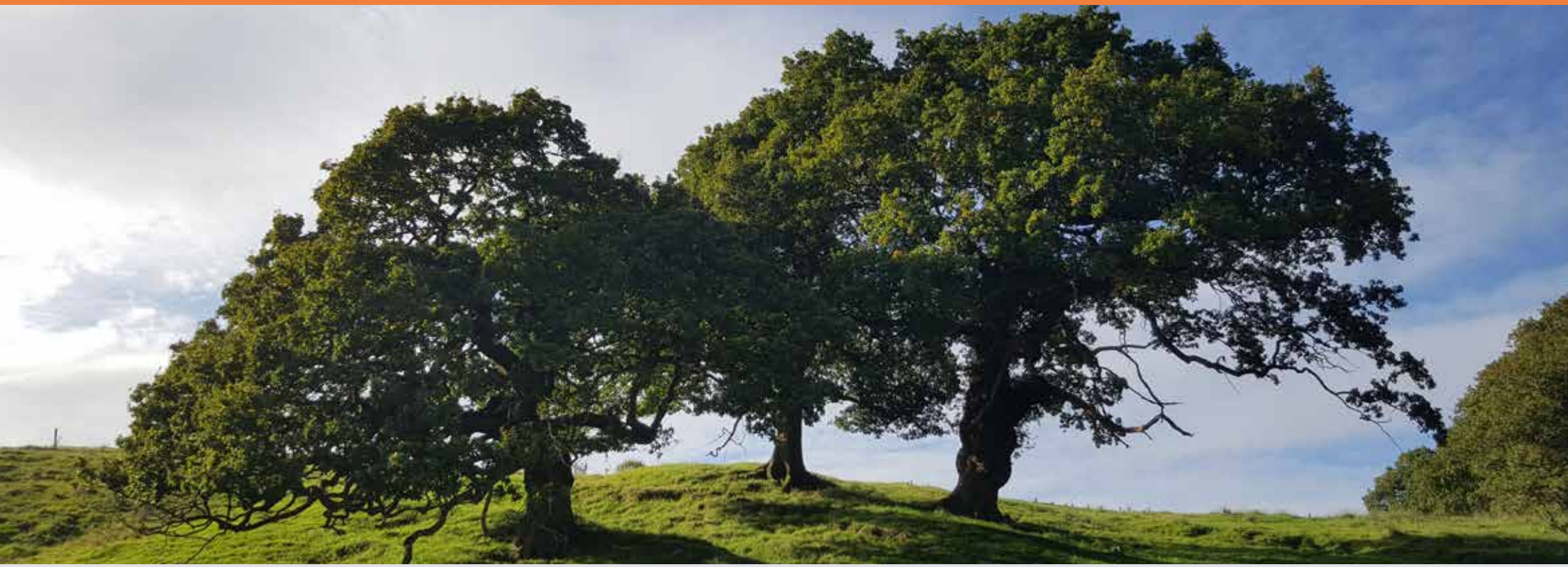
FOREST OF BOWLAND
Area of Outstanding Natural Beauty

Trees, Woodland & Forestry Stratetgy

June 2021



FOREST OF
BOWLAND
Area of Outstanding Natural Beauty

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FOREST OF BOWLAND
One of the AONB Family

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Foreword

As we publish our Trees, Woodland & Forestry Strategy we are at a time of unprecedented interest in woodland. Over the last year, we have lived through a global pandemic where society has ever more found the need to engage with the natural world. Our woodland landscapes have long been an escape from the pressures of a modern world. Now more than ever they are seen as critical for society's health and wellbeing.

The sense of repair also runs through our response to the twin climate and biodiversity crises. Lancashire local authorities are working together to consider both nature recovery and nature-based solutions to the impacts of a changing climate whether this is enhanced carbon sequestration or managing surface water through appropriately designed woodland planting.

In May 2021the Government launched its England Tree Action Plan with a commitment to treble the rate of woodland planting (30,000 hectares per year by 2024). The Forest of Bowland AONB has identified the target of creating 200 hectares of semi-natural and mixed woodland including scrub by 2030.

The AONB will be working with partners to ensure that we have the right tree for the right place using woodland to maximise the benefits for society and the environment. We will seek to ensure that woodland creation respects existing species and habitats, landscape character, the historic environment and the overall 'sense of place' that makes the Forest of Bowland Area of Outstanding Natural Beauty such a special place to visit or to live.

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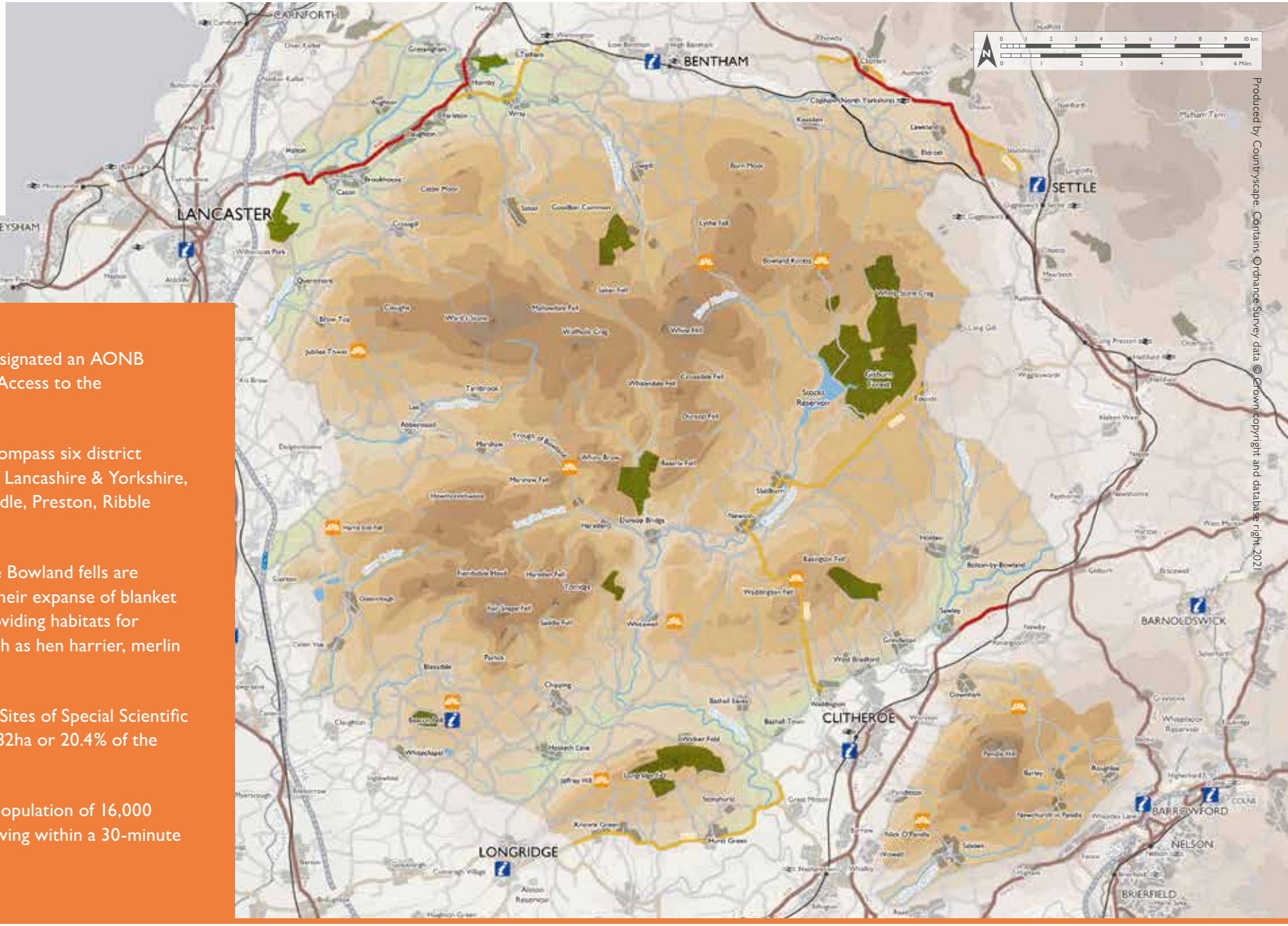
Key Facts

Figure#1: Forest of Bowland AONB – our woodland vision

Our vision is that well sited and managed mixed and native woodland habitat across the AONB is providing a home for biodiversity, helping lock up carbon and is a valued place where people are enjoying and connecting with nature. Wildlife is thriving in well cared for, ecologically resilient woodlands, which are integrated with the wider ecological network. Commercial forestry is well managed, delivering timber and sustainable benefits for people and wildlife. Woodlands exist in the right place as a vital part of the mosaic of habitats that make up the countryside, without further compromising other important habitats and species. Our woodlands are valued for the full range of benefits they provide to society.

Figure#2: Forest of Bowland AONB – our woodland vision



- The Forest of Bowland was designated an AONB under the National Parks and Access to the Countryside Act 1949 in 1964
- At present, its boundaries encompass six district councils within the counties of Lancashire & Yorkshire, namely Craven, Lancaster, Pendle, Preston, Ribble Valley and Wyre.
- At the heart of Lancashire, the Bowland fells are internationally important for their expanse of blanket bog and heather moorland providing habitats for breeding bird communities such as hen harrier, merlin and peregrine
- Forest of Bowland also has 21 Sites of Special Scientific Interest (SSSIs), covering 16,382ha or 20.4% of the AONB's 803 km² area
- The AONB has an estimated population of 16,000 with over one million people living within a 30-minute journey of the area

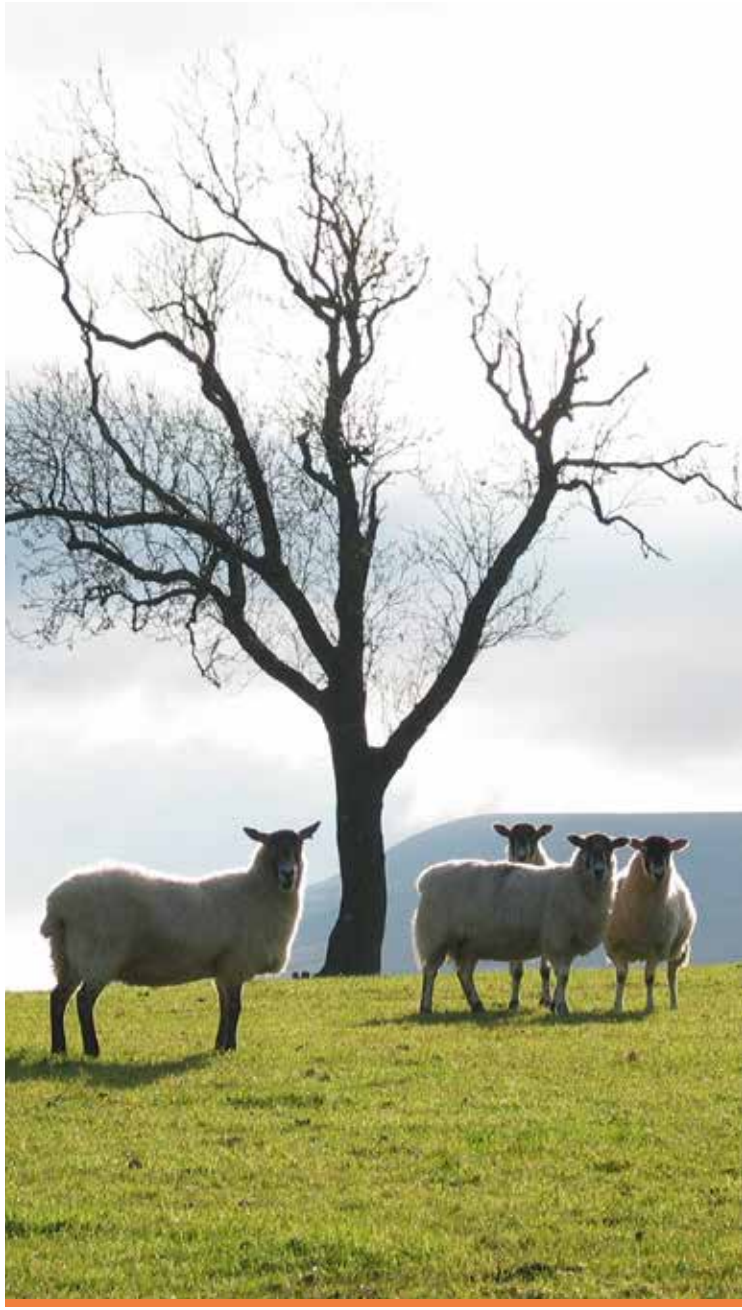
Summary of Policies

The table below is a summary of the policies that are to be found in the body of the report. Whilst this report naturally focuses on trees, woodland and forestry it should not be seen in isolation from other land-use or habitats. Indeed, our trees and woodland form part of the mosaic that is the Forest of Bowland. Viable agriculture and viable forestry are mainstays of the rural economy. Equally, important habitats including priority habitats such as species-rich grassland and blanket bog are really important natural assets supplying services beyond the boundary of the Forest of Bowland AONB.

Beyond timber, woodland and forestry provide an important habitat that increases ecological connectivity and a range of what can be described as ecosystem services from ameliorating slope stability and controlling erosion to carbon sequestration. The AONB recognises the need for woodland creation following the maxim of the right tree in the right place that embraces native and productive woodland species. Indeed with the challenge of climate change and plant health there will necessarily be a need to design woodlands for future climate change. The Forest of Bowland AONB has identified the target of creating 200 hectares of semi-natural and mixed woodland including scrub by 2030.

2.3	Existing woodland
	• Woodland habitats, and ancient woodlands in particular, are among our richest terrestrial habitats and the highest levels of biodiversity are often found in woodlands that are actively and sensitively managed. Woodlands contribute to local landscape character and are often of cultural, historical and archaeological significance – for example the ancient semi natural woodlands within old estates.
2.4	Existing woodland and biodiversity
	• Forest management in general and forest management plans specifically should conserve and enhance biodiversity • The full opportunities for woodland creation and management for biodiversity in the wider environment should be considered, including the roles of forest habitats and open habitats in creating ecological networks that link similar habitats. • Do not establish new forests or woodlands on deep peat soils and on sites that would compromise the hydrology of adjacent bog or wetland habitats. • Consider other important priority habitats including species-rich grassland. • Maintaining wader populations remains a priority for the AONB. Waders, including curlew, redshank, lapwing and snipe, need to be considered as part of any proposals for woodland creation or managing woodland habitat. • The Forest of Bowland AONB will work with other conservation organisations to consider the reintroduction of black grouse.
2.5	Ancient & Semi Natural Woodland Having due regard for these unique habitats and promoting the restoration of plantations on the site of ancient woodland back to native species
	• Plantations on ancient woodland sites may have retained some features of ecological and cultural interest and provide valuable opportunities for restoration. The AONB will support an initiative that protects and conserves ancient and semi natural woodland. • Support the restoration of PAWS (Plantation on Ancient Woodland Sites) to richer and more diverse woodland • There are likely to be areas within managed woodlands with indicators of a long history of woodland cover. If native species are still present (including ground flora) , natural regeneration and colonisation are the most appropriate way of creating and restoring these woodland habitats
2.6	Open, scrub and edge habitats
	• Plan open space in new and existing woodland to create and enhance networks of open-ground habitats to assist species movement • Ensure wetland features such as springs, flushes and bogs are protected, and take opportunities to restore degraded features. • Develop graded edge habitats and manage woodland edges to create a diverse and convoluted structure and a transitional zone between habitats.

2.7	Wood pasture, wood meadow and parkland
	• The AONB would support the conservation of existing wood pasture and the creation of new wood pasture or meadow where the balance of grazing and woodland are appropriate.
3.0	Woodland creation
	'The right tree in the right place': maximising the benefits of new woodland creation for landscape enhancement, biodiversity and nature recovery and reducing surface-water run-off. **A climate emergency**: Woodland and trees that are appropriately located can help to alleviate the impacts of climate change on society such as carbon sequestration and reducing surface water flows but need to consider other habitats that also have a role in climate mitigation and seek to maximise net biodiversity net gain.
3.1	The 'Right Tree in the Right Place'
	• The AONB welcome exploring opportunities to plant new mixed and native woodlands on the lower hills and moorland fringes without compromising the area's character; ensuring that woodland expansion avoids bodies of deep peat and avoids impacting on other sites of biodiversity value; and ensuring that new woodlands enhance the local landscape character in terms of typical scale, type and location and avoid impacting on features of historic interest.
3.2	Woodland creation constraints : Important habitats and species
	• The AONB will support the natural regeneration and appropriate planting of new small scale native woodlands, the expansion of existing woodlands (particularly small areas of ancient, semi-natural woodland) and the planting of trees outside woodland, especially within moorland cloughs and river valleys. The impact on other habitats (in particular, the Bowland Fells Special Protection Area) needs to be considered.
3.3	Woodland opportunity mapping
	• The AONB will look to develop woodland opportunity mapping working with partners including Rivers Trusts, Lancashire Environmental Records Network and Lancashire Wildlife Trust to consider woodland creation opportunities.
3.7	Traditional boundaries : Hedgerows, hedgerow trees and open grown trees.
	• The AONB will continue to champion a traditional boundaries programme. The AONB will support conserving, restoring and enhancing existing woodland boundary walls, banks and hedges, giving priority to those that are important for stock control, landscape value and habitat. • The AONB will look to promote standard trees in hedgerows and open grown trees
4.0	Ecosystem Services
4.2	Carbon sequestration: Woodland Carbon Code
	• The Forest of Bowland would support woodland creation for carbon sequestration working with recognised project developers such as the Yorkshire Dales Millennium Trust and Ribble Rivers Trust.



Summary of Policies

4.3	**Woodland and soils**
	• The quality of soil should be protected or enhanced in terms of its physical, chemical and biological properties. Operations should be planned and managed to avoid damage to soil structure and function.
4.4	**Woodlands and water**
	• Woodland should provide and maintain buffer areas along watercourses and water bodies creating valuable new habitat that incorporates open space • New woodland and existing woodland/forestry management should contribute towards achieving the objectives of both Catchment & River Basin Management Plans and ensure that forestry pressures on the aquatic environment are addressed. • Woodland management should be used to reduce surface water flows and where drainage is planned these ensure that water is discharged slowly into buffer areas and not directly into watercourses. Such buffers can also improve water quality.
4.5	**The role of woodland in managing flood risk**
	• Woodland management and the creation of large woody debris dams are valuable means of assisting Natural Flood Management.
5.0	**Forestry and landscape**
	• The Forest of Bowland AONB Landscape Character Assessment should inform decisions about the nature, location and design of new woodland. Having taken this landscape context into account, design principles from the UK Forestry Standard should be used to assess the landscape and visual impacts of both new woodlands and forestry operations.
5.1	**Woodland design guidelines**
	• Woodland design should emulate 'natural' patterns and forms, rather than regular boundaries unless there is a historic precedent. For example, if the historic enclosure pattern is dominant or special features such as deer parks or vaccaries require special attention. • Landscape impacts of forestry operations need to be considered such as rotation age; felling and restocking with applications providing the management opportunity to enhance the visual contribution they make. Clear felling in particular can have a dramatic impact on familiar views. • The AONB would encourage owners to explore opportunities to modify the overall structure of existing conifer plantations to create softer outlines that respond to topography and contain a higher broadleaved content. • Management practice can achieve more appropriate forest shapes over time, including the effects of fences, felling coupes and access tracks.
5.3	**Woodland creation and the historic environment**
	• Woodland creation should be designed and managed to take account of the historical character and cultural values of the landscape.

6.0	**Existing woodland and forestry management** 'A wood that pays is a wood that stays': promoting a balance between 'productive' woodland, amenity and wildlife.
	• The AONB will encourage applications for woodland management and creation that meet and exceed standards in the UK Forestry Standard • The AONB aim to support the continuation of timber production and processing and to ensure all new and existing productive forests provide a wider range of benefits by ensuring they are structurally diverse and include a wide range of tree species.
6.2	**Continuous Cover Forestry**
	• Consider alternatives to clearfell systems, such as continuous cover forestry, where suitable sites and species combinations allow and where management objectives are compatible. • Maintain a range of stand structures and silvicultural approaches across the forest as a whole, including veteran trees, open-crowned trees, occasional windthrow, understorey layers, open space and areas of natural regeneration
6.3	**Sustainable woodland management** Promoting a woodland culture: woodland crafts can sustain employment, retain traditions and promote woodland management but also seeking to better integrate woodlands and woodland management into land management and farming practice.
	• Bring under-managed woodland into profitable and sustainable management. • Explore opportunities to get existing woodland into management for local woodland products and wood fuel supplies. • Understand that some woodlands will have over-riding conservation, landscape or recreational objectives. • Where woodlands are managed for timber production, maximise carbon sequestration through efficient management consistent with the output of durable products. • The Forest of Bowland AONB will promote woodland crafts and seek out increasing training opportunities
6.4	**Grazing, deer and squirrel management**
	• When planning new woodland it is crucial to consider what pests (such as deer) are present in the area and what protection needs to be put in place. This is usually tree shelters or deer fences. Site planning can usually mitigate the impacts of pests. • The AONB would support co-operation across several landowners to manage and, if necessary, control deer numbers.
6.5	**Invasive species**
	• Where non-native species are invasive and pose problems, control or remove them where this is feasible. • Measures to reduce the dominance of rhododendron will be supported.

Summary of Policies

6.6	**Plant health:** The real threat to our trees and woodland from disease and grazing has become more acute over recent years. The prevalence of Hymenoscyphus fraxineus (ash dieback) and Phytophthora ramorum impacting larch will continue to have an impact on our woodland and forests. There is a need to consider future threats by encouraging a range of species in woodland planting to increase resilience. Moreover, the prevalence of deer in the Forest of Bowland AONB will need to be closely monitored and controlled through collaboration if new woodland is to be established.
	• The AONB will work with partners including the local authorities to raise awareness of the threat to our ash trees. • The AONB will consider the impact upon our landscapes represented by the loss of our ash trees both inside and outside woodlands and develop a programme to replace significant losses with future generations of new 'landmark trees' within the AONB. • The AONB will support the work of Forestry Commission Tree Health Officers and the North West Tree Health Group as a mechanism for recognising future plant health threats. • The AONB will support a collaborative approach to managing deer grazing across the AONB.
7.0	**Our Inheritance: The cultural heritage of our trees and woodland:** 'Justified and ancient': Recognising the unique value of trees outside woodland. Identifying and celebrating our landmark trees – those that have a key place in our cultural heritage and our present day landscape.
	• The AONB will work with landowners, estates and local communities to protect Landmark Trees in estates, parklands, village settings, hedgerows and pasture. • The AONB propose to map veteran trees (as part of the Ancient Tree Forum) and other in-field trees to ensure their continued conservation. • The AONB will work to increase people's awareness and understanding of the cultural, archaeological and historical assets of trees, woods and forests. • Retain and manage existing veteran trees and select and manage suitable individuals to eventually take their place
8.0	**Education, access and recreation:** From Forest Schools to mountain biking and 'dementia-friendly' walking trails - woodland contributes to a number of demands in society from environmental education to helping to improve health and well-being.
	• Encourage recreation to be considered in new planting; noting especially the potential for plantation-type forestry to be managed to accommodate a range of activities including mountain bike trails and new rights of way. • Optimising visitor's experience through careful planning where activities such as footpaths, equestrian bridleways and cycle tracks might conflict and require geographic separation • Encouraging engagement with the natural environment through traditional and novel activities and in particular supporting Forest School-type activity.

6.0	**Existing Plantations** 'A wood that pays is a wood that stays': promoting a balance between 'productive' woodland, amenity and wildlife.
	• The AONB will encourage applications for woodland management and creation that meet and exceed standards in the UK Forestry Standard • The AONB aim to support the continuation of timber production and processing and to ensure all new and existing productive forests provide a wider range of benefits by ensuring they are structurally diverse and include a wide range of tree species.
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	• When planning new woodland it is crucial to consider what pests (such as deer) are present in the area and what protection needs to be put in place. This is usually tree shelters or deer fences. Site planning can usually mitigate the impacts of pests. • The AONB would support co-operation across several landowners to manage and, if necessary, control deer numbers.
6.5	**Invasive species**
	• Where non-native species are invasive and pose problems, control or remove them where this is feasible. • Measures to reduce the dominance of rhododendron will be supported.

Section One Introduction

1.1 Why do we need a strategy?

Initiate and review action to ensure that the AONB's trees and woodlands are adequately protected and cared for so that their extent, quality, biological diversity, contribution to the landscape character, and ecological value can be sustained alongside economic value and enriched for the benefit and enjoyment of the landowners, farmers, residents and visitors to the Forest of Bowland.

Woodlands are an integral part of the Forest of Bowland landscape. They have been a source of income and jobs in the rural economy. In the case of ancient woodland they are one of the most enduring elements within the landscape – a priceless habitat. New woodland can play a part in improving water quality, reducing surface water flow, mitigating greenhouse gas emissions as well as reducing soil erosion. No wonder woodlands and trees occupy a special place in the hearts of the wider public. However, there are threats to this resource – invasive species, tree diseases and grazing by deer and livestock need to be managed to retain existing woodland into the future.

The Forest of Bowland AONB Trees, Woodland and Forestry Strategy is closely linked to the Forest of Bowland Management Plan 2019-2024 but also reflects both local agendas and national strategies. This Strategy will guide the Forest of Bowland AONB Partnership in not only responding to consultation on woodland management plans and applications for creation and woodland management but also identifying future work streams working with our partners in the private, public and voluntary sector including estates, local landowners and farmers towards a more integrated approach. This strategy covers woodland, forestry and trees in all their myriad shapes and forms and recognises that they all have a different 'value' or role to play. For example 'scrub' may not be valued for its timber but may be a really important habitat. Scrub habitats have the potential to support over-wintering birds and could support the reintroduction of black grouse.

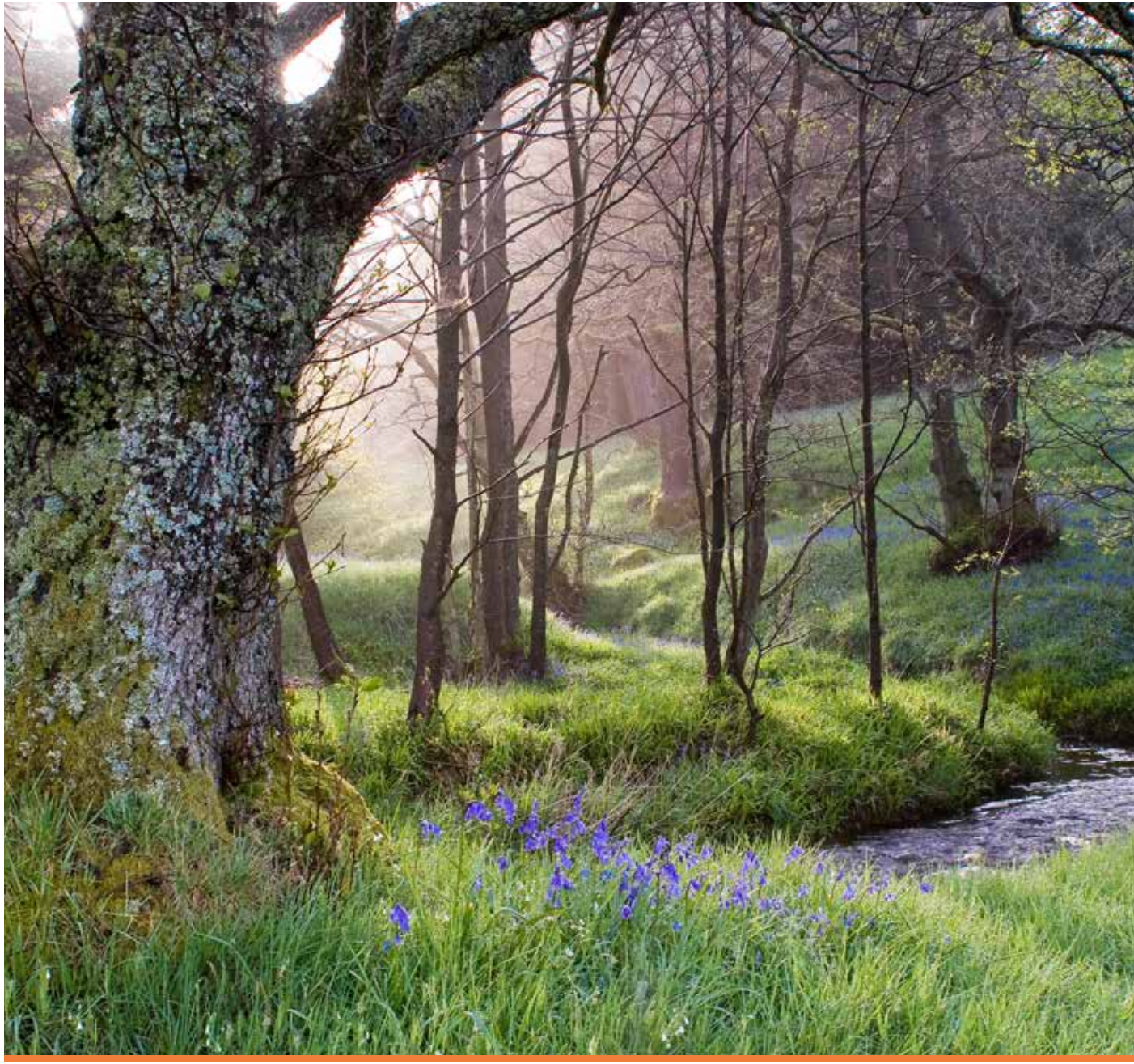
An overview

The objectives of the Forest of Bowland AONB Trees, Woodland & Forestry Strategy are that,

- Semi-natural woodland is managed
- Ancient replanted woodland is restored to a semi-natural state
- Overall coverage of semi-natural and mixed woodland including scrub is increased by at least 200 hectares by 2030.

1.2 An integrated approach:

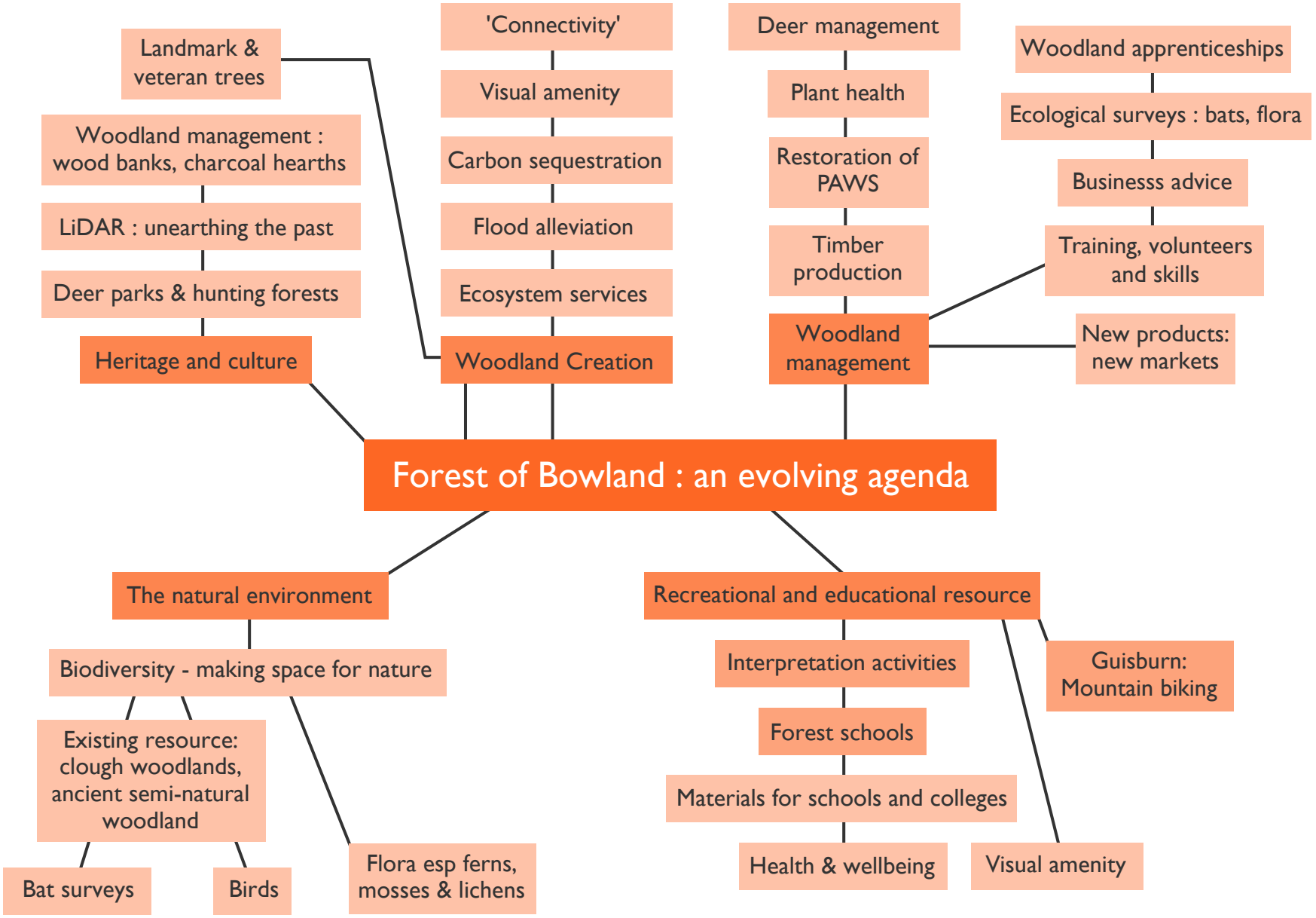
A more integrated approach to our tree and woodland assets recognises the potential of trees, woods and forests to contribute to environmental, social and economic outcomes. This approach should consider trees and woodland in the landscape regardless of ownership. Not taking an integrated approach may mean that landscape, biodiversity, recreation, culture and heritage are treated in isolation with the potential that prioritisation of one aspect above others leads to unforeseen and potentially negative consequences. For example, forestry extraction damaging cultural or natural heritage or new woodland creation failing to maximise the benefits for reducing surface water run-off and biodiversity.



1.3 Core principles

- **'The right tree in the right place'**: maximising the benefits of new woodland creation for landscape enhancement, biodiversity and nature recovery and reducing surface-water run-off.
- **Ancient woodland restoration**: having due regard for these unique habitats and promoting the restoration of plantations on the site of ancient woodland back to native species
- **'A wood that pays is a wood that stays'**: promoting a balance between 'productive' woodland, amenity and wildlife.
- **Promoting a woodland culture**: woodland crafts can sustain employment, retain traditions and promote woodland management but also seeking to better integrate woodlands and woodland management into land management and farming practice.
- **Education, access and recreation**: From Forest Schools to mountain biking and 'dementia-friendly' walking trails - woodland contributes to a number of demands in society from environmental education to helping to improve health and well-being.
- **'Justified and ancient'**: Recognising the unique value of trees outside woodland. Identifying and celebrating our landmark trees – those that have a key place in our cultural heritage and our present day landscape.
- **A climate emergency**: Woodland and trees that are appropriately located can help to alleviate the impacts of climate change on society and the environment but need to consider other habitats that also have a role in climate mitigation.

Figure#3: Forest of Bowland AONB – an evolving agenda



1.4 Why now?

Traditionally, woodland and forestry management takes place over extended periods of time, in many instances over 60 years and this strategy is set within this context. Despite this over recent years there have been some significant challenges and opportunities for woodland creation and management in the AONB which will have a dramatic impact on existing woodland in the AONB, for example, Hymenoscyphus fraxineus (ash dieback) (see section 6.6).

For ease of implementation of the strategy the timescale of this strategy will act in parallel to the AONB Management Plan period from 2019 to 2024.

1.5 Key drivers

- Climate change mitigation and adaptation: developing resilient habitats by identifying potential corridors/ linkage and buffers to existing priority habitats (such as ancient semi natural woodland) or looking at how new woodland could address the challenges relating to surface water and the potential for carbon sequestration. Shade may be necessary, for example, new riparian woodland has the potential to mitigate the impacts of direct sun on river ecology by creating shade. Hedgerows can fulfil a similar role.

- Changes in the value of timber: High timber prices with potentially extensive extraction have an impact on habitats and amenity. Equally low-value timber in plantations or woodland lead to situations that would benefit from management. Explore the potential for other ways of working, for example, continuous cover forestry with benefits to ground flora or wood fuel as a by-product of woodland management.

- Plant health: Phytophthora ramorum (particularly affecting larch) and Hymenoscyphus fraxineus (causing ash-dieback) will have dramatic impacts on the landscape over coming years.

- Invasive species: Himalayan balsam and rhododendron are just two invasive species that can shade ground flora. Deer and grey squirrels can equally reduce any natural regeneration unless populations are controlled.

- The loss of our landmark trees: whether these are reaching the end of their natural life or lost to disease or wind blow. There is a need to look to develop the next generation of 'landmark' trees but also look at trees outside woodland as having a distinct and unique value.

- Payments for public benefits: Changes in the incentives for woodland creation and management moving towards a public benefits model that covers a wider range of ecosystem services.

- Changes in how we perceive and access woodland: Changes in societal demand have an impact upon how we see our natural environment. For example, the COVID-19 pandemic changed public attitudes to the countryside specifically but also our relationship with the wider natural world.

  - The growth in mountain biking over recent years has created a demand for challenging routes (note the role of the Forestry Commission in creating a regional hub for mountain biking at Gisburn Forest),

  - The desire to encourage the next generation to engage with the natural environment has led to the interest in Forest Schools (note how the AONB has promoted this unique form of engagement as part of the Pendle Hill Landscape Partnership):

  - It maybe that we change the way we see woodland – for example, there is current interest in developing 'wilder landscapes.' The AONB has undertaken research to gauge the reaction of residents and visitors to landscape change in general and woodland creation or forestry specifically. The results indicated a high appetite for new native broadleaved woodland creation in lowland valleys, and sensitive planting and regeneration of scrub and cloughs in the uplands. (Ritchen-Stones,2018)

1.6 Policy context

National policy

A Green Future: Our 25 Year Plan to Improve the Environment (HM Government 2018).The Twenty Five Year Environment Plan is necessarily wide ranging with ambitious targets to create wildlife-rich priority habitat, protect and restore our peatlands, improve water quality and safeguard and enhance natural beauty. The Plan also restated the target to increase woodland cover in England. The Plan was informed by a number of reports recognising the scale of biodiversity loss and the challenge of reducing this loss including the Lawton Review chaired by Sir John Lawton reviewing how England's wildlife and ecological network could be improved to help nature thrive in the face of climate change and other pressures.

Landscapes Review (HM Government 2019)The findings of the Designated Landscapes Review, chaired by Julian Glover, were published in September 2019 to mark the 70 years since the National Parks and AONBs were founded and called upon radical new approaches to biodiversity loss and to climate change. The National Association of AONBs has sought to rise to this challenge publishing the Colchester declaration in the summer of 2019 which declared that by 2030 at least 100,000 ha of wildlife-rich habitat outside of protected sites will have been created/ restored and at least 36,000 ha of new woodland will have been planted or allowed to regenerate in AONBs following the principle of the right tree in the right place

The Natural Environment & Resources Act (NERC) Act 2006 recognised duties on public bodies to protect biodiversity and recognised a number of section 41 priority habitats (that includes native woodland and wood pasture) and priority species ranging from juniper to cuckoo and includes bats, fungi, lichen and invertebrates some of which are specifically associated with woodland such as lady's orchid

The England Trees Action Plan (ETAP) May 2021 sets out the Government's long-term vision for woodland. Government will at least treble woodland creation rates in England by 2024 as well as better protect existing trees and woodland.

There are five chapters outlining policy actions

- **Expanding and connecting our trees and woodlands**
- **Trees and Woodlands as part of the green economy**
- **Protecting and improving our trees and woodlands**
- **Connecting people with trees and woodlands**
- **Knowledge and science for trees and woodlands**

England Tree Action Plan: Amongst the 80 policy actions are several of immediate interest here: -

- Encourage National Parks and Areas of Outstanding Natural Beauty to include net zero and tree establishment targets in their statutory management plans
- Specific and targeted support for catchment partnerships and utility companies to deliver on the strategy. **See section 4.4 Woodlands and water**
- Specific and targeted support for landowners to deliver woodland creation and agroforestry.
- New guidance for England that will help determine when afforested peat should be restored to bog, and to minimise impacts on peaty soils from tree planting. **See section 3.2 Woodland creation constraints.**
- Develop a national deer management strategy. **See section 6.4 Grazing, deer and squirrel control**
- Ensure the provision of safe and appropriate public access is a feature of as many woodlands as possible and work with landowners and woodland users to develop and implement a plan to improve the quantity, quality and permanency of public access to new and existing woodlands. **See section 8 Education, access and recreation.**
- Improve capacity in the sector by publishing guidance, and conducting training for land managers and foresters, historic environment and landscape professionals on landscape, design and the historic environment in woodland creation. **See section 5 Landscape & heritage.**
- Continue to support research to ensure our forests and treescapes are resilient to current and future threats, including investigating climate adaptation and pests and diseases. **See section 6.7 Building resilience in our woodlands**

Local and regional policy

The Forest of Bowland AONB Management Plan AONB Management Plans are statutory plans. They provide a framework for ensuring delivery of the statutory purpose for AONBs, that of conserving and enhancing the natural beauty of the landscape. The latest Plan covering 2019 - 2024 includes the commitment to publish a woodland strategy as well as the following policies.

[1.2G] Support the creation and establishment of at least 200 ha. of new native and mixed woodland that enhances the AONB landscape, with priority given to projects that conserve and enhance existing key habitats and species, increase carbon storage, keep rivers cool and help reduce flooding.

[1.2H] Support woodland owners to actively manage existing woodlands to conserve, enhance and restore biodiversity, whilst identifying opportunities for sustainable timber production and woodland products.

[2.1G] Support the development of a local woodland economy linked to more active woodland management, identifying opportunities for sustainable timber production and woodland products

There is a demand that the AONB should consider woodland. A public online survey was conducted by the AONB in spring 2018 to gather views on priorities for the next AONB management plan 2019-24. Respondents (285) were able to choose from more than one option where the AONB should focus its interests. The results showed respondents identify landscape conservation (59.30%); moorland management (58.25%); woodland creation and management (55.44%); river catchment management (45.26%); future of farming in the uplands (34.04%); visitor experience and information (23.51%) and development and planning in the AONB (17.90%) (Forest of Bowland AONB Management Plan, 2019).

At the heart of the Forest of Bowland AONB, the Bowland Fells are internationally important for their expanse of blanket bog and heather moorland providing habitats for breeding bird communities such as Hen Harrier, Merlin and Peregrine; protected species under the Wildlife and Countryside Act 1981. The Forest of Bowland has 21 Sites of Special Scientific Interest (SSSIs) covering woodland, blanket bog, mire and hay meadow covering 16,382 Ha or 20.4% of the AONB's 803 km² area (Forest of Bowland, 2018).

Northern Forest: The 'Northern Forest' is an initiative led by the Woodland Trust covering an area from the Mersey to the Humber and encompassing a wider 'halo' of interest that includes Lancashire and the Forest of Bowland. The aim is to plant 50 million trees by 2032 which would provide a timber industry, leisure opportunities and environmental benefits. Initial funding for the project supported by the Woodland Trust was granted by Government in January 2018.

Lancashire Woodland Vision (Lancashire County Council, 2006). This policy document from 2006 offers a local woodland vision statement for the 21 landscape character types and 3 urban landscape types of Lancashire.

National Character Area Profiles A National Character Area (NCA) is a natural subdivision of England based on landscape, biodiversity and geodiversity rather than administrative, boundaries. Following the Natural Environment White Paper, Natural England published 159 National Character Areas. The Forest of Bowland is covered by three NCAs (NCA 33 Bowland Fells, NCA 34 Bowland Fringe & Pendle Hill and, in part, NCA 35 Lancashire Valleys). These profiles have provided a valuable background to this strategy.

1.7 Who will use the Strategy?

A partnership approach: Central to this strategy is a partnership approach to delivery. Partners are already delivering programmes of woodland creation (notably the Rivers Trusts, United Utilities and the Woodland Trust) and woodlands are already being managed by the landowners and woodland managers. This strategy seeks to support these endeavours by placing them within the landscape-context of the Forest of Bowland.

This Strategy adds detail to the Forest of Bowland Management Plan and offers an integrated approach to forestry, woodland and trees in the Area of Outstanding Natural Beauty. With respect to woodland creation and management, the AONB Partnership sees a variety of competencies and skills not just including the core AONB team to implement this strategy but based upon a partnership approach. There are many stakeholders and policy drivers. We have sought to consult with the following organisations who all have a stake in woodland and forestry in the Forest of Bowland.

- Individual farmers and landowners
- Estates
- Forestry Commission
- Yorkshire Dales Millennium Trust
- Ribble Rivers Trust
- Lune Rivers Trust
- Wyre Rivers Trust
- Natural England
- Environment Agency
- The Wildlife Trust for Lancashire, Greater Manchester and North Merseyside
- Friends of Bowland
- Local authorities
- Parish councils
- Woodland Trust
- RSPB
- United Utilities
- Forestry and woodland consultants

The Strategy will be periodically reviewed to ensure it remains current and relevant. This review will be against the Forest of Bowland AONB Management Plan every five years.

DEFRA family: Forestry Commission/ Natural England/ Environment Agency

In England, the Forestry Commission is divided into three divisions: Forestry England, Forestry Commission and Forest Research. The Forestry Commission is the agency that regulates applications for woodland creation and for forestry operations. Forest Research has a key role in advising the government including issues relating to plant health. Forestry England manages the forest estate, notably in the Forest of Bowland this includes Knots Wood (1.01 km2), Gisburn (11.96 km2) and Dunsop Valley (1.87km2) a total of 1.84% of the AONB's area.

The Environment Agency has key responsibilities for the protection and enhancement of the environment including water quality and reducing flood risk. The agency has sought evidence upon using woodland as a means to reduce surface water discharge and improve water quality through its 'working with natural processes review' (Environment Agency, 2016).

Natural England is the Government's advisor on the natural environment including biodiversity, landscape and geodiversity. Responsible for enforcement of designations including the Bowland Fells Site of Special Scientific Interest and Special Protection Area as well as identifying ancient woodlands, Natural England also offers advice on the Government's Environmental Land Management schemes.

Voluntary Sector

The Woodland Trust is the largest woodland conservation charity concerned with the creation, protection, and restoration of native woodland heritage The Woodland Trust has three key aims: i) to protect ancient woodland which is rare, unique and irreplaceable, ii) the restoration of damaged ancient woodland, iii) plant native trees and woods with the aim of creating resilient landscapes for people and wildlife.

The Lancashire Wildlife Trust is a membership organisation which through projects and programmes seeks to deliver on biodiversity gains throughout Lancashire. Their network of reserves includes Moor Piece Nature Reserve in the Forest of Bowland which combines elements of plantation, regenerated birch and bog with 80 species of birds present - 38 of which breed on site.

The Yorkshire Dales Millennium Trust is a charity based in Clapham that funds and delivers projects across the Dales including the Forest of Bowland. The Trust has been involved with woodland creation and management for over twenty years and was an early adopter of the Woodland Carbon Code (see section 4.2).

Friends of Bowland is a small but committed group of volunteers that get involved with practical conservation tasks and talks. Champion Bowland is an independent charity that seeks to support environmental and conservation projects within the Forest of Bowland.

Rivers Trusts: The area is covered by three Rivers Trusts; the Lune, the Wyre and the Ribble. The Trusts all employ teams of officers working on projects to improve and protect the river environment. Lancashire Woodland Connect is an ambitious ten year campaign to create an expanding network of woodlands for the benefit of communities across Lancashire. It is a partnership approach administered by Ribble Rivers Trust .

With over one million members the RSPB is the largest conservation charity in Europe with a particular interest in the Forest of Bowland because of its international importance for upland birds. Whilst recognising the value of open moorland habitats, the RSPB has shown a strong interest in improving the value of woodland for conservation, both nationally and within the Forest of Bowland.

Local Authorities

The AONB incorporates boundaries that include Lancashire County Council and North Yorkshire County Council and parts of six district council areas, namely: Craven, Lancaster, Pendle, Preston, Ribble Valley and Wyre. Responsibilities with trees and woodland reflect the responsibilities of the two tier structure with counties responsible for highways including highway trees and the six district councils responsible for most (but not all) planning issues. This two tier structure is subject to a review that would replace the two tier structure with single unitary authorities. Lancashire County Council has traditionally managed several significant woodlands including the 75 hectares of woodland at Beacon Fell as part of its portfolio of country parks and has managed projects in the past to develop woodlands under Lancashire Woodlands Project. Budgetary constraints have impacted on the role of LCC to develop this landscape-scale vision. In 2019, Lancaster City Council stated its intention to plant 1 million trees as a response to the climate emergency. The Forest of Bowland also has a number of parish councils which take an interest through local amenity planting schemes and support for the AONBs Traditional Boundaries programme (see section 3.7) .

The England Trees Action Plan has stated that it will publish guidance for local authorities to develop their own local tree and woodland strategies and open the Local Authorities Treescape Fund to deliver strategic planting and natural regeneration of trees outside of woodlands for the benefit of local communities and nature. (DEFRA,2021).

Catchment Management Partnerships

The Catchment Based Approach (CaBA) seeks to bring a range of partners together to support integrated catchment management, pool knowledge and expertise, and deliver cross-cutting environmental improvements. The many rivers and valleys that bisect the Forest of Bowland can be characterised by three broad catchments each represented by a catchment management partnership created as a response to the Natural Environment White Paper. Each catchment management partnership is administered by a rivers trust. There is a direct link between woodland and water (see section 2.7) and each of the catchment management partnerships have developed a capacity to deliver on woodland creation projects in tandem with measures to improve water quality and reduce surface water discharge which will be supported through the England Trees Action Plan. Furthermore, the Plan will support the development of the Woodland Water Code, a crediting mechanism to encourage private investment in trees for the improvement of the fresh-water environment (DEFRA,2021).

Local Nature Partnerships

Originated from the Government's Natural Environment White Paper in 2011 as a response to the Lawton Review 'Making Space for Nature' (Lawton, et al, 2010).

The Forest of Bowland is part of the **Northern Upland Chain Local Nature Partnership** that works across the Pennine spine from Northumberland and including the North Pennines and the Forest of Bowland AONB to promote habitat restoration and 'high nature value farming.' The Northern Upland Chain has helped to co-ordinate opportunity mapping for woodland creation. The newly reformed **Lancashire Nature Partnership** is looking to work on developing a nature recovery network throughout the County. Part of this work supports the **Lancashire Woodland Connect** campaign that seeks to double woodland cover within the County in the next ten years. The campaign is administered by the rivers trust.

Landowners

Aside from limited areas of local authority owned woodland and the Forestry England estate most land in the Forest of Bowland is owned by private landowners and farmers. Incentives for woodland management and creation work on the basis of the 'voluntary principle': namely, there is no compulsion to manage or create woodland. There are however regulations around creation and forestry or woodland operations and there are incentives usually through the mechanism of grants administered by the Forestry Commission. Over the coming years these incentives will change towards a system based upon payments for public benefits -the Environmental Land Management Scheme.

United Utilities is a significant landowner in Bowland abstracting drinking water and owning significant amounts of upland water catchment. Their SCaMP - Sustainable Catchment Management Programme in Bowland (2005-10) took a holistic approach to catchment management working with tenants to restore habitats and improve water quality. Woodland creation was part of the programme and resulted in the planting of clough woodland in their catchments in the upper reaches of the Hodder, Odgen Clough on Pendle Hill and Grize Dale . Infrastructure such as the Haweswater aqueduct will see further planting to both mitigate work and using the principles underpinning Biodiversity Net Gain. The England Trees Action Plan challenges water companies to exceed their target of planting 11 million trees as an industry by 2030, whilst maximising the benefits of trees for water quality, flood resilience and biodiversity.

2.1 The significance of trees, woodland and forestry in the Forest of Bowland.

Although trees and woodland are absent across large areas of Bowland, notably the moorland plateaux, they are a significant feature of the landscape's fabric; important habitats for wildlife; and part of the historic and cultural landscape that defines the Forest of Bowland. They are an enduring testament to past human activity and still provide us with a sustainable source of building materials and fuel as well as sporting and recreational interest. They can also be a cause of negative effects when poorly sited or poorly managed.

As well as conifer plantation, there are two principal types of broadleaved woodland: upland oak woodland and upland mixed ash woodland with limited elements of wet woodland. Those woodlands that can be considered to have existed since before 1600 (the time before significant plantations) are considered ancient semi-natural woodland and can be found within the AONB on the steep valley sides of the Rivers Roeburn, Wyre, Calder, Ribble and Hodder. These woodlands are characteristic of the area and an important resource for wildlife. In particular, they are important for their rich assemblage of mosses and lichens. Pied and spotted flycatchers, redstart, tree pipit, tawny owl, great spotted woodpecker and sparrow hawk are all characteristic bird species associated with these woodlands

(Natural England, 2015).

Extensive conifer plantations occur within the AONB. Gisburn Forest, the Dunsop valley, Longridge and Grindleton Fells contain some of the largest areas. The main species is sitka spruce which has generally been planted in uniform, close-ranked, single species blocks. These are mainly clear felled and restocked according to forest design plans, generally with more diversity and structure in terms of landscape and also wildlife interest. For example, the Forest Design Plan for Gisburn has an overall aim to increase mixed broadleaf to 27% of the area of the forest.

2.2 Historic background

But where are the trees in the Forest of Bowland?

The origin of the word 'forest' is from the Latin forestis silva, where silva (as in 'silviculture') meant woodland and forestis meant 'outdoor'. Commonly these were extensive areas of rough land on which the king or major landowner had the right to keep deer for hunting. These areas were subject to Forest Law in order to preserve game. As the home to several such 'Forests' – it can be seen that the 'Forest of Bowland' is closer to this historic meaning of the word forest than many of the woodland and plantations that might commonly be perceived as forests today.

The area was once more wooded in a climate that was more favourable to tree growth. Pollen evidence suggests the first woodland clearance was at the time of the Bronze Age. A deteriorating climate from1250 to 800 BC led to the abandonment of these sites and the leaching of nutrients and water logging that led to peat formation. The wood pastures of these areas became the acid moorland of later centuries.

Man assisted clearance to the point where the remaining woodland existed only in steep valleys (cloughs) or escarpments unsuitable for grazing or cultivation. The woodland that survived grazing and the need for firewood was in these steeper cloughs and streams or it was protected by charter. From the 9th and 10th centuries there was an intensification of cattle rearing involving seasonal movement to summer pastures. Human influences continued to have an impact on this landscape whether it is the medieval deer forests or the enclosures of the 17th and 18th centuries or the designed landscapes and estates of the 19th century. Significant historic features such as the 'vaccaries' (clearings for oxen) remain visible today. Conifer plantations often associated with the reservoirs or estates date from the 1930s onwards and were an attempt to increase rural employment at a time when rural areas had fewer opportunities. There was little consideration to the ecological value of the existing habitats or the importance of landscape at that time.

2.3 Existing woodland

- Woodland habitats, and ancient woodlands in particular, are among our richest terrestrial habitats and the highest levels of biodiversity are often found in woodlands that are actively and sensitively managed. Woodlands contribute to local landscape character and are often of cultural, historical and archaeological significance – for example the ancient semi natural woodlands within old estates.

The National Forest Inventory indicate an area of 67km² (approximately 8% of the AONB) is woodland largely fragmented except for Forestry England estates at Knots Wood, Gisburn and the Dunsop valley and privately owned woodland on Grindleton Fell and Longridge Fell, which are predominantly conifer plantations. The majority of remaining woodlands are semi natural lowland mixed deciduous woodland (NVC classes W10 & W16). (Natural England, 2018, Rodwell, J.S (ed) 1991). Clough woodland includes upland oak woodland (NVC W11 and 17) dominated by sessile oak (Quercus petraea) with birch (Betula sp.), rowan (Sorbus aucuparia), holly (Ilex aquifolium) and hazel (Corylus avellana). Native woodlands are among the richest habitats for biodiversity and they support a high concentration of UK priority species. The loss and fragmentation of woodland cover from the last ice age has had a dramatic impact on biodiversity such that species of large mammals are absent. There can be sites in Bowland where a scatter of remnant trees live on and are sometimes accompanied by traces of woodland ground cover. These 'ghost woods' can form the historical precedent for restoration of this habitat but are threatened by grazing. Elsewhere designed landscapes from the 18th and 19th centuries relate to country houses and estates. Here coverts for shooting, woodland shelter belts and planted avenues ensured significant areas of woodland.

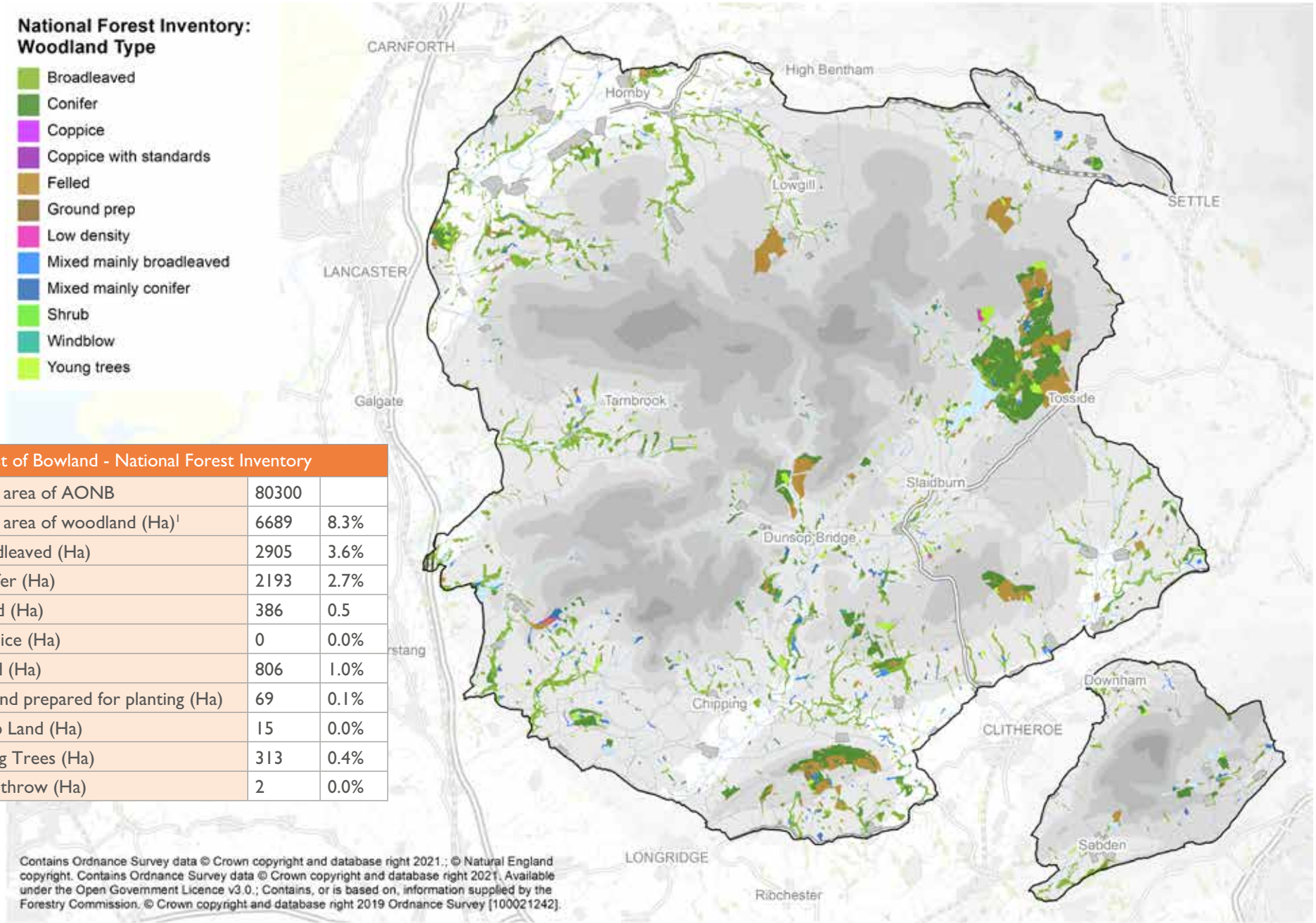
2.4 Existing woodland and biodiversity

- Forest management in general and forest management plans specifically should conserve or enhance biodiversity;
- The full opportunities for woodland creation and management for biodiversity in the wider environment should be considered, including the roles of forest habitats and open habitats in creating ecological networks that link similar habitats.
- Avoid establishing new forests in deep peat soils and on sites that would compromise the hydrology of adjacent bog or wetland habitats.
- Consider other important priority habitats including species-rich grassland.

Expanding mixed and native woodlands by creating new woods and restoring existing woodland sites will have significant benefits for biodiversity, especially when associated with existing ancient semi-natural woodlands reducing habitat fragmentation. The decline in traditional woodland management, reduced the amount of open woodland, together with its associated populations of sun-loving insects such as butterflies such as the pearl-bordered fritillary (absent in Bowland). Forestry operations have the potential to impact biodiversity in both a beneficial and a harmful way. Choices may not be straightforward. For example, some birds may require extensive felling coupes whilst woodland floor prefers more intimate coupes. Fungi, lichens and invertebrates require old growth. Whilst clearly trees form the largest physical element of woodland they represent just a small part of the number of species in woodland. Ground flora such as ramsoms and bluebells depend upon the amount of light within a woodland canopy. They can benefit from woodland management.

There can sometimes be a lively debate as to what constitutes 'native' woodland. Moreover, with a changing climate and the risk of pest and disease there can be very good reasons to move away from the palette of native species to increase the genotypic variation in woods to increase resilience. Indeed, it can be argued that nearly all woodland has been historically managed for a range of products and already have a more narrow range of species than would be expected. However, there may equally be conservation reasons for using what could be considered as 'native species' because of particular ecological associations *(see appendix 1)* . When planting native species and native woodlands it is best to use well-adapted local or regional origins from similar elevations.

Figure#4: Forest of Bowland AONB – existing woodland cover



Forest of Bowland - National Forest Inventory		
Total area of AONB	80300	
Total area of woodland (Ha)[1]	6689	8.3%
Broadleaved (Ha)	2905	3.6%
Conifer (Ha)	2193	2.7%
Mixed (Ha)	386	0.5
Coppice (Ha)	0	0.0%
Felled (Ha)	806	1.0%
Ground prepared for planting (Ha)	69	0.1%
Shrub Land (Ha)	15	0.0%
Young Trees (Ha)	313	0.4%
Windthrow (Ha)	2	0.0%

2.5 Ancient & Semi Natural Woodland

- Plantations on ancient woodland sites may have retained some features of ecological and cultural interest and provide valuable opportunities for restoration. The AONB will support an initiative that protects and conserves ancient and semi natural woodland.
- Support the restoration of PAWS (Plantation on Ancient Woodland Sites) to richer and more diverse woodland
- There are likely to be areas within managed woodlands with indicators of a long history of woodland cover. If native species are still present (including ground flora), natural regeneration and colonisation are the most appropriate way of creating and restoring these woodland habitats

In the AONB ancient woodland forms just 1.35% (10.8 km2) of the landscape (Natural England, 2018). These ancient woodland sites i.e. woodland that pre-date 1600 and the onset of plantation planting are of considerable importance for UK woodland conservation. The continuity of woodland cover and longevity of management has resulted in high levels of ecological interest. (Peterken, 1996; Rackham 2003). Ancient Semi Natural woodland can act as refuges of species. Moreover, the complex relationships between plants, fungi and insects developed over centuries are only now beginning to be understood. They also retain characteristics of previous management such as coppice and other traces of cultural history.

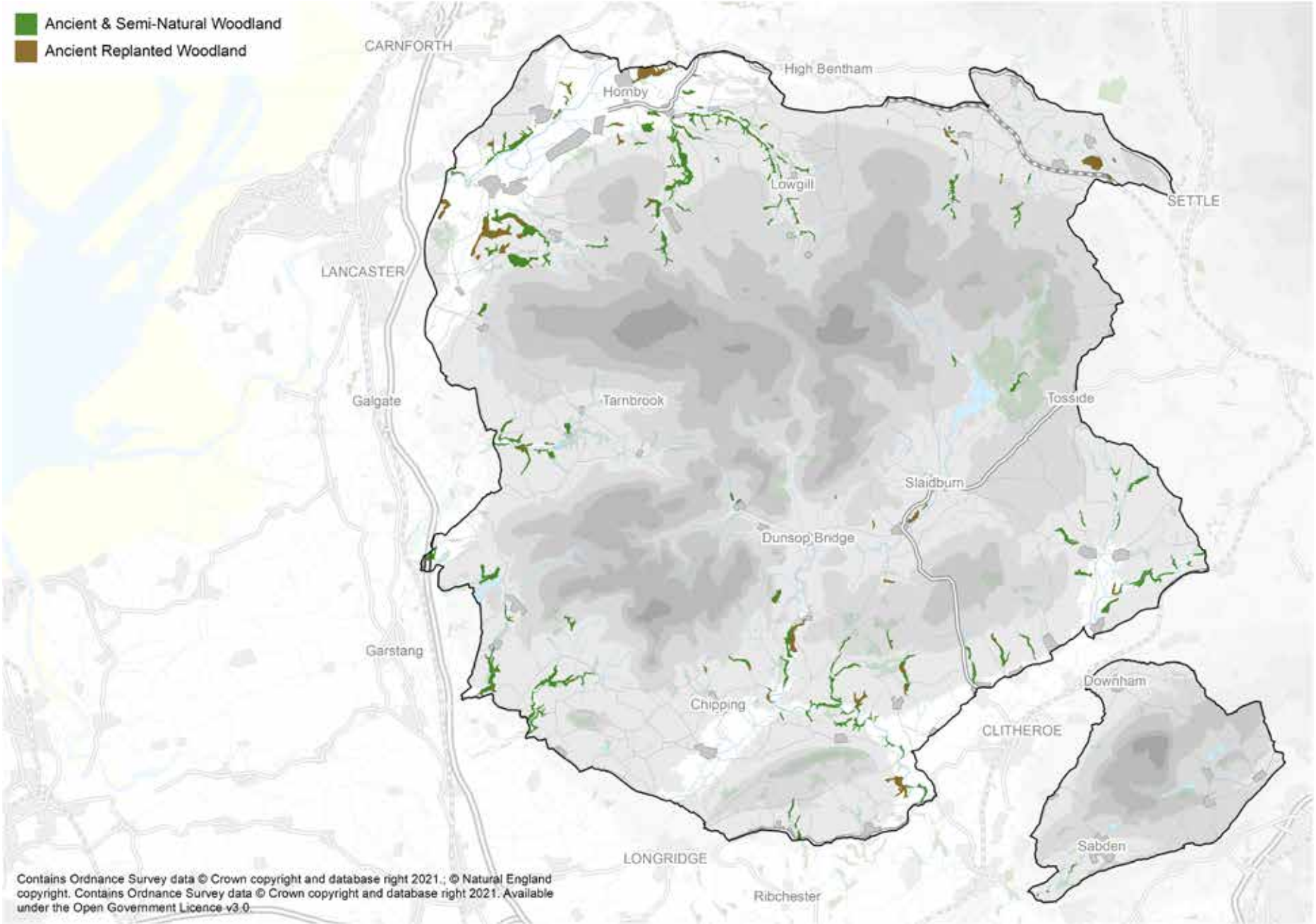
Mostly in the 20th century, these woodlands have been planted with non-native species to provide timber, known as PAWS (Plantations on Ancient Woodland Sites). Around 8% of woodland in the AONB are PAWS woods (such as Knots Wood). Many PAWS retain at least some characteristics or remnants of native woodland, which give them the potential to be restored to woods that approach a more native composition. Non-native conifer in particular can have a negative impact on the ecology of ancient woodlands. Initiatives particularly led by the Woodland Trust and supported by the Forestry Commission have sought to restore these woodlands to ensure residual species retained in the woodland are conserved. This may be done by ensuring the protection of residual ancient woodland features in the woodland and then shifting the overall species composition to a more semi-natural composition. This restoration needs to be carried out over a period of time with thinning, retaining dead wood and opening up patches of flora along streams. Clear felling may destroy important ground flora and lower plants.

Deadwood is often overlooked and yet up to a fifth of woodland species depend on dead or dying wood for all or part of their life cycle. Deadwood in riparian habitats provides structural habitat for fish and invertebrates whereas deadwood retained close to sunny glades and edges will provide a useful habitat for both ground flora and invertebrates. As a guide, the UK Forestry Standard suggests around 20 m^3 per hectare (equivalent to a lorry load per hectare) deadwood (excluding tree stumps). Native species provide the most valuable deadwood for biodiversity, especially in sections of 200 mm diameter or more.

Case study#1: Cragg Wood & Calf Hill Wood Special Area of Conservation:

These old sessile oak woods occupy the headwaters of the River Conder in a steep valley. Oak dominates in the canopy with birch Betula sp., rowan Sorbus aucuparia and holly Ilex aquifolium. The ground flora ranges from areas of abundant bilberry Vaccinium myrtillus, through grassy areas, to rich moss carpets. Small areas of alder Alnus glutinosa flushes also occur. In particular, Crag Wood is one of the last refuges for Juniper, one of only three native conifers. The low shrub that grows at altitude is at risk through climate change and the AONB wish to work with estates to help conserve and protect remaining communities.

Figure#5: Forest of Bowland AONB – ancient & semi natural woodland



2.6 Open, scrub and edge habitats

- Plan open space in new and existing woodland to create and enhance networks of open-ground habitats to assist migration.
- Ensure wetland features such as springs, flushes and bogs are protected, and take opportunities to restore degraded features.
- Develop graded edge habitats; thin woodland edges to create a diverse and convoluted structure and a transitional zone between habitats.

Open spaces within or adjacent to woodland are especially important for biodiversity. These unplanted areas contain shrub species and the potential to support invertebrates and provide valuable cover for birds such as black grouse (absent in Bowland) and mammals. Edge habitats that grade into open ground which contain mixtures of native trees and shrubs are far more beneficial to biodiversity than abrupt edges. Scrub, especially in cloughs helps to support over-wintering birds. It is important that amongst the dense stands are areas of less dense vegetation and open space.

2.7 Wood pasture, wood meadow and parkland

- The AONB would support the conservation of existing wood pasture and the creation of new wood pasture or wood meadows where the balance of grazing and woodland are appropriate

Deer parks and hunting are an integral part of the Forest of Bowland landscape that can trace their roots from before the Norman conquest. The estates that date from that time are home to great examples of parkland and wood pasture with fantastic examples of ancient and veteran trees. They are part of the special sense of place of the Forest of Bowland linking the landscape features today back over one thousand years and are of great historical as well as ecological importance.

Ancient/veteran trees which are special in their own right as some of the oldest living organisms in the UK, alongside the presence of grazing animals, create a unique open habitat. Animal dung and decay in wood contributes to invertebrate and fungal diversity. The microhabitats in hollowing trees, other decaying wood and rot holes support a wide range of specialised invertebrates, lichen and fungi.

There has been great interest in wood pasture more recently as part of a wider debate about nature recovery. This reassessment of natural systems and grazing animals in a 'wilder' landscape has potential benefits for wildlife with the creation of 'edge' habitats and scrub. Moreover, open grown trees and trees outside woodland have real benefits. An open grown oak can have as much as twenty times the leaf cover as its woodland equivalent. There have been some exciting developments recently within the AONB with landowners looking to experiment with grazing in a wooded landscape and the recreation of wood pasture. However, the balance between the needs of grazing stock and trees needs to be carefully considered. Sustained high levels of grazing will preclude any regeneration and might actually increase impacts on ancient and veteran trees. For example, cattle sheltering from the rain under the canopies of trees can cause compaction around veteran trees.

This different extensive approach to nature recovery can be considered on a landscape-scale. For example, in the adjacent Yorkshire Dales National Park the Wild Ingleborough Project represents an interesting partnership between several partners including Yorkshire Wildlife Trust, Woodland Trust, WWF , University of Leeds and Natural England to restore habitats through low intensity farming . Lessons learnt might well be applied across a wider area working closely with private landowners and farmers.

Case study#2: Waders: Curlews – a cause for concern

- Maintaining curlew populations remains a priority for the AONB. Waders, especially curlews, need to be considered as part of any proposals for woodland creation or managing woodland habitat

Curlews have declined greatly in Europe (-48%, 1995-2014), most probably due to habitat loss and degradation and poor breeding success and are classified as globally near threatened on the IUCN Red List of Threatened Species. The UK supports one of the largest national breeding populations of curlew yet declines here are amongst the steepest recorded throughout the curlew's range. The Forest of Bowland is an important area for breeding populations in Northern England. Curlews are unusual amongst breeding waders in Britain in that large numbers utilise both unenclosed moorland habitats and adjacent semi-improved grassland pastures and meadows, with adult birds and chicks often moving from one habitat to another during the breeding season. Land adjacent to forests and woodland is less suitable as evidence shows that breeding productivity in such areas is unsustainably low due to nest predation by foxes, stoats and carrion crows.

Case study#3: Black Grouse – the potential for reintroduction to Bowland

- The Forest of Bowland AONB will work with other conservation organisations to consider the translocation or reintroduction of black grouse.

Another iconic species of the British uplands, black grouse thrive in areas with a moorland and in-bye habitat mosaic with nearby forestry or scattered trees. The black grouse population in the UK has declined and contracted owing in part to the direct loss, fragmentation and degradation of habitat. In Northern England following the instigation of conservation measures, numbers increased from nearly 800 males in 1998 to over 1,000 in 2006 however these were confined to strongholds within the Pennines. The Game & Wildlife Conservation Trust has successfully managed a programme of dispersal of males in the Yorkshire Dales. Conditions in the Forest of Bowland may be conducive for reintroduction. For example, research from the Game & Wildlife Conservation Trust shows black grouse benefit from reduced grazing on the moorland edge, which increases the cover but also increases the invertebrates upon which black grouse chicks feed. The creation of scrub could assist reintroduction.

3.1 The 'Right Tree in the Right Place'

- The AONB welcome exploring opportunities to plant new mixed and native woodlands on the lower hills and moorland fringes without compromising the area's character; ensuring that woodland expansion avoids bodies of deep peat and avoids impacting on other sites of biodiversity value; and ensuring that new woodlands enhance the local landscape character in terms of typical scale, type and location and avoid impacting on features of historic interest.

The Government's England Trees Action Plan has committed to treble the rate of tree planting and increase woodland cover in England to 12% by 2060 planting 180,000 hectares by 2042. The recognition that action is needed to combat climate change will mean that in some areas there will be land-use changes in favour of woodland creation to help offset carbon emissions.

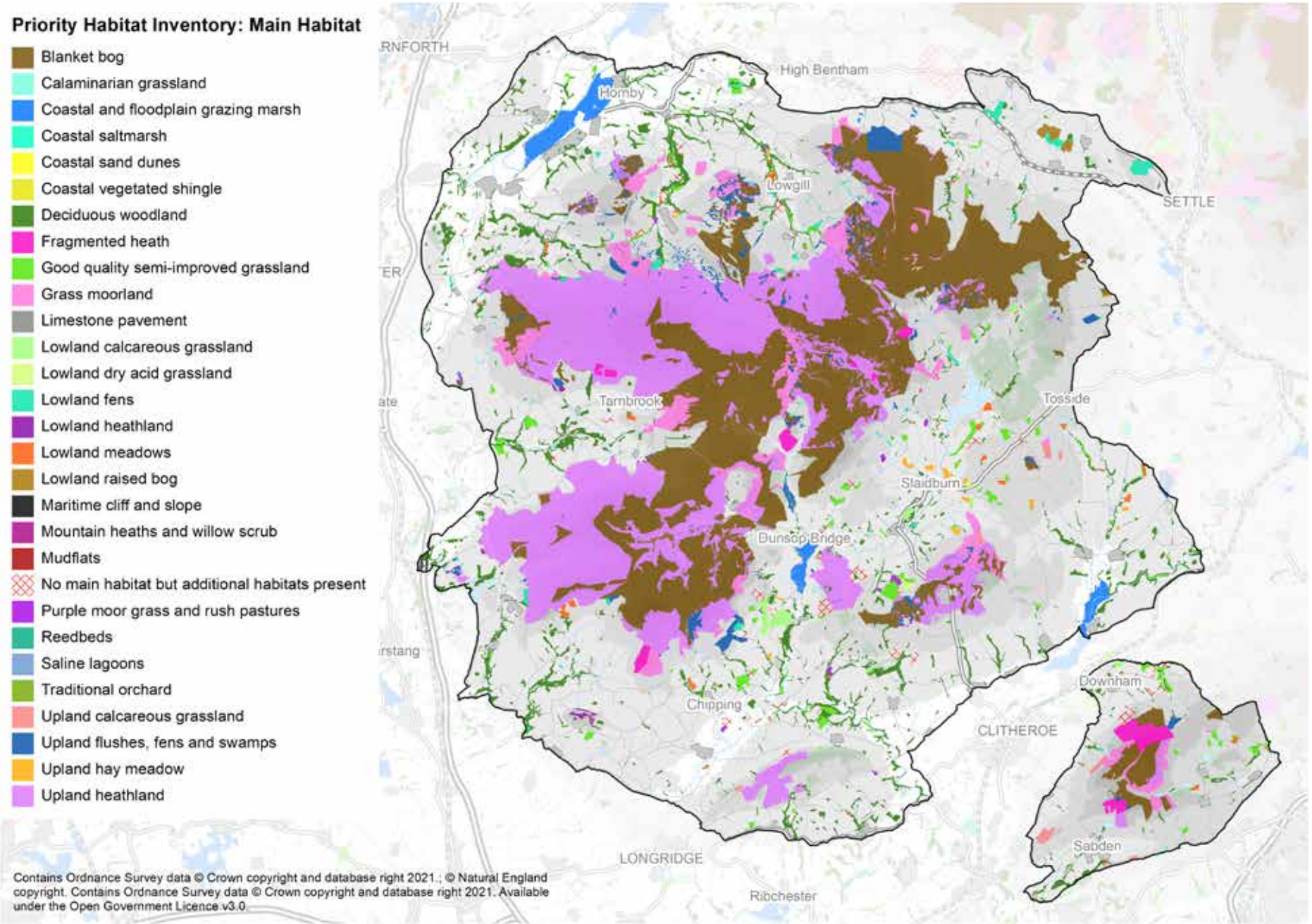
Woodland creation has been driven by agri-environment schemes as well as initiatives by the Forestry Commission. Under the woodland creation scheme, land in the scheme must not be used for any agricultural activity, including grazing, for a period of at least five years. The introduction of the new Environmental Land Management Scheme and phasing out of Basic Payments will, it is anticipated, make woodland creation a viable option on many landholdings.

There has been significant debate about landscape issues and species choice especially in the context of Designated Landscapes (AONBs and National Parks). These have in some instances been simplified to suggest that Designated Landscapes are "against" woodland creation. It is important to reaffirm that the AONB welcomes woodland creation in the context of constraints that are clearly articulated within UK Forestry Standard. The English National Parks have adopted a position on what constitutes the right tree in the right place. The Forest of Bowland AONB seeks to adopt this principle.

When identifying or assessing the suitability of sites for tree planting/restocking and considering the appropriateness of species to be planted, the nature of their planting and their ongoing management needs, there is a presumption in favour of schemes that will conserve and/or enhance the natural beauty, wildlife and cultural heritage, as evidenced within the Forest of Bowland Management Plan and subsidiary documents including the Landscape Character Assessment. There is similarly a presumption against schemes that overall do harm to the natural beauty, wildlife and cultural heritage. In meeting these requirements, schemes that also provide for public access and thereby provide opportunities for the public to understand and enjoy the special qualities of the Forest of Bowland AONB are likely to be seen more favourably. In assessing the wider effects of any planting scheme, the potential social and economic benefits to the local community will also be taken into consideration, but this will not override the presumptions identified above since these benefits have already been factored into the Management Plan.

(Reference: adopted from English National Park Authorities 2019.)

Figure#6 : Forest of Bowland - priority habitats



3.2 Woodland creation constraints: Important habitats and species

- The AONB will support the natural regeneration and appropriate planting of new small scale native woodlands, the expansion of existing woodlands (particularly small areas of ancient, semi-natural woodland) and the planting of non-woodland trees, especially within moorland cloughs and river valleys where the impact on other habitats (in particular, the Bowland Fells Special Protection Area) can be managed.

On some peat soils the magnitude of soil carbon losses due to disturbance and oxidation can be greater than carbon uptake by tree growth over the long term. Oxidation and degradation can also result from changes to the local hydrology by planting adjacent to these sites. For this reason, and for reasons of habitat and biodiversity value, there is a general presumption against forest establishment on deep peat soils. This is particularly the case for raised bogs and blanket bogs.

UK Forestry Standard

Proposals need to be considered very carefully to ensure that woodland creation does not negatively impact protected species or priority habitats. Not only are peat soils important ecologically, they are also internationally important for carbon sequestration with upland soils being England's largest carbon store. Species rich grassland is another vulnerable critical habitat which has declined by more than 97% in the UK since the 1950's. The Forest of Bowland AONB has restored 150 hectares of species rich hay meadow over the last decade and consideration of the potential for restoration to species-rich grassland should be taken into account in new schemes. Waders are a priority species. Curlew have recently joined lapwing on the red list 'birds of conservation concern'. These species may rely on rushy pasture that could appear initially to be good opportunities for woodland creation. Detailed bird and habitat surveys may be required. Monitoring and surveying are never easy to resource. Ideally more monitoring and survey work should be carried out as a matter of course.

Table#1: Woodland creation – target areas and unsuitable sites

Land specifically targeted for creation of new native and mixed woodland

- Open ground between existing semi-natural woods; particularly where newly created woodland will connect previously separate Ancient Woodland Inventory woodlands. (Species-choice can be critical here with opportunities for natural regeneration).
- Areas with relic woodland ground flora including areas mapped as felled or replanted ancient semi-natural woodland in the Ancient Woodland Inventory
- (Potentially) areas of scrub/ scattered trees
- Bracken stands
- River corridors especially where existing or potential priority areas for aquatic species.

Land unsuitable for new woodland

- Land above 400 metres
- Land on deep peat or blanket mire
- Species rich grassland (or potential species rich)
- Mires/flushes
- Rushy pastures of importance for breeding waders
- Sites of archaeological interest

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3.3 Woodland opportunity mapping

- The AONB will look to develop woodland opportunity mapping working with partners including Ribble Rivers Trust, Lancashire Environmental Records Network and Lancashire Wildlife Trust to consider woodland creation opportunities.

Despite the constraints, there are opportunities for new woodland creation. There are a number of approaches to scoping woodland creation at various scales from broad landscapes and habitats through to fine grain analysis field by field.

Opportunity mapping carried out through the Northern Upland Chain Local Nature Partnership (NUC LNP) considered designations and mapping on a macro-scale. Biodiversity designations including Special Protection Areas and Sites of Special Scientific Interest as well as other sensitive habitats and historic or cultural features were considered in scoping out areas unsuitable for woodland creation.

Nidderdale AONB has recently published woodland opportunity mapping based on over 80 variables considering both conservation and productive woodland (Nidderdale AONB, 2020). The Forest of Bowland AONB will look to develop and refine these techniques working with partners including Ribble Rivers Trust, Lancashire Environmental Records Network and Lancashire Wildlife Trust to consider woodland creation opportunities through the Lancashire Woodland Connect initiative and wider-nature recovery mapping.

It is important to note that the lack of constraints should not be taken to be a presumption to plant. Every opportunity should be taken on a site by site basis. For example, some pasture may appear botanically poor but offer breeding for ground nesting birds such as lapwing and curlew.

3.4 Connectivity - Nature Recovery, Environmental Net Gain & Green Infrastructure

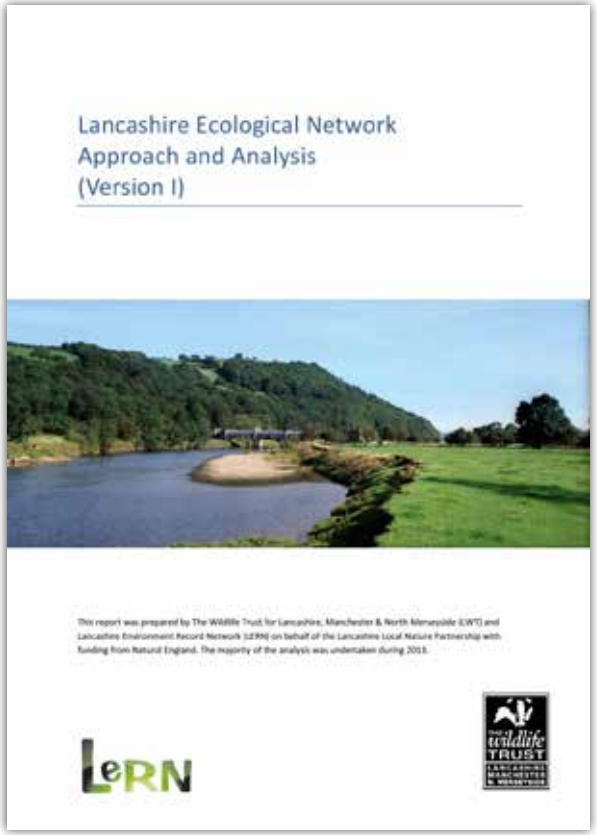
The loss of ecological connectivity through the fragmentation of woodland habitat poses a significant threat to woodland biodiversity. Climate change poses further threats to isolated populations. This is particularly the case where woodlands are isolated which increase the likelihood that priority species will become locally extinct. To promote connectivity, habitats have to be considered in the context of the wider landscape. For woodland habitats, a range of options can be used to restore ecological connections. These include expanding existing woodlands and creating new woods adjacent to them. Wood pastures and parkland can also be created or managed to act as a link between woodland habitats. Because of their linear nature, riparian zones offer good opportunities to increase connectivity. Hedgerows and diverse uncultivated field margins can also serve in creating cover and developing connectivity between habitats.

The Lawton Review ('Making Space for Nature') identified a number of areas for improvement in how wildlife and our wider natural environment is conserved (Lawton. et al, 2010) through the linked concepts of 'Bigger, Better, More connected'. Protecting existing wildlife sites; increasing their size; enhancing connection by creating new wildlife corridors or stepping stones and reducing pressure on wildlife by improving the wider environment including through buffering wildlife sites. These principles have been restated in the Government's 25 Year Environment Plan which identified a target of creating or restoring 500,000 hectares of wildlife-rich habitat outside the protected sites network, focusing on priority habitats as part of a wider set of land management changes providing extensive benefits. This Nature Recovery Network has been launched at a time when there has been a renewed interest in woodland creation. Associated with 'connectivity' is the concept of 'porosity' the idea which explains that some habitats are more connected than others, so for example, a woodland invertebrate would find it much easier to cross a meadow or go along a hedge than to go across a ploughed field or a field of rye grass. Any initiative has to involve landowners and farmers in managing land for public benefit using their knowledge and skills and this should be the starting point for any project.

Green infrastructure Connectivity is at the heart of the concept of Green Infrastructure – networks of 'multi-functional' greenspace (or indeed 'blue' space) which might be green corridors, cycle ways or greenspace. Not just an urban concept these networks may help the migration of species or indeed help re-direct surface water. A number of local authorities are developing strategies that identify these networks of Green Infrastructure. These strategies will be a material consideration in determining planning applications for development which, as outlined in the Government's 25 Year Environment Plan, will have to demonstrate future 'environmental net gain.' Potentially, this could be a significant new mechanism for promoting woodland creation into the future (see section 5.4). There are many opportunities for woodland creation which will have a positive impact for wildlife, landscape and the environment. Two examples illustrated below are for clough woodland and farm woodland.

Section Three Woodland Creation

Lancashire Environmental Records Network (LERN) produced a report on the application of ecological networks (Shirres,R ,Bruce,N. 2015) . Connectivity within the landscape can be of huge importance for some species, especially amongst plant and insect species. The degree of connectivity is related to habitat patch size, quality of habitat as well as separation distance. Hot spot analysis identifies where features with either high or low values cluster spatially. Given a set of weighted features, it identifies statistically significant hot spots and cold spots. For each map the results are presented as five classes of equal area. The darkest areas are considered to have the greatest potential for achieving multiple benefits from undertaking woodland creation.



3.5 Clough Woodland

- The AONB supports the creation of clough woodland which does not adversely impact the Bowland Fells Special Protection Area or other important habitats.
- The AONB will work with partners (including United Utilities and the Rivers Trusts) to identify opportunities for restoring clough woodland.

The steep cloughs of the Bowland Fells present opportunities to create clough woodlands. Indeed this may be the restoration of features that have been lost due to over-grazing in the past. With reduced stock numbers and the poor quality of grazing on some of these sites, these cloughs present an opportunity for woodland creation.

Woodlands could be created naturally by excluding livestock and deer using fencing and allowing existing shrubs near the site to colonise through natural regeneration. Wind or birds often disperse the natural seeds sources. Alternatively this may be by planting stock with tree guards. Both these approaches have different environmental and landscape impacts, such as the use of plastic tree guards or the visual impacts of fencing in the landscape.

Managing these sites can be the single biggest challenge. Fencing has to be maintained to exclude stock. Natural regeneration may take several years to create a woodland with the risk of colonisation by non-native species however woodlands created in this way are more natural looking and may be more resilient to climate change. The presence of clough woodlands also provides opportunities for the development of diverse moorland and woodland edge habitats. For example, the areas adjacent to wooded cloughs offer the opportunity to recreate a wood pasture landscape. Linkages to local and long distance ecological networks should be made wherever possible.

Woodland regeneration should not be encouraged where this will threaten other important habitats or the open character of the landscape, which is important for breeding birds.

Deer can have a serious impact especially on small woodland (see section 6.4) . There is also a need to carefully consider the impact of deer fencing and tree shelters on the landscape and limit their use to the minimum.

There already has been significant work carried out by the AONB, the Rivers Trusts (see WINNS case study) and United Utilities through their sustainable catchment management programme to identify and create new clough woodland. The AONB will take this work forward working with partners and landowners across the AONB.

Table#2: Benefits of Clough Woodland

- Wildlife Providing habitat for woodland plants, invertebrates and birds as well as shelter for species more associated with adjacent areas of moorland.
- Water quality and reducing surface water

Clough woodlands can help to improve water quality as well as contributing to the reduction of downstream flood risk and increasing the stability of slopes.

- Landscape Clough woodland can be perceived as more naturalistic than plantations.
- Stock control Whilst clough woodland reduces the amount of grazing available they can create shelter for stock, reducing encroachment of bracken and reducing the spread of wildfire.

Figure#7: Forest of Bowland AONB – landscape context

Enclosure dominates the moorland fringes and valleys of Bowland. An enclosure pattern refers to the network of hedges, walls, ditches, fences and trees that define field boundaries. Enclosure has a historical and cultural value and is a cherished and distinctive visual feature

3.6 Farm-scale woodland

Trees on farms provide shade and shelter for animals, habitats that contribute to ecological connectivity, and a future source of renewable energy. On a larger scale there has been interest in agro-forestry.

3.7 Traditional boundaries: Hedgerows, hedgerow trees and open grown trees.

- The AONB will continue to champion a traditional boundaries programme.
- The AONB will support conserving, restoring and enhancing existing woodland boundary walls, banks and hedges, giving priority to those that are important for stock control, landscape value and habitat.
- The AONB will look to promote standard trees in hedgerows and open grown trees

It is easy to underestimate the significance that hedgerows and trees outside woodland can have on a landscape. However, it is not just their landscape impact that is important. According to the RSPB hedgerows can support up to 80% of our woodland birds, 50% of our mammals and 30% of our butterflies (RSPB, 2016). The ditches and banks associated with hedgerows provide habitat for frogs, toads, newts and reptiles. In the past, amalgamation of land holdings has led to the loss of hedgerows. The Forest of Bowland AONB has managed a traditional boundaries programme for over 20 years, funding creation and management of hedgerows and offering training in traditional skills, such as hedge laying. Increasing the width whenever possible would have a dramatic impact on the landscape and for wildlife, creating corridors for wildlife linking woodland and scrub; however this requires an increase in fencing costs and a reduction of grazing.

Case study#4: Quernmore & the Conder Valley Landscape Enhancement Initiative

The Landscape Enhancement Initiative (LEI) is a grant scheme that forms part of National Grid's Visual Impact Provision project providing up to £24 million over six years (2015-2021) for localised visual improvement projects. For National Grid, which is the electricity transmission owner in England and Wales, this means considering the landscape and visual impacts of their existing infrastructure in the 19 Areas of Outstanding Natural Beauty (AONBs) and seven National Parks in which they have electricity infrastructure, including The Forest of Bowland AONB. High voltage transmission cables pass close to Quernmore and the Conder Valley area in the north east of the Area of Outstanding Natural Beauty. The National Grid's Landscape Enhancement Initiative includes for over 2 hectares of woodland creation and 5 kms of hedge creation working with local farmers, landowners and the Woodland Trust. It is also intended as a catalyst for further related landscape restoration work in the area over the coming years. For example, investigating the restoration of a 4 hectare PAWS (Plantation on Ancient Woodland Site) at Bushy Bank near Quernmore Park.

Case study#5: Pendle Hill Traditional Boundaries

As part of the Pendle Hill Landscape Partnership the project has initiated a traditional boundaries scheme to restore and maintain traditional boundaries as an essential element of the landscape and provide training in rural skills such as hedge laying and dry stone walling. The project will restore 5 kms of traditional hedge and organise over 40 training days.

Section Four Natural Capital & Ecosystem Services

'It is a landscape valued for the range of services and benefits it provides for society, with a functioning, diverse natural heritage where land management practices allow opportunity for natural processes to develop and flourish; and where partnership-working between land managers, conservation bodies, communities and businesses is focused on delivering more for nature together.'

Excerpt from the 'Vision' in Forest of Bowland AONB Management Plan 2019-24

Beyond the economic value of timber, woodland can provide a number of 'services' to society known as ecosystem services. In the context of climate change these have been increasingly recognised and include:

- **Provisioning services:** the products obtained from ecosystems, such as timber.
- **Regulating services:** the benefits obtained from the regulation of ecosystem services, such as the regulation of climate through carbon sequestration, slope stability and surface water management (natural flood management)
- **Cultural services:** the non-material benefits of woodland through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience
- **Supporting services:** Ecosystem services that are necessary for the production of all other ecosystem services. Biomass production, soil formation and provisioning of woodland habitat

The England Trees Action Plan has committed to support the forest economy by investigating natural capital concepts, supporting payments for ecosystem services and attracting more green finance. In addition, DEFRA will build the economic evidence base to help land managers and businesses make informed decisions on land use change and woodland management (DEFRA,2021)

Note: Ecosystem services apply to all habitats whether it is to the sequestration of carbon by deep peat or supporting pollinators from species rich hay meadows.

4.1 A changing climate

Woodlands are highly dynamic ecosystems: succession, natural regeneration, windthrow, flooding, drought, the activities of herbivores, insect attack, disease and fire all will change a woodland. Climate change will have an impact on woodland and this will present both risks and opportunities. Risks include tree mortality, fire, extreme weather events, and pest and disease outbreaks. Opportunities include potential increases in productivity and the range of species that can be grown. Climate change will require a new flexibility in managing existing woodland. A diversity of species and structure may all help to build resilience. For native woodlands, augmenting the current range of species with others associated with the woodland type will often help meet biodiversity objectives in addition to increasing the resilience of woods.

Trees and woodland can make a positive contribution to climate change mitigation measures:

- supplying products used in place of energy-intensive construction materials;
- source woodfuel to substitute for fossil fuels;
- maintaining and enhancing carbon stocks in woodlands and their soils;
- managing risks such as wind, fire and damage from pests and disease

The Forest of Bowland published a Climate Change Adaption Plan in 2011 which aims to provide a suite of adaptation actions designed to reduce the vulnerability of the landscape character and ecosystem services. Amongst those habitats identified as most vulnerable to climate change were wet woodlands and lowland mixed deciduous woodland with upland oakwoods, upland mixed ashwoods and wood pasture moderately vulnerable. (Forest of Bowland, 2011)

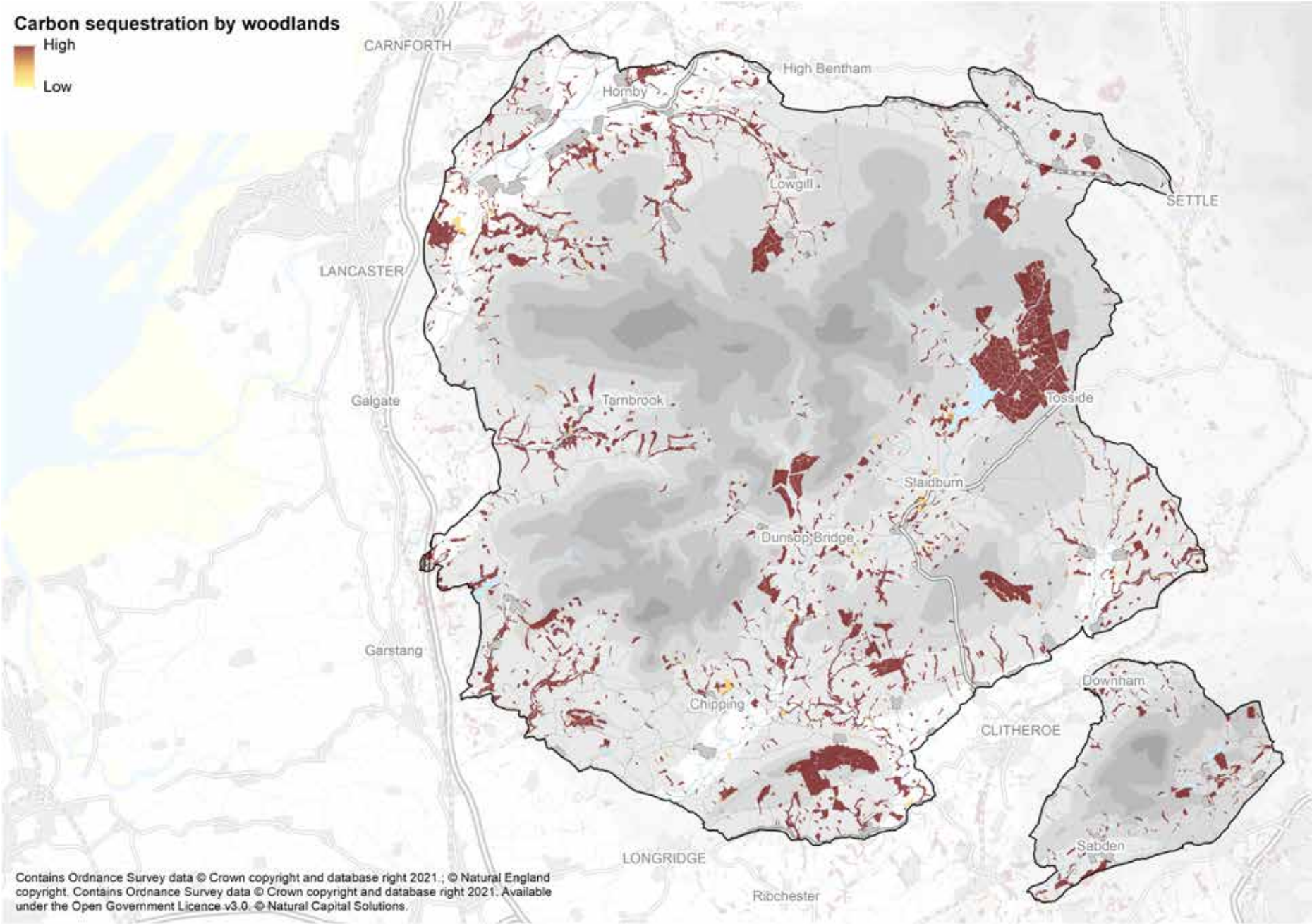
4.2 Carbon sequestration: Woodland Carbon Code

- The Forest of Bowland would support woodland creation for carbon sequestration working with recognised project developers such as the Yorkshire Dales Millennium Trust and Ribble Rivers Trust.

The need to plant trees in response to climate change has been articulated at both an international and national level. If woodland and forest are managed in a sustainable way, they perform a vital role both as carbon stores and sinks, representing an important means of removing carbon dioxide from the atmosphere. The accumulation of carbon is referred to as 'carbon sequestration'. A new native woodland can capture 300-400 tonnes of CO2 equivalent per hectare by year 50. By year 100, it can capture 400-600 CO2 equivalent per hectare. (Forestry Commission, 2017)

The Woodland Carbon Code is the UK standard for afforestation projects for climate change mitigation. Landowners can approach a project development group as a broker between landowners and companies wishing to acquire carbon credits. The Yorkshire Dales Millennium Trust are a recognised local project developer who control the 'carbon rights' and work with landowners to pass on this benefit to landowners. The Government announced an investment of £30 M to re-fresh this carbon market through a series of reverse auctions in 2019.

Figure#8: Forest of Bowland AONB – woodland carbon



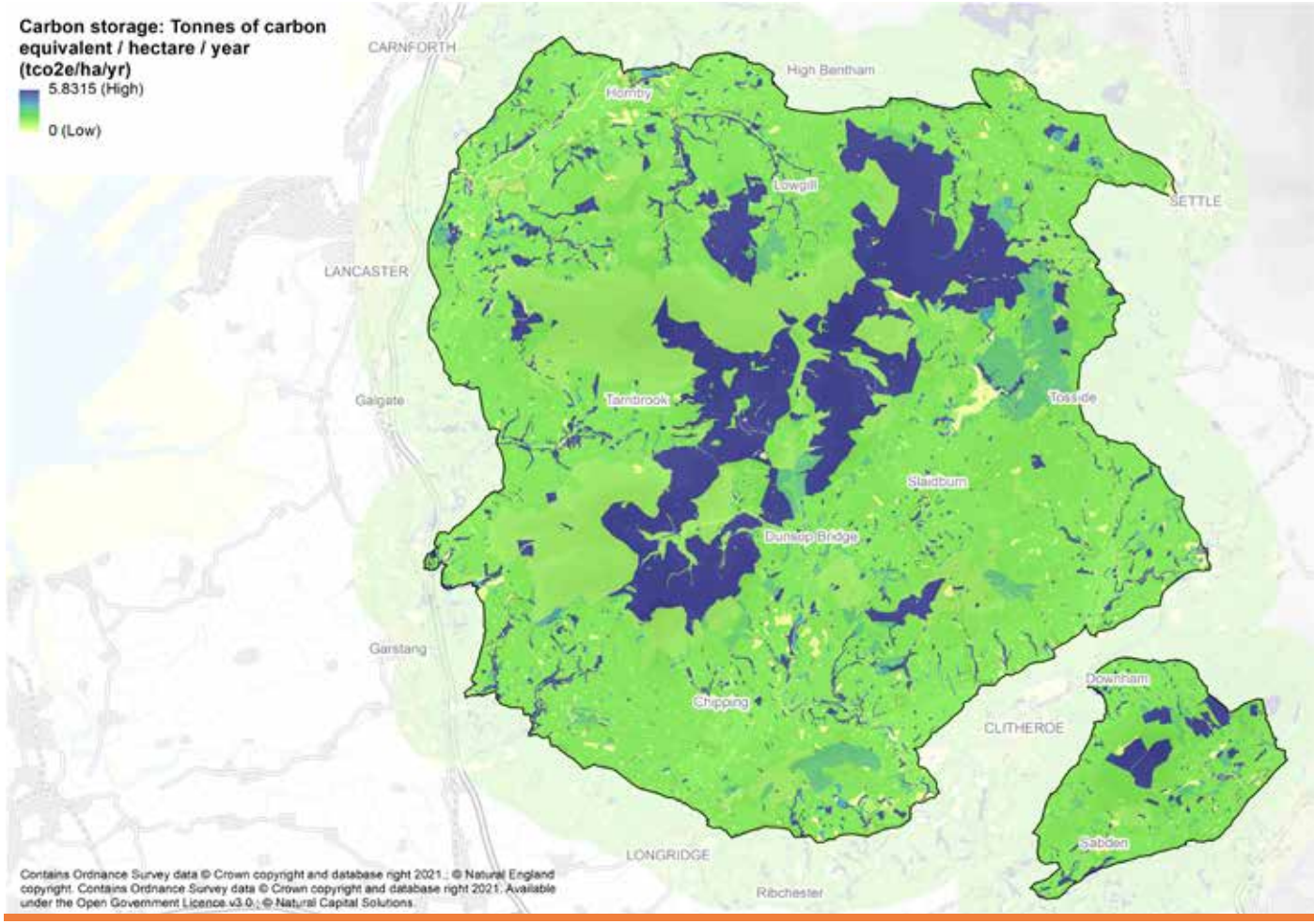
The overall total sequestration of carbon from woodland in the Forest of Bowland is 42,545 TCO2/ha/year

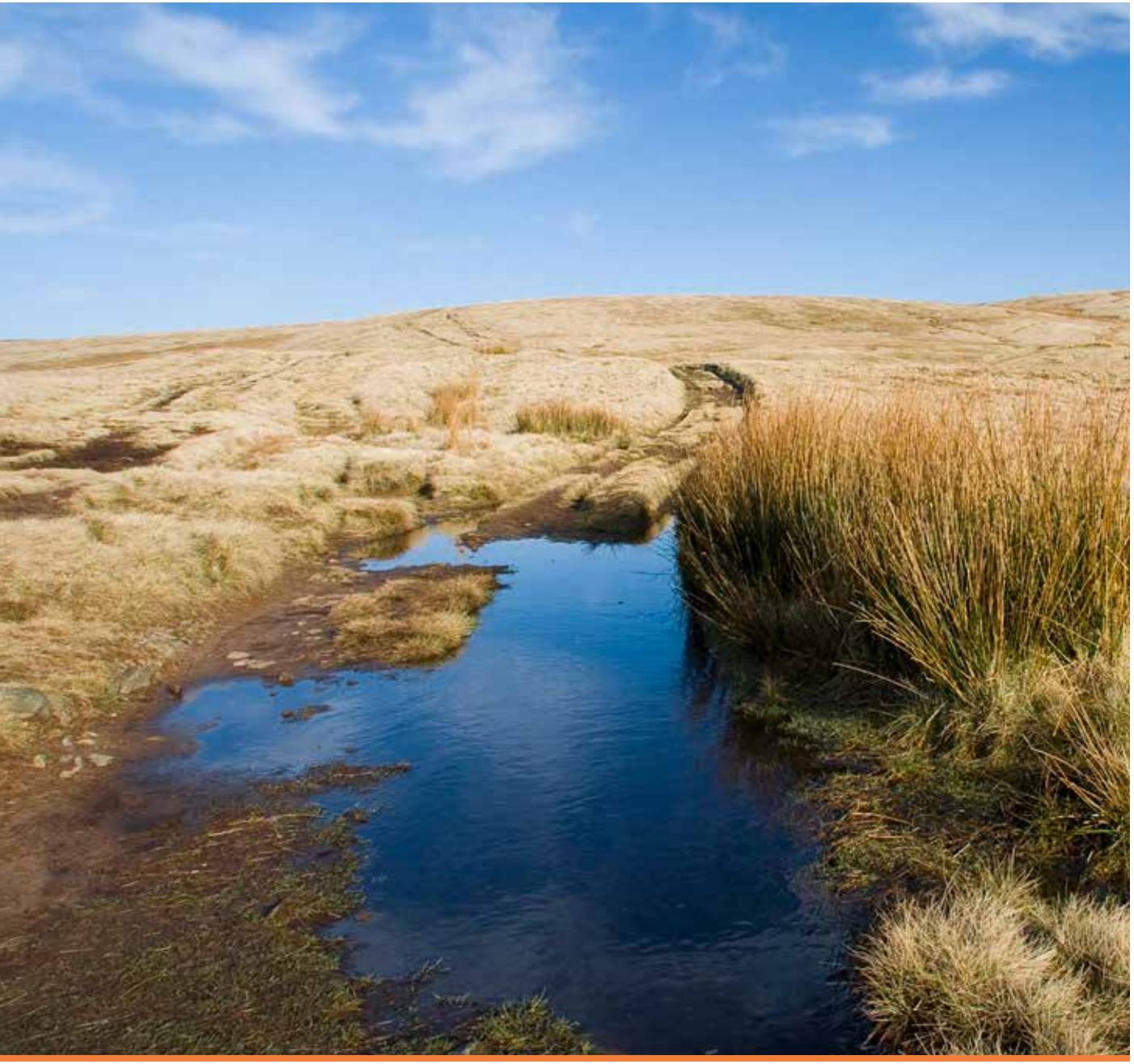
The map of woodland carbon produced by Natural Capital Systems for the AONB in 2020 basically reflects woodland cover across the Forest of Bowland and does not distinguish between the conifer plantations of Stocks Reservoir and Longridge and the native broadleaf woodland in terms of carbon capture. In the medium term conifers are a better choice than hardwoods, but in the long term (100+ years) oak and beech store as much as conifers (Dewar and Cannell, 1992). Although it should be noted that these rapid growing plantations may not supply the other ecosystem services around landscape and biodiversity and indeed may have negative impacts upon water flow and biodiversity. Carbon storage will be high both in woodland soils and the woodland itself. If woodland and forest are managed in a sustainable way, they perform a vital role both as carbon stocks and sinks, representing an important means of removing carbon dioxide from the atmosphere.

Methodology

Carbon sequestration from woodland areas were calculated following the UK Woodland Carbon Code methodology and look-up tables (Woodland Carbon Code 2018a,b). Coniferous woodland sequestration rates were averaged over an 80-year period and deciduous woodland sequestration rates were averaged over a 100-year period, as this is the length of a typical forestry cycle for deciduous woodland. Information on species composition was taken from the Forestry Commission 'National Inventory of Woodland and Trees, England, Regional Report for the NW'. The annual sequestration rates for each woodland type were then multiplied by the area of each and added together to give the total annual sequestration estimate for woodland at the site. Parkland areas were included assuming a sequestration capacity of 20% of woodland, and dense continuous scrub was assumed to be 50%. Maps of the sequestration rate scaled from 0 to 100 were produced.

Figure#9:
Overall carbon sequestration
in Forest of Bowland AONB.
Note: the importance of peat stored in
blanket bog of the Bowland Fells SSSI.





4.3 Woodland and soils

- **The quality of soil should be protected or enhanced in terms of its physical, chemical and biological properties. Operations should be planned and managed to avoid damage to soil structure and function.**

Soils are a traditionally neglected area of study in both agriculture and woodland and yet are critical not just in terms of the forestry and agricultural systems they support but increasingly in terms of the wider ecosystem services they supply. Forest soils naturally have a high organic or carbon content. On average about 75% of total organic carbon contained in the forest is within the forest soils; a balance that is under threat in the context of a changing climate.

Upland peatland such as those in blanket bog, or the very acid loamy upland soils in the Forest of Bowland in good biological condition, can retain high quantities of stored carbon which might otherwise become greenhouse gases. When peatland is functioning well, (active) they are also able absorb (sequester) the greenhouse gas carbon dioxide from the atmosphere. Degraded peat bogs release these stored gases into the atmosphere (carbon emissions) through water and wind erosion. Deep peat soils in Bowland are particularly vulnerable to disturbance and woodland establishment can result in a net loss of stored carbon and, for this reason, should be avoided. Indeed the England Trees Action Plan has committed to develop new guidance for England that will help determine when afforested peat should be restored to bog, and to minimise impacts on peaty soils from tree planting (DEFRA,2021).

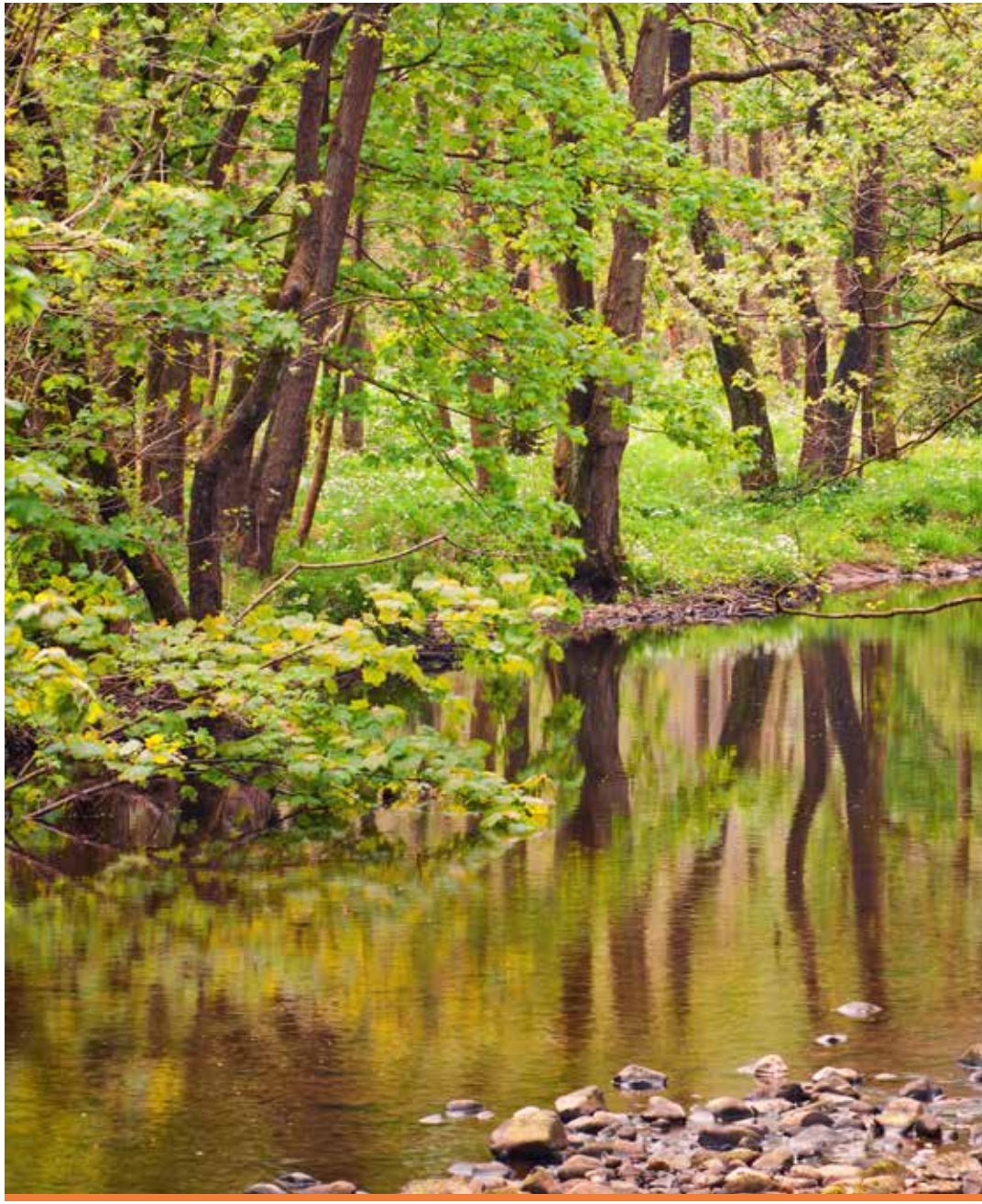
Forest management activities, for example planting and harvesting, can also have impacts on soils. Engineering works, such as the building of roads and bridges involve soil movement and disturbance which need to be carefully considered.

4.4 Woodlands and water

- Woodland should provide and maintain buffer areas along watercourses and water bodies creating valuable new habitat that incorporates open space
- New woodland and existing woodland/forestry management should contribute towards achieving the objectives of River Basin Management Plans and ensure that forestry pressures on the aquatic environment are addressed.
- Woodland management should be used to reduce surface water flows and where drainage is planned these ensure that water is discharged slowly into buffer areas and not directly into watercourses. Such buffers can also improve water quality.
- Woodland management and the creation of large woody debris dams are valuable means of assisting Natural Flood Management.

Woodlands and water are bound together in Bowland, the steep-sided Rivers Hodder, Wyre, Roeburn and Lune are all associated with ancient semi natural woodland. Woodland can have a range of effects on flood flows depending on the type and scale of woodland, topography and permeability.

The woodland canopy adjacent to watercourses provides shade, thereby helping to control water temperature with resulting benefits for freshwater ecology and chemistry. Shade, such as that provided by the alder (a key element of the Bowland landscape) helps keep summer water temperatures down, important for aquatic life, particularly salmonid fish.
A key resilience measure in the context of climate change. Vegetation and deadwood (such as large woody debris dams) can also improve water quality by filtering and trapping sediment which is important for aquatic life by for example the trailing branches and roots of riparian trees. Riparian zones present a major opportunity to enhance the biodiversity of woodland by linking permanent habitats and establishing native trees, shrubs and ground flora. However, they can also facilitate the rapid spread of invasive species such as Japanese knotweed, Himalayan balsam and Giant hogweed, so control measures and careful management are required in areas where invasive species may be a problem.



4.5 The role of woodland in managing flood risk:

The severe floods of recent years such as those in December 2015 at Galgate & Padiham has seen a re-evaluation of flood prevention that has embraced a catchment-scale approach alongside traditional engineered structures. Looking at a catchment as a whole, agricultural intensification can contribute to increased generation of run-off by reducing soil infiltration and soil water storage. The three catchment partnerships working within the Forest of Bowland AONB have championed this new approach characterised as Natural Flood Management.

Natural Flood Management techniques might include:

- Catchment woodland which can intercept, slow, store and filter water in the headwaters, particularly clough woodland. This can help reduce flood peaks, flood flows and flood frequency.
- A cross-slope woodland is a woodland which is planted across hill slopes. It intercepts the flow of water as it runs down the hill reducing rapid runoff and encouraging infiltration and storage of water in the soil.
- Floodplain woodlands have greatest flood risk effect in the middle and lower river reaches of medium to large catchments
- Interventions such as large woody debris dams can have an impact in terms of trapping sediment and modest attenuation.
- With respect to the wider agricultural landscape, hedgerows can perform a natural flood management function by intercepting rainfall, slowing overland runoff and increasing infiltration. Planting hedgerows on small embankments, known as kested hedgerows, can improve the growth of the hedge and enhance the NFM and water quality benefit by intercepting and temporarily storing overland flow. These benefits can be achieved by planting new hedgerows across slopes, or restoring old hedgerow boundaries still evident in the landscape. (Eden Rivers Trust, 2019) Through the Pendle Hill Project these measures have been tested using surface water modelling carried out by Ribble Rivers Trust and form part of the wider environmental benefits relating to the Padiham Flood Risk Management Scheme.

The Environment Agency has published useful guides (working with natural processes to reduce flood risk) outlining techniques alongside an evidence review. The Pendle Hill Project managed by the Forest of Bowland AONB has also produced a practical guide for farmers. As a relatively new area of research, the evidence is still limited to smaller catchments and there is still much to understand. For example, how the type of woodland, its placement in the catchment and the catchment's size affect its flood risk impact.

(Environment Agency, 2016)

Case study#6: Woodland and Invasive Non-Native Species Project (WINNS) with Ribble Rivers Trust

As part of the Pendle Hill Landscape Partnership the Woodland and Invasive Non-Native Species Project managed by Ribble Rivers Trust aims to create new woodlands and better manage existing woodlands and address invasive species such as Himalayan Balsam. Amongst the projects is the creation of new riparian woodland adjacent to Twiston beck.

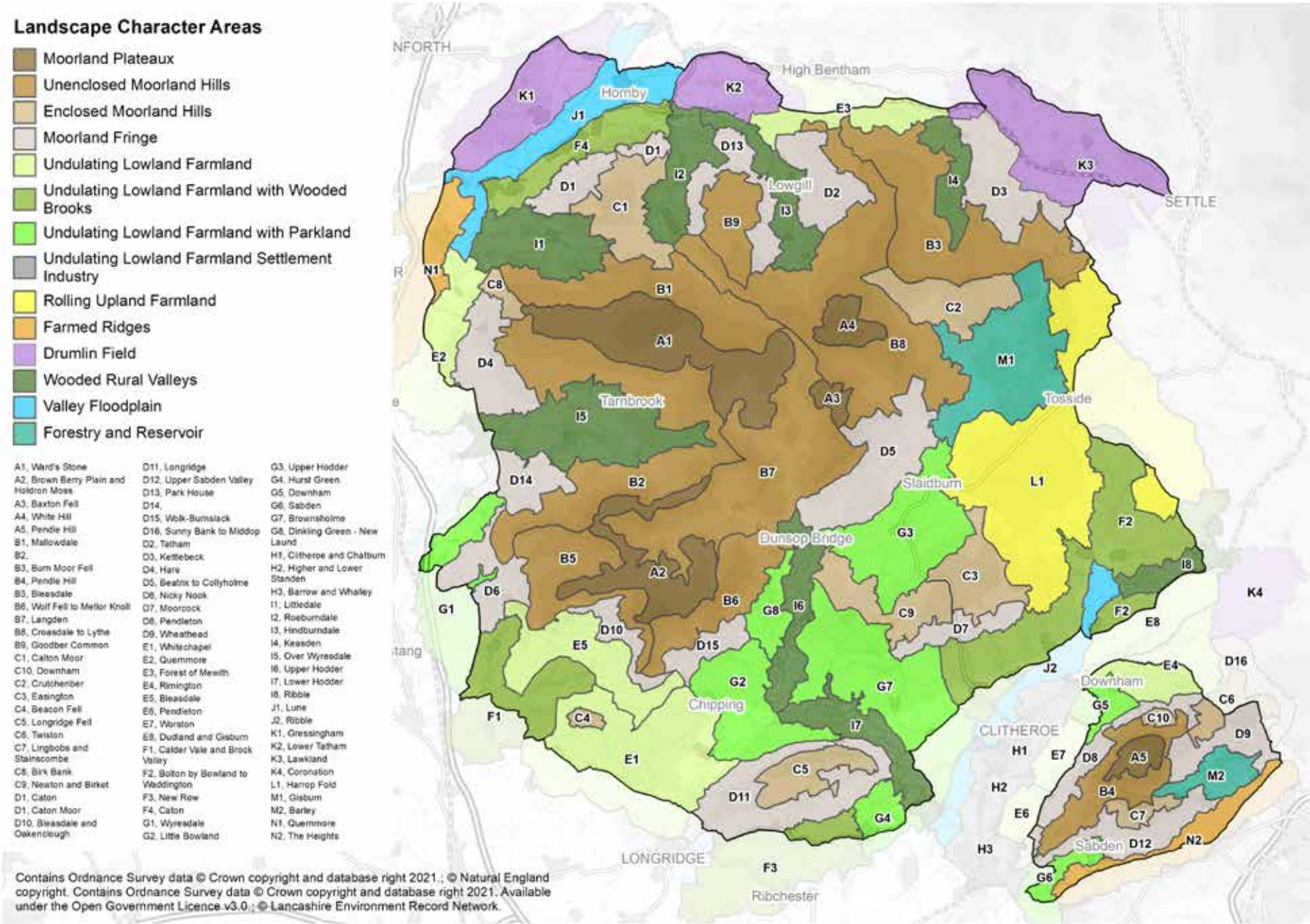
Section Five Landscape and Heritage

The Forest of Bowland Landscape Character Assessment should inform decisions about the nature, location and design of new woodland. Having taken this landscape context into account, design principles from the UK Forestry Standard should be used to assess the landscape and visual impacts of both new woodlands and forestry operations.

Woodlands are a dominant element in the landscape, shaping and enclosing space, framing views and providing colour, texture and scale. The creation of new woodland and the felling and restocking of existing woodlands have the potential to dramatically alter landscapes. Changes occurring to familiar scenes can be unwelcome – especially when the change is sudden and unexpected. The additional impact and damage caused by the construction of forestry tracks need to be taken account of at an early stage in planning operations. When it comes to restocking there are the obvious landscape impacts of plastic tubes. Applicants should also be informed of the adverse landscape effects of using fences. As well as the long-term decline in vegetation diversity, there are also problems of woodland birds striking fences during flight, which can be mitigated by careful design.

Large-scale plantations planted in the 50s and 60s in Bowland made of non-native conifers laid out in geometric shapes that follow ownership boundaries with limited species and age diversity can look 'unnatural' in the more intimate landscapes of the valleys such as the Hodder, Ribble and Lune. Many of these plantations on the higher and steep ground can dominate these intimate landscapes. As these plantations reach maturity and are clear felled an opportunity exists to restock in a way that reduces the landscape impact and ensure compliance with the UK Forestry Standard.

Figure#10: Forest of Bowland AONB – landscape character



5.1 Woodland design guidelines

Advice from the Forest of Bowland AONB will mirror that within the UK Forestry Standard.

- Woodland design should emulate 'natural' patterns and forms, rather than regular boundaries unless there is a historic precedent. For example, if the historic enclosure pattern is dominant or special features such as deer parks or vaccaries require special attention.
- Landscape impacts of forestry operations need to be considered such as rotation age; felling and restocking with applications providing the management opportunity to enhance the visual contribution they make. Clear felling in particular can have a dramatic impact on familiar views.
- The AONB would encourage owners to explore opportunities to modify the overall structure of existing conifer plantations to create softer outlines that respond to topography and contain a higher broadleaved content.
- Management practice can achieve more appropriate forest shapes over time, including the effects of fences, felling coupes and access tracks.

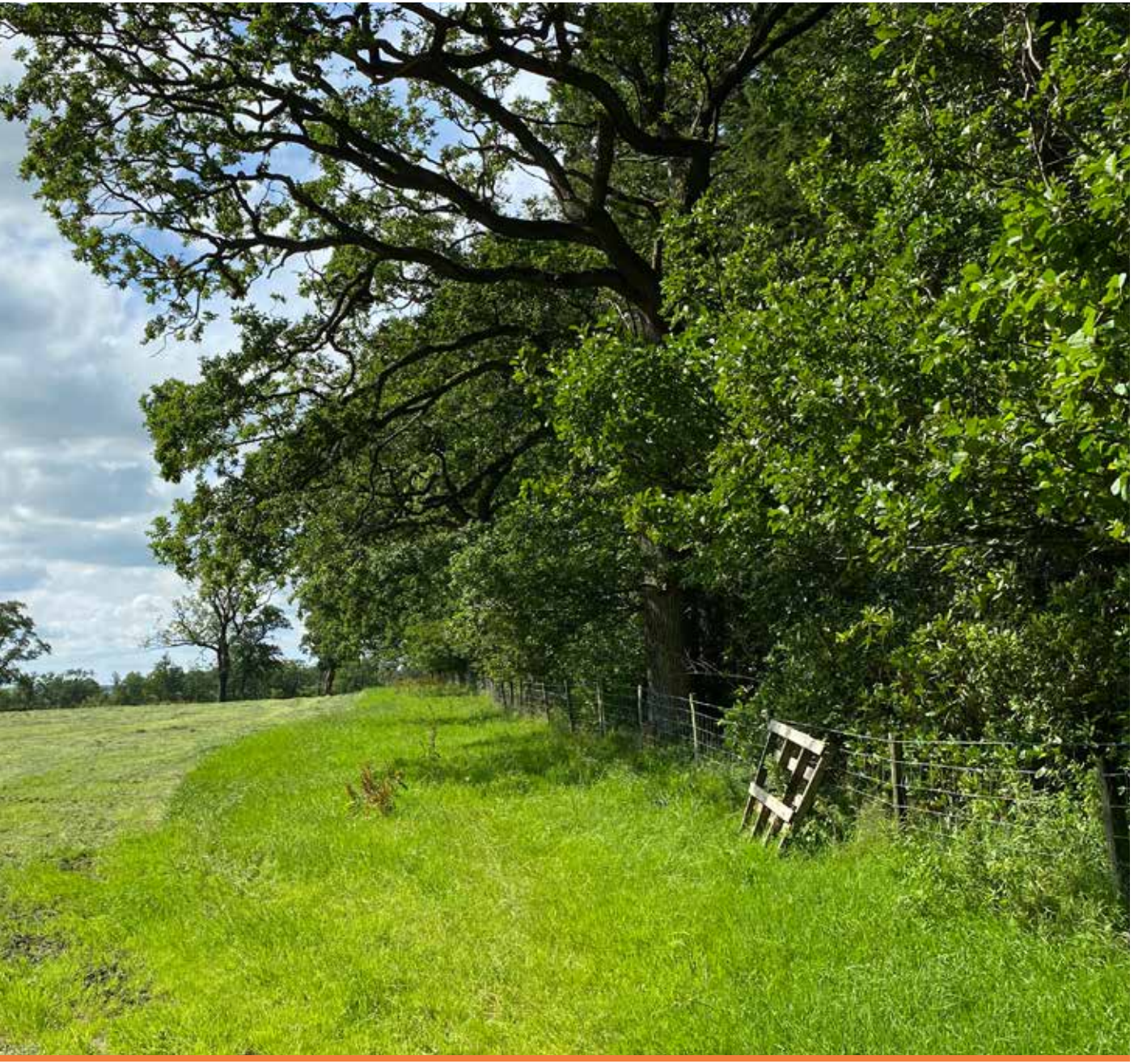
'Trees and woodlands are important features in our landscapes. We will encourage greater landscape scale planning which will enhance and transform landscape character, while protecting and conserving heritage assets from inappropriate tree planting and during woodland management'

(England Trees Action Plan, DEFRA, 2021)

Where new forests or woodlands are proposed, applications should consider the capacity of the landscape to accommodate change, and design them to have a positive impact on landscape character. The first step in the design of new woodland is to assess whether the landform or historic field patterns are dominant and should influence design. Where the enclosure pattern is dominant, tree planting and woodland management can help reinforce the pattern, especially where hedges have been removed and trees have been lost. Reference to the Forest of Bowland Landscape Character Assessment will help identify generic landscape types and the key landscape characteristics.

The UK Forestry Standard has a detailed approach to design of new woodland creation. There are a number of key points to consider:

- The visual sensitivity of the landscape can be considered and assessed in terms of the scale of the landscape, the importance of the view and significance of the visual impact. Woodland proposals can reduce impact by seeking to relate to the scale of the landscape whether this be in a tributary valley or across an escarpment.
- Shapes in a woodland design that are influenced by topography and the surrounding natural vegetation appear better integrated with their surroundings. The dominant landscape influence differs according to whether the landscape is upland, lowland or flat.
- Analyse the landform by identifying lines of visual force. Natural forests and other vegetation patterns tend to reflect the underlying landform. Upper treelines are lower on exposed ridges and higher in sheltered valleys. Avoid putting straight lines of forests across distinctive landforms
- In the wider landscape, forests and woodlands can introduce diversity, but extensive uniform forests can also hide landscape features and reduce visual diversity and habitat diversity. Within forests, public preference research shows a strong affinity for diversity.



5.2 Public perception

In 2016 research was undertaken on behalf of the AONB on public perceptions and woodland by Lancaster University research student, Lorraine Ritchen-Stones, based upon around 100 individual and stakeholder responses. Respondents outlined helpful parameters.

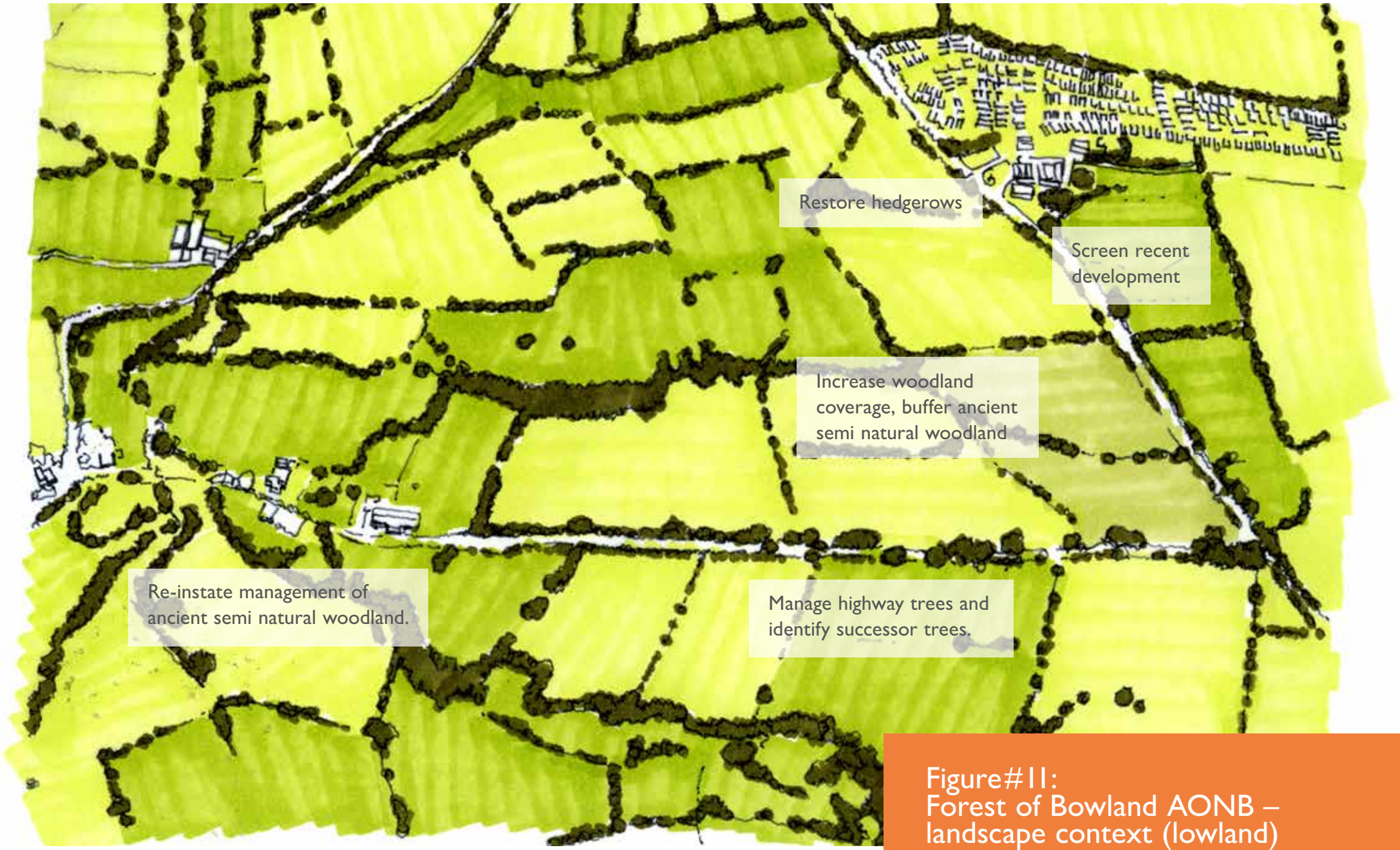
'In spite of a general appetite for woodland creation, there was a consensus amongst (19.4%) of respondents that the high upland heather moorland habitat should not be sacrificed to trees, seeing these maintained for ground breeding birds such as hen harriers, although some did have an appetite to see clough and scrub woodland on the fells regenerated. Likewise, blanket bog and meadows were considered high value. Generally native broadleaved woodland was favoured, however 6.5% directly acknowledged the need for commercial woodland as 'provisioning services' with one stating for "jobs not just amenity". Planting principles being reasonable mixed species tree density in valleys, along riparian corridors and lowlands, making use of degraded land, yet without totally sacrificing productive pastureland. Some respondents mentioned how visually unappealing were blocks of isolated woodland on hillsides (9.7%). An equal percentage also commented on the importance of natural planting "without clear boundaries and edges" avoiding the "appearance of plantations" of trees. It can be summarised that the study has highlighted a significant appetite for increased woodland cover amongst respondents provided planting is sensitive to aesthetic and habitat conservation principles. In the minority, two respondents expressed a limited appetite for trees, another expressing preference for conifers.'

(Ritchen-Stones, 2018)

5.3 Woodland creation and the historic environment

- Woodland creation should be designed and managed to take account of the historical character and cultural values of the landscape.

Features such as burial mounds, hillforts and farmsteads indicate a history of open land, whereas features such as saw-pits or charcoal hearths indicate a woodland history. Cultural values are often linked to historical uses and may include designed landscapes. If the landscape is not listed, but there is evidence that it is part of a park or designed layout, investigate the original design intentions. Historic Landscape Characterisation (HLC) uses the historic assessment / categorisation or any description given in a historic register or list, together with the Landscape Character Assessment, to inform the development of proposals.



Figure#11:
Forest of Bowland AONB – landscape context (lowland)

5.4 Planning

- The AONB will seek applications that comply with and, where appropriate, exceed those standards in the UK Forestry Standard.
- We aim to support the continuation of timber production and processing and to ensure all new and existing productive forests provide a wider range of benefits by ensuring they are structurally diverse and include a wide range of tree species.

Forestry activities themselves are not defined as 'development' and so do not come within the scope of the Town and Country Planning Acts. However, forest roads and some forestry infrastructure do require prior notification to, or planning consent from, the local planning authority. Landscape and Visual Impact Assessment (LVIA) may be required to guide the forest design and communicate the landscape change through a recognised method for assessing the effects of landscape change. Proposals considered sufficiently sensitive to require an Environmental Impact Assessment (EIA) may also require an LVIA

The guidance on EIAs states that if more than 2 hectares within an Area of Outstanding Natural Beauty then screening is required for an EIA. This is reduced to below 0.5 hectares for deforestation. There however are valuable trade-offs; for example, the AONB is looking to support the clear felling of a plantation where the restocking would be in a more suitable adjacent site in terms of both ecology and landscape.

Biodiversity Net Gain is embedded in the National Planning Policy Framework (NPPF, 2019) as a mechanism for not just minimising the impact of development but providing measurable net gains for biodiversity, including establishing coherent ecological networks that are more resilient to current and future pressures. Going forward, the government has stated to expand this policy to secure broader environmental net gain that could include natural capital benefits, such as flood protection and improved water/air quality. Government are currently proposing a minimum 10% net gain of 'biodiversity units' – put simply if there were ten trees – eleven trees should be planted as replacement – priority must be given to enhancing biodiversity on site or nearby but if this is not possible then an offsetting fee will be applied to create habitat elsewhere.

Section Six Existing Woodland and Forestry Management

6.1 UK Forestry Standard & UK Woodland Assurance Standard

All woodland creation and woodland management operations are expected to comply with UK Forestry Standard. The UK Forestry Standard outlines a series of requirements and guidelines so woodlands, both new and well established, provide a range of economic, environmental and social benefits. It also provides a basis for regulation and monitoring as well as a number of voluntary certification schemes including Grown in Britain and the UK Woodland Assurance Standard. The UK Woodland Assurance Standard complies with Forestry Stewardship Council. By getting their woodlands certified to the UK Woodland Assurance Standard, woodland owners can meet customer or consumer demand and demonstrate to society that their woodlands are responsibly managed. The list of requirements range from restocking after felling trees through to access and recreation. Of specific interest with respect to this strategy:

- **Woodland Management Plans:** The impacts of woodland plans shall be considered at a landscape level, taking due account of the interaction with adjoining land and other nearby habitats. (Section 2.5.2 UK Forestry Standard)

- **Woodland Creation:** New woodlands shall be located and designed in ways that will: Deliver economic goods and/or ecosystem services; maintain or enhance the visual, cultural and ecological value and character of the wider landscape, and ensure the creation of a diverse woodland over time. (Section 2.6.1 UK Forestry Standard)

- **Tree Species selection:** The range of species selected for new woodlands and natural or artificial regeneration of existing woodlands shall be suited to the site and shall take into consideration: Improvement of long-term forest resilience; management objectives; requirements for conservation and enhancement of biodiversity; requirements for enhancement and restoration of habitats; landscape character. (Section 2.8.1 UK Forestry Standard)

- **Conservation:** Management planning shall identify a minimum of 15% of the woodland management unit where management for conservation and enhancement of biodiversity is the primary objective. (Section 2.11.1 UK Forestry Standard)

- **Woodland access and recreation:** Existing permissive or traditional uses of the woodland shall be identified and sustained except when such uses can be shown to threaten the integrity of the woodland or the achievement of the objectives of management. (Section 5.1.1 UK Forestry Standard)

Figure#12: Forest of Bowland AONB – landscape context (plantation)

6.2 Continuous Cover Forestry

- Consider alternatives to clearfell systems, such as continuous cover forestry, where suitable sites and species combinations allow and management objectives are compatible.
- Maintain a range of stand structures and silvicultural approaches across the forest as a whole, including veteran trees, open-crowned trees, occasional windthrow, understorey layers, open space and areas of natural regeneration

In the clear-fell system – the most commonly used in plantations in the Forest of Bowland - the entire stand is felled in one operation and the new tree crop is most commonly regenerated by planting. The new stand therefore becomes established without any shelter from the old canopy. Clear cutting system in forests has increasingly been criticised for its impact on the landscape, ecology and soils. This is especially the case when the forests are highly visible in the landscape on steep slopes. As a result of these concerns there is a move now both in the UK and internationally to adopt continuous cover forestry systems.

Continuous cover forestry is defined as the use of silvicultural systems whereby the forest canopy is maintained at one or more levels without clear-felling so that the old crop is not removed in one single operation (Forestry Commission 1998).There are various methods. In the shelterwood system, the old stand is removed in a series of fellings known as regeneration fellings. The regeneration fellings gradually extend outwards from these gaps and eventually meet and thus the whole stand is regenerated over a period of time. The single tree selection system results in a completely uneven-aged type of forest. Fellings involve the removal of single trees. These include dead and diseased trees and trees of exploitable size. This method does add to the costs in the short term but it can be argued that there is an even income over time rather than the peaks in expenditure and income under the clear-fell system

Not all sites are suitable for continuous cover forestry. For example, some podzols associated with plantations preclude this approach but there are sites where this method would be preferable. For example:

- within forests and woods that fit well into the landscape where minimal landscape change is desirable (i.e. a backdrop to a high-profile recreation area);
- stands to be retained to biological maturity (i.e. long retention stands);
- within woods and forests where successful/economic restocking may be difficult to achieve with clear felling. Yorke (1998)

6.3 Sustainable woodland management

- Bring under-managed woodland into profitable and sustainable management.
- Exploring opportunities to get existing woodland into management for local woodland products and wood fuel supplies.
- Understanding that some woodlands will have over-riding conservation, landscape or recreational objectives.
- Where woodlands are managed for timber production, maximise carbon sequestration through efficient management, consistent with the output of durable products.
- The Forest of Bowland AONB will promote woodland crafts and seek out increasing training opportunities

A wood that pays is a wood that stays' rings true in the Forest of Bowland where 'productive' woodland has been an integral element of both the landscape and individual estate management whether this is in the conifer plantations or the residual native woodlands. Managing native woodland has a number of benefits, not least, ecologically with a more open canopy encouraging ground flora. In addition to storing carbon, forest products can substitute for more energy-intensive materials and can be used as a source of renewable heat and electricity.

On average, building a house in timber instead of brick reduces carbon emissions by 10 tonnes (Barrett, J. Wiedmann,T. (2007). With two thirds of timber imported, increasing local supplies of timber is good for both the economy and the environment. Grown in Britain is an initiative that seeks to stimulate the supply of British timber.

Beyond the commercial products of woodland management, there is a cultural heritage to the woodland crafts and traditions. From the Midddle Ages until the nineteenth century woodland was managed as coppice i.e. periodically cut to the ground usually in combination with 'standards' i.e, the oak that would supply timber for buildings. There are many benefits to this system. Coppicing hazel not only produced the 'spring wood' that provided materials such as broom handles and charcoal but also indirectly retained an open habitat that also encouraged ground flora. Organisations such as the Bill Hogarth Memorial Apprenticeship Trust work to keep these crafts alive through their apprenticeships.

Section Six Existing Woodland and Forestry Management

Existing woodland should be exemplars of sustainable development and provide opportunities for enterprise and employment.

The Bowland Initiative's Added Value project (AVP) operated in the Forest of Bowland from 1999 until 2001 seeking to demonstrate ' added value' opportunities from timber and hence try to bring woodlands into sustainable management. The project explored the benefits and constraints relating to the whole 'timber chain' from identifying standing timber through to harvesting and processing to the marketing and retailing of finished wooden products through a number of trials.

The following reasons were given for the lack of woodland management in the Forest of Bowland

- The timber is predominantly low quality
- Harvesting is relatively expensive (usually poor access to woods)
- The market prices for timber or round-wood are traditionally poor.
- Economies of scale: the small dispersed woodlands and low stocking density yield only small parcels of timber.

Other less obvious reasons were also offered

- A lack of knowledge of woodland management and timber markets.
- Lack of appropriate technical skills (owners, contractors and wood-users).
- General erosion of a 'woodland culture' which existed a few generations ago amongst a majority of landowners.
- Game management for shooting can restrict the desire for management and the timing of operations.
- Agricultural tenants may not be responsible for woodlands on their holding

Nevertheless a number of woodland products were developed

- Beams and lintels (square sawn, green oak only).
- Seasoned boards.
- Kiln-dried boards.
- Tongue-and-grooved and planed, solid floor-boards.
- Outdoor furniture.
- Interior furniture (e.g. simply designed coffee tables).
- Decking (oak and larch).
- Turnery blanks.

The project identified that a market could be created for 'quality' hardwoods but only by understanding the requirements of small 'niche' markets and moreover generating a local demand for local timber. For example, ash logs were highly valued for furniture and general planking.

Woodfuel can be seen as being a valuable sustainable substitute for fossil fuel. It is not completely carbon neutral, as carbon dioxide is emitted during harvesting, transport and processing. The market for biomass is currently supported through the Renewable Heat Incentive

Small, farm woodlands are notoriously difficult to manage based upon not just scale but accessibility. Sawmills in the area tend to be on a small-scale. For example, the Abbeystead Estate has its own sawmill which supplies fencing materials and powers the estate offices. There may be an opportunity to consider management on a larger scale across the Forest of Bowland AONB but this would require considerable investment with challenges about quality and supply of timber.

6.4 Grazing: Deer and squirrel management

- The AONB will support a collaborative approach to managing deer grazing across the AONB.

'When planning new woodland it is crucial to consider what pests such as deer are present in the area and what protection needs to be put in place. This is usually tree shelters or deer fences. Site planning can usually mitigate these impacts.'

(UK Forestry Standard)

Natural woodland has evolved together with a range of grazing animals. Animals can help retain open ground and encourage regeneration through scarifying the ground but if uncontrolled can lead to loss of natural regeneration and ground flora. The effective management of grazing and browsing is important in achieving objectives for woodland and open-ground habitats. While low grazing pressure can be advantageous, in the absence of control, herbivore populations (in particular, deer) can increase to a level where regeneration is limited. The impact is more severe in smaller woods. In wood pastures and parkland, light grazing is an essential element of maintaining the characteristics of the habitat. Where there is no grazing scrub can eliminate less competitive plants. Wood pasture and parkland have become less diverse as the quality and extent of their habitat has declined.

Grazing by deer and wildfire are ever present threats to new woodland that need to be maintained until establishment. If a candidate site has a high population of deer, hare or rabbits, fencing will be required. The Forestry Commission Shelterwood uniform system showing successive stages of regeneration (after Matthews 1999) recommend that deer densities should be less than 5-10 animals per 100 ha to minimise damage to regeneration or they should be excluded from areas by fencing

(Mason and Kerr 2001)

The England Trees Action Plan has made a commitment to a national deer management strategy (DEFRA,2021). The Cotswold AONB have produced specific advice on the management of wild deer (Cotswold AONB Conservation Board, 2017).

- Assess grazing and browsing levels and the impact on the biodiversity value of the woodland.
- Take action to control grazing and browsing levels that will have negative impacts on the woodland or its biodiversity.
- In areas where deer are a threat, develop and monitor deer management plans – ideally in co-operation with neighbours and local deer management groups
- Trees can be protected from grazing by fencing; tree guards or tubes offer protection to individual trees. With the growing awareness of the use of plastics there has been increasing interest in other means of protection and establishment such as the establishment of thorny species to act as a nurse crop. As well as hawthorn or blackthorn even species such as bramble and dog rose can perform this task and form rich habitats.

6.5 Invasive species

- Where non-native species are invasive and pose problems, control or remove them where this is feasible.
- Measures to reduce the dominance of rhododendron will be supported.

Some invasive species are native (e.g. bracken) but most are non-native (e.g. grey squirrel and rhododendron). Invasive species such as Himalayan balsam and Japanese knotweed are all significant threats to native ground flora. Rhododendron, a feature of many estates in the Forest of Bowland, can modify soils and cause the loss of native ground flora. Measures to control rhododendron will be supported. Recent increases in the number of new pests and diseases arriving from overseas, some of which have been, or may become, highly damaging to our forests and woodlands.

6.6 Plant health:

- The AONB will work with partners including the local authorities to raise awareness of the threat to our ash trees.
- The AONB will consider the impact upon our landscapes represented by the loss of our ash trees both inside and outside woodlands and develop a programme to replace significant losses with future generations of new 'landmark trees' within the AONB.
- The AONB will support the work of Forestry Commission tree Health Officers and the North West Tree Health Group as a mechanism for recognising future plant health threats.

Over the past decade, several new pests and diseases have been found with serious economic and environmental consequences. Moreover, climate change may have a major effect on the severity of the impact of some existing pests and diseases and may facilitate the establishment of new problem organisms in the future.

Ash dieback, Hymenoscyphus fraxineus, is the most significant tree disease to affect the UK since Dutch elm disease. The fungus arrived from Asia to Europe during the 1990s with the first official record in the UK in 2012.Once infected, most trees will die with a mortality rate estimated by the Tree Council of between 70 and 85%. The Tree Council estimates that there are two billion ash trees nationwide (over 1.8 billion saplings and seedlings to more than 150 million mature trees). In Lancashire it is estimated that there are 91,000 ash trees outside woodland (pers estimate by Chris Bennett, LCC). Loss of these trees represents a risk in terms of health and safety, a financial cost to the landowner including the local authorities but wider a loss to both the landscape and those ecosystem services that we value from trees and woodland.

Ash trees support a large number of other species. A list of 955 species that use ash trees has been collated, of which 45 are obligate on ash, i.e. are only known to occur on ash trees and 62 are highly associated with ash (rarely found on trees other than ash). (Tree Council, 2019) As a response to ash dieback, the AONB will support exploring species-choice through restocking where this is appropriate within well planned mixed woodland. Since no single species fills the gap left by ash there will inevitably be a change in species composition. A more varied palette of trees that include non-native species is likely to be more resilient to future threats.

Ultimately, there is a need to manage these risks where statutory agencies will out of necessity have to carry out regular survey work of say highways. Proactive management of trees and risks is more cost effective than reactive management. Communication, collaboration and active engagement with local communities will be key to the success of managing ash dieback.

6.7 Building resilience in our woodland

Whilst ash dieback Hymenoscyphus fraxineus is the most high profile disease impacting trees and woodland it is sadly not the only threat to our trees and woodland. Phytophthora ramorum has already impacted larch plantations throughout the Forest of Bowland. As one of the few deciduous conifers this has deprived plantations from autumn colour. There are also threats that are, through climate change and importation, making their way north. For example, the Oak Processionary Moth present throughout the south has implications to human health. Overall there is a need to consider pests and diseases in the future and build resilience into our woodland.

DEFRA has published a Tree Health Resilience Strategy to improve the extent, condition, diversity and connectivity of our trees, woods and forests, and enhance protection to minimise the risk of new threats occurring. The strategy promotes four environmental goals to build resilience:

1: **Extent:** increasing tree cover

2: **Connectivity:** enhancing the linear forest and matrix of trees within other habitat settings

3: **Diversity:** increasing the genetic and structural diversity of our treescapes

4. **Condition:** healthier trees and more dynamic woodlands

Ensuring a forest is diverse in terms of age, structure, species and origin, genetic diversity and choice of silvicultural system is likely to endow forests with greater resilience. Planting stock should be of traceable origin (and provenance).

Case study#7: UK Sourced and Grown

In an increasingly connected world, biosecurity is fundamental. Following recent issues over plant health, foresters and growers have sought to ensure the provenance of planting stock – not only to prevent the importation of pests and diseases but also to retain regional diversity in genetic stock. For example, the Woodland Trust has sought to promote a voluntary initiative for forest nurseries. The UK and Ireland Sourced and Grown Assurance Scheme (UKISG) is a voluntary initiative for forest nurseries. It identifies provenance and assures that trees have been raised from seed sourced and grown solely within the UK.

7.1 The cultural heritage of our trees and woodland

- The AONB will work with estates, landowners and volunteers to protect landmark trees in estates, parklands, village settings, hedgerows and pasture.
- The AONB propose to map veteran trees (as part of the Ancient Tree Forum) and other in-field trees to ensure their continued conservation.
- The AONB will work to increase people's awareness and understanding of the cultural, archaeological and historical assets of trees, woods and forests.
- Retain and manage existing veteran trees and select and manage suitable individuals to eventually take their place

The physical factors of climate, geology and topography are not the only factors that contribute to a landscape. Clearly cultural factors are at play and tenure has always been critical. For example, the protection afforded through Forest law preserved a historically significant landscape that remains to this day. Historically and culturally woodlands hold rich resources that have been undisturbed by cultivation in the wider landscape including pre-historic and more recently evidence of producing and furniture-making. In the lowland areas the 'designed' landscapes and 'model' farms sought to create a landscape as a 'rural idyll'.

7.2 Ancient and veteran trees.

- Encourage recreation to be considered in new planting; noting especially the potential for plantation-type forestry to be managed to accommodate a range of activities including mountain bike trails and new rights of way.
- Optimising visitor's experience through careful planning where activities such as footpaths, equestrian bridleways and cycle tracks might conflict and require geographic separation
- Encouraging engagement with the natural environment through traditional and novel activities and in particular supporting Forest School-type activity.

Trees themselves can be fundamental to the spirit of place. Britain is thought to have the greatest number of ancient trees in Northern Europe. They are a vital part of the cultural story of Bowland; many have a link back as far as the origins of the hunting forests of Bowland. Not only are they a vital link to the past but ecologically some of these open grown trees are home to bryophytes and lichens that exist nowhere else. This vital asset can be threatened through a lack of awareness.

Information on the number and distribution of individual veteran trees in the Forest of Bowland is sparse. Historic parklands probably support the most important numbers of veteran trees and their associated ecological interests. There are a number of issues facing ancient and veteran trees, which by their nature are old and show signs of decay. With care these trees will live for many years, but in the meantime the next generation need to be identified and managed appropriately. Working with the Ancient Tree Forum, the Forest of Bowland hopes to increase awareness of the value of ancient and veteran trees through working with landowners and seeking to map records to increase the national Ancient Tree Inventory.

There has always been a strong affinity between people and woodlands. Woodland and forestry has the potential to offer a range of recreational and educational opportunities where these are planned to minimise conflict with biodiversity and forestry operations. The Forestry Commission estate at Gisburn is one of the largest woodland estates in Lancashire at 1245 hectares. It has been designed and managed with recreation in mind alongside timber production. The estate attracts at least 50,000 visitors per year with three car parks and the Forest Hub at Stephen Park with a café and cycle hire. The Forest has hosted dark skies events with the AONB and the Cloudspotting Festival but is perhaps best associated with mountain biking where it has a regional reputation. There has been significant development of routes over the last twenty years ranging in grade from the 10km Bottom's Beck blue route, the 19km 'The 8' red route which incorporates harder black graded sections to just under 1km of orange bike park.

Research carried out by the University of East Anglia and funded by Forest Research has identified the significant benefits from physical exercise in woodland including relieving high blood pressure and obesity, as well as mental symptoms of stress and depression. (Henwood,2001). There are concerns that new generations have become detached from nature in their everyday life. Yet outdoor play and learning is essential to children's health, development and well-being. Forest Schools are part of an exciting new movement of nature-based communities where trained practitioners nurture learner-led exploration and discovery, nurturing meaningful experiences for positive lifelong impacts. A number of enterprises have set up in Gisburn Forest and Beacon Fell which the AONB will try and support.

The Forest of Bowland AONB's Pendle Hill Project working with the Ernest Cook Trust and with funding from the National Lottery Fund has developed a programme called Little Saplings for 18 months to 5 year olds where parents are encouraged to allow the children to discover the environment independently using techniques developed for Forest Schools.

Educational visits tailored to suit school needs and flexible learning experiences can enrich and enhance the National Curriculum. Offering outdoor experience will result in personal learning and self-reflection. Overall this results in a positive experience, additional understanding of our local environment, and a greater respect for nature. The Forest of Bowland AONB will try and support such activity through its established Countryside Visits Fund.

The Forest of Bowland AONB with Champion Bowland has worked with the Forestry Commission and Lancashire County Council to make Trampers (all-terrain, electric mobility scooters) available in several sites including Gisburn Forest and Beacon Fell Country Park.

Case study#8: Landmark Trees

Champion Bowland, the independent charity supporting community and environmental projects in the Forest of Bowland has launched the Landmark tree campaign to identify and plant the next generation of 'landmark trees' in the Forest of Bowland.

Appendix#1: UK Biodiversity Action Plan Priority Habitat Descriptions

Of relevance here are the UK Biodiversity Action Plan Priority Habitat Descriptions. These descriptions of priority habitats describe the significance and the conservation importance of these woodland habitats that are well represented within the Forest of Bowland AONB.

Wet woodlands:

Wet woodland occurs on poorly drained or seasonally wet soils, usually with alder, birch and willows as the predominant tree species, but sometimes including ash, oak, pine and beech on the drier riparian areas. It is found on floodplains, as successional habitat on fens, mires and bogs, along streams and hill-side flushes, and in peaty hollows. Therefore wet woods frequently occur in mosaic with other woodland key habitat types and with open key habitats such as fens. Within the context of this strategy there is a potential to expand this priority habitat through the creation of riparian woodland with the additional benefits that would ensue for water quality and biodiversity.

Upland mixed ashwoods:

The term 'upland mixed ashwoods' is used for woods on base-rich soils in the north and west, in most of which ash is a major species, although locally oak, birch, elm, small-leaved lime and even hazel may be the most abundant species. Yew may form small groves in intimate mosaics with the other major tree species and alder may occur where there are transitions to wet woodland. In terms of National Vegetation Classification (NVC) plant communities in the Forest of Bowland AONB (above) this habitat is characterised by W8 and W9. Clearly these habitats are subject to change as a result of ash dieback (Hymenoscyphus fraxineus).

Upland oakwoods:

Upland oakwoods are characterised by a predominance of oak (most commonly sessile, but locally pedunculate) and birch in the canopy, with varying amounts of holly, rowan and hazel as the main understorey species. The range of plants found in the ground layer varies according to the underlying soil type and degree of grazing from bluebell-bramble-fern communities through grass and bracken dominated ones to healthy moss-dominated areas. The ferns, mosses and liverworts found in the most oceanic of these woods are particularly rich; many also hold very diverse lichen communities and the woods have a distinctive breeding bird assemblage. These woodlands are recognised internationally as important because of their extent and distinctive plant and animal communities. For some of these species Britain and Ireland hold a substantial part of the world/European population.

Wood pasture and parkland:

Wood-pasture and parkland are mosaic habitats valued for their trees, especially veteran and ancient trees, and the plants and animals that they support. Grazing animals are fundamental to the existence of this habitat. Specialised and varied habitats within wood pasture and parkland provide a home for a wide range of species, many of which occur only in these habitats, particularly insects, lichens and fungi which depend on dead and decaying wood.

Appendix#2: Woodland Carbon Code

Validation / verification to the code means that woodland carbon projects:

- are responsibly and sustainably managed to national standards and can provide reliable estimates of the amount of carbon that will be sequestered or locked up as a result of the tree planting;
- must be publicly registered and independently verified;
- meet transparent criteria and standards to ensure that real carbon benefits are delivered.

To meet the requirements of the code, projects must:

- register their project, stating the exact location and long-term objectives of their project;
- meet national forestry standards to ensure they are sustainably and responsibly managed;
- have a long-term management plan;
- use standard methods for estimating the carbon that will be sequestered;
- demonstrate that the project delivers additional carbon benefits than would otherwise have been the case.
- maintain verification for the duration of the project.

Projects that meet all these requirements can carry the Woodland Carbon Code label of approval.

The Code works for everyone involved:

- Carbon buyers have reassurance that they have invested in a responsible scheme and can see the benefits that will be provided.
- Projects have recognised procedures and standards to work to, and can use their verified status as an attractive selling point for potential customers.
- Woodland managers have clearly set out standards of forest management to follow.

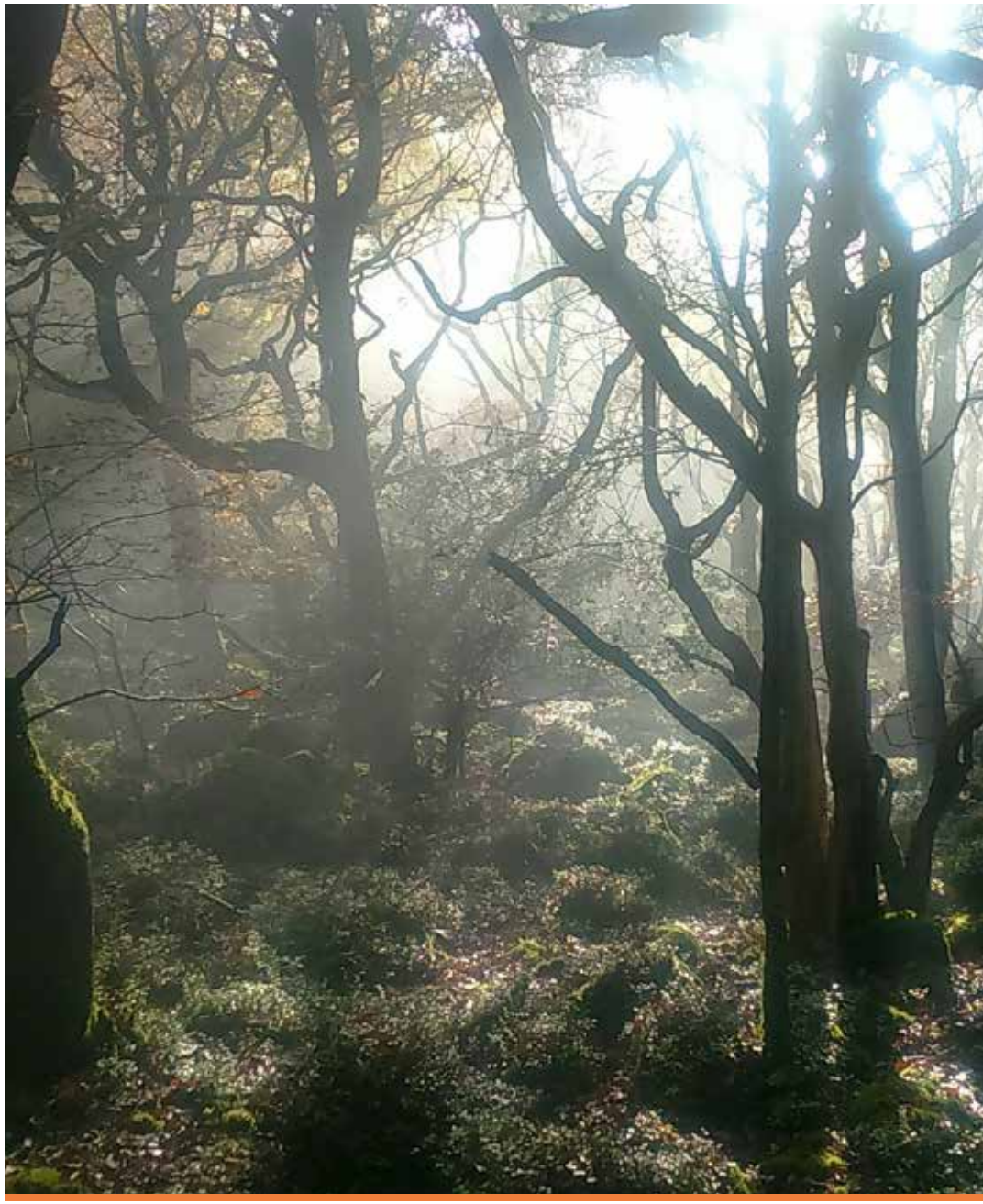
Appendix#3:
UK Forestry Standard

- In designated areas, for example national parks, particular account should be taken of landscape and other sensitivities in the design of forests and forest infrastructure.
- Use the historic assessment/categorisation or any description given in a historic register or list, together with the Landscape Character Assessment, to inform the development of proposals. UK Forestry Standard 6. Elements of sustainable forest management
- Consider the impacts of forestry on the historical context and landscape character in forest management plans; consider opportunities to complement, enhance or re-create landscapes of historic interest.

Maintain or establish a diverse composition within the forest management unit; where only one species is suited to a site and management objectives, a maximum of 75% may be allocated to a single species (see notes below). In all cases, incorporate a minimum of:

- 10% open ground or ground managed for the conservation and enhancement of biodiversity as the primary objective;
- 10% of other species;
- 5% native broadleaved trees or shrubs.

Note: (i) Where more than one species is suited to a site and matches the management objectives, opportunities must be taken to further diversify the above species composition. (ii) In woodlands of less than 10 hectares and in native woods the above proportions may be relaxed as long as the adjacent land uses provide landscape and habitat diversity.

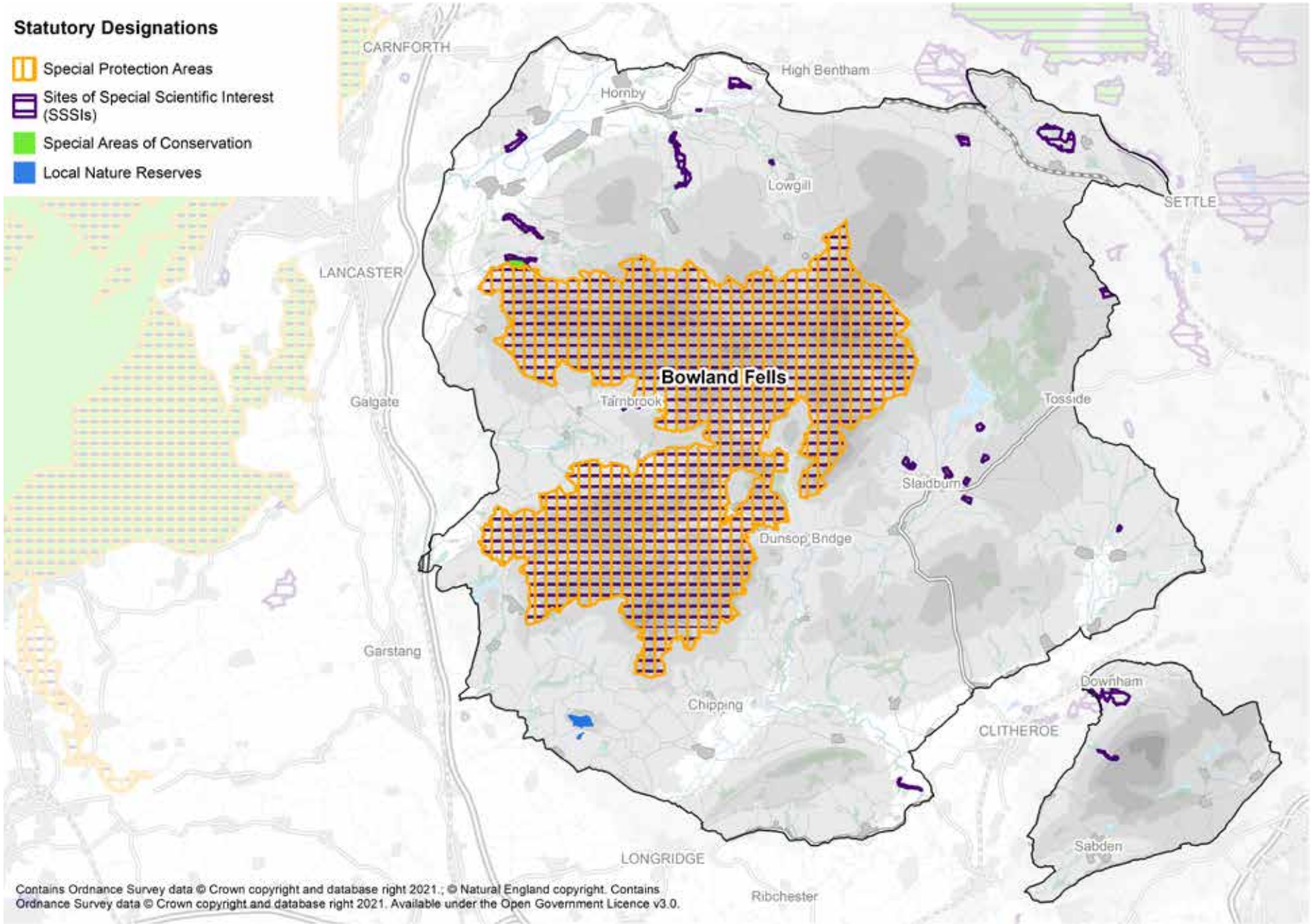


Appendix#4: UK Forestry Standard – Forest & woodland design principles.

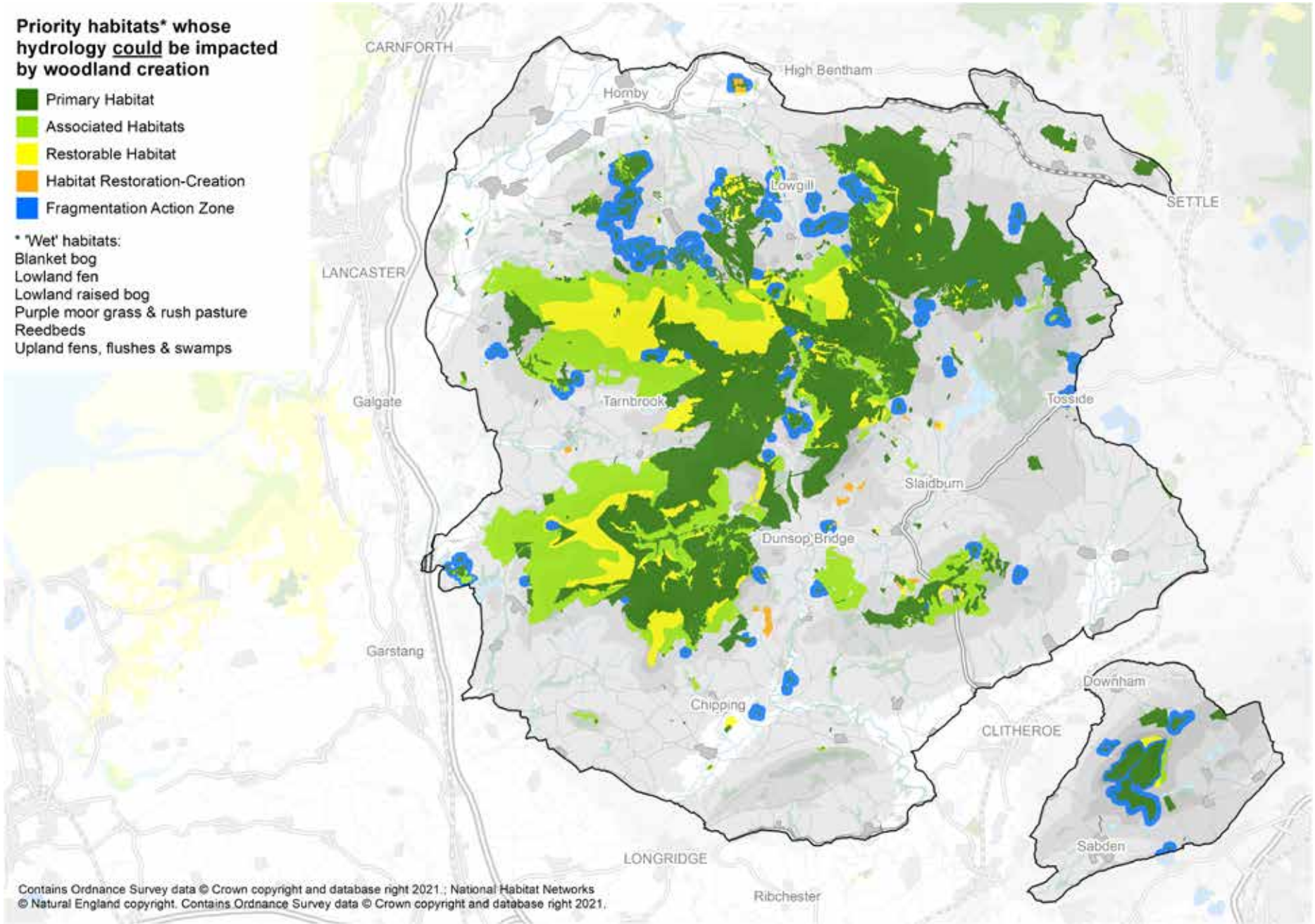
Landscape context	
Landscape character	An appreciation of landscape character helps determine the capacity of a landscape to accommodate new forests and their design with respect to the key landscape characteristics of a particular area.
Landscape and visual sensitivities	Within a valued landscape, new forests, woodlands and trees can have a significant impact on its recognised qualities and on how people experience it.
Historic context	Forests, woodlands and individual trees are key landscape components that can be integral to historic character, but new ones can also detract from historic character if sited or managed inappropriately.
Designed landscapes	Designed landscapes and their woodlands and trees are a valued art form and an important part of the cultural heritage of the British Isles.

Forest design principles	
Shape	The shapes of forests and woodlands within the landscape can be the most striking visual features: both the overall shape, and the patterns of species and felling coupes within
Landform	In hilly or mountainous areas, landform is usually the dominant and most obvious landscape influence for forest and woodland design. The most prominent landform features have the strongest visual forces, and lesser forces relate to the more minor features.
Pattern of enclosure	In lowland areas, where landform is subdued, field patterns are usually the dominant and most obvious landscape influence for forest and woodland design.
Scale	Scale describes the relative size of visual elements as seen by the viewer. Generally, the scale of forest and woodland shapes should reflect the scale of the landscape.
Diversity	Diversity refers to the number of different elements in a design. Diverse forests are usually more visually appealing, but the level of diversity should be appropriate to the situation.
Unity	Unity is achieved when forests or woodlands integrate well with other features and look as though they belong in the landscape. Unity also applies to the integration of the various elements within a forest design.
Spirit of place	Spirit of place is a term used to describe the intangible qualities, such as wildness, tranquillity and cultural associations, that make a location special or unique.

Map#1: Forest of Bowland AONB – statutory designations



Map#2: Forest of Bowland AONB – priority habitats that could be impacted by woodland creation



Glossary of terms

- **Woodland** – land under stands of trees with a canopy cover of at least 20% or having the potential to achieve this, including integral open space, and including felled areas that are awaiting restocking
- **Forestry** – commercial plantation woodland
- **Native woodland** – land covered in native trees
- **Ancient semi-natural woodland** – woodland that has existed since 1600AD in England, Northern Ireland and Wales and 1750AD in Scotland
- **Plantations on ancient woodlands** – ancient woodlands that were felled and planted with non-native trees
- **Priority habitats and priority species** – Priority habitats have the potential to provide for the richest and most varied components of biological diversity. Priority species are those that are rare and at risk of extinction, threatened, or have special requirements.
- **Native woodlands** – Native woodlands, and especially ancient woodlands, are the priority habitats of greatest relevance to forestry. They have a very high biodiversity value or potential, and support a large proportion of priority species.
- **Ecological connectivity** – Ecological connectivity facilitates the movement of species by providing linkages between habitats.
- **Native woods** – are broadly defined as woodlands mainly composed of native species and can include both semi-natural and planted trees. Ancient semi-natural woodland (ASNW) - these are still widespread although fragmented.
- **Invasive species** – is any animal or plant that has the ability to spread and be detrimental to the environment, the economy, or our health and well-being.

Appendices

References

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