



# National Spatial Overview 2018

## Introduction

The National Spatial Overview (NSO) succinctly describes the National Forest Estate (NFE), creating a 'pen picture' of the diversity of land managed by Forest Enterprise Scotland (FES). It maps where we can best deliver our corporate commitments, and outlines the current challenges required to be addressed to manage the land and forests sustainably. The NSO combines eighteen mapped zones with text describing the key geographic characteristics and the corporate and Scottish Government commitments that are most applicable to each zone.

## What is the purpose of the NSO?

The NSO has two roles. It provides information by succinctly describing the land managed by FES, and it provides direction by identifying issues which require strategic thinking to help us sustainably manage the Estate.

## What is included in the NSO?

The NSO includes four elements:

A map of 'broad brush' zones that have common attributes or characteristics<sup>1</sup>. The zoning that underpins the NSO is necessarily broad brush. It is based on topographical/bio-geographic/climatic zones. The zones also take into account thirty year predictions for climate change, the type and maturity of the woodland on the NFE, the proportion of open habitat to forest cover, environmental designations and the amount and type of recreation provision and visitor interest.

A brief description of the broad common characteristics of each zone. These descriptions outline topography and land use, and key geographic and social aspects which inform management of the NFE;

A list of the relevant FES corporate priorities, aims and objectives that are most applicable to each zone. This includes FES corporate commitments as set out in the Corporate Plan and other relevant Scottish Government priorities which FES can deliver;

A list of issues, or 'investment challenges', which are required to be tackled in each zone to help the NFE to deliver corporate priorities. These are issues that require considerable investment of

time, skills and financial commitment, often over the longer term, to ensure that they are tackled efficiently and effectively.

(<sup>1</sup> Note that because of the strategic nature of the zoning, in each zone there is land that does not reflect the broad characteristics which define the zones).

## What is not included in the NSO?

The NSO does not include nationally applicable commitments which FES are required to undertake to achieve sustainable land management, to meet UK Woodland Assurance Scheme (UKWAS) requirements, to comply with legal and regulatory obligations or to support overarching Scottish Government policies and priorities, such as community engagement. These commitments are applicable to all zones, and therefore are not spatially defined.

The NSO also does not address issues where FES is reactive – such as proposals for renewable energy on the Estate – it deals with issues we can proactively anticipate.

## How does the NSO relate to the Corporate Plan?

The Corporate Plan sets out agreed priorities, commitments and direction of travel for the organisation and is the reporting tool that we use to demonstrate to our stakeholders that we are delivering against national priorities.

The NSO describes the type of land we manage, where corporate commitments might best be taken forward and, for FES, the spatial distribution of land management priorities which require focus and investment if we are to meet these commitments.

During the coming year, as FES prepares the Corporate Plan for the new agency, the NSO will be revised to take into account the corporate commitments identified for Forest and Land Scotland. A version of the NSO will form part of the consultation on the Corporate Plan for Forest and Land Scotland.

The NSO will then be reviewed every three years, coordinated with reviews of the Corporate Plan.

## What will the NSO be used for?

The NSO will be used at national and local level. Its main purposes are to:

- Succinctly describe the NFE, creating a ‘pen picture’ of the land that we manage, its physical diversity and the opportunities and constraints this creates;
- Provide a spatial understanding of our corporate commitments wherever possible, illustrating where commitments can best be achieved relative to the land managed by FES;
- Identify and locate measures that need to be put in place to help achieve these commitments, including identifying where we need to invest to meet specific land management challenges; Provide a standard spatial framework to reference when developing future policies and strategies or refining existing ones, so that policies or guidance can have a spatial application if appropriate;
- To assist in corporate business planning, by identifying where significant, often sustained long term investment, (in time, planning, programming, skills and financial support) is required to tackle long term management issues, or take forward corporate commitments
- Provide a national context for Land Management Plans (LMPs), so that, when appropriate, individual LMPs can address relevant corporate priorities and tackle the investment challenges identified in each zone.

## Review and Monitoring

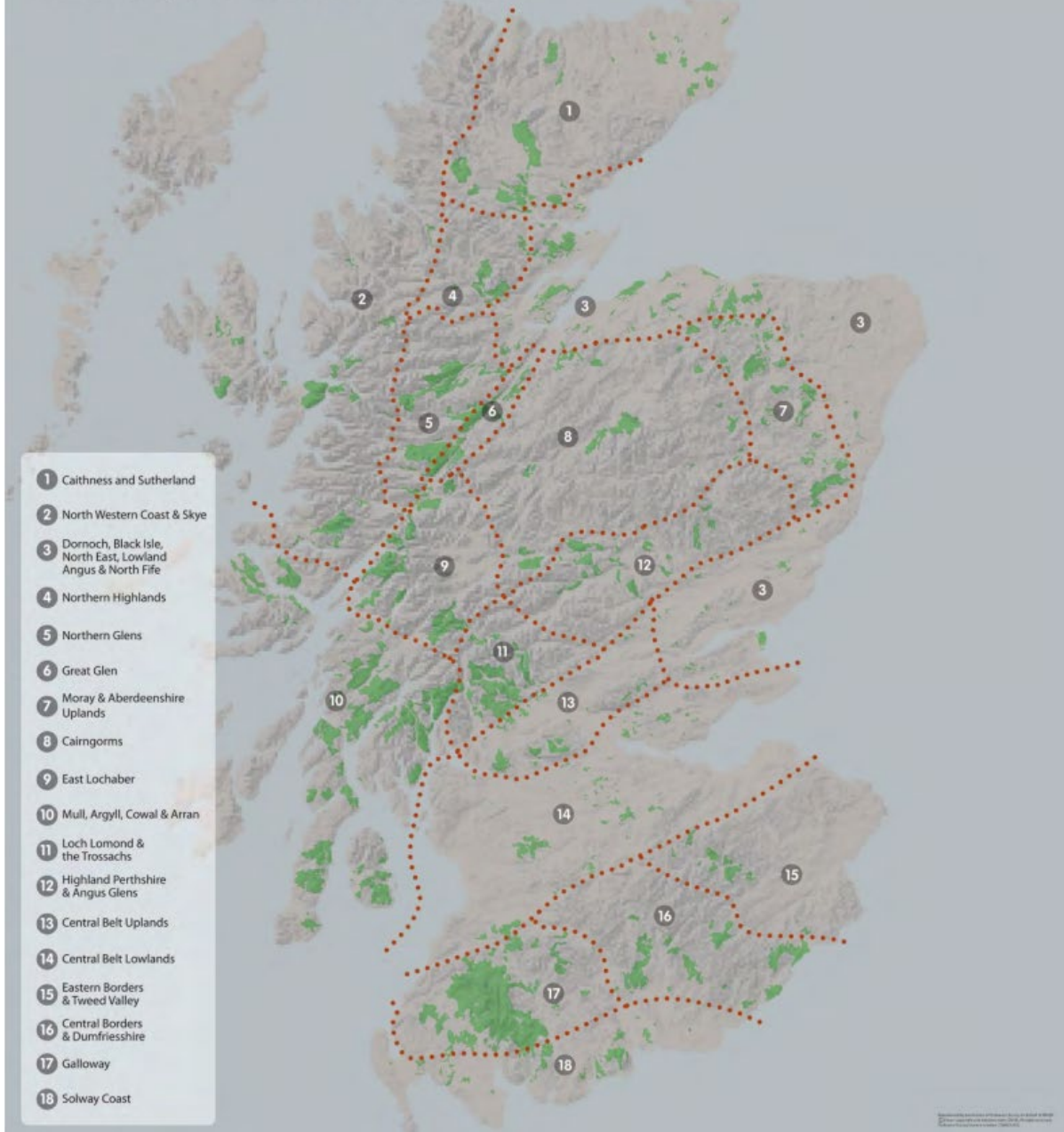
The NSO will be subject to monitoring and review, possibly along the same timelines as the Corporate Plan.

The NSO will be updated to reflect any new corporate priorities, and the focus of effort will change over time, as existing management challenges are resolved, and new ones emerge. In this way, the NSO will allow us to identify and plan for the larger areas of work both spatially and – when relevant – over a longer timescale than current business planning cycles.

## What happens now?

The 2018/19 version of the National Spatial Overview will be tested during 2018 to assess its usefulness at both a national and local level as outlined above. This exercise will inform the future iterations and application of the NSO.

## National Spatial Overview – March 2018



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## Zone 1: Caithness and Sutherland

- Gently undulating landform, low hills, extensive areas of peat and lochan
- Can be exposed and windy; predicted to become drier, especially in Caithness; short growing season; soils can be fertile, although there are extensive peat moorlands and blanket bog;
- NFE land use includes establishing second rotation conifer crops on low hills and more elevated moorland areas; crops are variable due to deep peat, although poor quality lodgepole pine largely now removed; some open ground; extensive bog and restored peatland; low percentage of broadleaf; wind farms and utility networks; agriculture
- Extensive areas of highly designated wetland Timber markets are relatively distant, although some access by sea

### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – restoration of peatland and blanket bog habitats likely to significantly increase carbon sequestration and improve water quality; improving water quality in river systems; sustainable timber production
- **Other national commitments** – Partnership working with others on continuous management of adjacent extensive conservation sites and projects; improving water quality to support conservation of freshwater pearl mussel
- **Contribution to financial sustainability** – wind energy; small round wood timber crops; biomass

### Focus of effort and investment challenges

- **Continue to work with others to maximise peatland restoration at a landscape scale.** Peatland is a high priority habitat that is also highly successful at sequestering carbon. Programming conservation and restoration work with other agencies and partners

maximises benefits of contiguous and cooperative management of high quality habitat. This will optimise the benefits of large scale interconnecting peatland and peatland edge woodland habitats, and continue to develop expertise in this area

- **Accommodate the increasing number of overhead power lines proposed to cross the NFE**, alongside continued wind farm development. Challenges include planning roads and efficient felling patterns within a more fragmented forest area, ensuring on going 'resilience' of infrastructure and timescales involved with construction
- **Shape the future forest area.** The woodland here is moving towards second rotation, and the forest area has been reduced by wind farm development and peatland restoration. There is an opportunity to identify where woodland can thrive and expand, and what species choice, spatial pattern and timber products are most appropriate to deal with exposure and maintain timber productivity
- **Continue to develop an efficient roading programme.** Road stone is scarce and expensive. The future forest area should include establishing an efficient and pragmatic road network that reflects the future timber outputs



## Zone 2: North Western Coast and Skye

- Rugged, variable topography, with rocky outcrops
- Highly exposed with a wet, oceanic climate, predicted to become wetter with changing climate; and often thin, nutrient poor soils; some peatland
- NFE land use includes largely unthinned conifer and native woodland; some steep ground; high proportion of open land; substantial areas of PAWS; native Atlantic oakwood woodland and Caledonian pinewood;
- Often highly designated for habitats and species as well as landscape and SNH 'wild land' areas; includes iconic mountain areas
- High numbers of domestic and international visitors
- Timber markets are relatively distant

### Most significant contributions to Corporate Priorities, Aims and Objectives

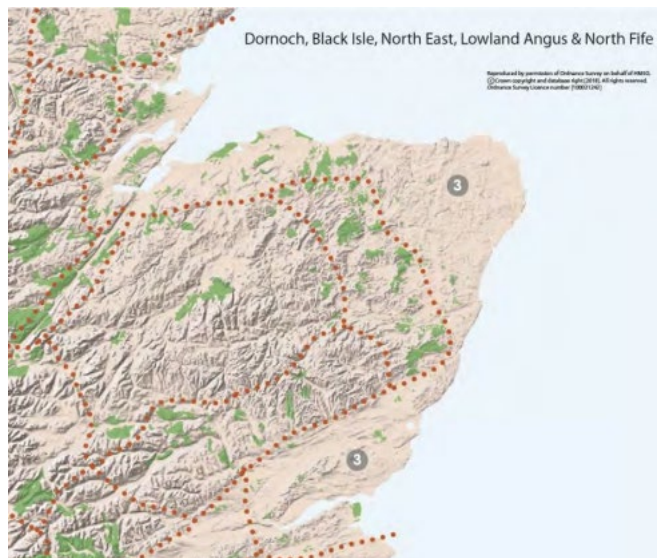
- **Ecosystem services and additional public benefits** – permanent native woodland and natural colonisation contributes to carbon sequestration; recreation use of NFE contributes to increased health and well-being; restoration of peatland and blanket bog habitats likely to significantly increase carbon sequestration and improve water quality; scenic quality and visitor attractions contribute to tourism economy; sustainable timber production



- **Other national commitments** – working in partnership with communities which are remote from central Scotland; habitat management for white tailed eagle and chequered skipper butterfly
- **Contribution to financial sustainability** – standard soft wood markets; good potential for sawlogs

#### **Focus of effort and investment challenges**

- **Prepare for potential impacts of windblow**, recognising that the trees are fast growing in exposed locations. Challenges include large areas of unthinned, similar age crops, the need to develop market connectivity building on the potential for high quality soft wood timber and future native woodland management
- **Develop sustainable PAWS restoration strategy** which maximises the habitat, water quality and carbon sequestration opportunities within a planned programme of PAWS restoration including on-going maintenance after restoration has started; working with neighbours to manage deer, capitalising on the removal of non-native trees and integrating on-going management of sites into wider work programmes where possible
- **Plan and implement an access strategy** that updates out dated infrastructure and efficiently addresses steep ground constraints. Take into account future infrastructure opportunities in sea-based transport, including possible combined benefits with other industries
- **Develop a strategy for dealing with potential disease threats**, especially in the light of possible impact on larch
- **Review options for making the most of increasing visitor numbers** including engagement with local communities on visitor management in areas of high visitor pressure



## Zone 3: Dornoch, Black Isle, North East, Lowland Angus, North Fife

- Farmed plain rising to low foothills; includes stretches of east facing coast
- Dry, can be cold, often sheltered, some elevation inland; predicted to become drier; fertile but often sandy soils
- NFE land use includes largely second/third rotation forest; well established woodland habitat; 95% conifer, mixed spp, high proportion of pine; below 5% BL; established thinning programme; low amount of open ground; extensive road network; includes coast and sand dunes; large number of accessible woods close to settlements used for informal recreation;
- High recreation use and visitor numbers – primarily domestic visitors, day visitor use and dog walkers
- High degree of interlock with farmland – mostly stock farming
- Good access to diverse range of timber markets, including local sawmills

### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – secure carbon sequestration through CCF; high recreation use of NFE contributes to increased health and well-being; support for small sawmills; sustainable timber production
- **Other national commitments** – Woodlands In and Around Towns; habitat management in well-established red squirrel strongholds; investment in silvicultural practices; management of tree disease; education, outreach and community engagement
- **Contribution to financial sustainability** – high quality timber crops; high potential for saw logs; primarily pine; specialist timber markets

### Focus of effort and investment challenges

- **Continue to develop a thinning and CCF programme.** More CCF would extend the resilient forest structure and reinforce 'coniferous forest as mature habitat' in this zone, while potentially increasing saw log production. Challenges are likely to be deer management, contractor and staff skills, provenance of recruited species, potential impacts of climate change and of tree disease, while benefits may include reduced restocking costs, long term carbon sequestration and established setting for high recreation woodland
- **Respond to predicted impacts of climate change,** including current and up-coming disease threats related to third rotation forests and changing climate, potential drought and predicted longer growing season. The challenge is to reduce the risk to future forest structure and high quality timber products
- **Increase BL to at least 5% in each LMP area and develop an associated management and marketing strategy,** as the zone overall does not meet UKFS requirements. There are opportunities to use broadleaves to provide shelter for farmland, maintain and improve water quality for salmon rivers; and expand woodland habitats; build on CCF management expertise and contractor base to expand broadleaf silviculture, higher value productive BL outputs and marketing
- **Sustain and where possible expand contribution to engagement of local communities,** through volunteering opportunities, outdoor learning and working with others to increase use of the NFE particularly where this aligns with Scottish Government social and equality agendas
- **Prioritise WIAT sites to improve site standards,** to enhance the quality of visitor experience within WIAT, provide well managed green infrastructure close to areas of urban deprivation, improve the settings of settlements and help plan future FES funding commitments



## Zone 4: Northern Highlands

- Complex topography, including high mountains, relatively remote interior, sheltered glens
- Relatively sheltered; wetter to the west, relatively short growing season; better soils on lower elevations
- NFE land use includes areas of extensive established first/ second rotation mixed conifer forests; some thinning
- Some domestic and international visitors
- Good access to timber markets

### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – flood mitigation; maintenance of high water quality of salmon rivers and lochs as well as wider riparian habitats; sustainable timber production
- **Other national commitments** –
- **Contribution to financial sustainability** – standard softwood markets

### Focus of effort and investment challenges

- **Maintain the thinning programme.** Maintain investment in the thinning programme, and where possible expand this. Challenges are likely to be deer management, contractor and staff skills, provenance and diversity of recruited species, potential impacts of climate change and the impacts of tree disease, while benefits may include reduced restocking costs and long term carbon sequestration.
- **Continue to work with others to maximise peatland restoration at a landscape scale.** Peatland is a high priority habitat that is also highly successful at sequestering carbon. Programming conservation and restoration work with other agencies and partners maximises benefits of contiguous and cooperative management of high quality habitat.

This will optimise the benefits of large scale interconnecting peatland and peatland edge woodland habitats, and continue to develop expertise in this area

- **Review options for making the most of increasing visitor numbers** taking into account the significance of this area as a 'gateway' to the west



## Zone 5: Northern Glens

- Variable topography, including high mountains, relatively remote interior and long east/west aligned glens
- Relatively sheltered but often elevated; cold, wetter to the west, relatively short growing season; generally nutrient poor, thin soils
- NFE land use includes areas of extensive established native Caledonian pinewood and first/ second rotation non-native conifer forests; some thinning; high proportion of open mountain tops; substantial areas of PAWS; high proportion of birch woodland
- Highly designated, including for woodland and riparian habitats and species as well as landscape and SNH 'wild land' areas
- Popular area for mountain walking, including international and domestic visitors

### Most significant contributions to Corporate Priorities, Aims and Objectives

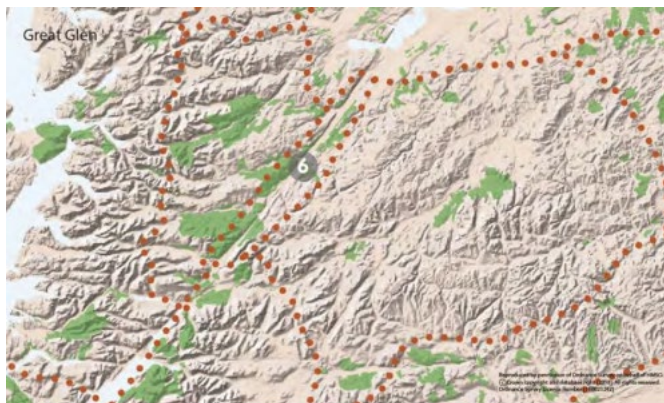
- **Ecosystem services and additional public benefits** – permanent native woodland and natural colonisation contributes to carbon sequestration, mitigation of downstream flood risk and habitat reserve; high recreation use of NFE contributes to increased health and well-being; scenic quality and visitor attractions contribute to tourism economy; maintenance of high water quality of rivers and lochs and wider riparian habitats; sustainable timber production
- **Other national commitments** – PAWS restoration; established partnerships with neighbours on new native woodland expansion and deer management; habitat management for chequered skipper butterfly
- **Contribution to financial sustainability** – standard softwood markets; hydro schemes

### Focus of effort and investment challenges

- **Develop sustainable PAWS restoration strategy** which maximises the habitat, water quality and carbon sequestration opportunities within a planned programme of PAWS

restoration, working with neighbours to manage deer, and capitalising on the removal of non-native trees. The challenge is to develop skills and knowledge for sustainable long term management of native woodland and identify future native species marketing opportunities;

- **Expand birch woodland management** to develop markets and maximise productive capacity from native woodlands
- **Develop a strategy for dealing with potential disease threats**, especially in the light of possible impact of DNB on native pine woodland
- **Plan and implement an access strategy** that updates outdated infrastructure, efficiently addresses steepground constraints and finds solutions to 'one off' access requirements to meet habitat management objectives
- **Work with neighbours to reduce deer numbers and expand woodland habitat where opportunities arise**. Extending woodland cover to a natural treeline could be achieved through natural colonisation, which would increase carbon sequestration and improve water management. The challenge will be to work with neighbours to reduce deer numbers to a sustainable level



## Zone 6: Great Glen

- Steep and potentially unstable slopes, in part above critical A82
- Exposed slopes, wetter in west; predicted to become drier; often fertile soils, although subject to land slips
- NFE land use includes areas of extensive woodland, largely second rotation, sometimes high yield class mixed conifer woodland; some well thinned crops; elevated open land; substantial areas of PAWS;
- High numbers of domestic and international visitors
- Timber value can be high, including some specialist market products, but harvesting difficult and expensive

### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – careful management of tree removal, establishment of slope stability woodland cover and reduced grazing contributes to slope stabilisation above the A82; permanent native woodland and natural colonisation contributes to carbon sequestration, habitat reserve, management of water run-off and slope stabilisation; recreation use of NFE contributes to increased health and well-being; scenic quality contributes to tourism economy; sustainable timber production
- **Other national commitments** – partnership working with neighbours – for example on the Great Glen Way and PAWS restoration – and Transport Scotland
- **Contribution to financial sustainability** – range of softwood, including saw logs, but relatively low timber income due to large diameter logs and high harvesting costs; hydro schemes

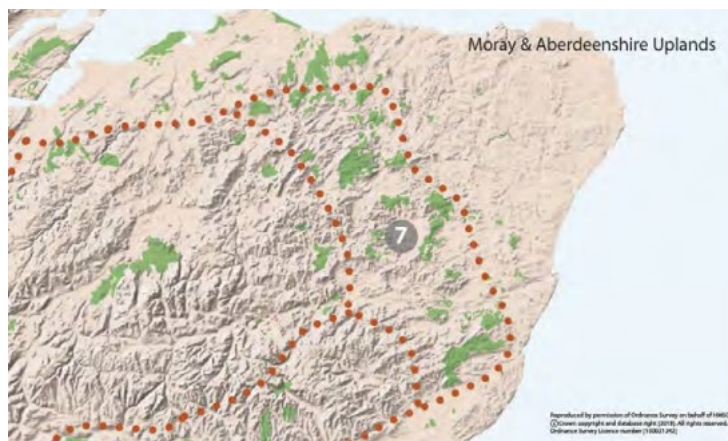
### Focus of effort and investment challenges

- **Continue to support the A82 slope stabilisation project**, working in partnership with Transport Scotland, to maintain momentum on establishing permanent slope



stabilisation woodland and well-maintained drainage system that will reduce the likelihood of landslips and excess water run-off. Challenges include managing tree removal at a sustainable pace, continued negotiation with affected communities and the availability of skilled and suitable contractor base

- **Plan and implement an access strategy** that updates outdated infrastructure and efficiently addresses steep ground constraints
- **Develop a sustainable PAWS restoration strategy** which maximises the habitat, water quality, carbon sequestration and slope stability opportunities within a planned programme of PAWS restoration, working with neighbours to manage deer, capitalising on the removal of non-native trees and identifying future native species marketing opportunities
- **Work with neighbours to reduce deer numbers and expand woodland habitat where opportunities arise.** Deer management is likely to be critical to quick establishment of slope stability and restored PAWS. In addition, extending woodland cover to a natural treeline could increase overall slope stability and be cost effectively achieved through natural colonisation
- **Review options for making the most of visitor numbers** including engagement with local communities on visitor management in areas of high visitor pressure



## Zone 7: Moray and Aberdeenshire Uplands

- Low foothills and plateaux that form the transition to higher Cairngorm mountains;
- Dry, can be cold, often sheltered, predicted to become drier especially on lower ground; generally fertile soils within glens but harder ridges and hill tops
- NFE land use includes largely second/third rotation forest; well established woodland habitat; 95% conifer, mixed spp; below 5% broadleaves; established thinning programme; low amount of open ground; extensive road network
- High visitor numbers, primarily local and domestic visitors, attracted by CCF forests relatively close to settlements
- Well established woodland habitat supports key species
- High degree of interlock with farmland – mostly stock farming
- Good access to diverse range of timber markets, including local sawmills

### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – support for small sawmills; establish and support starter farms; secure carbon sequestration through CCF; maintenance of high water quality of salmon rivers; provide shelter for stock on neighbouring land; high recreation use of NFE contributes to increased health and well-being; sustainable timber production
- **Other national commitments** – investment in silvicultural practices; management of tree disease; habitat management for Scottish wildcat
- **Contribution to financial sustainability** – high quality timber crops; high potential for saw logs; diversity of softwood species; specialist timber markets; wind farms

### Focus of effort and investment challenges

- **Continue to develop a thinning and CCF programme.** More CCF would extend the resilient forest structure and reinforce ‘coniferous forest as mature habitat’ in this zone,

while potentially increasing saw log production. Challenges are likely to be deer management, contractor and staff skills, provenance of recruited species, potential impacts of climate change and of tree disease, while benefits may include reduced restocking costs and long term carbon sequestration

- **Respond to predicted impacts of climate change**, including current and up-coming disease threats related to third rotation forests and changing climate, potential drought and predicted longer growing season. The challenge is to reduce the risk to future forest structure and high quality timber products
- **Accommodate the increasing number of overhead lines proposed to cross the NFE**, alongside continued wind farm development. Challenges include planning roads and efficient felling patterns within a more fragmented forest area, ensuring on going 'resilience' of infrastructure and timescales involved with construction
- **Increase broadleaf to at least 5% in each LMP area and develop an associated management and marketing strategy**, as the zone overall does not meet UKFS requirements. There are opportunities to use broadleaves to provide shelter for farmland, maintain and improve water quality for salmon rivers; and expand woodland habitats; build on LISS and CCF management expertise and contractor base to expand broadleaf silviculture, higher value productive BL outputs and marketing



## Zone 8: Cairngorms

- Extensive massif of high mountains with convex slopes, deep glens;
- Cold and relatively dry; predicted to become drier; exposure at high elevations but can be sheltered; short growing season; fertile soils along lower glens;
- NFE land use includes areas of extensive areas of managed native pine woodland including significant Caledonian pinewood remnants; high proportion of open elevated land; substantial areas of PAWS;
- Highly designated for both biodiversity and scenic quality including open and woodland habitats;
- Woodland directly contributes to recognised scenic qualities in National Park and other scenic areas
- High numbers of local and international visitors
- Good access to timber markets, including local saw mills

### Most significant contributions to Corporate Priorities, Aims and Objectives

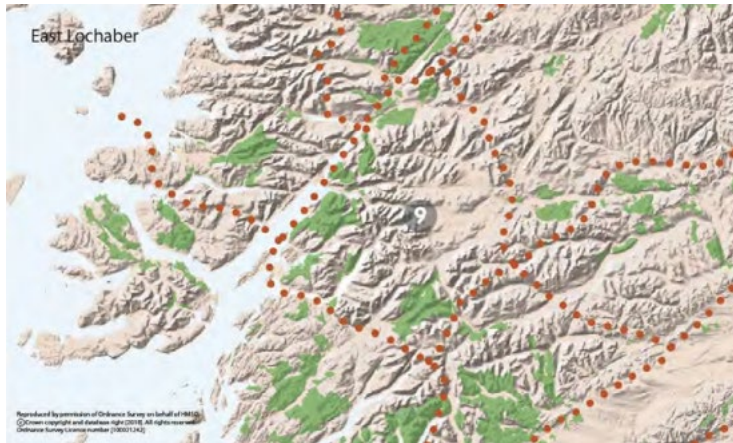
- **Ecosystem services and additional public benefits** – secure carbon sequestration through permanent woodland cover and PAWS restoration; high recreation use of NFE contributes to increased health and well-being; scenic quality and visitor attractions contribute to tourism economy; support for third party visitor businesses in National Park; sustainable timber production
- **Other national commitments** – partnership projects maximise benefits of contiguous habitat management and joined up approach to visitor management; protection and development of habitats for capercaillie; education and outreach
- **Contribution to financial sustainability** – range of softwood; visitor revenue

### Focus of effort and investment challenges

- **Develop CCF strategy for native pine wood** to maintain volume and productivity of timber outputs. CCF would also develop a more resilient forest structure and setting for recreation facilities while maintaining key habitat. Challenges are likely to be deer

management, developing staff and contractor skills and knowledge for sustainable long term management of native woodland, potential impacts of climate change and of tree disease, while benefits may include reduced restocking costs, long term carbon sequestration and management of habitat for priority species

- **Work with neighbours to manage deer and expand woodland habitat where opportunities arise.** There are opportunities through partnership working to expand woodland cover to a natural treeline through natural colonisation. Challenges include reducing deer and other herbivore numbers while also gaining support from neighbours, increasing carbon sequestration and improving water quality
- **Develop a strategy for dealing with potential disease threats,** especially in the light of possible impact of DNB on native pine woodland
- **Develop recreation management to complement other business ventures** through partnership and engagement with neighbours on visitor management in areas of high visitor pressure



## Zone 9: East Lochaber

- Steep sided glens with narrow glen floors enclosed by high mountains, rocky outcrops, water catchments draining west
- Some exposure; wet, predicted to become wetter; soils at higher elevation thin and low in nutrients, some blanket bog
- NFE land use includes extensive areas of both first and second rotation conifer forest, dominated by sitka spruce; largely unthinned; High proportion of open mountain top; substantial areas of PAWS;
- Highly designated for scenic quality including iconic mountain areas
- High numbers of domestic and international visitors
- Good access to timber markets

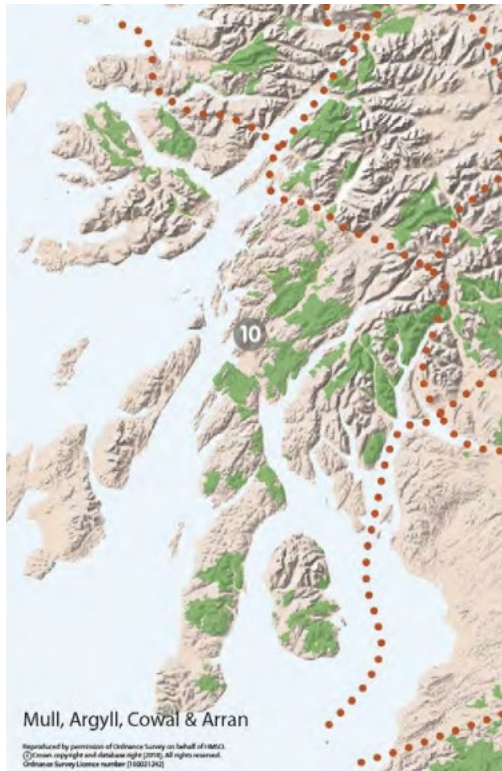
### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – scenic quality and visitor attractions contribute to tourism income; sustainable timber production
- **Other national commitments** – PAWS restoration; rhododendron control; a number of partnership projects contribute to visitor management, including the West Highland Way and Glen Nevis Partnership; habitat management for chequered skipper butterfly
- **Contribution to financial sustainability** – range of softwood; hydro schemes

### Focus of effort and investment challenges

- Work with neighbours to reduce deer numbers deer and expand woodland habitat where opportunities arise. Extending woodland cover to a natural treeline could be achieved through natural colonisation, which would increase carbon sequestration and improve water management. The challenge will be to work with neighbours to reduce deer numbers to a sustainable level.

- Develop a sustainable PAWS restoration strategy which maximises the habitat, water quality, carbon sequestration and slope stability opportunities within a planned programme of PAWS restoration, working with neighbours to manage deer, capitalising on the removal of non-native trees and identifying future native species marketing opportunities;
- Understand and support the implications of steep ground working. Challenges include managing financially and logistically efficient woodland management that respects the landscape and recreation sensitivities of many sites and the availability of skilled and suitable contractor base Review visitor facilities and opportunities for expansion or improvement in light of increasing visitor numbers and opportunities provided by partnership working and third party developments on the NFE
- Maintain a sustainable rhododendron control strategy which builds on work undertaken to date, and allows the work to progress in an ordered sequence that optimises investment



## Zone 10: Mull, Argyll, Cowal and Arran

- Variable, but generally lowlying, terrain, often rolling and plateaux, moorland, water catchments draining west, some steep ground
- Often exposed, wet climate, predicted to become wetter; long growing season; soils nutrient poor N
- FE land use includes extensive areas of first and second rotation largely unthinned forest, dominated by sitka spruce; lack of roads in extensive first rotation forests; native Atlantic oakwood woodland; windfarms and utility networks
- Significant archaeological sites
- High numbers of wind farms and hydro schemes
- Visitors attracted by coast and islands, sea-based travel

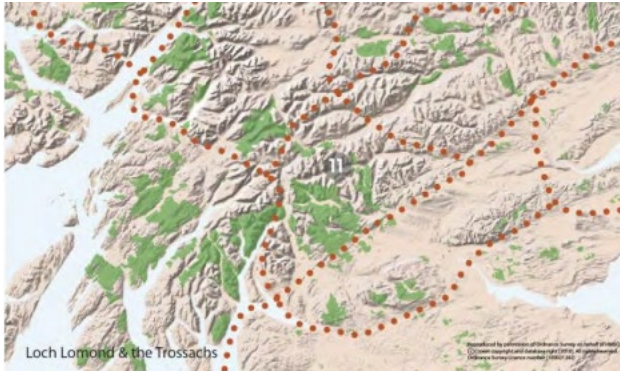
### Most significant contributions to Corporate Priorities, aims and Objectives

- **Ecosystem services and additional public benefits** – establishment of permanent native woodland contributes to carbon sequestration; sustainable timber production
- **Other national commitments** – working with partners and neighbours on shared transport initiatives; restoration of PAWS; management of significant red squirrel strongholds; beaver reintroduction
- **Contribution to financial sustainability** – range of softwood including high percentage of sawlogs; windfarms; hydro schemes



## Focus of effort and investment challenges

- **Shape the future forest area.** Extensive areas of the woodland are first rotation, often even aged conifers, including planting in areas that may not be cost effective to manage in the future. There is an opportunity to look ahead and establish where woodland can thrive and timber production can be most efficient
- **Plan and develop a cost-effective forest road and access network,** taking advantage of the lack of existing roads to invest in a network that meets future ambitions for forest management. Take into account future infrastructure opportunities in sea-based transport, including possible combined benefits with other industries
- **Accommodate the increasing number of overhead lines proposed to cross the NFE, alongside continued wind farm development.** Challenges include planning roads and efficient felling patterns within a more fragmented forest area, ensuring on going 'resilience' of infrastructure and timescales involved with construction
- **Identify key areas of steep ground** and develop a long term, costed programme of working across these difficult and expensive sites that recognises potential impacts on national transport links and other infrastructure
- **Respond to predicted impacts of climate change** including increased windiness and higher rainfall, pest and disease threats and a longer growing season. Design appropriately scaled, accessible coupes, with wide rides to improve wind resistance
- **Identify key areas of steep ground** and develop a long term, costed programme of working across these difficult and expensive sites that recognises potential impacts on national transport links and other infrastructure
- **Maintain a sustainable rhododendron control strategy** which builds on work undertaken to date, and allows the work to progress in an ordered sequence that optimises investment
- **Develop a sustainable PAWS restoration strategy** which will maximise the habitat, water quality and carbon sequestration opportunities within a planned programme of PAWS restoration, capitalising on the removal of non-native trees and identifying future native species marketing opportunities



## Zone 11: Loch Lomond and the Trossachs

- Narrow glens and lochs; complex topography, often sheltered, often steep sided
- Wet, oceanic climate, predicted to become wetter; generally fertile soils especially at lower elevations
- NFE land use includes a high proportion of established, diverse second rotation conifer woodland; some established CCF; well established road network; high proportion of elevated open mountain; steep ground; well established woodland habitats; some PAWS
- Highly designated for both biodiversity and scenic quality including open and woodland habitats Woodland directly contributes to recognised scenic qualities in National Park and other iconic mountain areas
- International and well as domestic visitors, attracted to key 'destination' woodlands and facilities

### Most significant contributions to Corporate Priorities, aims and Objectives

- **Ecosystem services and additional public benefits** – secure carbon sequestration and improve water quality through CCF and PAWS restoration; mitigate flood risk; high recreation use of NFE contributes to increased health and well-being; high scenic quality, including woodlands and visitor attractions, contribute to tourism economy; support for third party visitor businesses in National Park; sustainable timber production
- **Other national commitments** – investment in silvicultural practices; working with National Parks and others on key partnership initiatives such as the West Highland Way; PAWS restoration; removal of rhododendron
- **Contribution to financial sustainability** – diverse range of softwood, including high proportion of saw logs, high value products and species diversity; hydro schemes; visitor revenue

### Focus of effort and investment challenges

- Continue to develop a thinning and CCF strategy to reduce potential impacts of tree disease, contribute to carbon sequestration, flood risk mitigation and water quality, slope stabilisation and established woodland habitat. Challenges likely to include deer

management, steep ground working and managing operations in areas where there is a high recreation or environment interest, while benefits could include decreased restocking costs

- **Identify key areas of steep ground** and develop a long term, costed programme of working across these difficult and expensive sites that recognises potential impacts on national transport links and other infrastructure
- **Develop a strategy for dealing with potential disease threats**, especially in the light of possible impact on larch, which is often located where it provides a setting for recreation facilities and contributes to scenic diversity
- **Review visitor facilities and opportunities for expansion or improvement** in light of increasing visitor numbers and opportunities provided by partnership working and third party developments on the NFE
- **Identify opportunities for establishment, management and marketing of broadleaves** to contribute to flood mitigation, slope stabilisation, visual diversity and the setting for recreation while restoring PAWS and consolidating other habitat benefits; include consideration of broadleaved silviculture, higher value productive BL outputs and marketing
- **Maintain a sustainable rhododendron control strategy** which builds on work undertaken to date, and allows the work to progress in an ordered sequence that optimises investment#



## Zone 12: Highland Perthshire and Angus Glens

- Complex topography, often sheltered, can be steep with rocky outcrops
- Can be cold, short growing season, predicted to become drier; generally fertile soils especially at lower elevations; moorland
- NFE land use includes a high proportion of established, diverse at least second rotation conifer woodland; established CCF; relatively well-roaded; high proportion of elevated open mountain; some steep ground; well established woodland habitats; some PAWS
- Highly designated for both biodiversity and scenic quality including open and woodland habitats Woodland directly contributes to recognised scenic qualities
- Domestic and some international visitors attracted to key 'destination' woodlands and facilities Good access to timber markets

### Most significant contributions to Corporate Priorities, Aims and Objectives:

- **Ecosystem services and additional public benefits** – support small sawmills and locally produced diverse, value added timber products; secure carbon sequestration through CCF and PAWS restoration; high recreation use of NFE contributes to increased health and well-being; high scenic quality, including woodlands, and visitor attractions contribute to tourism economy; maintenance of high water quality of salmon rivers and lochs as well as wider riparian habitats; sustainable timber production
- **Other national commitments** – investment in silvicultural practices; PAWS restoration; management initiatives to protect red squirrel and Scottish wildcat
- **Contribution to financial sustainability** – diverse range of softwood, including high proportion of saw logs, high value products and species diversity; hydro schemes; visitor revenue

### Focus of effort and investment challenges

- **Continue to develop a thinning and CCF strategy** to reduce potential impacts of tree disease, contribute to carbon sequestration, flood risk mitigation and water quality, slope stabilisation and established woodland habitat. Challenges likely to include deer management, steep ground working and managing operations in areas where there is a

high recreation or environment interest, while benefits could include decreased restocking costs

- **Identify key areas of steep ground** and develop a long term, costed programme of working across these difficult and expensive sites that recognises potential impacts on national transport links and other infrastructure
- **Ensure that the road network is spatially efficient, fit for purpose and adequately maintained.** The established road network is dense enough to support thinning and CCF, and will require on-going maintenance. There may be opportunities to rationalise the road network and increase forward planning for roads maintenance
- **Develop a strategy for dealing with potential disease threats**, especially in the light of possible impact on larch, which is often located on steep ground where it provides a setting for recreation facilities and contributes to scenic diversity
- **Identify opportunities for management and marketing of broadleaves** to contribute to flood mitigation, improvements to water quality and salmon rivers, carbon sequestration, shelter for neighbouring farmland, slope stabilisation, visual diversity and the setting for recreation while restoring PAWS and consolidating other habitat benefits; include consideration of broadleaved silviculture, higher value productive broad leaf outputs and marketing



## Zone 13: Central Belt Uplands

- Low rounded hills, steep convex side slopes rising out of farmed plain, numerous small glens; some peatland
- Dry in the east, wetter in the west; predicted to become drier; long growing season; soil can be fertile on lower slopes and glens
- NFE land use includes diverse forest, first rotation conifer forest, upland deep peat and blanket bog; utility networks
- Primarily domestic and often local visitors attracted by destination sites and accessible hills
- Good access to diverse range of timber markets

### Most significant contributions to Corporate Priorities, Aims and Objectives:

- **Ecosystem services and additional public benefits** – high recreation use of NFE contributes to increased health and well-being; restoration of peatland and blanket bog habitats likely to significantly increase carbon sequestration and improve water quality; sustainable timber production
- **Other national commitments** – established partnerships including Central Scotland Green Network and the John Muir Way
- **Contribution to financial sustainability** – standard softwood timber; wind farms

### Focus of effort and investment challenges

- **Shape the future forest area.** Large areas of the woodland are first rotation, often even aged conifers, including planting in areas that may not be cost effective to manage in the future. There is an opportunity to look ahead and establish where woodland can thrive and timber production can be most efficient
- **Develop and optimise recreation opportunities in destination sites**, such as Kilpatricks and Carron Valley, including working with communities to develop integrated approach to management as opportunities arise
- **Take forward peatland restoration projects.** Peatland is a high priority habitat that is also highly successful at sequestering carbon and contributes to managing water quality.

Challenges include integrating peatland restoration with forest and other open ground management.



## Zone 14: Central Belt Lowlands

- Generally low lying, undulating topography and wet plateaux within an extensive, highly populated farmed plain
- Dry in the east, wetter in the west, but generally sheltered; long growing season; predicted to become drier; some fertile land, but also includes extensive lowland raised bog and deep peat, former coal field and other reclamation sites
- NFE land use includes diverse forests of varied structure and age, from long established policy woodland to first rotation conifer and new woodlands around towns; includes ex-coalfield and challenging reclamation sites, deep peat and blanket bog; large number of important small woods close to settlements used for informal recreation; land adjacent to areas of urban deprivation; wind farms and utility networks
- High recreation use and visitor numbers – primarily domestic visitors, day visitor use and dog walkers
- Well established woodland habitat supports key species
- Good access to diverse range of timber markets

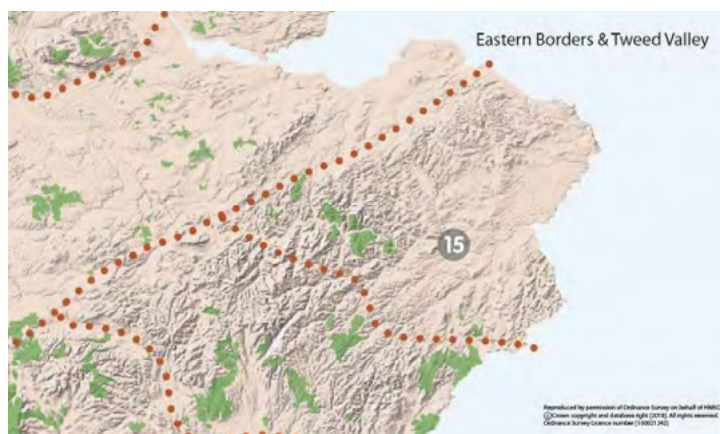
### Most significant contributions to Corporate Priorities, Aims and Objectives:

- **Ecosystem services and additional public benefits** – programme of managing woodlands around towns increases health and well-being and improves air quality; reclamation of ex-coalfield and contaminated land to improve opportunities for inward investment; improving the setting of urban areas and accessibility in areas of urban deprivation; restoration of peatland and blanket bog habitats likely to significantly increase carbon sequestration and improve water quality; sustainable timber production
- **Other national commitments** – partnership working with wide range of public bodies and organisations such as Central Scotland Green Network to improve setting of semi-urban areas and increase accessibility; Woodlands In and Around Towns; investment in silvicultural practices; education, outreach and wide range of community working
- **Contribution to financial sustainability** – standard softwood timber; wind farms



## Focus of effort and investment challenges

- **Take forward a structured programme of land restoration projects** associated with former coalfield and contaminated land that improve the landscape and investment potential across this area
- **Accommodate the increasing number of overhead lines and utilities infrastructure proposed to cross the Estate.** Challenges include planning roads and efficient felling patterns within a more fragmented forest area, ensuring on going 'resilience' of infrastructure and timescales involved with construction
- **Prioritise WIAT sites to improve site standards,** to enhance the quality of visitor experience within WIAT, provide well managed green infrastructure close to areas of urban deprivation, improve the settings of settlements and help plan future FES funding commitments
- **Sustain and where possible expand contribution to engagement of local communities,** through volunteering opportunities, outdoor learning and working with others to increase use of the NFE particularly where this aligns with Scottish Government social and equality agendas
- **Finalise lowland bog restoration strategy.** Peatland is a high priority habitat that is also highly successful at sequestering carbon. Careful programming of conservation and restoration work will optimise the benefits of interconnecting peatland and peatland edge woodland habitats, and continue to develop expertise in this area
- **Work with partners to develop and deliver future green networks** to improve urban setting, encourage inward investment and create widespread accessible opportunities for off road access and informal recreation



## Zone 15: Eastern Borders and Tweed Valley

- Narrow valley floors wind between often steep, convex valley sides that rise to rounded hills and undulating plateaux
- Dry, often sheltered; predicted to become drier; generally fertile soils on side slopes and valley floors; thinner soil on moorland summits
- NFE land use includes extensive areas of third rotation forest; well established woodland habitat; high percentage of conifer, including mixtures; high yield class on lower elevation; established thinning programme; low amount of open ground; well roaded
- Domestic and some international visitors, attracted to key 'destination' woodlands and facilities, local day visitor use
- Well established woodland habitat supports key species
- Good access to diverse range of timber markets

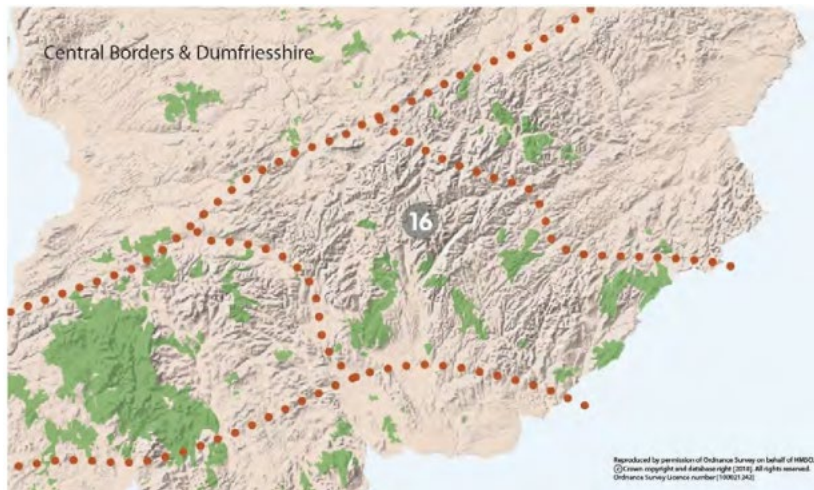
### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – secure carbon sequestration and maintain water quality of river systems through CCF; high recreation use of NFE contributes to increased health and well-being; scenic quality and visitor attractions contribute to tourism economy; support for third party visitor businesses; sustainable timber production
- **Other national commitments** – well established red squirrel habitat; investment in silvicultural practices
- **Contribution to financial sustainability** – high quality timber crops; high potential for saw logs; diversity of softwood species; specialist timber markets; firewood; visitor revenue

### Focus of effort and investment challenges

- **Continue to develop a thinning and CCF/LISS strategy** to reduce potential impacts of tree disease, contribute to carbon sequestration, flood risk mitigation and water quality, slope stabilisation and established woodland habitat. Challenges likely to include deer management, management of woodlands across steep ground, and securing contractor resource while benefits could include decreased restocking costs

- **Managing public access, user group requirements and recreation infrastructure while maintaining timber productivity** across Tweed Valley, where demand for recreation is high, sometimes with conflicting user interests, and managing the forest in recreation areas can be challenging
- **Develop a strategy for dealing with potential disease threats**, especially in the light of possible impact of *P. ramorum* on larch, a high value timber which also contributes to scenic diversity in areas of high recreation activity and difficulty of access on steep ground close to the public road network and River Tweed SAC
- **Respond to predicted impacts of climate change** including likely increase in drought and a longer growing season as well as potential increased threats of pests and diseases
- **Develop a management and marketing strategy for broadleaves**. There are opportunities to use broadleaves to maintain water quality of the River Tweed, sequester carbon, stabilise slopes along the A72, mitigate water runoff, provide permanent settings for recreation facilities and contribute to visual diversity as well as increase biodiversity. There may be associated opportunities to develop markets for local firewood and higher value hardwoods



## Zone 16: Central Borders and Dumfriesshire

- Extensive area of rounded hills with smooth convex slopes, upland rolling plateaux hinterland Moderately wet, can be cold; dry heath; often sheltered, some exposure on upland plateaux; can be fertile soils, some peatland
- NFE land use includes largely second rotation sitka spruce with some mixed conifer; widely thinned across lower slopes; relatively low amount of open ground; well roaded; some windfarms and energy-related infrastructure
- Primarily domestic and often local visitors attracted by destination sites
- Good access to larger timber markets, local merchants and biofuel

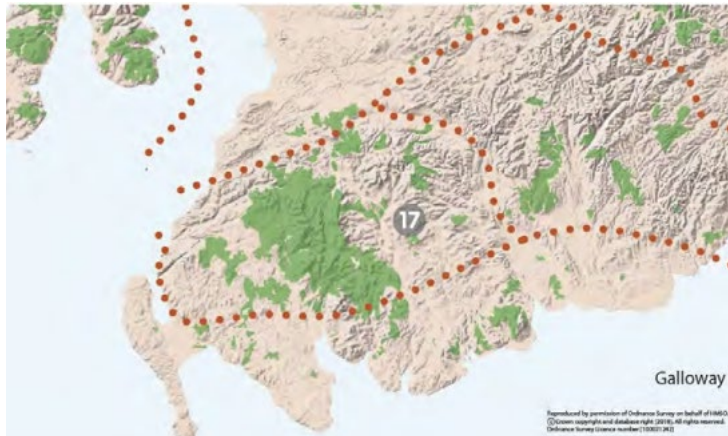
### Most significant contributions to Corporate Priorities, Aims and Objectives:

- **Ecosystem services and additional public benefits** – mitigate flood risk; recreation use of NFE contributes to increased health and well-being; sustainable timber production
- **Other national commitments** – management of *P. ramorum*; red squirrel strongholds; investment in silviculture; partnership working on South Scotland timber transport routes
- **Contribution to financial sustainability** – mixed softwood products, including significant proportion of saw logs; wind farms

### Focus of effort and investment challenges

- **Develop a thinning strategy and a related CCF strategy.** Build on opportunities created by second rotation woodland and established road networks to increase saw log production by increasing thinning and more CCF. Challenges are likely to be deer management, wind firmness, provenance of recruited species in CCF areas, potential impacts of tree disease and ongoing maintenance of roads while benefits may include reduced restocking costs and increased carbon sequestration
- **Tackle the implications of naturally regenerating conifer**, which, while it is an opportunity that may reduce restocking costs, may have implications on the quality of genetic stock and requires re-spacing

- **Respond to predicted impacts of climate change** including potential increased threats of pests and diseases, alongside increased windiness, a higher likelihood of sudden heavy rainfall events and a longer growing season
- **Review strategy for tackling potential impact of P. ramorum**, focussing on the need to maximise revenue and plan for restocking in line with LMP objectives and commitments to the regulator
- **Invest in south Scotland timber transport routes** to give access to timber markets?
- **Accommodate the increasing number of overhead lines proposed to cross the NFE**, alongside continued wind farm development. Challenges include planning roads and efficient felling patterns within a more fragmented forest area, ensuring on going 'resilience' of infrastructure and timescales involved with construction



## Zone 17: Galloway

- Extensive rolling hills and relatively accessible terrain; includes upland rolling plateaux and concave slopes
- Can be exposed, wet oceanic climate, some sheltered locations and long growing season; moderately fertile, some poorer soils
- NFE land use includes some first and extensive second rotation conifer forest, dominated by sitka spruce; largely unthinned; lack of roads in some areas; extensive areas of elevated open ground and peat bog; recreation within designated Dark Sky/ Forest Park; wind farms and energy-related infrastructure;
- High demand and good access to larger timber markets, biofuel

### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – restoration of peatland and blanket bog habitats likely to significantly increase carbon sequestration and improve water quality; recreation use of NFE contributes to increased health and well-being and contributes to tourism economy; managing forest and create riparian buffer zones to improve water quality in acid sensitive catchment; support for third party visitor businesses in Forest Park; sustainable timber production
- **Other national commitments** – management of *P. ramorum*; work with partners on management of Biosphere Reserve in Central Galloway and on South Scotland timber transport routes; habitat management for red squirrel strongholds and black grouse
- **Contribution to financial sustainability** – mixed softwood products, including significant proportion of saw logs; wind farms; visitor revenue

### Focus of effort and investment challenges

- **Shape the future forest area and access network.** The woodland here includes first rotation forest requiring roading and careful planning of the next rotation to maximise timber productivity alongside other land management objectives. There is an opportunity

to look ahead and establish where woodland can thrive, roading can be most efficient and open land managed effectively

- **Tackle the implications of naturally regenerating conifer**, which, while it is an opportunity that may reduce restocking costs, may have implications on the quality of genetic stock and requires re-spacing
- **Respond to predicted impacts of climate change** including potential increased threats of pests and diseases, alongside increased windiness, a higher likelihood of sudden heavy rainfall events and a longer growing season. This is likely to include consolidating a 'post-P. Ram' strategy to ensure that regulatory requirements are fully met and that future forest structure meets all land management objectives
- **Develop a thinning strategy**. Build on opportunities created by second rotation woodland and established road networks to maintain or increase saw log production by increasing thinning. Challenges are likely to be deer management, wind firmness, provenance of recruited species, potential impacts of tree disease and ongoing maintenance of roads, while benefits may include reduced restocking costs and increased carbon sequestration.
- **Maintain water quality and work with others on mitigating flooding**, putting in riparian buffers to reduce impacts on acidification in failing water catchments and ensuring that FES do not contribute to increasing risk of flooding, and where possible assist in mitigation of potential impacts;
- **Continue to maximise peatland restoration benefits**. Programme conservation and restoration and work with other agencies and partners if possible to maximise benefits of contiguous and cooperative management of high quality habitat. This will optimise the benefits of large scale interconnecting peatland and peatland edge woodland habitats, and continue to develop expertise in this area
- **Accommodate the increasing number of overhead lines proposed to cross the NFE**, alongside continued wind farm development. Challenges include planning roads and efficient felling patterns within a more fragmented forest area, ensuring on going 'resilience' of infrastructure and timescales involved with construction
- **Develop the contribution that the NFE might make to wider tourism** to complement other businesses where NFE offers recreation opportunities and visitor attractions;
- **Tackle the fencing liabilities associated with grazing leases on the NFE** which are likely to require considerable investment



## Zone 18: Solway Coast

- Farmed plain with low hills alternating with extensive areas of wet lowland bog; Warm, wet climate but low lying and long growing season; predicted to become significantly drier; often sheltered, some elevation inland; generally fertile soils, some peatland and lowland bog
- NFE land use includes second/ third rotation thinned, well roaded, mixed woodland; established forest habitat, including mature BL; can be high yield class; extensive areas of lightly roaded, first rotation conifer on lowland peat bog; peatland restoration
- High recreation use and visitor numbers – local and from further afield
- Well established woodland habitat supports key species

### Most significant contributions to Corporate Priorities, Aims and Objectives

- **Ecosystem services and additional public benefits** – restoration of peatland and bog habitats as well as CCF management of woodland will increase carbon sequestration and improve water quality; woodland edge provides shelter for stock on neighbouring land; high recreation use of NFE contributes to increased health and well-being and tourism economy; sustainable timber production
- **Other national commitments** – investment in silvicultural practices; management of P ramorum in larch; habitat management for pearl bordered fritillary butterfly
- **Contribution to financial sustainability** – high quality timber crops; high potential for saw logs; diversity of softwood and hardwood species

### Focus of effort and investment challenges

- **Continue to develop a thinning and CCF strategy for woodland on stable ground.** More CCF would extend the resilient forest structure and reinforce 'coniferous forest as mature habitat' in this zone, while potentially increasing saw log production. Challenges are likely to be deer management, provenance of recruited species, potential impacts of climate change and the impacts of tree disease, while benefits may include reduced restocking costs and long term carbon sequestration



- **Consolidate a ‘post-P. Ram’ strategy to ensure that regulatory requirements are fully met** and that future forest structure meets all land management objectives
- **Take forward opportunities to restore peatland and review access requirements for afforested lowland bog areas.** The woodland here is largely first rotation, and access both to and within the forest can be poor. Assess the future management options for these areas, including continued support for peatland restoration especially where this maximises benefits of contiguous and cooperative management of high quality habitat
- **Investigate specialist timber markets that support diverse timber outputs.** Build on LISS and CCF management expertise and contractor base to expand alternative conifer and broadleaf silviculture, higher value productive broadleaf outputs and marketing
- **Take into account the impacts of predicted much drier climate.** A warmer, drier climate will impact on tree species choice and timber productivity and possibly on peatland habitats

## Glossary

**CCF** Continuous Cover Forestry, a silvicultural system that maintains the forest canopy at one or more levels without clear felling

**DNB** Dothistroma Needle Blight, also known as red band needle blight is a fungus disease that most frequently affects pine species

**FES** Forest Enterprise Scotland - now known as Forestry and Land Scotland

**LISS** Low Impact Silvicultural System, a silvicultural system that maintains forest cover without extensive clear felling, and includes systems such as group selection, shelterwood, small coupe felling, minimum intervention and single tree selection systems. It is most suitable for wind firm sites.

**LMP** Land Management Plan, a plan prepared by FES that outlines the proposed management of woodland and open land on the NFE over a ten year period.

**NFE** National Forest Estate, the land managed by Forestry and Land Scotland on behalf of Scottish Ministers

**NSO** National Spatial Overview, prepared by FES

**PAWS** Plantation on Ancient Woodland Site, where native tree cover has been felled and the site replanted with species not native to the site

**P. ramorum** Phytophthora ramorum, a fungus-like pathogen that affects larch as well as other species of trees and other plants

**SNH** Scottish Natural Heritage - now known as NatureScot

**UKWAS** UK Woodland Assurance Scheme,