, where they are assessed as a priority in the region, such as the proactive maintenance or restoration of structures or features that make a major contribution to the design intentions or feel of registered parkland, and provide for their biodiversity and amenity value.

Maintain or restore historic buildings that are assessed as a priority in the region.

Create new permissive access where there is identified demand or need to link people with places, creating better opportunities for people to access the coast and immediate countryside around built up areas, enhance the existing rights of way network, and/or provide opportunity to improve people's understanding of the farmed environment through educational access.

Some of the Limestone Landscapes project area lies outside of this primary target area and is therefore subject to a regional theme statement²⁶ for non target areas. The most relevant themes in respect of this document are summarised below, applicants must contribute to at least one theme:

Theme 1: Improving the resilience of Nationally Important (UK Biodiversity Action Plan) habitats to climate change: Natural England will consider applications offering to maintain and/or restore/link/buffer 'significant'¹ areas of priority habitats outside Target Areas. We are especially interested in **lowland heathland** sites in Northumberland and Durham, **woodland pasture**, and other areas of **species rich grassland** not otherwise covered by target areas.

Theme 2: Reversing the decline of farmland birds : Natural England will consider applications that will provide a package of ELS/HLS options² capable of delivering the most appropriate management possible within **Nationally Important Farmland Bird Hotspots**³ defined as areas supporting (a) 3 or more of the following range restricted arable birds: **grey partridge; corn bunting; lapwing; sparrow; yellow wagtail** OR (b) 3 or more of the following breeding range-restricted wet grassland species: **lapwing, redshank, curlew, snipe, yellow wagtail** OR (c) (with strong supporting evidence) important regional breeding populations for any of the above species particularly in areas of arable or mixed farming in East Durham, South East Northumberland and the Saltburn area (Redcar & Cleveland).

Theme 3: Securing the recovery of UKBAP species outside of UK BAP Habitats. Natural England will consider applications offering to maintain/restore/create appropriate habitat for the following rare & rapidly declining UKBAP species outside of areas of UK BAP habitat: rare arable plant species.

Theme 8: Improving people's enjoyment & understanding of the farmed environment: Natural England will consider applications offering to enhance or improve access and recreation¹⁰ (where it can be shown that (a) there is identified demand or need and (b) where it will link people with place or (c) where it will enhance existing networks and/or provide opportunity to improve

the public's understanding of the farmed environment through educational access visits.

Table 4.17 below shows the uptake rates of Environmental Stewardship in the Limestone Landscapes project area up to 2006. In addition to this there were 55 Countryside Stewardship Schemes covering 2577.13 Ha within the project area. Countryside Stewardship was the predecessor to Environmental Stewardship and as these schemes come to an end it is likely that they will go into either Entry Level or Higher Level Stewardship.

Table 4.17. Agri- Environment Scheme Uptake (up to 2006)

SCHEME	Area Ha	No of Agreements
Entry Level plus Higher Level Stewardship Total	899.28	7
Entry Level Stewardship Total	9063.08	106
Higher Level Stewardship Total	88.92	3
Organic Entry Level Stewardship Total	91.58	3
English Woodland Grant Scheme	473.7	unknown
Grand Total	10616.54	119+

English Woodland Grant Scheme (EWGS)

EWGS is part of a suite of environmental support measures provided by the Defra family. The Forestry Commission operates the scheme under the Rural Development Programme for England (RDPE). The purpose of the scheme is to develop the co-ordinated delivery of public benefits from England's woodlands. The grant scheme has a national framework but funding is allocated and grants targeted at regional level.

The overarching objectives for EWGS are:

- to sustain and increase the public benefits derived from existing woodlands in England
- to invest in the creation of new woodlands in England of a size, type and location that most effectively deliver public benefits.

The component grant types of EWGS have their own objectives. Some grants are focused regionally to meet the priorities of Regional Forestry Framework action plans, and the objectives are specified more closely to suit.

Applications for grants under EWGS will be considered if they deliver key targets in the areas of:

- area of woodland under certified sustainable forest management and approved management schemes
- expanding the area of woodland with public access
- bringing woodland SSSIs into favourable condition
- assisting delivery of Priority Habitat and Species Action Plans for woodlands
- improving the environment of disadvantaged urban communities
- woodland creation.

A number of other funds can be used to match EWGS grant rates in order to make creation schemes more attractive to landowners.

4.9 Management proposals summary

Table 4.19 Showing BAP target delivery where estimated for Project Areas

Costed project summary				BAP targets (ha)																
NOTE: other un-costed recommendations appear in the text				MLG			LMP			Fen			Wood			Pond			Heath	
Plan ref	Project Name	Outline	Approx cost	AC	R	E	AC	R	E	AC	R	E	AC	R	E	A	R	E	A	R
5.1	MG4 restoration project	3 year grassland restoration project	£120,000					x												
5.1	MG4 scoping (alternative)	survey and bid for restoration project	£5,000					x												
4.1	Escarpment Ridge Area Projects	All projects	£521,000	7	4		6	8	5	8	4		21		15	4		1		
4.2	Escarpment Spurs Area Projects		£515,000	50	11	15		2			3	1	15					1		
4.3	Central Clays Area Projects		£276,000		2		2	19		1	10	2	15		5		1	1	6	
4.4	Coastal Dene Projects	Total	£606,000																	
4.5	Coast Area Projects		Uncosted																	
4.6.1	Cleadon Hills Projects		£32,000																	
4.6.2	Cleadon Lea Projects		£26,000																	
4.6.3	Sunderland Projects		£114,000																	
4.8.1	Grazing support		£60,000																	
Key:				MLG: Magnesian Limestone Grassland; LMP: Lowland Meadows & Pastures; Fen: Lowland Fen; Wood: Native Woodland; Heath: Lowland Heath AC: Achieve condition; R:Restore; E: Expand																

5. Further Survey

There is an ongoing need for up-to-date survey information for all the habitats. We have also identified a specific need for survey work to locate and safeguard a particular grassland community which may have been overlooked in previous survey effort.

5.1 MG4-related, tall herb fen vegetation MG4

During a survey of fen and wetland sites in the DMLP area for the Durham Biodiversity Partnership in 2007, a type of species-rich tall herb fen vegetation with obvious floristic similarities to MG4 (NVC classification²⁷) was found at 8 different sites. This community has not been previously recorded from this area and has clearly been overlooked. The following recommendations include extracts of text from a report by Ptyxis Ecology which is included in **Appendix G**.

The vegetation in this community is dominated mainly by tall herbs with a smaller amount of coarse grasses and is by far the most species-rich type of tall herb fen vegetation found in the 2007 survey. The contractors reported that the vegetation was clearly of conservation significance, although most of the stands were suffering from neglect and becoming overgrown.

The 2007 survey focussed on wetland sites rather than grasslands and it is thought that there may be sites with remnant MG4 communities, formerly managed as hay meadows but recently maintained as pasture by horse-grazing. Hopefully some of these grasslands will have retained some of their characteristic species and they may be restorable to some extent by re-instating hay meadow management. Other types of rank unmanaged wetland vegetation in this area may also have potential for restoration to MG4-type.

In our opinion and the opinion of the contractors most or all of the stands of this type of vegetation found in the Durham fen survey have developed from species-rich floodplain grassland (MG4) that was managed in the past by grazing or cutting or a combination of both. The restoration and conservation of these grasslands in the DMLP should be regarded as a high conservation priority.

5.1.2 Recommendations

There are two options to consider to take this work forward. The first is to undertake a full restoration project with a project officer whose role would include

- initial survey work
- liaison with landowners
- developing a restoration methodology
- contracting and supervising restoration work
- ongoing monitoring of results
- second stage restoration
- promotion and publicity

This is likely to be a full time role, at least for the initial two years of the project when a lot of work will need to be done with landowners and in setting up donor criteria and monitoring procedures. Approximate costs for this project would be in the region of **£120,000**

An alternative approach would be to support initial survey work, to include a desk-top study to establish the whereabouts of further sites worthy of investigation, to provide full NVC survey of all potential sites, and management recommendations for all sites deemed restorable. An initial list of potential sites for survey is provided in the report in **Appendix G**.

Subsequently a fully costed bid for habitat restoration project should be developed to undertake the restoration work recommended. Costs for this initial report and bid option are estimated at approximately **£5000**

6. Community Engagement Opportunities

Conservation of biodiversity, particularly in a semi-urban and well-populated landscape such as the DMLP cannot be achieved by conservation bodies in isolation. It requires the active and tacit support of local people as site users, land managers, volunteers and simply as tax-payers and voters.

Conservation requires that people appreciate the intrinsic value of biodiversity and have an awareness of its importance in a national, regional and local context. It requires that people have an understanding of how habitats have developed in the landscape, of the lives of species which inhabit them and how our lives impact on them.

It is also important that sufficient people living locally also have the skills and knowledge to properly look after the special wildlife and habitats in this landscape. Accordingly we divide this section into awareness raising, interpretation and training.

As ecologists we have restricted ourselves to outlining projects which we feel will meet the objectives outlined above, and providing detail for those projects only when they require an ecological input. Others with more expertise in event management and interpretation, for example, will be able to take these ideas further.

6.1 Awareness raising

Two area-wide projects are proposed below, both of which are tried and tested methods of raising the profile of an area and its special qualities amongst both residents and visitors. These are not biodiversity projects, per se, but will be important in raising the levels of pride in the special qualities of this Natural Area and helping to give an identity to the DMLP on the map and on the ground. Both create opportunities for interpretation of the physical, cultural and natural landscape.

The requirement for further, specific, awareness raising initiatives are noted at the end of this section.

6.1.1 Annual Limestone Landscapes Festival

The unique geology, biodiversity and cultural heritage of the Durham Magnesian Limestone Natural Area is generally recognised only by a small group of experts and enthusiasts. The challenge is to spread that level of expertise and to spread the enthusiasm for this landscape to the wider public both within the area and the region and further afield.

An annual festival of walks and workshops which celebrates and interprets special qualities of an area is a regular feature of many protected areas. We use experience from the North Pennines AONB Partnership, who have organised the Northern Rocks festival since 2004, as a basis for this proposal. A case study is given in **Appendix K**.

Outline proposal

We propose an annual fortnightly festival in the middle two weeks in June to showcase the special qualities of the Durham Magnesian Limestone Natural Area - A series of interpretive events, walks and open days led by experts in their field, appealing to a wide range of audiences, advertised widely and free to all.

Timing

The timing of the festival should be designed to show off the best features of the area. Given the constancy of the geological and historical features it is the biodiversity which is most likely to determine the timing. Flowering plants will be the most important consideration as they form the most obvious visual evidence of diversity, although the emergence of certain butterflies and moths, glow worms etc., may also have a bearing on the dates and length of any festival.

It might be unwise to clash with the neighbouring Northern Rocks festival (last week in May, first week in June) as some of the same walk leaders are likely to be used for some events, and publicity may be diluted from two similar festivals taking place at the same time every year.

The length of the festival will depend on the number of events planned and the resources allocated to this project, but a longer festival will allow a longer time to cover different biological events and allow for seasonal variation.

We suggest a fortnight festival during the middle two weeks in June. This should coincide with many of the area's most visible flowering plants but also with some of its most obvious invertebrates, including

Northern Brown Argus – flies early June to mid August

Glow worm – display from early to mid June

Dingy Skipper – flies early May to end June

Whatever the timing, it is inevitable that some key flowering species will be missed. For example Blue Moor grass flowers early in April/May and Dark Red Helleborine in July. It may be possible to have one or two outlying events to enable some habitats to be seen at their best, but publicity around the festival may lose impact if it is too spread out.

Types of events and leaders

Guided walks as part of the festival should use the best available leaders to establish and maintain the reputation of the festival as a high quality event.

Given the proximity of some important sites to each other, and the network of railway tracks and quiet roads which exist in parts of the area, consideration might also be given to guided cycle tours with experienced guides. Tours in vintage vehicles for the less mobile have also proved popular in other areas.

Arts events which encourage a closer look at flora and fauna could also be staged.

The experience and knowledge of the assistant leader is also a key element in the success of these events, and care should be taken to ensure a broad spectrum of expertise between leader and assistant.

Audience and promotion

Consideration should be given to establishing a mailing list of interested parties at an early stage as part of any promotion of the festival. This should target recruitment of individuals involved in all the Friends of LNR Groups, all conservation volunteer groups with NGOs, existing natural history groups as well as targeting the groups themselves to promote the festival. Consideration should also be given to targeting groups and individuals outside of the DMLP. The popularity of the festival with an outside audience is likely to raise the status of the festival in the eyes of local residents.

Venues and subject areas

This would be an essentially outdoor festival, and so venues would just need to be starting (and ending) points for walks and tours. Car parking and nearby toilet facilities are the only essentials in addition to the features of interest themselves.

Venues and subjects for guided walks and open days are probably best chosen by the leaders themselves, who should take some responsibility for checking routes and facilities beforehand. Subject matter should stay within the chosen theme for the festival – along the lines of the cultural and natural history of the DMLP.

A consistent message for the festival needs to be developed and taken on board by all walk leaders and assistants, as well as in the promotion of the festival. See Interpretation section below.

Organisation and costs

The majority of the cost of the festival will be in the staff time to organise and promote the festival. A small cash budget of approximately £5000 should be sufficient to cover the costs of a promotional booklet and expenses and fees for walk leaders. Back markers or assistant leaders for the walks should be recruited from partner organisations and can genuinely be promoted as part of continuing professional development.

For a festival with approximately 40 events each year, approximately 40 staff days should be allowed for event co-ordination, press, promotion and administration. Clearly in the first year of the festival, more time will be needed to check all the walks and venues and to recruit suitable walk leaders.

Co-ordination work includes an early (autumn the previous year) booking of events and leaders, risk assessments and risk control, booking transport, quality control (ensuring a consistent message for the festival), taking bookings, promotion and publicity, training for back markers, organising feedback forms and assessing feedback.

Unlike in protected landscapes, there is no one organisation with a brief to promote and protect the DMLP, and therefore to co-ordinate such a festival. The role played by the North Pennines AONB staff unit for Northern Rocks (see **Appendix J**) would have to be shared between the host organisation for Limestone Landscapes and its partners, many of whom have experience of organising events throughout the year in this area.

It would seem appropriate to have a steering committee made up of all the organisations involved in interpreting biodiversity, geology and the historic environment to develop the festival programme and to delegate other tasks.

The most effective system would be for one partner organisation to handle these delegated tasks, including budgeting, risk assessment, insurance, bookings and publicity. However the tasks are delegated, the key elements, over which a steering group must exert control, are:

- Good co-ordination
- Effective promotion
- Quality control
- A consistent message

The first steering group should convene at least 10 months before the first festival.

From the biodiversity side, the main organisations with a current interest in interpreting biodiversity are:

- Durham Wildlife Trust
- Durham Heritage Coast
- Durham County Council
- Natural England

South Tyneside Council
Sunderland Council
Hartlepool Council
Butterfly Conservation
RSPB
Durham Bird Club
The Grasslands Trust

Commitment from all organisations with an interest in the area to the longevity of this festival should be sought at an early stage in the project, and continuation funding sought. The involvement of local people in a festival organisation or committee, perhaps taking over from the steering group at some point, may be the start of a longer term strategy for engendering pride in the area's special qualities.

6.1.2 The Magnesian Limestone Way

We propose the creation of a new long distance footpath using existing rights of way which stretches approximately from South Shields to the Bishop Middleham area with a link back to the Durham Coastal Path. The new Magnesian Limestone Way would be a vehicle for the promotion of the Durham Magnesian Limestone Natural Area as a geographic entity and to promote its special qualities to both local people and visitors to the region. The effectiveness of this route as an awareness raising tool will depend on the resources allocated to its promotion, the clear interpretation of key sites, its long term maintenance, and on the design of an attractive route.

Status of route

The route should at least have the status of a Recreational Trail. To be recognised as a Recreational Trail by the Ordnance Survey for inclusion on their maps the route would have to meet the following criteria:

- Minimum length 10km for inclusion on Explorer (1:25,000) maps

- Minimum length 40km for inclusion on Landranger (1:50,000) maps.

- It should be fully and distinctively waymarked.

- It should be supported/endorsed by all local authorities covered by the route.

- It should be supported by a guidebook or detailed mapping to enable accurate plotting of the route.

- Ordnance Survey also needs a named contact to keep them informed of route amendments as they occur.

The possibility of the route becoming a National Trail like the Pennine Way or the Hadrian's Wall Path should also be pursued with Natural England. As the proposal stands the Magnesian Limestone Way would be a similar length to many of the National Trails such as the Yorkshire Wolds Way (79 miles / 127km).

National Trails are promoted by Natural England and so far all of these routes pass through protected landscapes (National Parks or AONBs). However the ability to promote a Natural Area and interpret its biodiversity as a coherent unit, the fact that the route passes through or near to three NNRs and twelve LNRs, and the large local catchment for healthy walking initiatives, all fit well with Natural England objectives and could prove attractive as a mould-breaker. The Magnesian Limestone Way could become the first National Trail to describe a Natural Area rather than a Protected Area.

nationaltrails@naturalengland.org.uk; Shiela Talbot, National Trails Specialist at NE

Other local routes

There are already several long distance paths in and around the East Durham area, including the Wear Valley Way, Durham Coastal Path, and several Great North Forest Trails.

The Marine and Coastal Access Act came into force on 12th November 2009, which means that a high quality coastal walking path around the whole of the English coast should be in place within 10 years, according to Natural England. On the Durham Coast, much is already in place.

It is proposed that the Magnesian Limestone Way (MLW) would complement and combine with the Durham Coastal Path and any future coastal footpath by following the escarpment and returning to join the coast in the south of the area, thus forming a circular route.

Currently a number of Great North Forest trails in the northern part of the DMLP are shown on OS Explorer maps, but no longer have a sponsor organisation. It is proposed that these are removed from future editions of OS maps, to rationalise routes and to remove responsibility from the local authority, as part of the conversation with Ordnance Survey.

There is currently no unifying route for the DMLP and the MLW is a relatively simple opportunity to create a vehicle for promoting both the extent and the quality of the Natural Area through an interpreted and guided route which visits many of the most important geological, cultural and natural historical sites on its way.

Route development and maintenance

The route proposed is entirely along existing Rights of Way or roads, except for the section through Castle Eden Dene NNR. Therefore no new routes are required to establish the trail. However an early conversation with Sunderland City Council highlighted a desire to look creatively at the path network where it crosses the A690 north of Houghton-le-Spring, with the possibility of new RoW being created. This could be looked at as part of the development of a long distance trail.

Expenditure is likely to be required on all sections of the route in terms of surfacing and crossing points to bring the whole route up to a good standard and to allow the route to be actively promoted. In addition the route will need to be waymarked with a distinctive sign.

Costs for this stage of the work will include:

- survey work and consultation with landowners and tenants to finalise a route
- inventory of remedial surfacing works and renewed crossings
- execution of remedial surfacing works and renewed crossings

Local authority Rights of Way officers may be best placed to undertake some of this work.

Promotion

The production of a guide with adequate mapping is a condition of the acceptance of the MLW as Recreational Route by the OS, and this should be produced at an early stage of the project. This route has the potential to be a key promotional tool for the Limestone Landscapes Project and the Durham Magnesian Limestone Natural Area and should be a priority for promotional spend.

The opportunity to interpret the biodiversity, geology and historic environment should be a key part of the development and promotion of this route. Excluding the coastal section the route passes through, or close to, three National Nature Reserves, 12 Local Nature Reserves and 23 sites of geodiversity interest identified in the Geodiversity Audit [ref] (see Interpretation section below).

We recommend a dedicated website for the trail, or at least a dedicated website for promotion and interpretation of the Natural Area (see Interpretation below), of which the MLW is a prominent part. Without this dedicated site the presence of the trail on the web may be difficult to detect. In research for this plan a number of long distance trails were eventually tracked down, buried deep within websites or their document stores.

A number of national organisations publicise long distance paths in addition to national trails. These could be used for additional web presence.

www.ldwa.org.uk

www.nationaltrail.co.uk

www.walkingenglishman.com

www.ramblers.org.uk

Some freelance workers also promote self-penned guides to existing routes which they provide on-line for free, e.g Roy McKee – www.nationaltrails.net

Interpretive opportunities

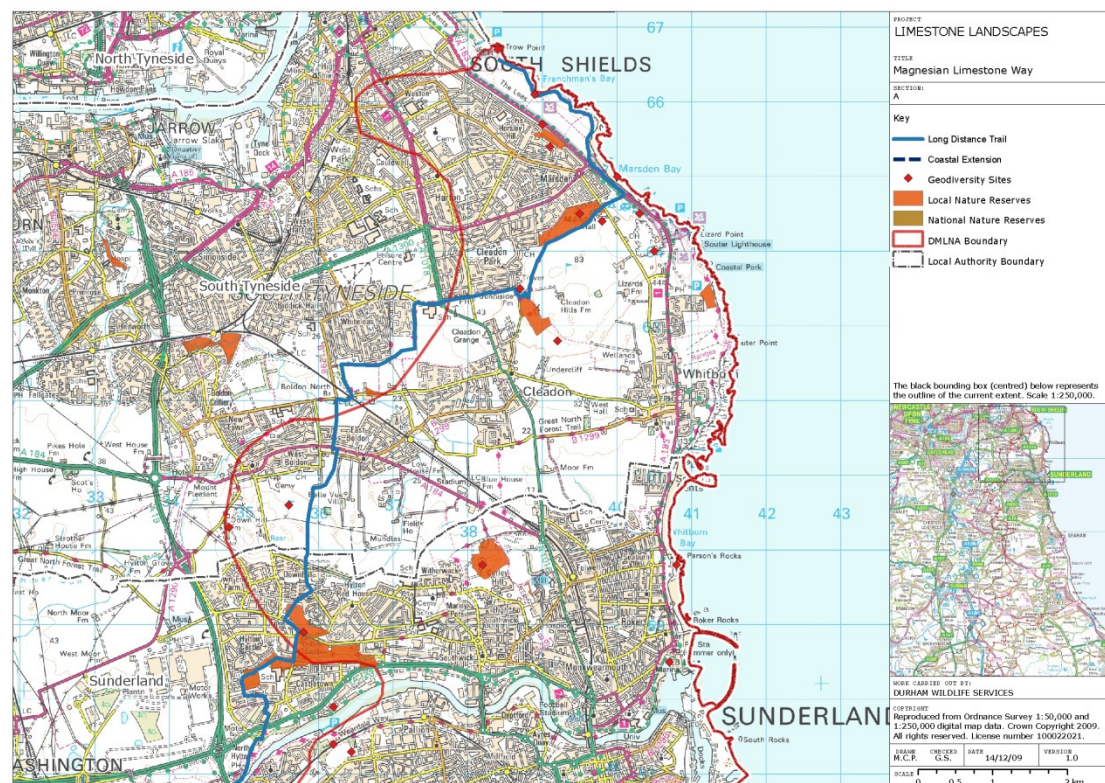
The main sites which should be interpreted on the route are listed in the interpretation section below.

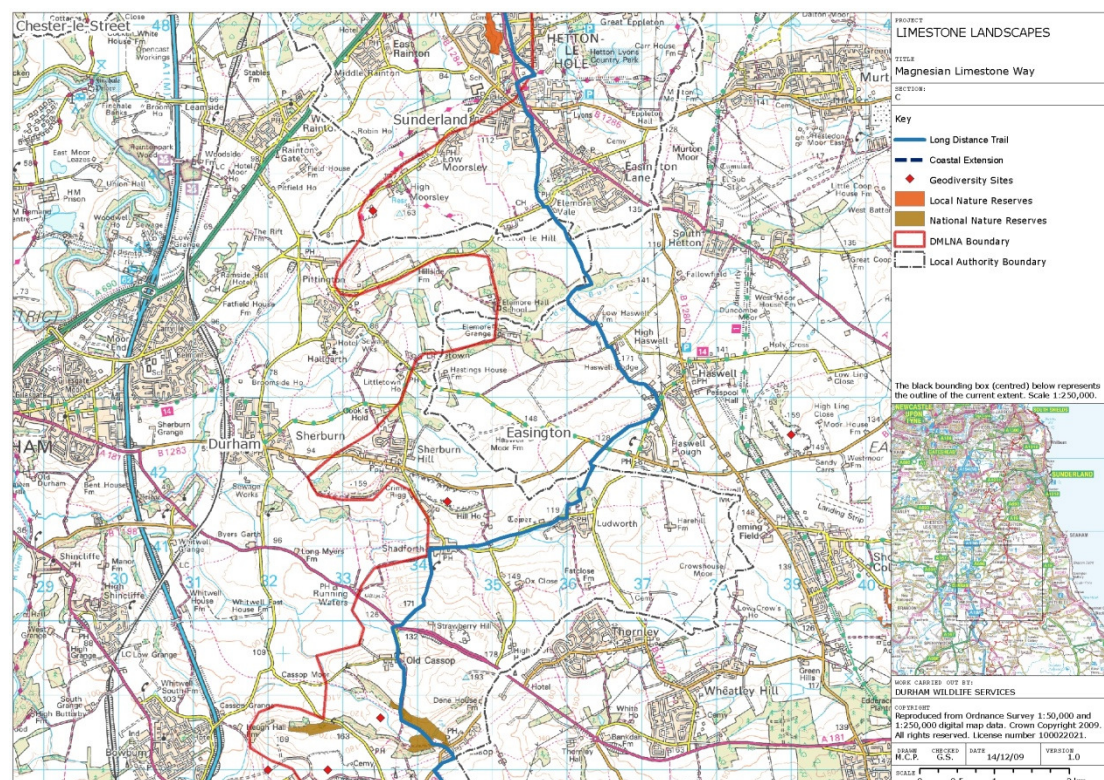
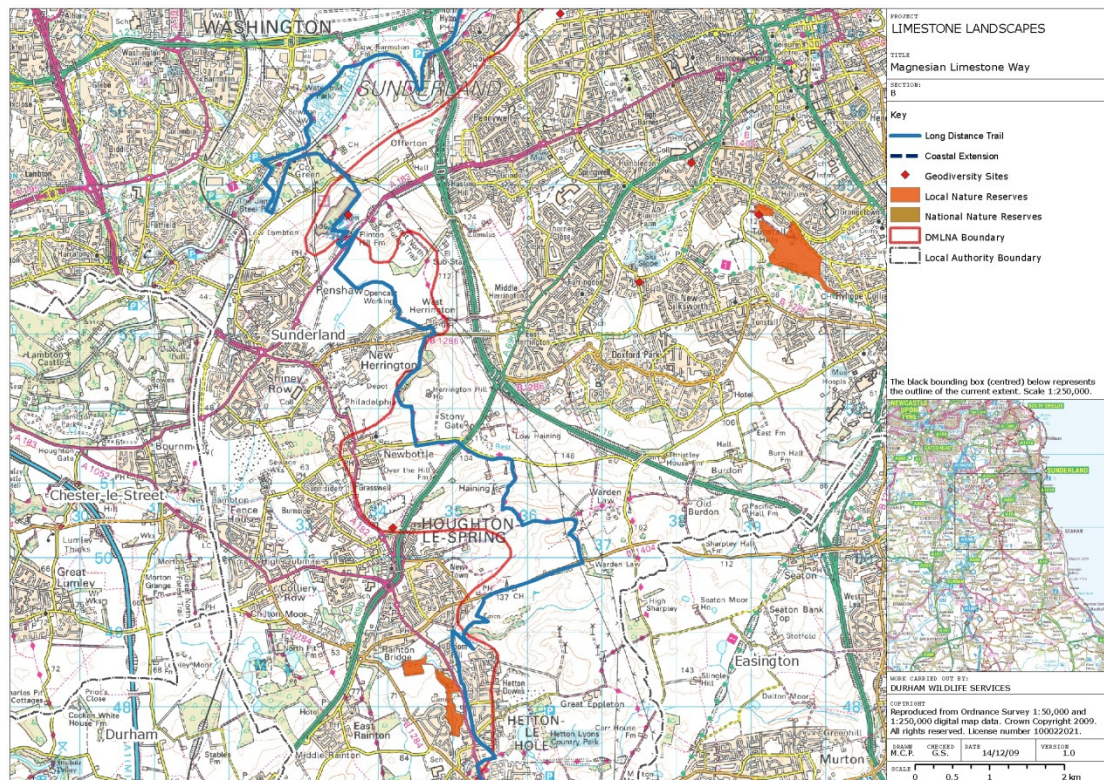
A proposed route

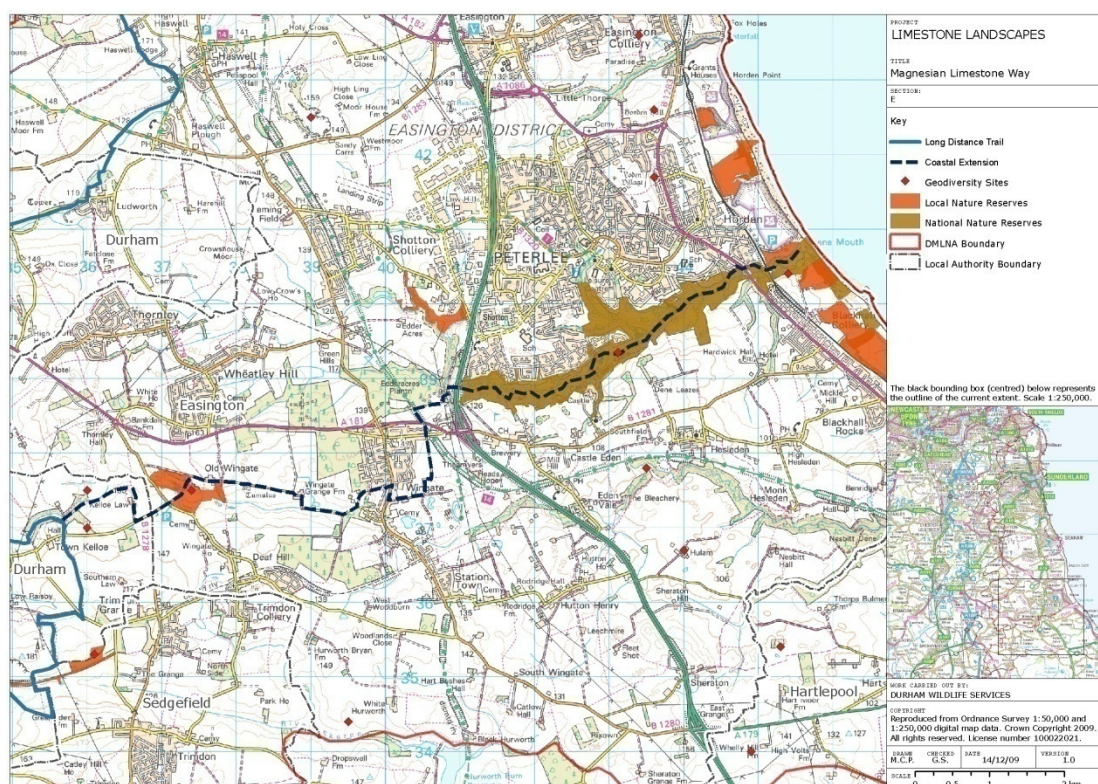
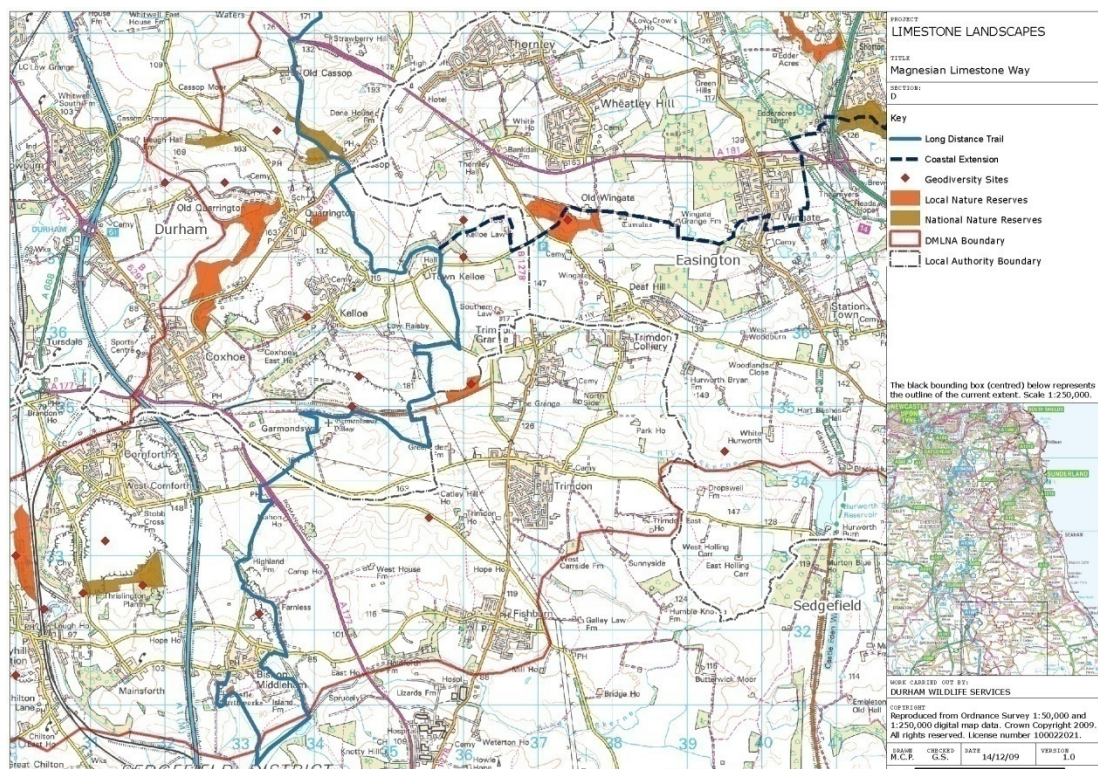
The following proposals for a route have not been subject to detailed scrutiny and are a best guess of a possible escarpment route between The Leas in South Tyneside and Bishop Middleham in Sedgfield, two very important areas for biodiversity near the extremes of the escarpment. Consideration was given to extending the route west to Westerton, the highest point in the Natural Area, but too much of this route would have been on roads, with the additional barrier of the A1 (M) to cross.

Some initial feedback has been given by Durham County Council and South Tyneside Council who have both indicated support for the project in principle. Their feedback is reflected in the proposed route. No feedback has been received from Sunderland City Council at the time of writing. It will be necessary to have Sunderland City Council's support for the route to be promoted and printed on OS maps.

As it stands the route is 69km between The Leas and Bishop Middleham. The short section linking this route with the coast is 14km in length.







6.1.3 Specific awareness issues and audiences

In addition to raising the profile of the Natural Area amongst all residents and visitors, there are a few issues which may need to be communicated to specific audiences. These are felt to fall outside the remit of interpretation and are outlined briefly below.

Grazing animals and dog walkers

An issue which has been raised in relation to one conservation grazing site in Sunderland (Copt Hill) is that of the potential conflict between the need for more conservation grazing and the use of these sites by dog walkers or horseriders.

This issue will become increasingly prominent as conservation grazing is facilitated across the area as part of this plan, and will become increasingly problematic if not tackled now. There are potential benefits to having regular dog walkers on conservation grazing sites too and the challenge is to maximise these benefits and minimise any conflict.

The issue is not unique to this area of course and is being dealt with in a number of parts of the UK already. The Grazing Animals Project (GAP) produces a number of useful documents with guidance on the issue²⁸, and its website allows connection with similar projects across the UK²⁹. Some of the main issue are summarised in **Appendix L**.

Solutions

The solution to these problems lie in dialogue between conservation managers and dog walkers. This requires expertise in the behaviour of the different grazing animals which are to be employed and an ability to communicate effectively to the public, particularly dog-owners. This expertise exists in the region with the Flexigraze project based at Northumberland Wildlife Trust, and which covers the north-east region.

We recommend buying in this expertise to help with some of the following project ideas.

- Meetings with local 'Friends of' groups where they exist (e.g. Tunstall Hills, Copt Hill in Sunderland).

- 'Just hairy – not scary'* or *'meet the grazers'* events, where site users can be taken to existing projects via minibus/coach to see how it works elsewhere. We area aware of at least one such project locally in Gateshead at Bill Quay Farm.

- Similar events on the day/s that stock are introduced onto a site.

- Developing signage for reserves with conservation grazing aimed at dog walkers and horse riders.

- Work with site users to develop fencing plans which allow joint use of the site by stock and dog walkers who are nervous about sharing the same compartments.

- Training for local people who are willing to act as 'lookers'.

Participation in agri-environment schemes.

Many of the most important sites in the DMLP for biodiversity are very small, and part of larger land holdings. Frequently they fail to qualify for Higher Level Stewardship (HLS) schemes because of their size and the lack of other interest features on the holding. Natural England and the Grassland Trust have collaborated to develop a 'group scheme' which allows several parcels of land in disparate ownership to be included in one HLS scheme to counteract the problem of these important sites falling through the agri-environment net. This enables these difficult to manage areas to come under a management scheme that is overseen by a third party as many of the individual landowners do not have the knowledge, the time or the inclination to manage such small, financially unviable parcels of land.

We are aware, however, that the availability of these group schemes is not always being effectively communicated to the landowners and tenants themselves. Agents do not always pass this information on to tenants and landowners, as it is not necessarily in their interest. These schemes are also in their infancy so awareness about them is limited, even within conservation organisations.

We recommend that a leaflet is produced and circulated directly to landowners and tenants in the area, making them aware of this mechanism for funding.

Consideration should also be given to supporting organisations in the setting up of these agreements. Once an agreement is up and running the idea is that the organisation that are managing it receive some of the agri environment money that is paid to the farmer, which helps to cover their costs. However the setting up of agreements can be a long and drawn out process with no guarantee of success. At this point funding could make a real difference.

We recommend setting up a small contract with an organisation with the relevant expertise such as Durham Wildlife Trust or the Grassland Trust to draw up a list of target landowners and tenants and to promote and draw up appropriate group schemes. The funding could also cover the cost of any leaflet drop to farmers.

Awareness-raising for the tourism and visitor sector

One of the key ways in which awareness of the special qualities can spread amongst visitors to an area is through those businesses which have an interest in attracting visitors.

Although the DMLP is not an obvious tourism destination, the Limestone Landscapes project should develop its profile and attractiveness to at least regional visitors. Consideration should be given to the facilitation of a scheme which brings together a group of like-minded tourism businesses such as B&Bs, and guesthouses, visitor attractions, conference venues and self catering and caravan parks, and also tourism staff in TICs. Knowledge-based training would be given to these businesses that could, in turn, pass this knowledge on to their customers. Support for this group from the Limestone Landscape partnership staff would be offered in the form of talks and field visits to raise awareness and increase knowledge of the special qualities of the area.

Elsewhere in the country such schemes are organised by tourism businesses themselves. Here in the DMLP it will be necessary to get facilitate the birth of such a scheme by talking to local providers and professionals and devising a scheme which suits them. The case study in **appendix M** will be helpful, and is nearby should a visit be necessary.

6.2 Interpretation

This section is not an interpretation strategy for the DMLP. Such a strategy for the area would have to encompass the stories from geology, biodiversity and our social and cultural history. However, from the perspective of biodiversity only, we do make recommendations which could become part of an integrated strategy. In particular we suggest an interpretive framework for biodiversity, within which new interpretation could be developed. We then take a brief look at what we already have and some of the mechanisms for taking interpretation forward in the area.

6.2.1 Towards an interpretation strategy for the DMLP

We suggest that the wider purposes of an interpretive strategy should include the following:

- Raise the profile of the DMLP and the national importance of its biodiversity.
- Increase understanding of the biodiversity of the DMLP and current threats to its survival.
- Increase awareness of nature conservation management in the DMLP.
- Interpret local sites and stories in the context of the Natural Area and its management.
- Influence visitor behaviour at sensitive sites.
- Raise awareness of the fundamental interdependence between landscape conservation and the sustainable development of local communities.
- Strengthen links with community groups and encourage local participation in interpreting, managing and conserving the DMLP.
- Establish a consistent and distinctive identity for the DMLP as a special and diverse part of the North-east through appropriate design, materials and branding.
- Establish a quality standard for all interpretation including design, production and installation.
- Co-ordinate interpretation, particularly themes and messages across the area, incorporating existing key sites.

6.2.2 An interpretation framework for biodiversity

There are many possible stories to tell about the area and its wildlife and habitats which will be memorable to people and which will help them understand the area's unique nature and the threats and opportunities it faces. To ensure that these stories make sense collectively, reinforce each other, and add up to something more than the sum of their parts, it is important that they be told within a consistent framework. One possible thematic framework for biodiversity is set out below with suggested themes or sub-plots for each part of the story.

The themes may never appear in these words in the interpretation, but they should guide the choice of the facts to be communicated and practical issues such as design style and illustrations. More detail for each of these story lines can be sought from the references provided in the text or from the list of key sites and associated species below.

It is important that each individual piece of DMLP interpretation communicates or supports one or more of these strategic themes.

1. The DMLP is nationally recognised for its unique wildlife habitats associated with its limestone geology.
2. The special qualities (our semi-natural habitats and species) of the area have been eroded in the past by our activities and are still threatened and disappearing today.
3. Many people are working together to conserve the area's unique biological heritage by looking after what we have left and creating new habitat to link and protect the remaining sites.

1) The DMLP is nationally recognised for its unique limestone geology and wildlife habitats

a) The limestone rocks under the surface have a big effect on determining which plants grow in our woodlands, wetlands and grasslands.

- i) Limestone woodlands – what makes them different to other woodlands – look out for the limestone indicator species. (Yew, Small-leaved lime, spindle, spurge laurel, lily of the valley, bird's nest orchid and herb paris).
- ii) There are limestone grasslands and neutral grasslands in this area. The neutral grasslands grow where the glacial till has been deposited, limestone grasslands develop where the soil is thin and the limestone outcrop is exposed.
- iii) Porous limestone makes wetlands scarce. Because wetlands are important to many forms of life – insects, amphibians, birds and so on, the remaining wetlands become even more important.
- iv) Wetlands with a limestone source have a different set of plants and animals associated with them.

b) Many invertebrates are also associated with limestone areas

- i) Northern Brown Argus, feeds on rock rose, which in turn requires open, grazed, limestone grasslands.[]
- ii) Cistus Forester moth also requires species rich magnesian limestone and feeds on thyme, rock rose and trefoils, often found on coastal sites.[]
- iii) The Glow Worm – associated with snails, themselves often associated with limestone areas for their shell formation. Because female glow worms can't fly, habitat fragmentation means that glow worms are now restricted to only two sites in the DMLP.[]
- iv) Our soft cliffs along the coast support rare insects. The constantly eroding soft cliffs have lots of bare soil and lots of nectar and seed rich plants – ideal for many insects. The rarest species are associated with the muddy wet seepages.³⁰

c) In our limestone areas we have unique combinations of rare plants usually only found separately in either the northern or the southern limestones.

- i) Species such as Bird's eye primrose are found in the upland and northern limestone areas of the UK, from the North Pennines northwards. Species such as Perennial flax are found in the southern limestone areas of the UK. Here in the DMLP you can find both growing together.[]

d) *We have some nationally important habitats and species in this area*

- i) Ecologists classify grasslands by their composition of plants. One grassland in this area which contains the rare Blue Moor Grass, is the rarest grassland type in the UK. Very little is left, but over two thirds of it are in the DMLP.[]
- ii) The Northern Brown Argus is a rare butterfly of Scotland and the north of England. It feeds on Rock Rose which is found on limestone grasslands.[]

e) *Not all important wildlife in the DMLP is associated with limestone habitats*

- i) Some plants and relatively immobile invertebrates which specialise in one habitat can be restricted by the distribution of limestone habitats. Other more mobile animals - e.g. some birds and mammals – are not limited by limestone habitat, but have other restrictions and are, therefore, also relatively rare or threatened

For example corn bunting is limited to areas where hedgerows and farming practices are just right and is now very rare, being concentrated in the area north of Bishop Middleham.

Water Vole is increasingly rare and limited to water courses with long vegetation at both sides, deep water and an absence of American mink. These conditions are increasingly difficult to find on a large enough scale.

f) *Special biodiversity is not always obvious to the casual observer*

- i) To the untrained eye one grassland can look much like another. It is only when you look at the detail that you see diversity. That is why we need people who can identify plants and animals. Possible links to training opportunities.
- ii) Where do insects/amphibians/plants etc go in winter – the amazing stories of the various life strategies for dealing with winter.[]

2) *The special qualities (our semi-natural habitats and species) of the area have been eroded in the past by our activities and are still threatened and disappearing today.*

a) *Wetlands have been lost in the past through drainage in urban and agricultural areas, and through use of fertilisers which have run-off into the wet areas. (This section applies particularly to the Central Clays focus area)*

- i) We have lost most of our wetlands, and the ones which remain are still under threat.
- ii) Run-off from urban areas and agricultural land pollutes the water and changes the plant and invertebrate composition.
- iii) If wetland sites are not grazed they will lose their diversity.

- iv) There is still a steep decline in the quality of our remaining wetland habitats.
- b) *Woodland cover is very low in the DMLP, and most of it is conifer plantation.***³¹
 - i) The only remaining semi-natural broadleaf woodland is usually in the denes and river valleys where agriculture and development was not possible.
 - ii) Woodland is vulnerable to fragmentation. The smaller a woodland is, the more edge there is and the less middle! This means that species which require dense, undisturbed woodland, or large areas of woodland, have disappeared from our fragmented woodlands.
- c) *The vast majority of grasslands have been agriculturally 'improved'. This means that fertiliser has been applied, or they have been ploughed up and reseeded, and consequently they have lost most of their diversity***³²
 - i) What remains is a tiny fraction (probably less than 3%) of what existed before the First World War.
 - ii) 'Unimproved' (or semi-natural) grasslands are still disappearing due to agricultural improvement, but mostly due to abandonment. Most grasslands not designated as SSSI are in 'unfavourable condition'.
 - iii) Conservation grazing is urgently needed on these neglected habitats
 - iv) Small patches of grassland, especially on slopes, are often not economic to graze, and many have been neglected for years. Eventually scrub takes over and the grassland is lost.
- d) *Quarrying has had a negative impact on biodiversity in the past, but now provides many new opportunities for habitat creation and restoration.***
 - i) Many magnesian limestone grasslands have developed on abandoned quarries.
 - ii) Quarry companies now write restoration plans which make sure new habitats are restored or created once the quarry is dormant.
- e) *The fortunes of the areas mammals and butterflies over the last century has been mixed, but specialist species have declined.***
 - i) Species which are generalists have done relatively well and increased.
 - ii) Specialist wildlife which needs our semi-natural habitats has declined.
- f) *Climate change will affect the biodiversity of all landscapes. We need to make our landscape more resilient to change.***
 - i) Connecting habitats allows species to move more easily.
 - ii) Larger and more structurally diverse habitats allow some species to find appropriate microclimates in a warming world.

- iii) Some species will not be able to adapt or move in time. Other species will arrive from further south. This is already happening with a number of butterfly and dragonfly species.
- 3) **Many people are working together to conserve the area's unique biological heritage by looking after what we have left and creating new habitat to link and protect the remaining sites.**
 - a) ***Ancient habitats such as old grasslands, woodlands and wetland sites are our first priority. We have a responsibility to conserve all that is left***
 - i) Ancient habitats cannot be recreated – once lost are lost forever.
 - ii) Undisturbed habitats sequester carbon. Wetlands can be as important as woodlands in absorbing carbon.
 - b) ***Habitat creation is underway to help reconnect these islands of biodiversity and to provide protective buffers from development and some potentially harmful agricultural operations***
 - i) Buffer areas are needed around wetland sites means because they are sensitive to runoff.
 - ii) Large and connected semi-natural sites are important in our adaptation to climate change. They allow some species to move more easily in response to changing climate.
 - c) ***Grazing management is an important tool in helping look after grasslands and wetlands.***
 - i) We need to achieve a balance between overgrazing and abandonment.
 - ii) The re-introduction of rare breed animals into grazing management is helping look after our grasslands and wetlands. Rare breeds are often better adapted to species-rich grasslands and can be quite robust.
 - d) ***The restoration of the Heritage Coast – a success story – work continues***

6.2.3 An audit of existing interpretation

There has not been time to undertake a full audit of all interpretation in the area, however a sample of sites have been visited to look at on-site interpretation, including traditional boards and art installations.

We have not taken stock of available leaflets in the area, although they are likely to be numerous, because leaflets tend to have a short shelf life and will probably not impact on future work.

We are not aware of any existing digital media being used to interpret biodiversity in the area.

On-site interpretation

A short sample audit of the existing provision was undertaken. The following is a summary

Branding

There are currently a range of interpretive brands and identities being promoted within the DMLP. Some relate to specific properties and sites, whilst others relate to wider areas of coast and countryside. These brands include:

- South Tyneside Council
- Sunderland City Council
- Easington District Council
- Sedgefield District Council
- City of Durham District Council
- Durham Heritage Coast
- Durham County Council
- Durham Wildlife Trust
- National Trust
- MAGical Meadows
- Natural England

To raise awareness of the DMLP as an integrated whole it is important to promote a DMLP or 'Limestone Landscapes' identity at every opportunity. This has also to be balanced with the more important goal of communicating the story of the landscape and its biodiversity. A confusion of identities is not helpful in communicating the theme 'many people are working together to protect this landscape and its biodiversity'.

Clarity & Communication

A checklist for on-site interpretive panels might include the following. [ref]

- Do the panels have clear links with features, objects or views around them (i.e. are they appropriately positioned and orientated)?
- Do the panels suggest or encourage visitors to notice and / or explore these objects, features or views (i.e. did they actively engage with their audience and encourage an active response from them)?
- Do the panels relate to their audience by either using personal language, analogy, metaphor or by making links with everyday lives or common experience, or through creative writing, poetry or quotations?
- Is their text clearly printed and legible?
- Is their text made accessible through the use of a design hierarchy, subheadings, short paragraphs and lack of jargon?
- Is effective design use made of images (e.g. photos, illustrations and maps)?
- Are the images themselves visually stimulating?
- Is the relationship between the images and the text clear?
- What is the condition of the panels?

Here are some observations from the sample audit:

- With the exception of the Magical Meadows panel at Durham Botanic Gardens and the geological information at Noses Point, the explanations of what Magnesian Limestone actually is are rather scant or basic. There is also a need to use language which describes a complex issue in more simple terms. The Magical Meadows panel at the Botanic Gardens is a good example of this.
- The panels tend to demonstrate the interests of the organisation. For example, the Durham Wildlife Trust panels go into much greater detail on biodiversity than the Heritage Coast panels, which tend to focus on cultural history.
- Some panels do not encourage access to the site.
- Bleaching is caused by sunlight and quickly ages panels, making them look older than they are and difficult to read.
- Some panels need to be sited more carefully, so that access to them is not restricted.
- Vandalism is also a major issue on all sites, with many panels damaged or now missing.

Clearly there is a need to review interpretation provision on many sites

6.2.4 Future interpretation

On-site interpretation

It is constantly necessary to review on-site interpretation. Our suggested priorities for reviewing or developing new biodiversity based interpretation would include the ten sites listed in the recent (2007) Magical Meadows publication³³. These are likely to be some of the more visited sites with a biodiversity interest and therefore a good way to communicate with a wide audience.

It is worth noting that not all sites need be interpreted, and indeed there is some value in leaving some sites for people to discover themselves. We would, however, recommend a review of all the sites which lie on the route of the proposed Magnesian Limestone Way with a view to deciding which of these should be interpreted on-site, and how best to communicate the strategic themes.

It should be noted that there is an existing signage and interpretation protocol for National Nature Reserves which restricts signage which is not in the Natural England style and which may restrict further interpretation on these sites.

Top Ten sites to visit (identified by DWT publication – MAGical Meadows)

- Thrislington Plantation NNR
- Wingate Quarry LNR
- Marsden Old Quarry NNR
- Bishop Middleham Quarry DWT Reserve
- Blackhall Rocks NNR, DWT Reserve
- The Leas, NT property
- Crimdon Dene
- Cassop Vale NNR

- Tunstall Hills LNR
- Castle Eden Dene NNR

Table 6.1 Sites within 1km of the proposed Magnesian Limestone Way.

Bishop Middleham Quarry		sssi		Inr	dwt			geo
Blackhall Grasslands				Inr				
Blackhall Rocks					dwt			
Bracken Hill Wood				Inr				
Cassop Vale		sssi	nnr					geo
Castle Eden Dene	sac	sssi	nnr					geo
Claxheugh Rock & Ford Limestone Quarry		sssi						
Cleadon Hills		sssi		Inr				
Crime Rigg & Sherburn Hill Quarries		sssi						
Crow Trees				Inr				
Dabble Bank		sssi						
Dawson`s Plantation Quarry, Penshaw		sssi						geo
Durham Coast	sac	sssi	nnr				nt	
Elemore Woods						wt		
Harton Down Hill		sssi		Inr				geo
Herrington Hill		sssi						
Hetton Bogs		sssi		Inr				
High Barmston WT						wt		
High Haining Hill		sssi						
Horden Grasslands				Inr				
Hylton Castle Cutting		sssi						
Hylton Dene				Inr				
Jubilee Terrace						wt		
Kelloe Law quarry								geo
Limekiln Gill				Inr				
Little Wood				Inr				
Low Lambton & South Bank Woods						wt		
Marsden Old Quarry				Inr				geo
Penshaw Monument							nt	
Pig Hill		sssi						
Quarrington Hill Grasslands		sssi						
Raisby Hill Grassland		sssi			dwt			
Raisby Hill Quarry		sssi						geo
Raisby Way and Trimdon Grange Quarry				Inr				
Reach Wood						wt		
Souter & the Leas							nt	geo
South Hylton Pasture		sssi						
The Bottoms		sssi						
Tillesheds				Inr				
Town Kelloe Bank		sssi			dwt			
Trimdon Grange Quarries					dwt			geo
Trimdon Limestone Quarry		sssi						
Victoria Bridge						wt		
Wear River Bank		sssi						geo
West Farm Meadow, Boldon		sssi						sssi
White Hill Woods						wt		
Wingate Quarry		sssi		Inr				geo

A number of additional sites have geodiversity interest as identified in the Geodiversity Plan []. These are only noted (geo) if they are already listed here. (dwt=Durham Wildlife Trust, nt=National Trust, wt=Woodland Trust).

Digital interpretation

We have not been made aware of any digital audio trails or video clips used to interpret biodiversity in the area. This is an area which ought to be exploited as more and more people use the internet and mobile devices to access information. Digital media has a potential for communication with new as well as existing audiences.

Consideration should be given to the development of a series of self guided trails of the larger reserves with good public access, which could be made available either as audio trails or as written and illustrated information available as a download.

Shorter audio or video packets could also be produced for direct download via Bluetooth on site, or via the web. These could also be packaged together as part of a longer distance trail with audio interpretation points.

There is a lot of scope within audio or video packets to use a variety of voices from local site users to site managers and national experts.

A central and easily accessible website with its own URL should be made available to host all of this information (including the Magnesian Limestone Way trail information).

A well maintained website with up-to-date information could be advertised on all new fixed on-site interpretation or signage. This would serve a number of important functions.

- It would encourage site visitors to explore other sites.
- It would allow visitors with appropriate technology (increasingly available in the future) to download site information there and then.
- Local people would be able to see their local site in the context of the Natural Area as a whole. This is important in raising the profile of the DMLP.

6.2.5 Local projects, key locations & associated species.

Sites on the proposed Magnesian Limestone Way indicated (MLW)

Escarpment Ridge

The following are some of the key sites in the Escarpment Ridge focus area.

Thrislington NNR

Key location for glow worm. The story of why some invertebrates are associated with limestone locations. The story of habitat fragmentation and why that can lead to the extinction of rare invertebrates like the glow worm.

Bishop Middleham Quarry (MLW)

Key location for Dark Red Helleborine – specialist of open habitats / quarries on limestone.

Key location for the story of quarry abandonment and restoration and the importance of secondary grasslands for conservation.

Highland and Farnless Farm (MLW)

Key location for Corn bunting and tree sparrow. Durham Bird Club, RSPB and Natural England all involved in conservation efforts in this area. How good farming practices can accommodate threatened species.

Blackall and Horden – soft cliffs

Key location for soft cliff invertebrates.³⁴

Key location for paramaritime grassland

Key site for Northern Brown Argus, Chalk Carpet

Central Clays

Introduction

The Central Clays focus area features close-knit communities which share an industrial past but also an essentially a rural future. Two potential interpretation projects are suggested.

Farming Futures / Wetland Wonders

Aim: to integrate farming and biodiversity conservation into local community life by exploring links between past and future land use relating to people and wildlife.

Key interpretive themes:

- What farms do for you: looking after wild plants and animals, tackling climate change, and managing water resources
- Wetlands are rare, special places and need help to survive in the agricultural landscape

Potential delivery by: Durham Wildlife Trust; local farmers, notably Dave Cowton of Carr's Farm; freelance interpretation consultant; Beamish Museum.

Key sites: Duncombe Moor Farm marsh, Pesspool Lane Ponds (owned by Carr's Farm)

Key biodiversity: water vole, barn owl, brown hare, and lowland fen meadow.

Link to the Biodiversity Management Plan: fen meadow restoration using donor seed from Duncombe Moor Farm.

Potential community group involvement: South Hetton Community Partnership; South Hetton, Murton and Haswell primary schools; Haswell History Group; Horns Garden Centre at Shotton Colliery; local gardening clubs.

Key participants: Primary school children; families; adults attending local history societies; local farmers; adults from local community organisations and local businesses, particularly gardening groups, local garden centres.

Project activities may include:

Commissioning an interpretation consultant to research Duncombe Moor Farm's history and sourcing, for example, photographs and documentary records from the Durham Records office, and interviewing the farmer (he is very elderly and this would be a great opportunity to capture his story for posterity). Why did the fen meadow survive here? How does he look after it? Contrast the traditionally managed fen at Duncombe with the modern methods at Carr's Farm combined with habitat creation and making space for wildlife e.g. barn owl boxes. How Carr's Farm may be used to grow biomass crops and have other roles in tackling climate change.

Production of an audio-visual presentation describing the farms, the habitats, species, habitat restoration/creation, and interviews with the farmers, to be shown in local community groups.

Visit for local primary schools to Beamish Museum in conjunction with seeing the audiovisual presentation.

Seed collecting & growing event, using seed collected from Duncombe Farm fen, grown on by local groups, for planting out at the restoration site at Duncombe Farm / elsewhere.

Traditional countryside skills and Green Gym family event: scrub clearance at Hesldeon Moor West SSSI and Hesldeon Moor East SSSI mire; hedge laying demo and hedge planting.

Coal Countryside Counts

Aim: To enable local people to explore a hidden dimension to disused colliery sites. To link geology and biodiversity on former mine sites, and highlight the special qualities of the species-rich grasslands and wetlands that often develop naturally on these sites.

Key interpretative themes:

- How mining created special places for wildlife
- What looks like a waste heap is full of hidden life!
- Counting plants and animals is crucial to conservation.

Potential delivery by: Freelance interpreter specialising in wildlife; group delivering the geodiversity community events; MAGical meadows project staff; Butterfly Conservation North-east; BTCV.

Key sites: Ludworth Pit Heap and South Hetton/ Hawthorn disused colliery site

Key biodiversity: dingy skipper butterfly, frog orchid, lowland calcareous grassland, lowland fen

Link to the Biodiversity Management Plan: Habitat restoration at Ludworth Pit Heap; hedge restoration at various farms in the area.

Potential community group involvement: Ludworth Local History Project (run from Ludworth Community Centre); South Hetton, Haswell, Ludworth, and Wheatley Hill primary schools; Wheatley Hill Community Regeneration Partnership.

Key participants: Primary school children; families; young people 16-25 doing John Muir Award; adults from local community organisations and local businesses.

Project activities may include:

Butterfly count on former pit sites.

Guided family walk around Ludworth with stories from the Local History project linked to wildlife / countryside issues.

“You are never alone in a wood” – bug hunt in woodland on Ludworth Pit Heap and

Scrub clearance/green gym activity and volunteer habitat monitoring training & delivery on Ludworth Pit Heap in conjunction with John Muir Award (would require ecologist input)

Event to involve local businesses and local gardeners with seed growing project.

Escarpment Spurs

Aim: to develop a schools community project exploring and interpreting the importance and beauty of the Magnesian limestone flowers.

Key interpretative themes:

- Making room for plants and animals in our landscape
- County Durham has special grasslands
- It is easy to overlook beautiful small things on your doorstep
- We all rely on plants

Potential delivery by: The *Environmental Extra* Project at Cassop Primary School led by Jim McManners 0191 3770293.

Key sites: Cassop Vale NNR; Raisby Hill Grassland SSSI; Raisby Way LNR; Trimdon Grange Quarry; Little Wood LNR; Cold Knuckles Quarry; Kelloe Beck Valley LWS.

Key biodiversity: Wild flowers associated with the Magnesian limestone grasslands and associated butterflies, including northern brown argus.

Link to the Biodiversity Management Plan: Magnesian grassland habitat restoration and creation; the Coxhoe-Kelloe landscape-scale habitat restoration scheme.

Potential community group involvement: Primary schools throughout the DMLP area.

Key participants: Primary school children; families; potential to develop to secondary school children studying combined science/biology.

Existing resources: The purpose-built laboratory at Cassop Primary School; the *MAGical Meadows and the Durham Magnesian Limestone* book by DWT; links with the Science and Plants in Schools (SAPs) national project to provide teaching resources.

Project activities may include:

Development of teaching materials to deliver a programme of one-day events for visiting schools, to include site visits, walks and group activities to deliver a range of science skills at Key Stage 2, with potential to develop to include secondary school Key Stage 4 science. Group activities to include using simple identification keys.

Package offer to primary schools throughout the region to attend these one-day events, to include subsidised transport costs (especially where half classes attend) to reach Cassop and associated marketing costs.

Delivery of 5 one-day school visit events, to include minibuss and equipment costs.

Delivery of 3 evening family events.

Equipment required would include: butterfly/sweep nets, binoculars, compasses, a digital camera, hand lenses.

Design and production of a *Calendar of Flowers* for Raisby Way, to include photographs of plants flowering through the year.

Design and production of Magnesian limestone grassland poster for schools, to show the wild flowers, fungi, butterflies and other invertebrates, birds and other animals characteristic of this special habitat.

6.3 Training

6.3.1 The skills needed

The skills need locally to conserve and enhance biodiversity in the DMLP comprise five core areas: taxonomy (which includes identification of plant and animal species); biodiversity surveying; ecological restoration; land management; and outreach communication skills.

There is a need to train and support both volunteers and conservation professionals. Adult volunteers underpin biodiversity conservation and their skills are fundamental to the work of most NGOs in the region. The majority of professionals working in the biodiversity sector have limited access to in-house Continuing Professional Development (CPD) training.

Taxonomy

Taxonomy is the science of identifying and classifying living things. Biodiversity can only be conserved if we know which species we have got and where they are distributed. Today, taxonomists are unlikely to work in universities or museums as taxonomy is either absent, or a small part of modern biology programmes. A recent high profile consultation identifies taxonomy as a key skills shortage area across educational sectors³⁵. As a result, taxonomists are mostly volunteers, and a biodiversity literate local population is crucial to maintaining the study of species taxonomy, especially for species found in specialist habitats and/or limited geographic areas, such as those associated with the DMLP.

We need to train the next generation of experts. Very few people with an interest in biodiversity have the motivation, commitment and time to become an expert. There are well-documented national shortages of specialists in invertebrates, bryophytes (mosses and liverworts), lichens, fungi, and freshwater and marine algae³⁶. These shortages are particularly acute in the north-east region. For example, there are only one or two bryologists in county Durham, and when the current British Bryological Society (BBS) vice county recorder moved to the area in 2006, the membership of the BBS in the north-east region doubled.

Biodiversity surveying

Biodiversity surveying involves using standard methodologies to locate, quantify, map and monitor habitats and plant and animal species. It is distinct from biological recording. Biological recording is generally conducted by volunteers and focuses on species data collection and management. Conservation and ecology professionals generally conduct site surveys, although volunteers may be involved on sites managed by conservation NGOs. Site surveys use a wide range of scientific methodologies focused on not only species data, but also, for example, habitat types, vegetation classification, and species population monitoring³⁷. The surveyor aims to evaluate the overall ecological value of a site. This requires academic knowledge, but also, crucially, much practical experience and training.

Ecological restoration

The skills and knowledge involved in restoring habitats requires a mixture of practical skills underpinned by a lot of scientific evidence scattered about in inaccessible journals and dispersed around the UK among practitioners who have worked on similar projects, rarely producing written handbooks or reports on how it is all done.

Whenever habitat restoration is planned, a fundamental best practice approach requires prior research into what we know that is relevant to any habitat type³⁸. There is a vast scientific literature on habitat restoration and creation. Despite the internet improving access to scientific knowledge, most of this literature is still only available to university academics via expensive subscriptions to academic library databases. It is essential that this knowledge is made more accessible to those working in biodiversity conservation. There is also a body of informal knowledge and experience held within local ecology practitioners who have worked on restoration projects. This knowledge needs capturing and disseminating in a systematic way to inform Durham Magnesian Limestone habitat restoration.

Land management

A major threat to plants and animals and their habitats in the DMLP is land abandonment or lack of appropriate land management³⁹⁴⁰. This threat from lack of management is doubly potent because it is often overlooked while conservation campaigns focus on more visible or popular issues, such as open cast or other development impacts or climate change. Biodiversity depends on the mosaic of habitats created by carefully balanced land management practices. Many of these practices are traditional farming skills such as hedgelaying and rare breed livestock management. Farmers and other land-owners are financially incentivised through agri-environment and other grant schemes to deliver ecologically friendly land management but need access to training, advice and support. Professional conservation staff need practical, on-going training in land management relevant to the region's special habitats.

Outreach

Biodiversity professionals need training in a range of communication skills to engage local communities in biodiversity projects, such as wildlife interpretation and group facilitation. They also would benefit from training in working with disadvantaged groups, such as Black and Minority (BME) groups, less able-bodied groups, and other local community groups with specific needs.

6.3.2 Existing provision

The table below outlines the key providers of biodiversity training for volunteers and professionals in County Durham. It excludes in-house provision for professionals and courses leading to National Qualifications such as degrees and NVQs. The information is based on either internet research or direct inquiries to the organisations concerned. A full list of consultees is in the Appendix.

Table 6.2 Existing training provision

Provider in Country Durham / DMLP	Taxonomic skills	Biodiversity survey skills	Ecological restoration principles & practice	Land management skills	Outreach and interpretation / communication skills
University & Further Education colleges (<i>continuing education departments offering evening/weekend classes &/or CPD</i>)	None at Durham, Sunderland or Teeside Universities Modules on Environmental Conservation NVQ at East Durham College	None at Durham, Sunderland or Teeside Universities Modules on Environmental Conservation NVQ at East Durham College	None at Durham, Sunderland or Teeside Universities or East Durham College	None at Durham, Sunderland or Teeside Universities Modules on Environmental Conservation NVQ at East Durham College	Newcastle University runs a Masters degree in heritage interpretation, but modules are not available as CPD
Other community adult education providers e.g. WEA, U3A, local authorities	No relevant courses identified with internet searches and by the Life Long Learning Department at Sunderland University.				
Institute of Ecologists & Environmental Managers (IEEM)	Grass, sedge and rush identification in west Durham - no other formal training in region. NE section events may cover animal or plant groups sporadically e.g. vegetative grasses in 2008 and fungi foray in 2009.	Phase 1 habitat survey training in 2008 and 2009	Sporadic events e.g. IEEM conference 2007 on NE grasslands and NE section event on restoration of grassland in 2009	Not a key IEEM interest but may have occasional events	Not core to IEEM members roles in the commercial sector
BTCV	Natural Talent project in Scotland & other one-off events nationally. NE office may run some ID events in East Durham in future.	Yes nationally but no events in NE in 2009	None identified on theoretical knowledge base – some practical skills training e.g. on riverbank restoration.	Various CPD and NCFE accredited training in NE.	Yes nationally as part of the ETN but no events in NE in 2009.
RSPB	Informal bird identification support through local bird groups but no formal training	Informal surveying through local groups but no formal training	Yes nationally but no events in NE in 2009	Yes nationally but no events in NE in 2009	None identified
Flora Locale	None identified	None identified	Yes nationally but no events in NE in 2009	None identified	None identified
Durham Wildlife Trust (DWT) &	Some 1-day courses open to anyone (not	Monthly training days for DWT	DWS plan to run some courses in	Monthly training days	None identified

Durham Wildlife Services (DWS)	just DWT volunteers) planned for 2010 including a range of protected species animal groups, grasses and flowering plants of certain key Durham habitats.	volunteers in protected species animal groups e.g. bat and water vole surveying. Phase 1 habitat survey open to anyone planned for 2010.	this area starting in 2010, but no details available at present.	for DWT volunteers e.g. dry stone walling and informal training as part of conservation work parties	
Private providers	Botanical identification courses run by Ptyxis Ecology and Durham Wildlife Services .	Increasingly commercial ecological consultancies are offering protected species survey training, but none as yet in the NE region	None identified from internet searches	None identified from internet searches	Local freelance heritage interpretation consultants could provide but none identified as having delivered training in the region.
Other biodiversity education projects	Public participation in species ID is being promoted by the Open University's OPAL project, to include biodiversity training aimed at volunteers and schools in 2011.	None identified	None identified	None identified	N/A
Butterfly Conservation north-east branch	Workshops on endangered species, e.g. chalk carpet, are held in north England, but none in the NE in 2009	Informal training provided in transect monitoring.	None identified	No provision for training in management for invertebrates was identified in the NE.	None identified
Bat Conservation Trust	Yes nationally but no events in NE in 2009	Yes nationally but no events in NE in 2009	None identified	None identified	None identified
The Mammal Society	Yes nationally but no events in NE in 2009	Yes nationally but no events in NE in 2009	None identified	None identified	None identified
Voluntary natural history societies e.g. BSBI, Northumbria NHS, local bat and badger groups etc	BSBI run 1 formal and informal training day every other year. Bat groups provide formal training towards NE licences. But mostly informal training on field meetings.	Bat groups provide formal & informal training towards NE licences. Others provide training and mentoring support for recorders in protected animal species groups such as reptiles and badgers	Have a role in dissemination - some events such as evening talks by NGO conservation section project officers.	None – not within the amateur naturalists society area of interest	None – not within the amateur naturalists society area of interest

6.3.3 Gaps in provision

There are the following key gaps in existing provision:

Taxonomy

There will be some provision for training in field identification skills and protected species surveying from 2010 delivered by DWT. This will probably include flowering plants, fungi, and protected species of mammal, reptiles and amphibians. However, this will not cover the more difficult and under-recorded species groups for which there is a shortage of experts available in the north-east region, such as bryophytes, lichens, invertebrates (other than butterflies) and fresh water and marine algae.

There is also a need for training in general taxonomy – there is much more to taxonomy than just field identification skills, and biodiversity conservation practitioners need to understand how and why biologists classify organisms if they are to make decisions about species conservation. This knowledge was previously central to biology degrees, but has declined in importance.

There is a gap in provision for ‘training the trainer’ provision designed specifically to enable amateur taxonomists to pass on their skills. Many taxonomists are experts at identifying and surveying their organisms, and enthusiastic about sharing their knowledge, but need support in developing effective teaching skills.

Biodiversity surveying

There is some provision in basic habitat surveying and local naturalist groups involved with protected species provide some survey training for their members. However, there is no comprehensive provision covering all protected animal species groups. There is also little or no provision for more specialist methodologies, such as NVC survey, PSYM pond surveying, and river corridor survey. FE and HE level biodiversity conservation courses at Newcastle and Sunderland universities and East Durham College have limited time available and cannot comprehensively cover all elements of biodiversity surveying required by practising ecologists.

Ecological restoration & land management

Conservation volunteers are generally well provided for across the north-east by a mix of informal conservation work parties mainly run by the Wildlife Trusts, and formal accredited training mainly run by BTCV in land management.

There have been some events for professionals providing dissemination of experience in ecological restoration, but these are few and far between. There is a need for more regular and more accessible ways for practitioners to engage with the universities research sector.

Professional ecologists and land managers tend to have to go outside the region for CPD in these areas.

There is a gap for training in biodiversity issues specific to farmers and land-owners. Accredited programmes designed for farmers exist, such as the Farm Conservation 2-day course offered by Lantra Awards. However, FE providers in the local Durham area currently

tend to focus on delivering National Qualifications. The nearest Lantra Awards trainer offering this course is a private provider based in Penrith, Cumbria⁴¹.

Outreach

Conservation professionals have to attend CPD events outside of the region to access this type of training.

6.3.4 Key issues

The following overarching issues have been identified:

- The lack of availability of biodiversity training in the north-east region. Consultees repeatedly stated that they have to send staff out of the region to access training courses.
- A need for more structured training – there is some provision of public engagement style events, and informal field meetings, but little professionally produced structured tuition.
- A lack of a focal point in the north-east for biodiversity training. The north-east is the only UK region without a Field Studies Council or equivalent biodiversity residential centre.
- A lack of availability of any form of quality control or accreditation for most training courses (with BTCV courses being the notable exception). However it is unknown whether or not accreditation is something that participants in biodiversity training actually want or need.
- A need for bursaries or other financial support to enable participants to access existing training.

6.3.5 Possible future provision & providers

Taxonomy & Biodiversity Survey

- **East Durham College** is interested in developing adult education short courses in taxonomic skills and biodiversity surveying in the medium to long-term. However, it does not have capacity to do so yet, as existing staff are fully occupied in delivering its NVQ and other programmes. The college is a registered provider for Lantra Awards and could deliver the Lantra-accredited bat conservation course.
- **OPAL project in 2011** This £13M Heritage Lottery funded project will cover 'biodiversity surveying' in 2011. At this stage, the scope and content of the programme has yet to be decided by the project's partners. The OPAL project is aiming at public participation, engaging schools, community groups and volunteers who are new to biodiversity, rather than offering training for the professional conservation sector. The 2011 biodiversity programme is being developed by the Open University.⁴²

- **The Mammal Society** would be interested in running training in the north-east as their nearest venue currently is Malham Tarn FSC centre in the Yorkshire Dales.
- **Local private training companies** offer teacher-training courses for the adult education sector, and could devise a bespoke 'training the trainer' course for amateur taxonomists and conservation professionals. **Sunderland University** teacher-training department also runs a 5-day intensive 'Preparing to teach in the lifelong learning sector' course, although this would not be tailored to the issues involved in biodiversity training, especially teaching outdoors.
- **BTCV** is interested in linking up with taxonomists to facilitate training provision for the wider public in the Easington District in particular.
- **DWT** is interested in developing its training capacity in taxonomy and surveying to match its land management training for volunteers

Ecological restoration

- **IEEM NE Section** could provide some ecological restoration events relevant to specific issues in the DMNLA. However, as IEEM relies on volunteers and in-kind support to organise its events, this would depend on the level of interest in this topic within the committee members.
- **Local universities and ecological education consultancies** could tender to conduct a small research project to collate the latest scientific findings on ecological restoration issues relevant to the DMLP, interview and capture the experience of local restoration projects and practitioner, and disseminate the results.

Land management

- **BTCV** are a key local provider for land management training and could also provide accreditation services as a registered assessment centre for NCFE.
- **DWT** is starting to develop training for the public, rather than just its own volunteers and would like to develop its capacity to do so.
- **East Durham College** already delivers various Lantra Awards and may consider adding training for farmers in biodiversity issues and awareness in the form of the Farm Conservation award. Bespoke one-off training events for farmers would also be a possibility, but it is likely that **Natural England** staff could deliver this more cost-effectively.

Outreach

- **Wildlife interpretation training** could be offered by commissioning local freelance heritage interpretation professionals.
- **Community group facilitation.** Existing BTCV / ETN training courses could be delivered in the north-east if funding was available to cover the extra costs involved for the trainers delivering the course.

Apprenticeship schemes

The information in the table below relates to a number of apprenticeship schemes in conservation or biological recording. Although these schemes are currently beyond the available funding and beyond the capacity of any organisation working in the DMLP to deliver, it would be worth considering the possibility of such a scheme in the future as the capacity of organisations to deliver training develops.

Table 6.3 Apprenticeship schemes

Name of Scheme	Details	Number of trainees taken	Funding
Somerset Environmental Records Centre Training Scheme ⁴³	<p>The scheme combines in-house training sessions (taking place ½ to 1 day per week) with work experience in up to three main subject areas. All applicants will participate in ecological survey throughout their time at SERC. Training is also given in Record Centre Management including the use of biological databases, GIS policy issues such as confidentiality of sensitive data, document control and copyright issues.</p> <p>Trainees must be 25 or under.</p>	Not known	New Deal (plus income derived from SERC)
Natural Talent (BTCV Scotland and Northern Ireland) ⁴⁴	<p>20 apprentices will go on placements with partner organisations in Scotland and Northern Ireland. Apprenticeships cover training in specialist areas. In 2006 apprenticeships have been offered in beetles, freshwater and grassland conservation, lichens and bryophytes. Training lasts 12 to 18-months, depending on the subject and is supported by a training bursary of £12,500 per annum.</p>	20 apprenticeships over three years	HLF (£677,500)
LEMUR (Ambios Ltd, Herefordshire Nature Trust, Sheffield Wildlife Trust) ⁴⁵	<p>Trainees spend a funded 9-month placement working alongside professional staff from a host organisation⁴⁶. All trainees undergo a block of ten days of 'Hub Core Learning', which is specific to each of the three hubs (i.e Sheffield WT, Herefordshire NT and Ambios). This learning reflects the nature of each placement. For example the Herefordshire NT hub core learning includes modules on vegetative grass ID, Woodland species ID and Wildlife Law. These core learning courses are then followed by a 'pick and mix' arrangement of a further five days of training from the optional courses. It is possible for Bursary Placements to attend courses at any of the hubs.</p> <p>The LEMUR project offers Units from the Environmental Conservation NVQ level 3 and Biological Assessment Skills OCN Level 3.</p>	12-placements per year over three years	HLF (£704,000)

Potential projects

In the short term we suggest that the following options are explored:

Training for volunteers and professionals already engaged in the field

Develop the capacity of the main existing training organisers including DWT, BTCV, East Durham College and IEEM to provide a more comprehensive and co-ordinated set of training in taxonomy/biodiversity survey/land management and restoration skills to volunteers and professionals with relevance to the DMLP. We believe this would best be done by bringing these main training providers together to agree on a combined training programme and on any accreditation and links to existing programmes. This will require funding to cover the costs of hiring specialist trainers as well as for the co-ordination and promotion of a programme and the hire of suitable venues and transport. The costs of any training to attendees should be heavily subsidised for volunteers.

Costs: Providing trainers, venues and transport for approx 12 courses per season over 4 years, co-ordination.

Training for new audiences

Develop the University of the Third Age (U3A) as a key audience for taxonomy and survey training. There are now several U3A branches in the area, none of which appear to engage in learning about wildlife, apart from some bird watching. This audience has the capacity to become a useful and knowledgeable resource in the monitoring of important sites and in raising others' awareness of local biodiversity. We suggest a dedicated programme of training events tailored to this audience which is offered to all local branches over a three year period. Key attendees could be identified and encouraged and subsidised to undertake further taxonomy training at Field Studies venues in other regions as part of an exit strategy. Courses should also be promoted widely to broaden participation in this over 50s group.

U3A branches currently opened in Easington, Sunderland & Newton Aycliffe within the DMLP and in Durham Darlington, Chester-le-Street and the Derwent Valley just outside.

Costs: Providing outside trainers, promotional costs, co-ordination

Maximise the potential of national and regional awareness and training projects for the residents of the DMLP.

Engage with emerging initiatives such as OPAL to ensure that people in the DMLP have good access to relevant training opportunities, particularly for young people. OPAL is based at Moorbank Botanic Gardens in Newcastle, and it may be important to provide alternative venues for the project nearer to some of our target audience.⁴⁷ In the past Durham Botanic Gardens have been enthusiastic supporters of the MAGical Meadows project and have even developed a magnesian limestone area in the gardens as a demonstration project.

Costs: Officer time, possible venue hire for events and event costs.

Collate and disseminate best practice on site management and restoration in the DMLP

Local universities and ecological education consultancies could tender to conduct a small research project to collate the latest scientific findings on ecological restoration issues

relevant to the DMLP, interview and capture the experience of local restoration projects and practitioners, and disseminate the results, possibly through a local conference.

Costs: Small contract approx **£5000**

Develop one or several key venues for training within the DMLP

Several training venues within the DMLP would be useful for all the above. These would need to be close to sites, with suitable presentation facilities, car parking, kitchen and toilets.

Costs: Officer time

Develop ongoing support for schools which neighbour key biodiversity sites

Cassop Primary School is a good example of a school which is fully engaged with its local wildlife sites through the dedication of its head teacher Jim McManners. Other schools are also encouraged to visit the area and learn about its geology and biodiversity, or take part in practical conservation through a scheme called Environmental Extra, run through the school.

Not all schools have an enthusiast like Mr McManners, but many are near to wildlife sites with which they could become involved at various times of the year. This link is an obvious one which is often made by land managers and schools, but there is rarely enough staff support to sustain the link in the long term.

Potential schools-site links to be identified through area projects (to follow). These links to be developed and then supported by a biodiversity mentor for three/four years to develop the capacity of the schools and the land managers to sustain an ongoing relationship.

Costs: Officer time

6.3.6 Local conservation groups

Table 6.4 Conservation volunteer groups, natural history groups and LNR ‘friends of’ groups active in the area and potential audiences for some of the training projects:

Group Name	Geographical areas within DMLP	Contact person	Contact tel/email
Durham Wildlife Trust Volunteers	County Durham, South Tyneside & Sunderland	Mark Richardson	0191 584 3112
Countryside Volunteers South Tyneside	South Tyneside	Katrina Ghent	0191 5363894 07814 764044
Sunderland Wildspace Volunteers	Sunderland	Andrew Bewick	0191 561 8773 andrew.bewick@sunderland.gov.uk
BTCV	County Durham, South Tyneside & Sunderland	Sarah Tierney	0191 469 8431; 07980 761034 s.tierney@btcv.org.uk
Friends of Copt Hill	Copt Hill LNR	Fay Jackson	coptleigh@talktalk.net
Crow Trees Heritage Group	Crow Trees Nature Reserve - Quarrington Hill Area	Joy Pounder	0191 377 3611
Durham Bird Club	County Durham, South Tyneside & Sunderland	Mark Newsome	mvnewsome@hotmail.com
Durham Bat group	County Durham, South Tyneside & Sunderland	Noel Jackson	noelbats@onetel.com
Durham Badger Group	County Durham, South Tyneside & Sunderland	Graham Temby	gtemby@harrowgatehillpri.darlington.sch.uk
Durham Voles	County Durham	Brian Oram Joe Davis	0790 998 1891 0191 518 2403
Friends of Spion Kop	North Hartlepool	Cath Torley	Catherine.torley@ntlworld.com
Hartlepool Countryside Volunteers	Hartlepool	Deborah Jefferson	01429 853352 countrysidewardens@hartlepool.gov.uk
Teesmouth Bird Club	Hartlepool	Alistair McLee	canda.mcleee@virgin.net
Northumbria Mammal Group	County Durham, South Tyneside & Sunderland	Ian Bond	01325 264296 bondian@hotmail.co.uk
Hartlepool Natural History Society	Hartlepool	Russell McAndrew	01429 277291
Tees Valley RIGS	Tees Valley	Beth Andrews	01287 636382 beth.geo@gmail.com

6.3.7 Consultees

The following individuals were consulted:

Sarah Tierney, BTCV Gateshead
Michelle Appleby, ecologist, Durham County Council
Anne Borland, Newcastle University - OPAL project co-ordinator
Andrew Cherrill, ecologist, Sunderland University
Rowena Staff, The Mammal Society
Karen McArthur, Durham Wildlife Trust
Ian Craft, Durham Wildlife Services
Peter Whitfield and Jonathan Pounder, East Durham College
Karen Devine, Education Officer, British Ecological Society

The following websites were consulted:

Bat Conservation Trust
BTCV Environmental Training Network
Butterfly Conservation North-East
Centre for Lifelong Learning, Sunderland University
Floodlight (adult education course listings)
IEEM (What's on – CPD Workshops section)
OPAL North-East
Lantra Awards
RSPB (training section)
Tees Valley Wildlife Trust
Teeside University
The National Trust
U3A North-East
Woodland Trust

7. Proposed Action Plan

Table 7.1 Showing project options from sections, 4, 5 and 6 of this plan

Proposed Action Plan				
Plan ref	Project Name	Outline	Potential delivery partners	Approx cost
5.1	MG4 restoration	3 year grassland restoration project for rare Lowland Meadow type	DCC, DWT, NE	£120,000
5.1	MG4 scoping (alternative)	A Survey and project bid development for the MG4 restoration project	DCC, DWT, NE	£5,000
4.1	Escarpment Ridge Area	Fishburn projects include Native Woodland expansion and Open Mosaic habitat restoration.	DCC, DWT, NE, Flexigraze, Local landowners	£53,000
4.1	Escarpment Ridge Area	Bishop Middleham projects include Native Woodland expansion, & the restoration of Lowland Meadow & Open Mosaic Habitats.	DCC, DWT, NE, Flexigraze, Local landowners	£298,000
4.1	Escarpment Ridge Area	Ferryhill projects include the restoration of Lowland Meadow, Lowland Calcareous grassland, Lowland Fen and Open Mosaic habitats.	DCC, DWT, NE, Flexigraze, Local landowners	£170,000
4.2	Escarpment Spurs Area	Projects in the Coxhoe/Kelloe area designed to maintain, restore & create wetland & grassland habitats, improving overall habitat connectivity. Includes restoration of Lowland Calcareous grassland & Fen & Lowland Fen expansion.	DCC, DWT, NE, Flexigraze, Local landowners	£515,000
4.3	Central Clays Area	An ambitious community-wide & community led wetland conservation project in the South Hetton area, & smaller projects at Ludworth. The South Hetton projects include restoration of hedgerows, Lowland Meadow & Fen and the expansion of hedgerows, Lowland Fen & Native Woodland.	DCC, DWT, NE, Flexigraze, Local landowners	£276,000
4.4	Coastal Dene	Estimated costs for management proposals aimed at improving woodland condition (and some improved access) across all coastal denes.	DCC, DWT, NE, Flexigraze, Sunderland CC, Local landowners	£606,000
	<i>Hawthorn Dene</i>	Costed example for one coastal dene		£189,000
		<i>Pre-works survey</i>		£12,000
		<i>New planting</i>		£262,500
		<i>Fencing for new planting</i>		£70,000
		<i>Removal of conifers</i>		£40,000
		<i>Reduction of sycamore and beech</i>		£150,000
		<i>Fencing for grazing</i>		£21,000

		<i>Fencing for exclusion of public</i>		<i>£6,000</i>
		<i>Footpath management</i>		<i>£20,000</i>
		<i>Access point improvements</i>		<i>£25,000</i>
4.5	Coast Area	None provided	DCC, DWT, NE, Flexigraze, NT, Heritage Coast, Local landowners	Uncosted
4.6.1	Cleadon Hills	Inc. Cleadon Quarry, Cleadon Hills Farm, South Shields Golf Club, Marsden Limekilns and The Leas.	DWT, STC, Flexigraze, NE	£32,000
4.6.2	Cleadon Lea	Inc. Boldon Crossing, Tilesheeds & Whiteleas.	DWT, STC, Flexigraze, NE	£26,000
4.6.3	Sunderland	Inc. Copt Hill, Houghton Ridge, Warden Law, Ford & Fullwell Quarries.	DWT, SCC, Flexigraze, NE	£114,000
4.8.1	Grazing support	Flexigraze staff time and support for 3 years		£60,000
6.1.1	Limestone Landscapes Festival	An annual festival of walks and workshops which celebrates and interprets the special qualities of the area		Uncosted
6.1.2	Magnesian Limestone Way	A proposal to create a new long distance footpath using existing rights of way which stretches approximately from South Shields to the Bishop Middleham area with a link back to the Durham Coastal Path.		Uncosted
6.2.5	Local Community Projects			Uncosted
	Farming Futures/ Wetland Wonders	Aims to integrate farming and biodiversity conservation into local community life by exploring links between past and future land use relating to people and wildlife.		Uncosted
	Coal Countryside Counts	Aims to enable local people to explore a hidden dimension to disused colliery sites. To link geology and biodiversity on former mine sites, and highlight the special qualities of the species-rich grasslands and wetlands that often develop naturally on these sites.		Uncosted
	Escarpment Spurs Schools Project	Aims to develop a schools community project exploring and interpreting the importance and beauty of the magnesian limestone flowers.		Uncosted

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