Forestry and Land Scotland
Coilltearachd agus Fearann Alba

Kilpatrick Hills land management plan 2026-36

We manage Scotland's National Forest Estate to the United Kingdom Woodland Assurance Standard – the standard endorsed in the UK by the international Forest Stewardship Council® and the Programme for the Endorsement of Forest Certification. We are independently audited.

Our land management plans bring together key information, enable us to evaluate options and plan responsibly for the future. We welcome comments on these plans at any time.

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Version history

Version	Date	Comments
1.0	Final Draft for Submission	Incorporates revisions to plan following community consultation and internal team sign-off. This Includes extra management information regarding anti-social behaviour, expansion of felling coupe 63239 to include all spruce stands near Glenarbuck geological SSSI and removal of the woodland creation proposal around Burncrooks reservoir. The latter change will be delayed to allow more time for further site investigation and consultation with the fishing club to determine the most appropriate future design.
1.1		
1.2		
1.3		

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A. Description of Woodlands

A.1 Property Details

Property			
Property Name:	Kilpatrick Hills		
Business Reference Number:	63	Main Location Code:	
Grid Reference: (e.g. NH 234 567)	NS 4709 7748	Nearest town or locality:	Old Kilpatrick
Local Authority:		East Dunbartonshire, West Dunbartonshire and Stirling.	
LMP Plan area (hectares):		3494.13	

Owner's Details			
Title:	Mrs	Forename:	Carol
Surname:	McGinnes		
Organisation:	Forestry and Land Scotland	Position:	Regional Manager
Primary Contact Number:	0131 370 5622	Alternative Contact Number:	
Email:	carol.mcginnes@forestryandland.gov.scot		
Address:	Five Sisters House, Five Sisters Business Park, West Calder, West Lothian		
Postcode:	EH55 8PN	Country:	Scotland

Approval - to be completed by Scottish Forestry staff:			
LMP Reference Number:			
Plan Period: (ten years) (day/month/year)	From:	To:	
Operations Manager Signature:		Approval Date: (dd/mm/yyyy)	

Declaration

I hereby apply for a permission to fell the trees described in this application and I certify that:

- I am the landowner or an occupier of the land with written permission of the landowner;
- Where the landowner is a business, I am authorised to sign legal contracts on behalf of that business;
- If I am an acting on behalf of the landowner or occupier, I have been mandated to do so;
- Any necessary consents from any other person(s) if required, have been obtained;
- I have made the necessary checks with the local planning authorities regarding Tree Preservation Orders and Conservation Areas;
- I have notified all stakeholders that may be affected by the felling in this application and sought their views prior to submitting this application;
- I hereby acknowledge that Scottish Ministers may process any of my personal data contained in or relating to this application in accordance with the terms of Scottish Forestry's Privacy Notice, a copy of which is available at www.forestry.gov.scot;
- Where applicable and appropriate I have submitted an EIA screening opinion form for operations contained within this application under the Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017;
- I have read and understand this application fully and, to the best of my knowledge and belief, the information given in this application is complete, true, and accurate;
- I accept that any false or misleading information provided in this application constitutes an offence and may result in any felling permission based on this application being revoked at any time, and I have read and understand Scottish Forestry's Privacy Notice, a copy of which is available at https://forestry.gov.scot/privacy-complaints-freedom-of-information-and-requests-for-information

Do you give consent for Scottish Forestry to access your land? Delete as appropriate.	YES	
You are not obliged to give us consent to enter your land, however if we are denied access to your land, and cannot carry out an assessment because of this, we may reject your application. This consent is for access to assess this application as well as monitor compliance with any subsequent approval, where applicable		

Signed:	Toby Austin	Print:	Toby Austin	Date:	15/09/2025

A.2 Location and Background

Kilpatrick Hills land management plan (LMP) is located immediately north-west of Glasgow city (Map 1) and covers approximately 3,500 hectares. It is comprised of conifer plantations to the east, north and west linked by a central expanse of open moorland.

The conifer plantations were established between 1960 and 1990 and heavily influence three separate sub-units of the plan (Auchineden, Auchentorlie and Merkins). We are currently restructuring these plantations in line with the Scottish Government forestry strategy and the UK Forestry Standard (**UKFS**).

The central moorland zone was purchased more recently to provide a range of public benefits and improve connectivity between conifer plantations. We have begun to diversify this area over the last decade by planting low density native woodland and restoring open mire habitats but it remains largely open in character.

In relation to administrative (council) boundaries the majority of the plan is within West Dunbartonshire (~92%) and a few zones fall within Stirling (~6%) and East Dunbartonshire (~2%) - see Map 1.

A.3 Existing Schemes and Permissions

Table 1 Existing Schemes and Permissions

Type (e.g. Felling Permission)	Ref. No.	Details
Long Term Forest Plan	32/14/01	Ten Year forest plan 06/01/2015 – 06/01/2025 (expired). Restocking of approved felling coupes is ongoing.
EIA Screening Opinion Request Afforestation, Fores roads & deforestation		EIA consent not required (28th March 2014) for works proposed in previous forest plan: • 400.7 hectares of afforestation (210.3ha planting & 190.4ha designed open ground). • 142 hectares of deforestation at Knockupple and Merkins to implement the Bog transition plan adjacent to Dumbarton Muir SSSI, restoring to priority open mire habitat. • 12.17km of new forest roads across Auchentorlie, Auchineden, Knockupple and Merkins and supporting quarries as per qualifying projects map. All projects were delivered during the previous plan.

A.4 Stakeholder Engagement

This table shows the main issues raised during stakeholder engagement and the corresponding section of this plan. A more detailed record of stakeholder engagement is in Appendix 5.

Table 2 Stakeholder engagement details	
Scoping – Main Points	**LMP Reference (section/page):**
Local Communities & visitors	Section A5 (Table 3); Sections A.7.1 & C.2.11 Communities & Recreation; Section C.2.6 & Map 12 woodland management in visitor zones
Biodiversity including connectivity of habitat networks, local nature conservation sites, statutory protected sites & peat restoration	Section A5 (Table 3); Sections A.6.10 & C.2.13 Biodiversity; Section C.2.7 Restocking Proposals; Appendix 4; Map 9 ten year felling plan; Map 10 future species & habitats; Map 7 concept design.
Historic environment	Section A5 (Table 3); Sections A.6.9 & C.2.12 Historic Environment; Map 10 future species & habitats
Core paths & visitor access during forest operations	Section A5 (Table 3); Sections A.7.1 & C.2.11 Communities & Recreation; Section C.2.6 & Map 12 woodland management in visitor zones Appendix 6 - core path re-location map
Angling Clubs	Sections A.7.1 & C.2.11 Communities & Recreation; Map 10 future species & habitats.
Public & private water supplies	Section A5 (Table 3); Sections A.6.5 & C.2.8 Hydrology & Water Supply; Section C.2.7 Restocking Proposals; Map 3 hydrological considerations; Map 7 concept design ; Map 10 future species & habitats
Forest resilience (incl. wildfires & tree health)	Section A5 (Table 3); Section A.7 Woodland Description; Sections A.8 & C.2.14 Tree Health; Section C.2.7 Restocking Proposals; Section C.2.16 Wildfire Management.
Major infrastructure developments	Not included as no major infrastructure developments proposed.

A.5 Long Term Vision and Management Objectives

Long term vision

The long term vision for the plan area is illustrated in the concept design map (Map 7) and the overarching management objectives (below). We will continue to manage Kilpatrick Hills to deliver a range of public benefits.

Overarching management objectives

Table 3 Overarching Management Objectives	
Objectives (including environmental, economic and social considerations)	**Indicator of objective being met**
Improve resilience through appropriate silviculture, species choice and careful forest design.	Diversity of suitable tree species and age-classes in forest stands. Use of crop mixtures, including nurse mixtures. Creation of ride networks and presence of windfirm edges. Use of thinning on suitable sites. Creation of fire breaks.
Pre-emptively remove Larch species (where appropriate), adhering to the FLS national plant health strategy.	Quantity of larch within forest stands.
Maintain small roundwood, pallet, log and biomass production through appropriate silviculture, species choice and careful forest design.	Production forecast from FLS sub-compartment database.
Promote responsible use of the forest by visitors.	Working with local partners to target anti-social behaviour and promote the Scottish Outdoor Access Code. Use of interpretation to increase public reporting of anti-social behaviour or crime. Adequate use of public signage and public management access plans (PAMPs) to ensure safe use of the forest during operations.
Maintain attractive woodlands, trails and other recreational opportunities to promote visitor health and well-being.	Use of promoted paths to prioritise amenity woodland, lower impact silviculture and circular trails. Working with partners to promote and maintain core path networks. Monitoring of visitor usage levels from important 'gateways' or access points. Condition of existing visitor services infrastructure.
Improve the visual amenity of the forest.	Internal and external forest design that reflects the scale and character of natural landform. Scale and design of felling coupes. Presence of amenity woodland throughout the forest. Forest composition and structural diversity. Protection of special landscape qualities identified in Kilpatrick Hills local landscape area.

Table 3 Overarching Management Objectives	
Objectives (including environmental, economic and social considerations)	**Indicator of objective being met**
Protect water quality and plan to mitigate against excessive water run-off in catchments.	Where natural flood management actions identified in local flood studies work with partners to help deliver. Follow UKFS best practice guidance to minimise flood risk downstream of catchments within the plan area. Follow UKFS and water industry guidance to minimise impact on water quality and drinking water supplies. Width of riparian buffer zones under low intensity management.
Maintain biodiversity value through appropriate management and design.	Extent and condition of wetland habitats within the plan area including priority open mires. Use of long term retentions, natural reserves and minimum interventions. Protection and enhancement of priority habitats including ancient native woodlands and biological SSSIs. Protection and enhancement of geological SSSIs. Partnership working to identify condition and management of local nature reserves. Connectivity and extent of habitat networks within and bordering the plan area. Monitoring and control (where present) of non-native invasive species.
Protect heritage features.	Appropriate buffers used at restocking. Protection and enhancement of Scheduled Monuments and Antonine Wall World Heritage Site. Condition of heritage features across the forest.

A.6 General Site Description

A.6.1 Topography & Landscape

Topography

A rugged upland plateau dominates **central** and **southern zones** of the plan and forms a distinct volcanic feature that is bounded to the south by the Clyde Valley, to the west by the River Leven and to the east by the Blane Water. This plateau contains the most prominent and varied topographical features within the plan, including the steepest slope gradients and highest elevation summits. All large water bodies within the plan are located on this plateau and most were created or enlarged by 'damming' for the purpose of water supply. The outlets to these

waterbodies often form deeply incised gulleys as they flow through the outer margins of the plateau.
The **northern zone** of the plan contains Merkins conifer plantation and parts of Dumbarton Muir. The topography is heavily influenced by underlying sandstone and peat deposits and consequently less rugged. The terrain gradually declines northwards towards the plan's northern boundary at ~130m ASL. Despite this, high wind exposure, lack of human development and a north-facing aspect create an 'upland' setting and unexpected high quality views northwards to Loch Lomond and Trossachs National Park strengthen this upland feel to the area.
This zone is flanked to the east and west by deeply incised river gulleys flowing roughly south to north into the Endrick Valley.

Landscape

Kilpatrick Hills Local Landscape Area:

The rugged upland landscape of the Kilpatrick Hills is an important backdrop to lowland areas surrounding it. The Council's of West Dunbartonshire, Stirlingshire and East Dunbartonshire have designated their respective parts of the Kilpatrick Hills as 'Local Landscape Areas' (LLA), the three together form one continuous area, see Map 2.

The Kilpatrick Hills Local Landscape Area - Statement of Importance (west-dunbarton.gov.uk) identifies special qualities of the LLA. There is a statement of importance in the West Dumbartonshire policy document which has been used to inform this plan. The **LLA key features** relevant to the plan:

- The Kilpatrick Hills form a **distinctive rugged upland** landscape
- Are linked with their surroundings: **'borrowed' views**
- Are unique and relatively accessible panoramas and a plethora of **high quality vistas**, both to and from the Kilpatrick Hills
- The Kilpatrick Hills rise relatively steeply from the River Clyde shores and the Leven Valley to around 400m at their **highest point at Duncolm**
- The landform comprises a series of rounded, **locally craggy summits** set within an undulating plateau, crossed by a series of burns
- Land cover is characterised by **open moorland including heather and rough grasslands**, with extensive areas of **blanket bog**
- **Reservoirs and lochs** which sit among the summits and several **coniferous plantations**
- **Auchineden Hill** and the **Whangie**, which together form one of the **best known viewpoints** and places of interest within the Kilpatrick Hills

The central area of the Kilpatrick Hills' landscape has a high degree of remoteness and perceived wildness. The outer portions have experienced a high degree of modification by human activity.

Multiple reservoirs have been created with associated support infrastructure forming a key component of the Kilpatrick Hills landscape.

Landscape Character:

NatureScot has produced a national map-based Landscape Character Assessment for Scotland. The Landscape Character Type (LCT) descriptions provide a list of key characteristics, and typically include sections on physical, cultural and aesthetic elements of landscape. The LCTs that cover the Kilpatrick Hills are:

- Rugged Moorland Hills LCT 216 - an upland character featuring distinctive summits and rugged crags and ridges with extensive areas of moorland vegetation to central portions of this LCT.
- Lowland Hill Fringes LCT 150 – a transitional moorland hill fringe landscape where Auchineden Hill and the Whangie, are important viewpoints within this LCT.

A.6.2 Climate and Wind Exposure

Current Climate

Large areas of the plan have a cool and wet climate with moderate to high wind exposure (Map 3). Some severe wind exposure zones are present across higher summits and along the forest boundary. The southern fringe of the plan sits within a warm climate zone with south facing slopes and moderate to low wind exposure. The northern tip and eastern flank of Merkins has a similar climate, although being slightly cooler on north and east facing slopes.

Predicted future climate

The UK forest research agency has generated climate projections to 2080. Based on these projections two important trends are identified at Kilpatrick Hills. Firstly the climate is expected to become warmer with longer growing seasons. Secondly there will be an increase in climatic wetness and associated soil moisture.

Wind exposure and ground suitable for thinning

Map 3 identifies those areas with DAMS scores of 16 or below and these zones offer sufficient shelter to consider stand thinning and continuous cover forestry (CCF). We have further refined this information using soil and crop data to identify approximately 702 hectares or 20% of the plan suitable for thinning. Further analysis of access infrastructure, previous crop treatments and management objectives has determined final thinning zones for the next 10 years; these are detailed in Section C.2.2 and on Map 9.

A.6.3 Surface Geology and Soils

Surface geology

Igneous rocks cover about 50% of the plan and heavily influence central and southern zones. These rocks often develop 'cliff and terrace' features characteristic of ancient lava flows and are a distinctive component of the landform.

Peat and glacial till deposits are dominant in remaining areas and cover about 46% of the plan. Peat is more frequent in northern zones overlying the older red sandstones. It directly functions as the soil. Glacial till is present in all areas as sporadic drifts and is particularly common across the central plateau. Remaining areas (~4%) are made up of and glacio-fluvial deposits and surface-exposed red sandstones

Soils

Deep peats cover the largest proportion of the plan and form the dominant soil type in northern zones. They markedly decline moving southwards across the volcanic geology and are almost absent on the slopes of the Kilpatrick braes, Gavninburn and Auchentorlie.

Peaty gleys are frequent alongside deep peats but also common on glacial till deposits across the central plateau. They make up the second largest soil type in the plan. Remaining soils (~40%) are an assortment of mineral groups most commonly formed on the volcanic geology. They are principally ironpans, brown earths, skeletal soils and surface water gleys.

Soil fertility changes markedly across the plan. The most productive soils for forestry are in southern zones where brown earths are prevalent. The older plantation blocks of Auchentorlie, Auchineden and Merkins contain soils of moderate fertility for productive conifers but limited potential for productive broadleaves. The Duncolm Hills, Saughen braes and Dunbarton Muir have low fertility soils and limited potential for productive forestry.

A.6.4 Land Use

Table 4 Current Land Use	% of plan area
Open land	53.82
High forest	37.18
Felled awaiting restock	5.49
Open water	1.24
Windthrow	1.06
Unplantable or bare	0.71
Agricultural land	0.36
Quarries	0.14

A.6.5 Hydrology & Water Supply

Open Water

The plan contains ~43.3 hectares of open water concentrated in three separate water bodies:

- Loch Humphrey Reservoir (NS 4569 7600)
- Fyn Loch (NS 4579 7725)
- Lily Loch (NS 4733 7795)

Both Loch Humphrey and Fyn Loch have been artificially dammed and form part of a public water supply network. Lily loch is part of 'Dumbarton Muir' nationally protected Site of Special Scientific Interest (Section A.6.10). Another 9 water bodies covering ~156 hectares are encircled by or partly border the plan boundary - shown on Map 4.

Public Water Supplies

Six waterbodies in the Kilpatrick Hills are used for public water supply and their drainage catchments originate primarily from the plan. The majority of catchment flow originates from central (open) zones where few operations are planned in the next 10 years. However, Auchineden and Auchentolie productive timber zones form part of three reservoir catchments and strategic planning of forest operations will be important to avoid impacts on water supply. UKFS requires that, in any 3 year period, recently felled ground and programmed forest harvesting is less than 20% of a drinking water supply catchment. We've identified one catchment (Loch Humphrey) where harvesting could potentially exceed this threshold and have addressed this in Section C.2.8.

Private Water Supplies

An analysis of private water supplies has been completed as part of the plan renewal. This process included consultation with neighbouring properties and has allowed us to update records on abstraction points, transport/storage infrastructure and source catchments. Due to the sensitivity of this information it has not been published in this plan.

Potentially Vulnerable Flooding Areas (PVAs)

PVAs are catchments with a significant risk of downstream flooding. Where they intersect a forest, UKFS requires that the combined area of felling, fallow and young crops (<10 years old) in any five year period should not exceed 40% of the catchment. There is one PVA catchment intersecting the LMP with over 40% forest cover and therefore with potential to exceed the UKFS threshold. This drains to an 'Objective Target Area' (OTA) at Milngavie and covers a large proportion of Auchineden plantation (see Map 4). We've assessed proposed felling, fallow and young crops over the next ten years (allowing for non-FLS forest) and calculated that, in any five year period, the 40% limit will not be exceeded.

Surface Water Quality

SEPA monitors 4 mainstem rivers whose watersheds originate wholly or partly from the plan and this provides a good indication of surface water quality. There are no required or planned actions with regard to forestry activities, beyond UKFS best practice.

A.6.6 Windthrow

Map 6 shows windthrow as a proportion of forest stands in January 2025, it is present in all mature conifer plantations and covers approximately 37 hectares. The lack of windfirm boundaries in these plantations and increased storm events has made their retention increasingly challenging and some may become uneconomic to harvest if left too long.

A.6.7 Adjacent Land Use

Adjacent land use is predominantly rough grazing and improved grassland; both require joint working to upkeep march fencing and boundary drainage. To the east of Auchineden there is some private sector forestry but sufficient open space between respective commercial stands to minimise impact of harvesting operations on stand stability. At the local scale, important adjacent land uses are recreation businesses (angling clubs, outdoor activity centres and catering), mineral extraction, utility wayleaves, and some residential properties.
Water supplies are detailed in Section A.6.5 and legally protected heritage/conservation sites in Sections A.6.9 and A.6.9.

A.6.8 Operational Access

Public access and recreational use of the forest is described in Section A.7.1.
Forest road access within original conifer plantation zones is generally good with most areas now accessible. Some remaining forest stands will require spur extensions to safely access within the plan period. Central parts of the plan have no road access and this restricts effective transport between commercial working areas.

Access into the plan is gained through multiple entrance points with different legal arrangements. Map 6 shows current forest entrances and whether they have ‘full’ or ‘restricted’ operational access. Restrictions include:

- Legal conditions on management activity, vehicle type and geographic areas accessed
- Safety restrictions relating to road gradient or interaction with other activities

HGV and timber haulage access to both Auchentorlie and Merkins is across private land using time limited access agreements. Auchineden provides secure long term operational access. All entrances used for timber or machine haulage directly link to main trunk roads (A82 and A809).

Both are managed for long distance and freight traffic and are the Local Authority's preferred routes for timber haulage.

A.6.9 Historic Environment

Detailed desk and site archaeological surveys of the plan were completed in 2008, 2012 and 2013. They established physical boundaries of archaeological features and protection buffers based on relative importance and condition and include locally, nationally and internationally protected heritage sites (Scheduled Monuments and World Heritage Sites). The latter two categories are described below.

Antonine Wall World Heritage Site

The Antonine Wall is an internationally important scheduled monument which forms part of the Frontiers of the Roman Empire World Heritage Site. It is a stone and turf fortification extending approximately 60 kilometres from Old Kilpatrick on the Clyde Estuary to Boness on the Forth Estuary. There are two short sections at the southern limit of the plan (Map 6). The first travels through open land along the lower slopes of Gavinburn. The second travels to the south of the A82 through the 'Old Kilpatrick' compartment of the plan. This latter area has amenity woodland on either side of the monument boundary and is used for local community events . Within both areas there are no known structural remains and they are managed following the world heritage site and scheduled monument management plans. The associated buffer or 'setting' zone is much larger and extends across the slopes of the Kilpatrick Braes up to the ridgeline. Lower and mid-ground areas of the buffer zone were planted with amenity mixed woodland during the previous plan, following the approved management proposals. Higher ground comprises open space and existing LEPO woodland, both of which have been retained.

Other Scheduled Monuments

Apart from the Antonine wall there is one other Scheduled Monument within the plan boundary. This is Knockupple long cairn (SM2911) located in Merkins plantation at grid reference NS 45811 80708. It is of pre-historic origin, probably from the Neolithic period and thought to be a chambered burial cairn. The land surrounding this monument is currently managed as open space. Over the previous 10 years a forest quarry to the south has been extended and its current boundary sits ~37 metres from the monument boundary. There will be no further excavation northwards towards the monument.

Another Scheduled Monument sits at the plan boundary (on neighbouring land). This is Lang Cairn ('chambered cairn and round cairn, Gallangad Muir, SM2329') located at grid reference NS 45766 81473. The site boundary is 130 metres long and incorporates 2 cairns, one of which is a well-preserved chambered long cairn of the Clyde Group. Due to its location, it could be affected by work at the boundary such as march fencing or drainage.

A.6.10 Biodiversity

UK Biodiversity Action Plan Priority Habitats

The plan contains the following priority habitats:

- Blanket & raised bog
- Upland heathland
- Fen, marsh and swamp
- Oligotrophic loch and eutrophic standing water
- Upland oak, mixed ash, birch and wet woodland.

LEPO woodland (Long established plantation origin woodland)

There is one area of LEPO woodland on the slopes of the Kilpatrick Braes (NS 4573 7432). It is thought to have been part of a historical wood pasture and contains a range of tree species including Scots pine, European larch, Beech, Hornbeam, Norway spruce, Oak, Ash, Birch and Rowan. Many trees within this area are approaching veteran status and the woodland has good deadwood potential. The LEPO designation amounts to 17.1 hectares but the surveyed woodland boundary extends to 37.9 hectares. The low density and irregular spacing of trees provides a natural appearance and allows views of the terraced crags along the Kilpatrick Braes and outwards towards the Clyde Estuary. Native woodland creation planted during the previous plan now provides connectivity southwards to ancient woodland at 'Haw Craig – Glenarbuck' Site of Special Scientific Interest (see below).

Ancient Woodland

There are three small areas of ancient woodland amounting to 11.7 hectares in total. These are widely separated within the plan but link to larger ancient woodlands outside the plan boundary. The first area is a mixed woodland at the head of Auchentorlie Glen (NS 4412 7475) covering ~7.65 hectares. It has upland oakwood characteristics and the presence of other species such as Larch, Norway spruce and Sycamore indicate it was managed as an estate or policy woodland at one time. It has a high degree of semi-naturalness as defined by the NWSS[1] and is currently managed by FLS as a minimum intervention (natural reserve).

The second area covers ~3.12 hectares and is located at the edge of Glenarbuck river valley (NS 4547 7385). It is an upland mixed Ash woodland extending westwards out-with the plan boundary into Glenarbuck river valley and biological SSSI. It is currently managed as minimum intervention and native woodland creation planted in the previous plan has expanded this woodland type north-eastwards to connect with LEPO stands along the Kilpatrick Braes.

The third area is a thin strip of land at the eastern boundary of Auchineden plantation (NS 5030 7845). The main ancient woodland is to the east outside the plan boundary and appears to be an

[1] Native Woodland Survey of Scotland.

upland oakwood running along Auldmurroch burn. The area within the plan was previously conifer plantation of low conservation value and has been replanted with native woodland. It is partly separated from the main ancient woodland by a forest track along the plan boundary. Two additional areas are located within the Glens of Gallangad (NS 4533 8162) and Carnock burns (NS 4733 8184) flanking Merkins plantation. Although not within the plan they offer some opportunity to improve native woodland connectivity/expansion.

Statutory Protected Conservation Sites

All statutory protected conservation sites within and bordering the plan are Sites of Special Scientific Interest (SSSIs). They are shown on Map 6 and listed below:

- Dumbarton Muir (Blanket Bog)
- Dumbarton Muir (Raised Bog & Lily Loch)
- Loch Humphrey Burn (Geological: Palaeozoic palaeobotany)
- Glenarbuck (Geological: Palaeontology - Palaeozoic Palaeobotany)
- Haw Craig – Glenarbuck (Non-montane rock habitats)
- Haw Craig – Glenarbuck (Upland mixed Ashwoods)
- Lang Craigs (Upland Habitats - Tall Herb Ledge)

Further site details and feature conditions are on the NatureScot webpage: SiteLink - Map Search
Management actions are detailed in Section C.2.13

Non-statutory sites

2154 hectares (or ~61%) of the plan is covered by local nature conservation site designations (LNCS) identified and designated by the local authority for their wildlife and biodiversity value in a local context. They encompass the priority habitats listed at the start of this Section and often provide important connectivity between statutory protected SSSIs.
Auchineden, Knockupple and most of Merkins plantations are not included in LNCS designations but often border them.

Priority Species

The forest supports a range of priority species which have benefited from the habitat niches created by the productive forestry in this area. There have however been significant challenges in the last ten years. Historic woodland management had resulted in an even aged crop with little structural diversity and a lack of windfirm edges, as such rapid restructuring of the woodland was required to prevent loss of timber revenue and catastrophic windblow across the forest block. In the short term this restructuring has led to a reduction in ecological connectivity across the land management plan area for a range of species, however this has also afforded us the ability to diversify the species composition within the land management plan area, increase connectivity between adjacent priority open habitats and implement further planting of broadleaved species in key connective corridors ensuring greater functional connectivity for

priority species in the long term, the benefits of this programme of restructuring will be greatly beneficial to a range of protected and priority species throughout and beyond the life of this land management plan cycle.

Deadwood potential

Table 5 shows areas of the plan currently with high, medium and low deadwood potential:

Assessed Deadwood Potential	Area (Hectares)	Future Volume Estimate (m^3/ha)	Total Future Est. Volume (m^3)
High	216	100	~20,000
Medium	393	30	~12,000
Low	1413	15	~20,000

Total future potential is estimated to be 27m^3/ha.

A.6.11 Invasive Non-Native Species (INNS)

During the previous plan *Rhododendron ponticum* was found in two locations (one in Merkins, the other in Auchentorlie adjacent to Lang Craigs SSSI) and was controlled by cutting of aerial components, burning and then treatment of stumps. These sites continue to be monitored for any re-growth.

Sitka spruce natural regeneration was also cleared from Glenarbuck and Haw craig geological/biological SSSIs, Dumbarton Muir SSSI (around Lily Loch) and adjacent to Lang Craig SSSI. It has also been cleared within the buffer of 'Knockupple long cairn' Scheduled Monument (SM2911).

A.7 Woodland Description

Forest Composition (Table 6)

Map 5 shows current forest species; woodland makes up ~43%[2] of the plan area and was originally concentrated in the conifer plantations at Auchentorlie, Auchineden, Knockupple and Merkins. During the last 20 years a significant increase in native woodland resulted from restructuring of these conifer plantations and woodland creation in central zones. Conifers and broadleaves are now evenly represented and a greater number of conifer and mixed species stands are present in place of the original single species spruce plantations.

Broadleaved woodland is currently managed for conservation and amenity. Conifers are chiefly managed for timber production under clear-cutting systems since wind exposure and widespread wet or shallow soil types hinder application of continuous cover forestry systems. The main conifer species are Spruce, Pine, Larch and some Douglas fir but larch planting has now

[2] This includes 'transient woodland' or 'felled awaiting restock'.

ceased due its susceptibility to the plant disease *Phytophthora ramorum*. In younger stands, Spruce is often planted in mixture with Lodgepole pine to aid establishment, reduce herbicide use and increase crop resilience. Small areas of alternative conifers have been planted in sheltered zones on drier soils and these stands have potential for thinning in the future. Remaining conifers outside clear-cutting areas are managed as long term retentions (LTRs) or minimum intervention zones for conservation and amenity.

Age-class characteristics of woodlands (Table 7 & Figure 1)

The range of age-classes in the woodland is fairly limited reflecting the even-aged characteristics of original plantations and sizeable felling, restock and woodland creation programmes over the previous 20 years. Large areas are therefore represented by younger age groups up to 20 years of age and making up ~70% of total woodland in the plan. Just under 20% of woodland is in the 41-60 age bracket which accounts for remaining even-aged conifer stands in Auchentorlie, Auchineden and Merkins. The majority of these stands have some level of windblow and will require felling and replanting in the next 10 to 15 years.

The oldest age classes are ancient and LEPO woodlands, now over 100 years of age with mixed species composition and some semi-natural characteristics. They make up just over 3 % of total woodland in the plan.

A.7.1 Community and Recreation

Kilpatrick Hills forest provides an accessible area of public land close to the most densely populated area of Scotland, Greater Glasgow City. The main recreational activities in the forest are hill walking and mountain biking. Other common activities include fishing on the reservoirs and outdoor pursuits. The main gateways to the forest are from Old Kilpatrick, Faifley, Overtoun House and Carbeth. All gateways have nearby car parking facilities and good public transport links allowing travel from built-up urban zones to relatively remote upland landscapes.

Within the forest a wide variety of informal desire lines have developed but most visitors stick to forest roads and promoted path networks (core paths and the John Muir Way), shown on Map 12. Key destinations are the summits of Cochno and Duncolm hills and larger water bodies such as Loch Humphrey, Greenside and Burncrooks reservoirs.

During the previous 10 years we've focused on partnership working to deliver a range of access and community improvements but more recently a reduction in resources has resulted in some aspirations not being achieved. So far, the John Muir Way has been completed and partial or full 'loops' have been developed along the main reservoirs. We've also worked with local schools and community groups to encourage communities into the outdoors, promote informal recreation and educational activities (pond dipping, bushcraft, tree planting and tree identification) and improve knowledge of the Scottish Outdoor Access Code.

Visitor pressure is highest at southern gateways (Old Kilpatrick and Faifley) and this has created a significant level of friction with neighbouring residents particularly with regard to anti-social behaviour, car parking pressures and unauthorised trail and quad bikes. Community consultation for this plan's renewal and a recent FLS survey for Kilpatrick Hills has identified these problems at the forefront of resident and visitor feedback.

There are several fishing clubs operating in or adjacent to the plan. They proactively steward the local area carrying out voluntary litter picking/waste removal and crime reporting. The main concerns expressed during scoping were lack of communication by FLS, the potential impact of woodland expansion around Burncrooks reservoir and the need to work with the club at the design stage, vehicle access restrictions, and FLS management of anti-social behaviour.

Table 6 – Current and projected forest composition in the years 2025, 2035 and 2045.

This shows the current and projected species composition within the entire Land Management Plan and includes non-woodland elements such as felled land awaiting replanting, open ground and open water. Forest composition in future years is based on management proposals in Section C.

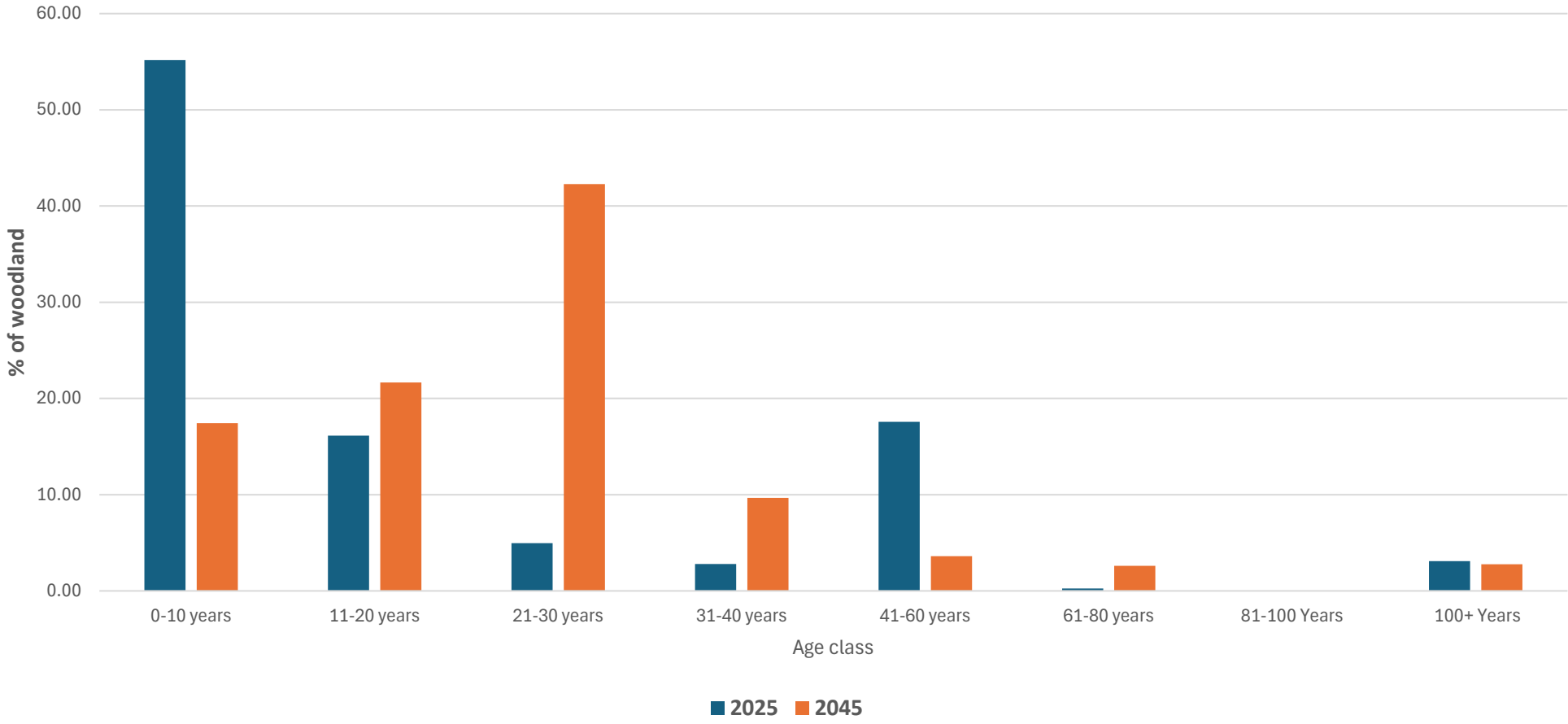
Area by species						
Species	**Current (2025)**		**Year 10 (2035)**		**Year 20 (2045)**	
	Area (ha)	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**
Sitka spruce	557.6	15.96	505.1	14.46	511.3	14.63
Pine spp.	87.8	2.51	198.2	5.67	226.7	6.49
Norway spruce	33.6	0.96	30.3	0.87	32.2	0.92
Larch spp.	31.7	0.91	3.6	0.10	2.6	0.07
Fir spp.	16	0.46	17.9	0.51	17.9	0.51
Other/mixed conifers	11.3	0.32	28.2	0.81	33.1	0.95
Native mixed broadleaves	535.2	15.32	617.6	17.68	631.3	18.07
Other mixed broadleaves	63.2	1.81	52.3	1.50	47.9	1.37
Fallow	191.8	5.49	108.64	3.11	11.3	0.32
Open Ground/Open Water	1965.93	56.26	1931.29	55.29	1979.83	56.66
Total	**3494.13**	**100**	**3494.13**	**100**	**3494.13**	**100**

Table 7 – Age profile of Woodland 2025 and 2045

This shows the woodland area broken down by age class and how well the woodland is distributed across age classes. The projected age class breakdown is based on the management proposals in this land management plan.

Age class (years)	Current (2025)		Year 20 (2045)	
	Area (ha)	% of woodland	Area (ha)	% of woodland
0-10	737	55.16	261.9	17.43
11-20	215.7	16.15	325.4	21.66
21-30	66.4	4.97	635.3	42.28
31-40	37.2	2.78	145.2	9.66
41-60	234.8	17.57	54.1	3.60
61-80	3.4	0.25	39.2	2.61
81-100	0	0.00	0	0.00
100+	41.5	3.11	41.5	2.76
Total	**1336**	**100**	**1503**	**100**

Figure 1 Age profile of woodland 2025 & 2045



A.8 Tree Health

Dothistroma Needle Blight (DNB)

DNB infected Scots pine is in young woodland creation areas managed for conservation and a few commercial stands in Auchineden plantation, both are mainly in mixture with other species. The infected Lodgepole pine is concentrated in older commercial stands across Merkins and predominantly single species in composition. Current policy is to continue using Pine species, carry out thinning where possible and accept a slight decrease in productivity.

Phytophthora ramorum (*P. ramorum*)

Kilpatrick Hills sits within the 'Priority Action Zone' of Scottish Forestry's Larch Action Plan, where actions to remove this species will have greatest impact on controlling the spread of the disease. Although larch makes up less than 1% of woodland in the plan, two Statutory Plant Health Notices have already been issued, both in Auchentorlie, and required the removal of all larch within 200 metres of each infection site. Larch has mainly been planted in mixture with other species and is spread widely across the plan (Map 6). It is present in both commercial and non-productive woodlands.

Ash dieback (*Hymenoscyphus fraxineus*)

Ash dieback is a highly destructive disease of ash trees (Fraxinus species) especially the United Kingdom's native species, common ash (Fraxinus excelsior). This tree currently makes up about 1% of woodland in the plan and is concentrated in two zones:

1. Young woodland creation stands at Cochno Hill as part of a native mixed woodland.
2. Ancient woodland at Gavinburn.

In both areas there are high mortality rates and other species in the mixture are now expanding to exploit this growing space. Some stands in Cochno Hill are adjacent to high usage visitor zones but trees were young when infected and do not present a hazard to the public.

Great spruce bark beetle (*Dendroctonus micans*)

The great spruce bark beetle is a non-native pest of spruce and pine trees which, if left uncontrolled, could cause serious damage to domestic softwood timber industries. At Kilpatrick Hills, Sitka spruce (Picea sitchensis) and Norway spruce (P. abies) are particularly susceptible to damage by this insect. So far no infections have been found but positive identification and control has been undertaken in adjacent woodland.

B. Analysis and concept

Through survey work and research, a broad range of factors have been identified potentially relevant to the future makeup and management of the land. We've assessed the importance of these factors and how they interact with the plan's long term vision. The results of this analysis have been used to develop strategies for each part of the plan. These strategies or 'concept zones' help….

1. Geographically link management objectives to current and projected forest resources;
2. Ensure sensitivities, user groups and forest assets are considered;
3. Provide a clear management direction in each part of the plan and, where necessary, prioritise specific objectives over the next 10 years.

This process is summarised below in Table 8 and illustrated on Map 6 Analysis and Map 7 Concept Design.

Table 8 Analysis & Concept Design

Constraints/Challenges/ Sensitivities	Opportunities	Relevant Concept Zone
Linked Overarching Management Objectives		
The original conifer plantations at Merkins, Auchineden and Auchentorlie are productive conifer zones supplying a range of sustainable timber products to wood using industries. However, age structure of forest stands is still limited & remaining 1st rotation crops are often unstable, do not reflect landform or have limited species diversity. Recent restructuring has allowed better forest design close to ancient woodland & nationally protected sites. Some less accessible spruce stands still remain that could negatively affect some sites. Windblow is rapidly spreading through remaining mature	Opportunity to continue restructuring forest stands to secure a resilient future timber supply & meet other UKFS requirements. Potential delivery mechanisms include the phasing of felling areas, use of long-term retentions & improving forest design at restocking. Opportunity to progress restructuring of less accessible conifer stands as agreed with SNH.	**'Core sustainable timber production zones':** We will continue to restructure forest stands to.... Maintain a core supply of marketable timber products; Improve operational & visual design; Protect water supply infrastructure & enhance catchment zones; Extend ride networks & windfirm coupe boundaries - to improve forest resilience & age restructuring potential; Expand the network of mixed woodlands managed at lower intensity for conservation, water quality & amenity; Protect &, where practical, enhance the setting of heritage features & important path networks (e.g. core paths, John Muir Way). To deliver these outcomes we will maintain a number of forest quarries supplying stone for management access. Ancillary objectives will be delivered based on site specific factors:

Constraints/Challenges/ Sensitivities	Opportunities	Relevant Concept Zone
Linked Overarching Management Objectives		
conifer stands at Auchentorlie and Auchineden. We are still reviewing damage from Storm Eowyn. The forest sits within the 'Priority Action Zone' of SF's 'Phytophthora ramorum larch Action Plan'. This zone is where actions will have greatest impact on controlling the spread of P. ramorum.	Opportunity to phase felling over the next 10 years based on the spread of windblow. This will ensure harvesting and restocking operations are still economically viable. Opportunity to review current quantity & distribution of larch species & schedule operational access, removal & replacement with suitable alternative tree species.	Diversify timber producing tree species; Expand & maintain native woodlands; Thin forest stands & use alternatives to clearfell; Restore priority open habitats. **'Whole plan area - Windblow & Larch'** The 10 year plan of operations will aim to: Restructure remaining mature conifer plantations with spreading windblow. Manage the threat of Phytophthora ramorum by removing mature larch & securing access to pre-commercial larch stands. (*A proportion of mature conifer areas, without Larch, will be retained as long-term retentions to improve age class diversity & for conservation*)
• **Improve resilience through appropriate silviculture, species choice and careful forest design** • **Pre-emptively remove Larch species (where appropriate), adhering to FLS National Strategy** • **Maintain small roundwood, pallet, log and biomass production through appropriate silviculture, species choice and careful forest design** • **Maintain attractive woodlands, trails and other recreational opportunities to promote visitor health and well-being** • **Improve the visual amenity of the forest** • **Protect water quality and plan to mitigate against excessive water run-off in catchments. Maintain biodiversity value through appropriate management and design** • **Maintain biodiversity value through appropriate management and design** • **Protect heritage features**		
Anti-social behaviour such as unauthorised trail bikes, vandalism & fire raising is a continuing issue affecting local residents, existing forest users and emergency services. The main hotspots are in southern zones of the plan. FLS & external partners currently have limited resources.	We will continue to use limited resources to target anti-social behaviour hotspots. Help legitimate forest users to report crime. Investigate path diversion routes away from local residents. Consolidate forest-wide information on wildfire threats, important assets, fire-fighting access/infrastructure.	**Whole plan area - Anti-social behaviour'** We will work with external partners to target anti-social behaviour hotspots in the plan & highlight the need for resources to control such activities. We will improve forest signage to help forest users & residents report crime & unauthorised activities. We will continue public interpretation & outreach work in local schools to educate on responsible use of the forest.
• **Promote responsible use of the forest by visitors.** • **Improve resilience through appropriate silviculture, species choice and careful forest design**		
Dumbarton Muir & Saughen Braes:	Opportunity to progress the removal of deer fencing	**'Dumbarton Muir & Saughen Braes'** Continue to manage as a remote upland landscape of open habitats & occasional peat

Constraints/Challenges/ Sensitivities	Opportunities	Relevant Concept Zone
Linked Overarching Management Objectives		
Perhaps the most remote upland zone in the plan consisting of open habitats & scattered peat fringe woodland. It has low visitor usage except along the John Muir Way (JMW). The FLS peat restoration programme is expanding & connecting priority open habitats. Native woodland creation is largely complete but some riparian zones were not planted. Deer fencing is still present &, in some places, having a negative effect by containing deer.	to assist deer control. Opportunity to complete & maintain restored peat habitats as mire vegetation regenerates. Opportunity to review native woodland riparian habitats & investigate longer term expansion..	fringe woodland. Continue peat restoration to connect & enhance existing priority habitats. Control deer populations & gradually remove deer fencing. Protect & maintain the John Muir Way. Protect heritage features & carry out agreed management to protect nationally important conservation sites, namely Dumbarton Muir & Lily Loch SSSIs. Review existing riparian woodlands & explore opportunities for longer term expansion. **'Whole plan area - Deer Management'** The deer management plan's objective is to regulate browsing levels to ensure regeneration of forest stands. Current control levels will be reviewed & adjusted annually based on deer population and tree condition surveys. Deer fencing will be removed to allow more active deer control operations to progress.
Duncolm Hills: This more remote central upland zone incorporates longer distance walking routes & popular viewpoint locations along the Duncolm Hills. Recent new planting has created a network of low density native woodland & successional open habitats. Deer fencing is still present &, in some places, having a negative effect by containing deer.	The management priority is to ensure establishment of young woodland by removing deer fencing to reduce containment effects & allow more active deer control.	**'Duncolm Hills'** Continue to manage as a remote upland landscape of low density native woodland & successional open space. Gradually remove deer fencing & control deer populations to allow establishment of young native woodland. Protect heritage features & public access routes, enhancing immediate setting through forest design where practical.
Operational access into the forest comprises a mix of temporary agreements & permanent acquired rights.	There are several opportunities to improve connectivity across the plan. This would secure long term operational access, assist deer control & provide informal recreation opportunities. It would also benefit 3rd parties	Investigate access improvements to facilitate management across the plan area with possible forest road linkage south of the Duncolm Hills between Auchineden & Auchentorlie sub-blocks .

Constraints/Challenges/ Sensitivities	Opportunities	Relevant Concept Zone
Linked Overarching Management Objectives		
	such as utility providers. Factors such as 'micro-siting' & landscape mitigation would need consideration.	
• **Maintain biodiversity value through appropriate management and design** • **Protect water quality and plan to mitigate against excessive water run-off in catchments** • **Protect heritage features** • **Improve the visual amenity of the forest** • **Maintain attractive woodlands, trails and other recreational opportunities to promote visitor health and well-being**		
Highly visible south facing slopes & summits deliver a wide range of public benefits. They contain key forest entry points, linking densely populated urban areas to more remote upland zones of the plan. They are visible from many parts of Glasgow City & form a prominent landscape backdrop to the River Clyde & Antonine Wall UNESCO World Heritage Site. They converge with nationally protected conservation sites & ancient woodlands.	Management of these zones should continue to reflect their high value for informal recreation, landscape & conservation. There is now opportunity to manage recently established woodland using low intensity silvicultural systems. This includes alternative conifer stands that will require thinning for longer term stability & retention.	**'Kilpatrick Braes, Cochno Hill & Old Kilpatrick - lower slopes.'** Recognising the value of this zone for landscape, recreation, heritage & conservation we will retain existing woodlands under lower intensity management systems. Tree species composition will be primarily native with some mixed LEPO stands, & alternative conifers. Except for the removal of Larch, LEPO stands will be managed through minimum intervention. Minor access facilities will be installed to allow thinning of alternative conifers for their long term stability. The 'Antonine Wall' & its immediate setting will continue to be managed in compliance with the WHS management plan. Visitor services infrastructure will be maintained &, where budgets allow, enhanced. **'Kilpatrick Braes & Cochno Hill - upper slopes & summits'** Recognising the value of this zone for landscape & recreation we will use minimum intervention management: 1. Summits & higher slopes will be left as successional open & scrub habitats 2. Lower slopes left as low density native woodland habitat.
• **Promote responsible use of the forest by visitors** • **Maintain attractive woodlands, trails and other recreational opportunities to promote visitor health and well-being** • **Protect heritage features**		

Constraints/Challenges/ Sensitivities	Opportunities	Relevant Concept Zone
Linked Overarching Management Objectives		
• **Improve the visual amenity of the forest** **Maintain biodiversity value through appropriate management and design**		
Lochs & reservoirs within & bordering the plan provide key services: water supply, informal recreation & wetland conservation.	Opportunity to continue the redesign & enhancement of riparian zones bordering these water bodies. Priority features would be water supply infrastructure, fisheries, promoted visitor trails & wetlands.	**'Riparian zones of main water bodies & their immediate setting'** Tailor restock design to reflect the ecological sensitivity & amenity value of these zones with a focus on UKFS & 'drinking water supply' best practice; Maintain &, where budgets allow, enhance visitor services infrastructure; Investigate opportunities for riparian native woodland expansion in the longer term. *Other relevant concept zone (see above for details):* **'Core sustainable timber production zones'** **'Dumbarton Muir & Saughen Braes'** **'Duncolm Hills'**
• **Protect water quality and plan to mitigate against excessive water run-off in catchments** • **Promote responsible use of the forest by visitors** • **Maintain biodiversity value through appropriate management and design** • **Maintain attractive woodlands, trails and other recreational opportunities to promote visitor health and well-being** • **Improve the visual amenity of the forest**		

C. Management Proposals

C.1 Silvicultural Practice

Industry compliance

All proposals have been developed in accordance with sound silvicultural and environmental principles, falling within the framework outlined by the UK Forestry Standard and the UK Woodland Assurance Scheme. The national strategies and standards we work to can be found here.

Overview of silvicultural practices to be used:

The majority of productive forest will be managed through patch clear felling. This is the most appropriate silvicultural system based on soil types, wind exposure and climate.

Most of the original (1st rotation) conifer plantations have now been felled and replanted. Of those remaining, ~86% will be restructured over the next 20 years. The remaining ~13% will be left beyond Phase 4 as 'long-term retentions'. Appendix 1 and Map 13 illustrate the scale of patch clear felling over the next 20 years.

We've identified several 2nd rotation forest stands suitable for commercial thinning over the next ten years. The aim will be to improve their potential for continuous cover forestry (CCF) and/or longer term retention. They are confined to sheltered zones of the plan with good management access and suitable soils. They make up categories '1' and '2' in Section C.2.2 (below) and are shown on Map 13.

We will replant a proportion of core timber production zones (see 'concept design' map) with native broadleaves to expand the network of low intensity managed woodland. The design of this network is intended to improve riparian zones, increase habitat diversity and connectivity, soften geometric forest boundaries and increase forest resilience. Some conifer natural colonization will be tolerated in these areas but we will retain the option to 'thin out' non-native conifers commercially where they start to impact on nationally protected conservation sites.

We've identified the following forest stands for minimum intervention management (MIs):

1. Ancient woodland and LEPO stands
2. Young native woodland across central zones of the plan
3. Several plantation conifer stands developing semi-natural characteristics.

Some limited operations may be carried out in MIs to remove Larch for plant health reasons, carry out small scale enrichment planting (where appropriate) and improve visual amenity along

well-used path networks. A few of these stands have, in addition, been prescribed as 'natural reserves' where the only intervention will be control of invasive species.

C.2 Prescriptions

C.2.1 Felling

The main commercial harvesting method to be used is patch clear-felling whereby forest stands will be separated into distinct felling coupes totalling:

Phase 1 coupes = 128.10 hectares (3.67% of LMP area)

Phase 2 coupes = 126.29 hectares (3.61% of LMP area)

Approval has also been sought for two younger felling coupes, normally considered to be premature, due to the presence of larch. They are identified on the felling plan as Phase 2 coupes 63002 and 63025 and can be considered **contingency coupes** only to be felled if larch is infected with *Phytophorum ramorum*. The eastern half of coupe 63025 is suitable for thinning and if no infections occur we propose to thin this part of the coupe in the next ten years (see below).

Phase 2 coupes (incl. larch contingency coupes) = 190.29 hectares (5.45% of LMP area)

Coupe design and forest resilience

Coupe boundaries have been designed to compliment visual landscape forces and accentuate geological landforms whilst considering operational constraints such as windblow, sensitive water features and steep or rocky terrain. Average coupe size reflects the scale and character of the landscape. We have programmed felling coupes based on the following priorities:

- Removal of larch
- Compliance with drinking water supply catchment guidelines
- Compliance with SSSI management plans
- Removal of unstable and heavily windblown stands
- Avoidance of excessive harvesting costs
- Avoiding removal of adjacent coupes at one time.

With the exception of larch contingency coupes all programmed coupes are now beyond optimum rotation age. Hence, those delayed until Phase 2 and 3 will require regular monitoring to identify any significant changes in windblow levels and economic viability.

C.2.2 Thinning

Ten year thinning areas have been identified using wind exposure and soils information combined with crop attributes, management access and stand objectives. Proposed thinning areas are shown on Map 13 and broken down by species in Appendix 1. The total is 190.03 ha.

Four categories of thinning have been specified:

1. 1st commercial thinning in young conifer stands
2. 1st commercial thinning in young productive broadleaved stands
3. Non-commercial thinning in unproductive broadleaved stands for amenity
4. Conservation thinning in ancient/LEPO woodland.

Categories 1 & 2 will be thinned for timber production. Thinning will normally be carried out at, or below, the level of marginal thinning intensity (i.e. removing no more than 70% of the maximum MAI, or YC, per year). Higher intensities (no more than 140 % of maximum MAI, or YC, per year) may be applied where thinning has been delayed, larger tree sizes are being sought or as part of a LISS prescription. Where trees need to be removed to accommodate facilities to support approved thinning and CCF, including stacking areas, ramps and access racks within adjacent management coupes, this is identified in thinning maps and plans.

Categories 3 & 4 will be thinned for non-commercial reasons such as improving woodland amenity along paths, removing larch from LEPO stands and non-native species from Ancient woodland. Trees will be 'felled to recycle' and not extracted from site. Thinning will be below 'marginal thinning intensity'.

C.2.3 LISS

Due to high wind exposure and wetter soil types across large areas of the plan there is limited opportunity to use lower impact silvicultural systems for commercial timber production. Forest stands in thinning categories '1' and '2' (above) have greatest potential but are still very young. We propose to implement the 1st thinning intervention in these stands within the next ten years and will subsequently review their continued suitability for LISS management.

C.2.4 Long Term Retentions (LTR) / Minimum Intervention (MI) / Natural Reserves (NR)

We will retain a proportion of productive forest as 'long term retentions' (LTRs) to increase age class diversity and provide 'later phase' woodland habitats. The total area of long term retentions is 234.48 hectares. Within this area we've specified two categories of LTR:

1. Mature conifer plantations where commercial harvesting will be delayed to improve age class diversity across the forest, to mitigate impacts of clear felling in the landscape and

to retain later phase woodland habitats such as deadwood and raptor habitat. The area of mature conifer LTRs is 80.41 hectares

2. Younger broadleaved restocking that will be retained in the long term but where Sitka spruce and Lodgepole pine have started to colonise naturally. In these stands we would like to retain the option, at some point in the future, to commercially harvest these conifers, particularly where they are supressing the intended broadleaved component

In relation to mature conifer LTRs, 26.80 hectares are proposed for clearfell in the next 20 years (Phase 4) and the remaining 53.62 hectares will be retained beyond Phase 4.

C.2.5 Other Tree Felling in Exceptional Circumstances

FLS will normally seek to map and identify all planned tree felling in advance through the LMP process. However, there are some circumstances requiring small scale tree felling where this may not be possible and where it may be impractical to apply for a separate felling permission due to the risks or impacts of delaying the felling.

Felling permission is therefore sought for the LMP approval period to cover the following circumstances:

Individual trees, rows of trees or small groups of trees that are impacting on important infrastructure (as defined below*), either because they are now encroaching on or have been destabilised or made unsafe by wind, physical damage, or impeded drainage.

*Infrastructure includes forest roads, footpaths, access (vehicle, cycle, horse walking) routes, buildings, utilities and services, and drains.

The maximum volume of felling in exceptional circumstances covered by this approval is 75 cubic metres per Land Management Plan per calendar year.

A record of the volume felled in this way will be maintained and will be considered during the five year Land Management Plan review.

C.2.6 Woodland Management of Visitor Zones

Visitor Zones have been identified in areas where FLS encourage and manage access or where the woodland managed by FLS interacts with popular visitor sites or access routes. They are identified on Map 12 as 'Interactive Zones' located along well-used path networks and extend ~15 metres on both sides of the path (Total ~30 metres wide). They provide the ‘immediate setting’ for these path networks and, in these zones, single trees or small groups of trees will be removed when necessary to protect facilities, infrastructure and trails, or to enhance the setting of features, or maintain existing views. Woodland in these zones will also be thinned, or trees re-spaced, for safety reasons (including to increase visibility to ensure that sites are welcoming and

feel safe) and where it is necessary to enhance the experience of the forest setting, through the development of large trees, or preferential removal of trees to favour a particular species.

Map 12 also identifies woodland that provides a 'mid-ground setting' from well-used path networks and we may thin this woodland for amenity purposes where resources allow. These areas are coloured green on the map and also shown in the 10 year thinning plan.

C.2.7 Restocking Proposals / Natural Regeneration

Restocking proposals for the next 10 years are in Appendix 2 which provides a breakdown of tree species and open ground at the coupe level. This can also be referenced with Map 11.

Future species and habitats for the whole plan is shown on Map 10. We've considered the following information in designing the forest and selecting tree species:

- landscape character, topography and heritage
- soils, hydrology and future climate forecasts
- updated information on water supply abstraction points and catchment zones
- buffers around statutory protected sites
- threats posed by tree pests and diseases
- presence and connectivity of priority habitats
- relative vigour and projected volume outputs
- relative economic value and wood processing demands

Measures to increase forest resilience include:

1. use of designed open space & mixed woodland networks to increase windfirm edges & fire breaks
2. selection of tree species suited to site conditions and projected future climate
3. use of intimate species mixtures to improve nutrient uptake, stability against wind, long term stand management options and resistance to pests and diseases
4. removal of species highly susceptible to disease (Larch & Ash) until resistant genetic stock can be produced

Productive conifers

The woodlands will continue to produce softwood timber for the saw log market, also providing for the pallet, small round and firewood markets. As such and as per the Regional restocking strategy, the management input will generally be:

- a preferred fallow period no more than 2 years and up to a maximum of 5 years, contingent on site conditions
- use of the least carbon intensive ground preparation (in terms of soil disturbance) that achieves silvicultural objectives

- restocking at full initial density of 2,700 stems/ha to achieve a final density of between 2,250 and 2,500 stems/ha, with an emphasis on achieving overall stocking
- regulation of herbivore browsing to ensure successful regeneration
- Use of pesticides in line with UKFS, UKWAS and FLS national policy

Broadleaved and mixed woodland networks

We will use ESC models and site observations to determine the most suitable woodland type. These areas will generally be managed for non-commercial objectives such as amenity, conservation, heritage and water protection.

The preferred seed zone for nursery grown stock will be 107 with adjacent zones used if 107 is unavailable (see link below):

https://www.forestry.gov.scot/publications/forests-and-the-environment/biodiversity/native-woodlands/seed-sources-for-native-trees-and-shrubs

The broadleaved restocking prescription will be broadly similar to the conifer prescription, but to achieve a final target density of 1600 stems/ha.

In many broadleaved areas, it is expected that a conifer component will develop through natural regeneration and, where necessary, this will be managed to maintain a mixed woodland structure. In addition, proactive control of non-native conifers will be undertaken where impacting on nationally protected conservation sites and priority habitats.

Within sensitive hydrological zones such as buffers of water supply catchments, fisheries and restored deep peats we will plant native riparian species to achieve a more open woodland with 50% open space and 50% woodland cover. Minimum or no cultivation will be used to prepare the ground and no drainage will be installed.

LEPO woodland enrichment planting

LEPO woodland areas are currently a mix of native and non-native tree species and we propose to undertake some minor enrichment planting in gaps created by the removal of Larch. The objective is to retain an open woodland structure so trees will be planted individually or in small groups using Sessile oak and a minor component of Scots pine, Hornbeam and Beech.

C.2.8 Hydrology & Water Supply

Forest operations & water supply catchments

UKFS requires that, in any 3 year period, recently felled ground and programmed forest harvesting (including that by other landowners) is less than 20% of a drinking water supply catchment. Loch Humphrey catchment (NS 4577 7601) contains a 10 year harvesting programme with potential to exceed this threshold due to the vicinity of two clearfell coupes (Ph 1 coupe 63221 and Ph 2 coupe 63226). We've therefore specified that, irrespective of felling phase, there is a 3 year gap between the harvesting of these coupes in order to remain below this threshold.

We've also identified several private water supplies whose catchments originate from within the plan. Over the next 10 years, however, there will be no felling within their catchments.

Forest Design Considerations

The future species and habitats plan follows current UKFS and water industry best practice. This includes pushing back commercial replanting a minimum of 50 metres from drinking water abstraction points, re-planting non-productive native or mixed woodland networks within riparian zones (in combination with open space), and restoring priority peat habitats to filter and slow down natural drainage from the plan area.

C.2.9 Tree Crop Protection

Herbivore Control

Our objective is to regulate browsing levels to ensure regeneration of forest stands. The main herbivores recorded in the forest are Roe Deer, Red Deer (lower populations), Hare and Sheep (periodically). The highest browsing pressure is from Roe Deer and, at a local level, Sheep. Therefore, the priority is to concentrate control operations on Roe Deer and work with local landowners to maintain march/livestock fencing. The Scottish Lowland Regional Deer Management Plan (Appendix 2) provides further details on our deer management strategy and objectives.

Individual Tree Guarding

Where active herbivore control is not deemed appropriate or achievable, we may use individual tree guarding for broadleaved woodland. We will avoid or reduce the use of plastic guarding where viable alternatives are available. Redundant guarding will be removed and recycled to avoid impacts of bio-accumulation.

Deer Fencing

Deer fencing has been used for woodland creation over the last 20 years. It is split into separate enclosures across central areas from Gavinburn to Dumbarton Muir. We intend to gradually remove this fencing over the next 10 to 15 years and will progress removal based on establishment of planted trees, efficacy of fencing and requirements for access to conduct deer control operations.

C.2.10 Forest Roads

New forest roads will be required in core timber production zones (Map 7) to facilitate the 10 year harvesting programme. We've listed this infrastructure below (by sub-block) and displayed on Maps 8 & 9. Map 9 shows estimated timber haulage (in tonnes) exiting from the plan area.

All new roads are 'spurs' extending from existing main haul routes. The listed quantities include ancillary infrastructure such as ramps, turning points, passing/loading bays and hard-standing for welfare units. All roadline felling is within proposed clearfell coupes.

Auchineden:
653 metres new forest road & ancillary infrastructure
145 metres new forwarder track to access coupe 63056 (as-dug surface)
Sub-total road area = 0.798 hectares[3]

Auchentorlie:
837 metres new forest road & ancillary infrastructure
Sub-total road area = 0.837 hectares deforestation

Merkins:
859 metres existing road upgrade (no roadline felling)

Gavinburn:
105 metres new ramps, turning & stacking bays (no roadline felling).
Sub-total road area = 0.105 hectares deforestation

Total new roads & ancillary infrastructure
Total new forest roads 1595 metres
Total forwarder track 145 metres
Total road area (final footprint for new road/new forwarder track/ancillary infrastructure): 1.74 hectares (1740m x 10m /10,000)

Total new road upgrade
Total road upgrade 859 metres

C.2.11 Communities & Recreation

Core path re-location

We have agreed with West Dunbartonshire Council to relocate a section of an existing Core path to reduce user disruption in the future and make the path more accessible. The old and updated routes are shown in Appendix 6.

Proposed management during the period of this plan

1. Continue restructuring conifer plantations adjacent to visitor zones to improve woodland setting for visitors (see also Section C.2.6)
2. Maintenance of existing recreational infrastructure including regular inspections and programmed maintenance

[3] This is the final road footprint – the road itself plus drains (total = ~10 metres width)

3. Liaison with Local Access Forums to manage core path networks in compliance with the Land Reform Scotland Act 2003 and Local Authority core path plans.
4. Seek options to improve facilities where high visitor pressure is causing friction between user groups. This will be reliant on availability of funding and resources.
5. Partnership working with local communities and businesses to promote responsible access, outdoor education and well-being activities.
6. Collaboration with other agencies, local residences and user groups to deter anti-social behaviour (ASB), improve wildfire control and increase awareness of the Scottish Outdoor Access Code

With regard to point 5, we will continue to work with angling clubs operating in the plan area. We value the work they voluntarily undertake to steward respective areas of land they operate in. We will continue to work with them to explore practical solutions to the concerns they've raised. We must do this in an open and fair way ensuring we're able to meet all our land management obligations.
With regard to point 6, we will be working with the local MSP, Councillors, local agencies and stakeholders in a renewed effort to tackle ASB and promote more responsible access. Although not an enforcement agency, we will work proactively with our partners to deliver any outcomes identified in this process.

C.2.12 Historic Environment

Antonine Wall World Heritage Site (WHS)

We will continue to manage this internationally protected site & its immediate setting in compliance with the WHS management plan. We will follow the approach of the previous plan:

- Avoid planting on the course of the Wall, and on a suitable size buffer either side.
- Preserve key views from the course of the Wall up the slopes to the ridges and crags of the Kilpatrick Braes.
- Avoid planting blanket blocks of conifers that would impact on the landscape character of the buffer zone.
- Continue the approved livestock grazing regime to keep the site clean of perennial vegetation.
- Carry out annual inspections and liaison with HES to ensure the site is preserved.
- Work with the local community at Old Kilpatrick to enhance awareness of the site.

Other Scheduled Monuments (SAMs) and Non-scheduled Archaeology

All historic assets are recorded on the regional historic asset management plan, their condition is monitored bi-annually and works are undertaken to manage and maintain their condition. There

are no operations proposed within Scheduled Monument boundaries or impact buffers during the lifetime of this land management plan.
With respect to non-scheduled archaeology, all operations in the vicinity of such features will be conducted in accordance with UK Forestry Standard Guidelines on Forests and the Historic Environment and appropriate steps will be taken to ensure their protection. Design consideration has also been afforded to these features through the future species and habitats plan.

C.2.13 Biodiversity

Priority Species

In core timber production zones we will progress two key strategies to improve habitat resilience and connectivity for priority species such as Red Squirrel:

1. Create networks of mixed/native woodland and open space that will be retained throughout these zones beyond normal economic rotations.
2. Increase windfirm edges, age-class and species diversity within productive conifer stands to improve wind resilience and habitat structure and increase opportunities for mature habitat retention.

Forestry and land Scotland will continue to work in partnership with external organisations and adjacent landowners to monitor and record populations of priority species across our landholdings, where possible we will actively seek to engage with external organisations to achieve shared objectives and ensure the success of protected and priority species across the national forest estate. As members of the Scottish raptor monitoring scheme FLS will continue to support the activities of SRMS and its members in protecting and bolstering raptor populations across the national forest estate.

Priority Habitats (including Ancient and LEPO Woodlands)

LEPO and ancient woodlands at Gavinburn and Auchentorlie currently have the highest value within the plan and will generally be managed under minimum intervention. Some minor thinning work will be undertaken in the ancient woodland at Auchentorlie Glen (NS 4412 7475) to remove non-native tree species (Sycamore, Spruce, Beech). We will also ‘thin out’ larch in LEPO stands (NS 4573 7432) and carry out some enrichment planting with Sessile oak, Scots pine, Hornbeam and Beech. The above areas have been included in the 10 year thinning plan.

During the previous plan we’ve started restoring approximately 212 hectares of priority open mire habitat (Map 10). This comprises ~142 hectares deforestation and re-wetting of previous conifer plantation in Merkins and Knockupple and ~69 hectares re-wetting of previous upland grazing across Dumbarton Muir and the Saughen Braes. This is intended to create a mosaic of open habitats fringed by low density native wet woodlands. Our proposal for the next plan is to

restore another 16.2 hectares of priority open mire at Merkins (Map 11) by deforesting a previous stand of Lodgepole pine. Our delivery methodology is in Appendix 4. We will also work with partner agencies to survey central zones of the plan and improve our understanding of open habitat development, composition and connectivity to Dumbarton Muir SSSI.

Deadwood Habitat

The UK Woodland Assurance Standard (UKWAS) target is for an average of 20 m^3 of deadwood per hectare, although it is expected actual concentrations will vary widely across a site. Total future potential in the plan is estimated to be ~27 m^3/ha. We will focus deadwood retention in areas of highest ecological value and where linkages can be provided between deadwood habitats:

- Ancient and LEPO woodlands
- Riparian woodland across the whole plan
- Mature conifers stands left as LTRs and MIs, particularly those with extensive windblow
- Native woodland creation stands established during the last 20 years, particularly where adjacent to ancient woodland or where Ash-dieback has occurred

We will continue to follow UKFS guidance for improving deadwood, taking into account safety and tree health considerations.

Statutory Protected Conservation Sites

We will work with NatureScot to comply with management objectives set out for Sites of Special Scientific Interest (SSSI) within and bordering the plan. In addition to annual monitoring, we've agreed with NatureScot to undertake the following work over the next ten years:

Haw Craig – Glenarbuck Geological and Biological SSSIs

We will seek approval from Scottish Forestry to fell mature spruce stands within coupe 63239 (Map 9). There is no means of timber extraction so we have agreed with NatureScot that all material can be left on site. We are currently assessing how this can be achieved in a practical and safe way.

We will also continue to remove non-native conifer natural regeneration from zones within and bordering the SSSIs as agreed with NatureScot.

Dumbarton Muir (Raised Bog) SSSI

We will work with NatureScot to remove encroaching scrub in zones around Lily Loch. Work was completed in 2023 and further work is programmed during the plan period.

Lang Craigs SSSI

We are currently monitoring this site subsequent to the removal of Rhododendron and non-native conifer regeneration in 2022. Further work will be programmed in agreement with NatureScot as required.

C.2.14 Tree Health

Our objective is to remove the main concentrations of mature larch within the 10 year felling and establish operational access to younger larch stands but only remove the latter if infected with *Phytophorum ramorum*. Larch species will not be used for restocking and Scottish Forestry guidance has been followed for the selection of suitable replacement species.
We will continue to monitor the forest for tree pests and diseases and alert Forestry Research, where necessary, of sightings.

C.2.15 Invasive species

Invasive species will continue to be monitored and removed.

C.2.16 Wildfire Management

In drafting this plan we have identified wildfire risk zones, vulnerable assets, operational access and fire fighting resources within each part of the forest. The information collected has been used to improve wildfire resilience in the future species and habitats plan and support the regional fire response plan during wildfire events. We have used the following guidance in this process which can be found in the following link:

- Forestry Commission (2014) Practice Guide 22: Building Wildfire Resilience into Forest Management Planning
- Information Note: Forest Planning to minimise wildfire risk in Scotland

D. Environmental Impact Assessment and Permitted Development Notifications

Table 9 lists forestry activities proposed in the next 10 years that are within 'scope' of current EIA regulations and must be assessed for their effects on the environment. Further details on each activity are in relevant management proposal sections and Appendices.

Table 9 – Summary of forestry activities within Scope of EIA Regulations

Proposed* Work	Gross Project Area (ha)	Non Native CON (ha)	Native CON (ha)	Non Native BL (ha)	NBL (ha)	DOG (ha)	OL (ha)
Afforestation (Sensitive area)	0						
		%	%	%	%	%	%
Afforestation (Non-sensitive area)	0						
		%	%	%	%	%	%
Deforestation Sensitive Area	16.2	12.8			2.96	0.44	
		79.01 %	%	%	18.27%	2.72%	%
Deforestation (Non-sensitive area)	0						
		%	%	%	%	%	%
Forest Roads	1.74						
Forest Quarry	0						

Further project details - forest roads

This part of the project is to extend existing forestry roads from existing main haul routes to enable access for restructuring remaining 1st rotation conifer plantations. It is comprised of 1.595 hectares of new forest road construction, 0.145 hectares of new forwarder track

construction and 0.859 hectares of existing road upgrade[4]. The above includes turning and passing points, welfare and storage areas. Total new roads/tracks will therefore amount to 1.74 hectares. All required roadline felling is within proposed clearfell coupes. Further details are in Section C.2.10 and Map 9.

Further project details – peat restoration

Earlier this year we submitted an EIA screening opinion request to Scottish Forestry for deforestation of 16.2 hectares of deep peats in Merkins plantation (see Map 11). This area was previously Lodgepole pine forest and felled in Phase 2 of the previous plan. The aim is to restore the deep peats to priority open mire habitat and the delivery mechanism is described in Section C.2.13 and Appendix 4. We have included this area in Table 9 under deforestation of a sensitive area (deep peats) so it is assessed as part of the whole land management plan.

[4] This is calculated using a final road or track footprint of ~10 metres width (the road itself plus roadside drains) multiplied by total road or track infrastructure length.

E. LMP Tolerance Table

Table 10 Regulatory tolerances for changes to the approved land management plan

Action Required	Map Required (Y/N)	Adjustment to felling Period[5]	Adjustment to felling coupe boundaries[6]	Timing of restocking	Change to species	Wind throw response[7]	Adjustment to road lines	Designed open ground[8]
Scottish Forestry (SF) Approval not normally required (record and notify SF)	N	Fell date can be moved within 5 year period where separation or other constraints are met	<10% of coupe size.	Up to 5 planting seasons after felling (allowing fallow periods for *Hylobius*).	Change within species group E.g. Scots pine to birch, Non-native conifers e.g. Sitka spruce to Douglas fir, Non-native to native species (allowing for changes to facilitate Ancient Woodland policy).			Location of temporary open ground e.g. deer glades if still within overall open ground design Increase by 0.5 ha or 5% of area - whichever is less
Approval by exchange of letters and map	Y		10-15% of coupe size.	5 years +	Change of coupe objective that is likely to be consistent with current policy (e.g. from productive to open, open to native species).	Up to 5 Ha	Departures of greater than 60 m from the centre of the road line	Increase of 0.5 ha to 2 ha or 10% - whichever is less Any reduction in open ground
Approval by formal plan amendment may be required	Y	Felling delayed into second or later 5 year period. Advance felling into current or second 5 year period.	>15% of coupe size.		Major change of objective likely to be contrary to policy, E.g. native to non- native species, open to non-native,	More than 5 Ha	As above, depending on sensitivity	More than 2 ha or 10% Any reduction in open ground in sensitive areas Colonisation of open Areas agreed as critical

[5] Felling sequence must not compromise UKFS, in particular felling coupe adjacency. Felling progress and impact will be reviewed against UKFS at 5 year review.
[6] No more than 1 ha, without consultation with FCS, where the location is defined as 'sensitive' within the Environmental Impact Assessment (Forestry) 1999 Regulations (EIA).
[7] Where windblow occurs, Scottish Forestry must be informed of extent prior to clearance and consulted on clearance of any standing trees.
[8] Tolerance subject to an overriding maximum of 20% designed open ground.

F. Production Forecast

N/A – FLS provide this nationally to Forest Research as per agreement with Scottish Forestry.

G. List of Appendices

Item number	Title
Appendix 1	Tables for scale of proposed felling and thinning over the next 10 years
Appendix 2	Table showing 10 year restocking programme by management coupe
Appendix 3	Scottish Lowlands Deer Management Plan
Appendix 4	Peatland Restoration 'Forest to Bog' methods
Appendix 5	Consultation Record
Appendix 6	Core path re-location map
Appendix 7	EIA SOR issues log for forest roads

H. List of Maps

Item number	Title
Map 1	Land management plan location & local authority boundaries
Maps 2	Landscape setting
Map 3	Climate & wind exposure
Map 4	Hydrological considerations
Maps 5	Existing forest
Map 6	Analysis
Map 7	Concept design
Maps 8 & 9	Management coupes & 10 year felling/thinning/new forest roads/timber haulage
Maps 10 & 11	Future species & habitats plan & Ten year restocking
Map 12	Woodland management in visitor zones