Forestry and Land Scotland
Coilltearachd agus Fearann Alba

Central Region

Blairadam forest Land Management Plan 2024-2034
Main Document

Plan Reference No: ---/--/--

Plan Approval Date: --/--/2024
Plan Expiry Date: --/--/2034

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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Land Management Plan Details			
LMP Name:	Blairadam Forest		
Grid Reference: **Nearest Post code:**	NT 1293 9462 (Site office & car park) KY4 0JQ (Site office & car park)	**Nearest town or locality:**	Kelty
Local Authority:		Fife	
Land Management Plan area (hectares):		1335.25	

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:**	07917271577		
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)**	
Planning Manager Signature:		**Approval Date: (dd/mm/yyyy)**	

Table 1 Version History

Version	Date	Comments
0.0	07/09/2023	Feedback from community drop in sessions incorporated into plan
0.1	24/01/2024	Feedback from external stakeholders and internal FLS staff incorporated into plan. Now ready for final community consultation and submission to forestry regulator (Scottish Forestry).
0.2		
1.0		
1.1		
1.2		
1.3		
1.4		
1.5		
1.6		

Forestry and Land Scotland
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Table of Contents

1.0 Plan Summary

This land management plan provides a long term vision for Blairadam Forest and details management proposals for the next 10 years (2024-2034). The forest area covers 1335.25 hectares and is located in the north-west of Fife County (see Map 1). Kelty town lies immediately to the east and Dunfermline City to the south. The forest falls within the Central Scotland Green Network (CSGN) boundary and delivers toward several of the project's objectives.

The forest has a rich heritage but is now mainly influenced by fast growing conifer plantations established during the 20th century. In recent decades the priority has been to restructure these plantations to deliver a wider range of public benefits.

Proposed management objectives are listed below and were agreed after consultation with FLS staff, local communities and external stakeholders. Many themes of the previous plan are still relevant. Some key additions include peat mire restoration and mitigating recent plant health threats.

Management objectives:

- Provide a sustainable supply of conifer and broadleaved timber products.
- Maintain recreational assets and community engagement.
- Diversify tree species and forest structure to increase forest resilience.
- Restore priority open peat habitats.
- Gradually move to lower impact forest management systems in visitor zones, recognising the value of these areas for local communities and tourism.
- Protect & enhance heritage assets, focusing on the designed landscapes linked to Blairadam Estate.
- Protect and enhance wildlife and hydrological assets.
- Manage and mitigate impacts of tree pests and diseases (*e.g. Phytophthora ramorum in larch*).
- Work in partnership to create woodland on vacant and derelict land.

2.0 Scottish Forestry (SF) Regulatory Requirements

2.1 Summary of planned operations (2024-2034)

Table 2 Summary of planned operations over the next ten years

Operation Type	Area (net)
Clearfell Phase 1	**115.79 hectares**
Clearfell Phase 2	**113.27 hectares**
LISS[1] felling	**5.6 hectares**
10 year LMP net felling (incl. LISS felling):	**234.66 hectares (17.57% of LMP area)**
Commercial thinning areas (*incl. LISS areas*) Conservation thinning *(i.e. remove non-native tree species from native woodland such as along riparian zones*). Pre-commercial thinning (broadleaved & conifers) **Total Thinning Area:**	149.44 hectares 109.06 hectares 7.84 hectares **266.34 hectares**
Restock	**236.46 hectares[2]**
LISS Restock	**7.95 hectares[3]**
Peat mire restoration (deforestation)	**65.33 hectares**
Woodland Creation	**53.40 hectares**
New Road Construction	**3.433 hectares (3.433 km)**
Existing Road Upgrade	**0.958 km**

[1] LISS = Lower Impact Silvicultural Systems Including group selection, shelterwood or underplanting, small coupe felling, coppice or coppice with standards, minimum intervention and single tree selection systems.
[2] Includes existing felled/fallow areas from previous plan and excludes peat mire restoration (65.33ha).
[3] Includes underplanting.

Table 3 Summary of woodland changes 2024-2044[4] (hectares)

LMP component	2024 (ha)	2034 (ha)	2044 (ha)
Primary conifer species: Sitka spruce	569.2	376.1	332.3
Secondary conifer species:	219.9	239.9	249.1
Broadleaves	216.8	271	294.4
Open space (incl. restored peatlands)	236.05	282.86	322.16
Felled/Fallow	81.17	150.1	122
Other (built facilities, quarries, open water, agricultural land)	12.13	15.29	15.29

2.2 List of management proposals requiring approval

- Clearfell & LISS felling - Section 5.3
- Thinning - Section 5.4
- Restocking - Section 5.7
- Woodland creation on former opencast - Section 5.8
- Peat mire restoration (deforestation) - Section 5.9
- Operational access - Section 5.14
- Woodland management in visitor zones - Section 5.16

This document can be navigated through the Table of Contents (above) by selecting the relevant section. The plan should be read in conjunction with supporting LMP maps, which are referred to in the text. A separate Appendices document provides supporting management tables and background information on the plan area.

2.3 Standards and guidance on which this LMP is based

This land management plan has been produced in accordance with a range of government and industry standards as well as recent research outputs. A full list of these standards and guidance can be found here: https://forestryandland.gov.scot/what-we-do/planning/links

All operations will be conducted in accordance with Forest Industry Best Practice Guidance, the UK Forestry Standard and the UK Woodland Assurance Scheme.

[4] A detailed breakdown of woodland changes is provided in Appendix III

2.4 Tolerance Table

Table 4 Regulatory tolerances for changes to the approved land management plan

Action Required	Map Required (Y/N)	Adjustment to felling period	Adjustment to felling coupe boundaries	Timing of restocking	Change to species	Wind throw response	Adjustment to road lines	Designed open ground
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

Forestry and Land Scotland's Larch Strategy

The management of larch and controlling the spread of *Phytopthora ramorum* relates to the revised Scottish Forestry *Phytophthora ramorum* action plan published in June 2021. Blairadam forest falls within the 'Priority Action Zone' and, under the FLS Larch Strategy, the aim is to undertake preparatory planning for sites. This LMP proposes the removal of larch from the forest over the plan period. Further tolerances have been applied for areas of larch requiring felling under Statutory Plant Health notices in other areas of Scotland. However felling to remove larch from Blairadam forest under this LMP should offset the need for additional tolerances.

Restocking Options.

Where larch is to be felled, Scottish Forestry guidance for the selection of suitable replacement species will be followed.

In landscape terms the replacement of larch with native broadleaves, alternative conifers and intimate tree species mixtures is deemed appropriate in terms of softening visible margins and maintaining visual diversity.

3.0 Environmental Impact Assessment (EIA) Screening Determination for forestry projects

Table 5 Proposed work that may require Screening determination for EIA

Proposed Work							
Please put a cross in the box to indicate the type of work you are proposing to carry out. Give the area in hectares and where appropriate the percentage of conifers and broadleaves							
Proposed Work	Select (X)	Area (ha)	Conifer	Broad-leaves	**Proposed work**	Select (X)	**Length (m)** **Area (ha)**
Afforestation	X	53.40	51.55%	48.45%	**Forest roads (incl. upgrades)**	X	**4391 metres** **3.433 ha**
Deforestation	X	81.53[5]	100%		**Forest quarry**		
Location of work		**Location of proposed work is provided in the appendices listed below.**					

[5] All proposed mire restoration, including areas outwith the 10 year plan period.

4.0 Analysis and Concept

Through survey work and research, a broad range of factors have been identified which are potentially relevant to the future makeup and management of the land. These have been analysed in order to better understand the way these interact, and to draw out the most important features and trends.

Specific management or 'concept' zones have subsequently been developed to:

1. Provide a clear management direction in each part of the forest and, where necessary, prioritise specific management objectives;
2. Ensure sensitivities, assets and user groups are properly considered/accommodated;
3. Geographically link the delivery of management objectives to existing forest resources (e.g. bog habitat restoration on deep peats, woodland creation on restored opencast, lower impact woodland management in visitor zones).

The analysis and subsequent concept process is summarised below in Table 6. This is supported schematically by Map 8 and Map 9.

Table 6 – Concept development through analysis of constraints and opportunities

Constraints/Challenges/ Sensitivities	Opportunities	Concept
Linked Overarching Management Objectives		
Western areas of the forest sit within a larger scale, rolling, upland landscape - the Cleish Hills. Characteristic moorland habitat is prevalent with extensive panoramic & elevated views. Western zones have substantial areas of less fertile deep peats where productive conifer growth is constrained. Progressive windthrow in even-aged conifer areas (planted in 1970s & 80s) has reduced management options for stand retention during restructuring. A key concern	Opportunity to tailor forest design in these zones to reflect larger scale character of this landscape & retain expansive viewpoints. Opportunity to increase open habitats & structural diversity by restoring peatlands & creating native wet woodlands. In the long term this should help improve water holding capacity within the forest catchment & reduce sedimentation downstream. Future species & habitats plan offers opportunity to improve long-term structural diversity in this area & increase resilience	**'Upland productive forest & wetlands' Concept Zone:** Larger coupe sizes have been maintained to reflect the more expansive landscape of the upland hills. Open mire habitats will be expanded and restored. This will help the forest link to the surrounding landscape and adjacent open habitats. It will allow maintenance of expansive panoramic views within the forest and diversify forest structure. The draft felling plan has programmed re-structuring mature conifer stands over a 15 year period. This will allow some continuity of mature conifer forest for dependent wildlife while younger surrounding stands develop. Long-term retentions have also been identified to provide mature conifer habitat during this period. Due to wetter soils and higher exposure, thinning is not available as a management option in the west of the forest. Therefore, to increase resilience to wind, the future species & habitats plan will

Constraints/Challenges/ Sensitivities	Opportunities	Concept
Linked Overarching Management Objectives		
in western zones of the forest is availability of mature conifer habitat used by Raptors, Red squirrel & Pine marten.	to wind damage. Review phasing of clearfell based on current spread of windthrow, attempting to extend over three phases if possible. Use long-term retentions in most stable forest stands	increase green or 'live' conifer forest edges using open space and native woodland to break up continuous blocks of conifers.
Restore priority peat habitats. Protect and enhance wildlife and hydrological assets. Continue to diversify tree species and forest structure to increase resilience in a changing climate. Manage the forest to provide a sustainable supply of conifer and broadleaved timber products.		
Limited management access in some areas of the forest.	Opportunity to extend forest road network to restructure existing tree stands, manage developing plant health issues and to enable woodland creation on restored opencast.	
Manage and mitigate impacts of tree pests and diseases (e.g. *Phytophthora ramorum* in larch). Continue to diversify tree species and forest structure to increase resilience in a changing climate. Manage the forest to provide a sustainable supply of conifer and broadleaved timber products.		
Windblow & resource constraints restricted ability to manage LISS areas as intended in previous plan.	Opportunity to review LISS areas & re-focus on stable tree stands where lower intensity management is most beneficial to recreation, heritage & conservation objectives.	The plan has targeted limited resources on specific areas with high potential for LISS management & where other key delivery objectives will most benefit (See Map 9 'Concept Design'). **'LISS (principally conifers)' Concept Zone:** Focused on core visitor zones with good forest soils & relatively low wind risk. There is good potential to grow alternative conifers to large sizes (beyond economic felling age) whilst complimenting other key objectives. A key priority in this zone is to prolong & regenerate the 100 year old spruce stands along the 'Glen Trail' on Kelty burn. The intention is to lightly thin these stands & underplant with alternative shade bearing conifers such as Silver firs & Coastal redwood.
FLS managed visitor zones are located close to Kelty town & have a high visitor footfall.	Opportunity to review FLS long term timber production objectives in these zones to	**'LISS (principally broadleaves)' Concept Zone:**

Constraints/Challenges/ Sensitivities	Opportunities	Concept
Linked Overarching Management Objectives		
They also contain residential & business areas. They are the most challenging part of the forest to deliver regular forest operations such as commercial thinning.	reduce potential conflicts & pressure on access infrastructure.	Where low intensity management will be used in mainly broadleaved stands. They are generally proposed on good forest soils where low intensity management is more compatible with other key objectives close to Kelty Town (recreation & visitor zones, protection of designed landscapes, residential/commercial activities, conservation). They do not exclusively contain native broadleaved woodlands - as the latter is proposed in all zones to ensure a more connective native woodland network through the forest.
• Over the longer term, move to lower impact forest management systems in visitor zones recognising the value of these areas for local communities and tourism. • Maintain recreational assets and community engagement. • Continue to diversify tree species and forest structure to increase resilience in a changing climate. • Protect and enhance wildlife and hydrological assets.		
St. Ninians recent acquisition with completed opencast workings & discontinued short rotation coppice areas.	Opportunity to expand new woodland on restored open ground & convert short rotation coppice to high forest.	**'Woodland creation' Concept Zone:** Over next 10 years establish new woodland, with aim of creating 'diverse productive forest' in the long-term. Main desire lines will be left unplanted as will key viewpoints from the central bing/spoil heap. Existing broadleaved woodland will be enhanced by expanding new broadleaved areas alongside.
• To provide a sustainable supply of conifer and broadleaved timber products. • Continue to diversify tree species and forest structure to increase resilience in a changing climate. • Protect and enhance wildlife and hydrological assets.		
Removal of Larch to help control the spread of *Phytophthora ramorum*, a fungus-like pathogen that is causing extensive damage and mortality to trees & other plants in the United Kingdom. Blairadam sits within the 'Priority Action Zone' of SF's 'Phytophthora ramorum larch Action Plan'. This zone is where actions will have the greatest impact on controlling the spread of *P. ramorum*.	Opportunity to assess the current quantity & distribution of larch species across the plan area and assess how it can be accessed and removed efficiently	Larch is present in all parts of the plan area (all concept zones) but makes up a relatively small proportion of the forest (3.67%). An assessment of its age and distribution has allowed a programme of operations to be scheduled over the next ten years to either remove or establish management access to forest stands with larch present. Larch will not be included in future restock proposals but alternatives will be used taking into account the benefits Larch would otherwise provide (Landscape diversity, timber, etc). The hope is that a resistant strain of Larch is identified at some point in the future.

Constraints/Challenges/ Sensitivities	Opportunities	Concept
Linked Overarching Management Objectives		
• Manage and mitigate impacts of tree pests and diseases (e.g. *Phytophthora ramorum* in larch). • Continue to diversify tree species and forest structure to increase resilience in a changing climate. • To provide a sustainable supply of conifer and broadleaved timber products.		
Ensuring a sustained timber supply and increasing forest resilience	Eastern parts of the forest have a more diverse and smaller scale landscape character than western areas. They also tend to be associated with better soils and more sheltered conditions for tree growth. Although LISS management is unachievable in all these areas, there is opportunity to tailor forest design and tree species choice to reflect the smaller scale, more diverse character of the landscape here. Many central areas of the forest form a transition between the smaller scale more diverse landscape to the east and more exposed expansive landscapes to the west. Central areas generally have higher wind exposure and/or wetter gley soils than eastern areas, with a lower visitor footfall. There is opportunity to concentrate management on production of core timber species which will produce fairly high yields in this part of the forest and not conflict with other key objectives.	**'Diverse productive forest' Concept Zone:** These zones often form a backdrop to LISS and Visitor Zones. In these zones a greater range of productive species & localised thinning operations will be used. Clearfell management is the most achievable forest regeneration strategy. A key constraint has been the lack of windfirm boundaries in even-aged forest stands. This resulted in, loss of control over felling time, larger coupe sizes & reduced stand retention opportunities. The future species & habitats plan aims to improve resilience to wind, reduce coupe size & increase opportunities for stand retention. Two key mechanisms to achieve this: Use of slower growing 'wind break' crops. Increasing the number of tree species & intimate crop mixtures, including the use of alternative conifers where suitable. **'Transition to larger scale upland forest' Concept Zone:** Concentrate management on production of core conifer timber species whilst protecting riparian zones & associated heritage infrastructure. **Phased felling:** Extend felling in remaining 1st rotation mature conifer crops over 15 years to help restructure and broaden this age class range (41-60 years).
• To provide a sustainable supply of conifer and broadleaved timber products. • Continue to diversify tree species and forest structure to increase resilience in a changing climate. • Protect and enhance wildlife and hydrological assets. • Protect & enhance amenity and heritage assets focusing on the designed landscapes • linked to Blairadam estate.		
Designed Landscape & Industrial Heritage.	Opportunity to target LISS management, use of open space and a range of forest	**'LISS management' Concept Zones and 'Diverse productive forest' Concept Zones** targeted to diversify and enhance designed landscape areas.

Constraints/Challenges/ Sensitivities	Opportunities	Concept
Linked Overarching Management Objectives		
Remnants of these features, often associated with Blairadam Estate, are most prevalent in the eastern part of the forest. Kiery Craigs (a craggy igneous outcrop) sits within the designated boundary of Blair Adam Garden & Designed Landscape - a mature late 18th century and early 19th century "Picturesque" landscape park. Roscobie Enclosures Scheduled Monument	species to enhance the designed landscape in the east of the forest. Opportunity to enhance Kiery Craigs through forest restructuring programme Opportunity to remove encroaching conifers and redesign future restocking to reflect amended monument boundary (2018) and impact zones.	Use of open space along historic avenues and built heritage features Kiery Craigs: Maintenance of an open rock face in front of the Kelty burn byt removing small scrub and spruce regeneration. Removal of mature Sitka spruce growing around the Craigs and retention of mature Scots pine. Replanting with species that more closely reflect William Adam's original prescriptions for this feature. Diversify forest species and incorporate more open space in future species and habitats plan to reflect amended boundary of Monument.
• Protect & enhance amenity and heritage assets focusing on the designed landscapes linked to Blairadam estate.		
Riparian zones	Continue to improve habitat connectivity and open space along riparian zones.	Use restructuring programme to increase native riparian woodland and open space along burns, aiming to establish a more connected network of native woodland. Use pre-commercial thinning and invasives control programmes to remove invasive species or dense shade casting conifers in riparian zones.
• Protect and enhance wildlife and hydrological assets.		
Services & Utilities	Opportunity to continue strategy of previous plan to reduce risks of forest operations and improve replanting design along utilities and services within the forest.	Continue to increase open space and low intensity forest management systems along utilities. Design new forest roads, felling and thinning coupes to avoid or reduce the frequency of machine crossing points or encroachment of utility risk zones.
N/A		

5.0 Long Term Management Proposals

5.1 General

5.1.1 Guidance & standards

All proposals have been developed in accordance with sound silvicultural and environmental principles, falling within the framework outlined by the UK Forestry Standard, the UK Woodland Assurance Scheme, FC Bulletin 124 Ecological Site Classification for Forestry, FC Bulletin 115 Alternative Silvicultural Systems to Clearcutting in Britain and the current FC edition of Forest & Water Guidelines. A full list of current standards and guidance can be found here

5.1.2 Use of concept zones

Distinct 'concept zones' or strategies have been identified in each part of the forest and are shown on Map 9. This will help prioritise management objectives in each area and sets the context for implementing detailed management proposals (below).

5.1.3 Key challenges this renewal has focused on:

1. Programming the regeneration of remaining first rotation conifer stands to moderate flows of timber & retain mature conifer habitat for dependent wildlife;
2. Reconciling forest management with other demands around Clentry, the main office and visitor car park;
3. Integrating large-scale peat mire restoration into the future species and habitats plan.
4. Woodland creation on former opencast workings;
5. Re-focusing LISS management to meet current resource capacity and other delivery objectives;
6. Removal of Larch species to help control the national spread of *Phytophthora ramorum;*
7. Improving management access to help achieve the above challenges.

5.2 Tree health

5.2.1 Ash dieback (*Hymenoscyphus fraxineus*)

Ash forms a very small component of forest stands at Blairadam (*~0.09%*). It is present in mixture with other broadleaves on restock sites planted in 2000 and 2012. In all areas it has succumb to this disease but other species in the mixture have expanded to exploit the growing space. All areas are away from high usage visitor zones, paths and roads. Since 2012, alternative native broadleaves, such as Oak, have been planted and this will continue in the next plan.

5.2.2 *Phytophthora ramorum* (P. ramorum)

Larch currently makes up about 3.67% of forest stands. It is spread throughout the plan area in mixture with other conifers and presents a relatively low risk. To date the pathogen has not been recorded, although infections have recently occurred in nearby plantations in west Fife.

Blairadam sits within the 'Priority Action Zone' of SF's '*Phytophthora ramorum larch Action Plan*' where the key focus is on controlling the spread of P. ramorum. The priority will be to target the main concentrations of larch within the 10 year felling and thinning plan.

Larch species will not be used for new planting or restocking and SF guidance has been followed for the selection of suitable replacement species. In landscape terms the replacement of larch with native broadleaves, alternative conifers and intimate tree species mixtures is deemed appropriate in terms of softening visible margins and maintaining visual diversity. **This has been incorporated into the future species and habitats plan.**

5.2.2 Dothistroma Needle Blight (DNB)

DNB is most prevalent in Scots and Lodgepole pine stands with surveys conducted every three years, most recently in 2021. There does not seem to be any significant deterioration in tree condition between surveys, although there has been an increase in number of stands infected. The latter could be greater awareness of tree diseases among field staff and consequently more reported field observations.

Pine species will continue to be regenerated as a component of future species and habitats. In order to mitigate the risk, they should be used in mixture with other tree species less susceptible to this disease. Macedonian pine will gradually be increased, as this species has shown to be resistant to DNB.

Scots pine will be used productively in mixture with species such as Norway spruce on better drained soils, and will then be thinned where soils and exposure allow. It will also provide important conservation benefits, being a native species, and will be used for amenity and conservation purposes in mixture with native broadleaves such as Birch, Aspen and Rowan.

Lodgepole pine makes up about 4.6% of forest stands. Older crops have often been planted on the most infertile deep peat soils in the west of the forest. Younger crops are entirely in mix with Sitka spruce and planted as a ‘nurse’ in order to eventually produce a pure spruce crop. Lodgepole pine will gradually be increased in this capacity - as a productive nurse species in intimate mixture.

5.3 Clearfell & LISS

5.3.1 Felling areas

Licensable[6] clear felling

Clear felling Phase 1 (net felling area): 115.79 hectares

Clear felling Phase 2 (net felling area): 113.27 hectares

LISS licensable felling net area (Phase 1) = 5.6 hectares

10 year felling area = 234.66 hectares (17.57% of LMP area)

Non-licensable clear felling:

Clear felling Phase 1 short rotation coppice below 10cm dbh = 39.59 hectares (net)

Table 7 Summary felling table 2024-2043

Scale of proposed licensable felling (incl. final LISS felling) Total plan area: 1335.25						
	Phase 1 (2024-2028)	**Phase 2 (2029-2033)**	**Phase 3 (2034-2038)**	**Phase 4 (2039-43**	**Long term retention**	**Area out-with 10 year plan period[7]**
Area (ha)	121.39	113.27	97	52	154.2	1100.59
Proportion of total plan area	9.09%	8.48%	7.26%	3.89%	11.55%	82.43%

Map 10b shows the location and boundaries of felling coupes. Appendix II contains felling tables with a breakdown by coupe in Phase 1 and 2. These tables also identify areas to be retained that are too small to map. Retained areas are predominantly unproductive broadleaves and will be identified during pre-operational site surveys.

5.3.2 Lower impact silvicultural systems

LISS management has been reduced in scale to match current resources, down from ~140 ha to 74 ha, and is focused on the most sheltered parts of the forest where lower intensity management will compliment other key objectives (recreation, amenity, designed landscapes and conservation).

[6] Defined under the Forestry and Land Management (Scotland) Act 2018.

[7] Area out-with 10 year plan period is the total plan area (1335.25 ha) minus Phase 1 and 2 felling.

LISS management will be undertaken using both irregular and uniform shelterwood systems. Management prescriptions for LISS coupes are in Appendix II Management Tables, and shown on Map 12. Underplanting in LISS areas are also described in Section 5.7.5.

5.3.3 Felling coupe design & adjacency

This LMP has followed the work of the previous plan design in reducing visual impact, complimenting visual forces and matching to the scale of landform. Some revisions to design and time of felling are proposed due to:

- Presence of larch or spread of windblow;
- Access constraints;
- New restrictions around utilities and services;
- Avoiding adjacency and making use of new information on windfirm edges;
- Peat mire restoration – ensuring whole hydrological units can be restored successfully.

5.3.4 Timber transport & consultation routes

FLS is a partner within the Timber Transport Forum (TTF), which aims to minimise the impact of timber transport on public road networks, on local communities and on the environment. There is one 'Consultation Route' along the minor council road from the B914 north to Cleish Village. FLS consults regularly with another TTF partner (Fife Council roads department) and there is currently an agreement that all timber transport on this route travels south to the B914 rather than north to Cleish Village.

5.3.5 Clearance of short rotation coppice

The proposed 10 year felling plan includes clearance of willow short rotation coppice (SRC) to allow remediation of man-made soils and replanting with high forest. The SRC was planted by the previous owner for biomass woodfuel, but was found to be uneconomic and later abandoned. Although included in the felling plan, stem diameter at breast height is well below 10cm and therefore clearance will not require felling permission. If the clearance is left any longer than 2 years (2026) then stem diameter should be re-measured and a felling license obtained from SF if above 10cm diameter.

5.4 Thinning

See supporting Map 10b with areas proposed for a range of thinning operations.

Management proposals for thinning in **Visitor Zones** are detailed are in Section 5.16

Table 8 Proposed thinning breakdown over LMP period

Thinning by Forest Species (Area in Hectares)	
Tree species	**Area (ha)**
Mixed Broadleaves	152.75
Mixed conifers	104.24
Grand fir	2.95
Norway spruce	4.48
Douglas fir	1.92
Total Area	**266.34**

The expected volume to be commercially removed during the LMP period is approximately 11,286m^3 or 10,541 tonnes.

5.4.1 Commercial thinning.

General principles:

FLS policy generally assumes that all productive crops will be thinned, unless:

- Thinning is likely to significantly increase the risk of wind blow;
- Operations are likely to require an unacceptably large investment in relation to the potential benefits due to access or market considerations;
- Thinning is unlikely to improve poorly stocked or poor quality crops.

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 Mean Annual Increment (MAI), or Yield Class (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. In all cases work plans will define the detailed thinning prescription before work is carried out and operations will be monitored by checking pre and post thinning basal areas for the key crop components.

5.4.2 Pre-commercial thinning.

Pre-commercial thinning of productive conifer crops will be undertaken in the following situations:

- The planted trees have improved genetic characteristics for timber production compared to the natural regeneration (e.g. Improved Sitka on high yield sites);
- Where larch is a component of the crop;

- The species and densities of natural regeneration do not meet the intended management objective for the site (e.g. Spruce in broadleaved low density riparian zones);
- Where high densities will lead to an unstable crop, particularly on exposed sites with wetter soil types.

For conifers the objective will be to retain healthy trees with single leaders and not to create gaps larger than 2 metres.

On broadleaved sites birch and cherry should be respaced to 3m centres (1,100 stems per ha). Oak, Beech, Sycamore and Sweet Chesnut should be respaced to 4000 – 5000 stems per ha. For all broadleaved, selection of retained trees should be based on strong apical dominance, good stem form and light side branching (Cherry will need pruning).

5.4.3 Conservation thinning.

These areas are young stands from 2 years up to 20 years of age that will be managed to remove invasive or aggressive non-native conifers and promote/retain planted native broadleaves. The main objectives are conservation, amenity and in some cases low output hardwood timber production. They include minimum intervention areas, riparian zones, visitor/amenity zones, heritage and designed landscape features and a sensitive water supply area. Some thinning of broadleaves may be undertaken to improve views, protect slower growing native species, protect or enhance heritage features and vary light levels along riparian zones. Retention of deadwood will be a key priority in these areas and every opportunity should be taken to retain both standing and fallen deadwood where safe to do so.

5.5 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 (*approximately 3 lorry loads of timber*) 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.

5.6 Long-term retentions, Natural Reserves & Minimum Intervention Areas

5.6.1 Long-term Retentions (LTRs)

LTRs are individual, generally stable stands and clumps of trees retained for environmental benefit significantly beyond the age or size adopted for commercial management.

Areas prescribed for long term retention now make up 154.2 hectares (or 11.5%) of the plan area (Map 10a). This is a significant increase on the previous plan (18.13 hectares), recognising the value of mature forest for wildlife and the need for continued age class diversification. It will also compensate for the reduction in LISS managed areas.

Retention of deadwood will be a key priority in LTRs and a proportion of standing and fallen deadwood will be retained where safe to do so.

Proposed LTRs comprise conifer, broadleaved and mixed stands. LTRs in conifer stands have been identified to:

- Buffer important LISS areas from wind;
- Reduce the impact of restructuring in visitor zones;
- Retain mature conifer habitat for conservation;
- Avoid adjacency and increase structural diversity in subsequent 2nd rotation crops.

In more sheltered parts of the plan area on drier soils, retained conifer stands will continue to be thinned and are included in LMP proposed thinning areas. This is predominantly in eastern zones.

Broadleaved and mixed woodland LTRs have been identified for conservation and amenity purposes. The LTR prescription has been applied to a mix of age classes in these stands types. They will help connect native woodland restock and new planting in the next 10 years. The aim is to improve connectivity of broadleaves and mixed woodland across the plan area.

5.6.2 Natural Reserves[8] & Minimum Interventions[9]

The status of existing Natural Reserves (NRs) has been reviewed. They comprise two isolated areas (1.75 hectares and 3.28 hectares) containing a significant proportion of open space. They have potential for some accumulation of deadwood but were otherwise found to be of low ecological value. The parts of these NRs covered predominantly by woodland have been re-classified as 'minimum interventions' rather than 'natural reserves'. A single larger NR of 12.11 hectares has been designated at grid ref: NT 1096 9616 (coupe 06003). The western boundary of this NR will be along the north-south forest road, rather than at the legal boundary, in order to avoid future management conflicts. This larger reserve will provide a range mature woodland types and stand structures comprising mature spruce, pine and birch stands, plus a patchwork of windblow with young natural regeneration.

Minimum intervention areas (MIs) from the previous plan were also highly fragmented, each being less that 2.5 hectares and totalling 5.2 hectares. Two of these MIs (NT 1097 9554 & NT 1214 9345) will be re-classified due to management conflicts involving presence of larch & council road safety (B914). In addition to the re-classified NRs, a new minimum intervention area has been assigned at grid ref: NT 1256 9535. It is a naturally regenerated area of native broadleaves within a visitor zone and containing private drinking water supply infrastructure. The revised area of assigned MIs in this LMP is 11.71 hectares; all areas are intended as native woodland. Proposed management is to remove spruce natural regeneration, where present, and reduce landscape fragmentation. With respect to the latter, native woodland restocking has been designed to expand these MIs and connect them to other native woodlands.

[8] Natural reserves are predominantly wooded, usually mature and intended to reach biological maturity. They are permanently identified and in locations which are of particularly high wildlife interest or potential. They are managed by minimum intervention unless alternative interventions have higher conservation or biodiversity value.
[9] Minimum intervention: management area with no systematic felling or planting of trees. Operations normally permitted are fencing, control of exotic plant species and vertebrate pests, maintenance of paths and rides and safety work.

5.7 Restocking proposals

5.7.1 Summary figures

Map 11a shows the intended forest design in the long term. Coupe level restocking over the next ten years is shown on Map 11b and in Appendix II Management Tables.

There is currently 81.17 hectares of fallow ground awaiting restock from the previous plan. Part of this area (coupe 06102, 29.6 hectares) will be restocked in winter 2023-24, before the next plan is approved. Remaining fallow areas (coupes 06017, 06093 & 06098) are planned for restocking or peat restoration in Phase 1 of the next plan (51.57ha). The net restocking area of these coupes (excluding peat restoration and retained forest) is 36.24ha. They are included in the restock totals below and broken down in Appendix II - Phase 1 Restock Table.
Note – net restocking figures include re-designed open ground that will not be restored to peat mire.

Phase 1 restock of clearfell areas:
Gross coupe area = 186.07ha (51.57ha fallow & 134.50 programmed clearfell coupes)
Net restock area = 149.33ha (excludes 31.58ha peat mire restoration & 5.16ha forest retained from previous stands).

Phase 2 restock of clearfell areas:
Gross coupe area = 127.34ha (programmed clearfell coupes)
Net restock area = 87.11ha (excludes 33.75ha peat mire restoration & 6.48ha forest retained from previous stands).

LISS restock and underplanting (Phase 1):
Net restock area = 7.95ha

General Prescriptions:

1. See FC Bulletin 112 Creating New Native Woodlands for recommended **NVC** species planting mixtures.
2. Stocking Density Assessment to be undertaken for both planting and natural regeneration areas at the 1st and 5th growing season.
3. Productive conifer restock planting will achieve a final density of 2,500 stems/ha at year 5, with an emphasis on achieving overall stocking.
4. Non-productive broadleaved & mixed woodland planting will achieve a final density of 1,600 stems/ha at year 5.
5. Productive broadleaved planting will achieve a final density of 4,500 stems/ha at year 5, with an emphasis on achieving overall stocking.

6. Peat edge woodland planted to be 50% planted area and 50% open space. Planted areas to achieve a final density of 800 stems/ha at year five.

Table 9 - Ten year restocking by component

Restock component	Area (ha)	% of total 10 year restock (excl. retained areas 11.64ha)
Sitka spruce	44.8	14.85
Norway spruce	20.87	6.92
Scots pine	17.03	5.64
Alaskan lodgepole pine	25.19	8.35
Douglas fir	6.34	2.10
Other conifers	12.38	4.10
Birch	21.92	7.26
Native mixed broadleaves	63.76	21.13
Other broadleaves	5.26	1.74
Open (including mire habitats 65.33ha)	84.22	27.91

5.7.2 Future species and habitats proposals

Maintenance of productive forest stands will be an important objective but continued expansion of other woodland and habitat types will ensure a range of services can be delivered:

- Biodiversity & conservation;
- Amenity and landscape enhancement;
- Climate change mitigation;
- Informal recreation;
- Water quality & flood mitigation.

Key design strategies:

1. Concentrate low intensity mixed woodland close to Kelty town;
2. Increase use of mixtures, both nursing and mature crop mixtures;
3. Diversify forest stands around designed landscapes, heritage features and visitor zones;
4. Expand open habitats focusing on priority mire habitats in the west of the forest;
5. Improve connectivity of native woodland, open space and riparian zones;
6. Increase resilience to wildfire and wind, designing open space and alternative woodland types to create fire breaks and promote development of green (windfirm) forest edges.

Selection of tree species

Guidelines set out in Forestry Commission's Ecological Site Classification (ESC) Bulletin 124 have been used to inform the most suitable species and woodland types for particular areas within the forest. This has been used in combination with on-site survey of soils, ground vegetation and existing crop performance. Other key considerations include plant health risks,

landscape, conservation and future predicted changes in climate (*annual rainfall, growing season temperatures and timing of seasons*).

Planting stock should be well-adapted to the local climate. Trees adapted to seed zone 203 should be used as a preference. If unavailable, then adjacent zones should be used (*see link below*).

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

Ground preparation on forest soils

Ground preparation will be used to deal with harvesting residues, pre-establishment weed growth, compacted soil layers and first rotation site drainage. The technique used will be suited to the specific soil type(s) present, with the aim of improving soil conditions for tree growth. Measures will be taken to protect hydrological features and minimise soil erosion.

5.7.3 Prescriptions for productive conifers

Due to the plant health threat posed by P. ramorum there will be no further planting using larch species, unless a resistant strain is identified and approved by SF. Alternatives will take account of its value for timber, amenity and conservation.
Scots pine will be used in mixture with other tree species to increase management options should DNB become more severe.

The standard prescription for productive conifers:

- Restocking at full initial density of 2,700 stems/ha to achieve a final density of 2,500 stems/ha with an emphasis on achieving overall stocking;
- Use of conifer species as prescribed in the future species and habitats plan or following SF tolerance rules (see Tolerance Table 4, Section 2.4);
- Where more than one species is prescribed, planting should be in intimate mixture and even proportions across the site, unless stated otherwise or if site conditions are not suitable for a particular species component;
- Weeding as required and identified by site observation during standard surveys;
- Standard Stocking Density Assessment process at years 1 and 5.

Natural regeneration of Sitka spruce is prolific in some zones of the forest. This should be used as an alternative to planting where it meets the above prescriptions. It will be less suitable on high yield sites, where improved stock can be used to full potential.

5.7.4 Prescriptions for broadleaves

Native non-productive broadleaves

Where native woodland is specified in the future species and habitats plan the most suitable NVC woodland type and tree species composition should be used as classified in FC Bulletin 112 'Creating New Native Woodlands'.

- Target stocking density at year 5 will be 1600 stems/ha (*2.5m x 2.5m*);
- Weeding as required and identified by site observation during standard surveys;
- Standard Stocking Density Assessment process at years 1 and 5.

Productive broadleaves

- Target stocking density at year 5 for Oak, Beech, Sycamore, Sweet chesnut will be 4500 stems per hectare (*1.5m x 1.5m*) or as specified in ForesterWeb 'Restock Areas' layer;
- Weeding as required and identified by site observation during standard surveys;
- Standard Stocking Density Assessment process at years 1 and 5.

Peat edge woodland

Peat edge woodland has been located around mire restoration areas to buffer these mires from productive conifer forest. Drainage and machine cultivation **will not be undertaken** in peat edge woodlands. Planting will follow FCS Practice Guide 'Deciding future management options for afforested deep peatland' and use NVC priority wet woodland types such as W3 *Salix pentandra - Carex rostrata*. W4 *Betula pubescens - Molinia caerulea* woodland, although suitable for these areas, will be used cautiously so as not to create a significant seed source for colonisation onto restored mires. Colonisation will be monitored and reviewed as mire and wet woodland habitats develop, and more knowledge on the dynamics of colonisation is gained.

- Ground preparation restricted to manual screef (to allow direct planting).
- Area will comprise 50% planted and 50% open space.
- Target stocking density in planted areas at year 5 will be 800 stems/ha (*3.5m x 3.5m*).

5.7.5 Prescriptions for underplanting (LISS stands)

Coupe 06038

The underplanting of shade tolerant alternative conifers has been prescribed in LISS coupe 06038. This coupe sits within FLS visitor zones and contains 100 year old spruce stands. The Kelty burn and several well used paths run through the coupe. Initial under planting will cover about 20% of the coupe area (2.35ha). It should be spread fairly evenly across the coupe. A further sub-division of 'planting zones' and 'felling zones' should be identified. 'Planting zones' are where planted groups will be located. 'Felling zones' are where machines will operate, crowns of felled trees should land and most of the harvesting residue is left. Felling zones should include stacking areas along forest roads. Tree species, spacing and group size is specified in the LISS management table (Appendix II). Consideration will be given to location of paths, burns and

heritage features. Visibility along paths should be maintained in the understorey to some degree (as per Visitor Services advice). Planting back from burns and heritage features as per UK Forestry Standard guidelines.

Coupe 06006

The underplanting of productive Beech and Oak has been prescribed in LISS coupe 06006 (Table 15, above).This will be concentrated in cleared windblown areas which are estimated to be 1.24 hectares. The Beech and Oak will be planted as single species groups, with Oak groups located under the largest gaps in the overstorey canopy. Planting will follow prescriptions in LISS management table (Appendix II). 'Felling zones' (as described above) should be identified at an early stage and left unplanted.

5.8 Woodland creation on former opencast soils

The total area of woodland creation proposed is 53.40 hectares. Details of these proposed areas are provided below in Table 10 (below) and displayed on Map 14. Table 16 includes the nature of ground being planted, area of planting, species proportions, tree mixture design and spacing. With the exception of soil remediation and cultivation, standard prescriptions as described in restocking proposals (above) will be used for woodland creation.

Table 10 woodland creation (Phase 1 2024-28)

Location	Planting mixture	Net Area (Hectares)	Details
Woodland creation on open ground (unaltered soils/former improved grazing) 6.82 hectares			
Coupe 06116; NT 1171 9320	Macedonian pine/Birch	2.42	Blocky planting in single species groups of 49 trees (7no. x 7no.) @ 1.9m x 1.9m spacing.
Coupe 06116; NT 1179 9325; NT 1139 9324	Birch/Rowan/Alder/NMB	3.61	Intimate planting mixture @2.5m x 2.5m spacing.
Coupe 06123; NT 1095 9258	Riparian woodland (W4-W7)/Open space.	0.79	Blocky mix of open space & planted areas 50:50. Planted areas @ 2.5m x 2.5m spacing in intimate mixture.
Woodland creation on open ground (restored opencast) 21.57 hectares			
Coupe 06127; NT 1193 9225; NT 1175 9263	Norway spruce/Birch	8.24	Intimate planting mixture @ 1.9m x 1.9m spacing in proportions 1:1.
Coupe 06129; NT 1123 9236	Sitka spruce/Lodgepole pine/Alder	1.96	Intimate planting mixture @ 1.9m x 1.9m spacing in proportions 1:1:1.
Coupe 06127; NT 1176 9275; NT 1210 9268	Macedonian pine/Birch	6.58	Blocky planting in single species groups of 49 trees (7no. x 7no.) @ 1.9m x 1.9m spacing
Coupe 06127; NT 1187 9253; NT 1211 9242	Birch/Rowan/Alder/NMB	3.81	Intimate planting mixture @2.5m x 2.5m spacing.
Coupe 06127 & 06129; NT 1222 9226; NT 1114 9235	Riparian woodland (W4-W7)/Open space.	0.98	Blocky mix of open space and planted areas 50:50. Planted areas @ 2.5m x 2.5m spacing in intimate mixture.
Woodland creation on abandoned short rotation coppice (previously restored opencast) 25.01 hectares			
Coupe 06129; NT 1157 9208; NT 1138 9232	Sitka spruce/Lodgepole pine/Alder	10.41	Intimate planting mixture @ 1.9m x 1.9m spacing in proportions 1:1:1.
Coupe 06129; NT 1159 9226	Norway spruce/Birch	2.42	Intimate planting mixture @ 1.9m x 1.9m spacing in proportions 1:1.
Coupe 06125; NT 1096 9184; NT 1122 9195	Birch/Rowan/Alder/NMB	7.02	Intimate planting mixture @2.5m x 2.5m spacing.

Location	Planting mixture	Net Area (Hectares)	Details
Coupe 06125 & 06129; NT 1091 9209; NT 1151 9201; NT 1122 9224	Riparian woodland (W4-W7)/Open space.	5.16	Blocky mix of open space and planted areas 50:50. Planted areas @ 2.5m x 2.5m spacing in intimate mixture.
Totals		**53.40 ha**	

Ground cultivation on heavily disturbed derelict land

Woodland creation areas are predominantly on disturbed, man-made soils. These can severely limit tree growth without considerable remediation work. Common characteristics include compaction, presence of soil contaminants; lack of organic matter, mycorrhizal fungi and essential nutrients. On such sites standard ground preparation techniques are unlikely to create conditions for healthy tree growth. FC Bulletin 110 'Reclaiming disturbed land for forestry' and FLS internal guidance describe best practice techniques for successful soil remediation. Use of soil organic matter and essential plant growth nutrients (both commonly known as 'soil ameliorates') will likely be introduced under the Waste Management Licensing (Scotland) Regulations and The Controlled Activities Regulations (CAR).

Retention of open ground

It is recognised existing open ground at St Ninians has value for conservation, recreation and internal views. Therefore half of proposed plantable open ground has been retained as designed open space. This, together with softer woodland edges provided by mixed and native woodland, will widen the range habitat types & help improve amenity throughout the area.

5.9 Priority peat mire restoration

The future species and habitats plan (Map 11a) proposes a total of 81.53 hectares of peat mire restoration, to be completed over three phases or 15 years. This longer period of forest removal and mire restoration will allow retention of some mature conifer habitat, for dependent wildlife, while younger forest stands in the area develop mature characteristics. It will also reduce the intensity of short-term hydrological impacts from initial re-wetting operations.

Within the 10 year period of operations under this Land Management Plan **65.33 hectares** (*of the total 81.53ha*) are proposed for restoration. Table 11 (below) lists all areas (81.53ha) and highlights (in blue) those proposed for completion within the LMP period. The latter 65.33 hectares is included within the open space component of restock coupes in Appendix II Management Tables. Further details for peat edge woodland is in Section 5.7.4.

Table 11 Peat restoration (2024 - 2038)

Site location & proposed restoration time	Net Area (Hectares)	Proposed restoration time & site attributes
Site A (NT 0887 9435) **Craiggaveral moss** **Fell & restore 2024-28**	26.06	Partly felled. Peatland team assessed as 10b/9e complex rather than 11b/(9e) (original 1969 survey). Across central/southern parts of the site there is poor conifer crop growth/stump diameter and greater abundance of Sphagnum mosses, *Erica tetralix*, *Eriophorum vaginatum* and also *Vaccinium Oxycoccos* (felled areas).
Site B (NT 0817 9490) **Blackrigg moss** **Fell & restore 2029-33**	18.37	Peatland habitat with core areas of raised bog (10b), surrounded by mosaic of unflushed (11b) and weakly flushed (9e) blanket bog. Sits adjacent to open mire habitats of Tipperton Moss SSSI. Very poor/checked conifer crop growth on 10b soils and fringing 11b soils. Forest road to be removed as part of peat restoration operation.
Site C (NT 0922 9541) **Kings seat moss** **Fell & restore 2034-38**	7.8	Peatland team assessed as 10b/9 complex rather than 11b/(9d) (original 1969 survey). Core areas along original 11/9 boundary with poor/checked conifer growth greater abundance of Sphagnum mosses. Area contains secondary inlet to Loch Glow.
Site D(NT 0958 9590) **The Lead** **Fell & restore 2024-28**	7.18	Partly felled. Peatland habitat 10b/9d complex adjacent to open habitat acid grassland. Very poor/checked conifer crop growth on 10b soils.
Site E (NT 0999 9485) **Craigencrow moss north** **Fell & restore 2029-33**	13.72	10b with weakly flushed 9 peats and flushed 8 peats, the latter along Drumnagoil burn. This burn and its associated riparian zones split the 10b mire units of Site E and Site F but will provide opportunity for creation of wet woodland and flushed open habitats between Sites E & F.
Site F (NT 0994 9446) **Craigencrow moss south** **Fell & restore 2034-38**	8.4	10b with weakly flushed 9 peats and flushed 8 peats, the latter along Drumnagoil burn. The site sits adjacent to improved grazing (to the east) and a native wet woodland buffer is proposed along this boundary in which drainage will not be altered.
Totals	**81.53**	

5.10 Biodiversity and Environment

All forestry operations to be conducted within the lifetime of this plan will comply with current best practice guidelines and conform with statutory regulations relating to the protection of species and habitats.

More detail on the existing biodiversity resource, both within and surrounding the forest, is provided in Appendix I, Section 11.0. The management proposals aim to protect and expand this resource in line with the above guidance.

5.10.1 Management for wildlife species

Badger:

Badger is present in low densities within this land management plan area. Species occupancy is constrained by edaphic conditions with greater levels of occupancy on free draining mineral soils to the east and remediated mining areas to the south.

Diversification of tree species and age class of trees within the woodland will benefit badgers by increasing diversity and structure within ground layer vegetation, increasing foraging opportunities. During operations, deliberate efforts will be made to retain volumes of standing and fallen deadwood, in line with current deadwood policy, this will generate niche habitats for a range of invertebrates further increasing foraging opportunities.

All forestry operations undertaken within adjacency to badger sett locations will adhere to current best practice guidance. When operations are required to occur within the legally specified buffer zones around badger sett locations NatureScot licensing will be sought and all operations will strictly adhere to the mitigation and zoning prescriptions detailed within the license.

Invertebrates:

Opportunities will be taken to increase the value of existing habitats for invertebrate communities. During forest operations deadwood will be retained wherever possible. Retentions will be targeted in riparian margins and on wet soils to maximise biodiversity benefits.

Peatland restoration will create and restore habitats and provide ecological niches currently absent at a landscape scale, supporting a range of invertebrate species. Opportunities will be taken during the peatland restoration process to create and restore bog pool habitats on deep peat soils as well as scrapes and ponds in areas of mineral soils.

Avian species:

Felling of large areas of woodland will be required during the plan period to facilitate the restoration of degraded peatland habitats and clear windblown first rotation crops.

As the remaining woodland matures and develops, an intricate mosaic of coniferous and broadleaved species will develop providing a diverse range of habitat niches for woodland species whilst creating opportunities for ground nesting species to colonise the area. Areas adjacent to peatland restoration sites will be restocked with broadleaved trees incorporating a fringe of low density scrub or peat edge woodland to further enhance habitat value.

Compensatory measures may be deployed in the short term to minimise the impacts of felling operations until such time as adjacent woodland areas can develop the size and structure needed to provide ecological function for tree nesting species. These include:

- Long term retentions of mature woodland areas to serve as habitat islands;
- The installation of passerine bird boxes to replace lost nesting habitat in the short term;
- The installation of osprey platforms to retain existing breeding pairs and provide opportunities for future population expansion;
- The installation of Tawny owl, Barn owl and Kestrel boxes to support these species as the restocked woodland areas mature.

FLS as a partner in the "Scottish Raptor Monitoring Scheme" (SRMS) will continue to protect and support raptor populations within our land holdings. Working with local conservation organisation's opportunities will be identified to protect and bolster priority species through habitat creation, modification and the monitoring of populations.

Bats:

The restoration of peat habitats and creation of native peat fringe woodland will create foraging opportunities and improve habitat value by providing a diverse mix of habitat types and increased abundance and diversity of prey species.

Improvements to riparian corridors such as the removal of non-native conifers and the planting of low density broadleaved species will create functional linear habitats for commuting and foraging bats as well as providing increased roost potential as the woodland matures and develops.

Short term measures to be deployed:

- Installation of bat boxes in key areas eg; adjacent to riparian corridors, in areas bordering grassland and peatland habitats, within areas of young and maturing woodland;
- Retention of deadwood where possible to retain roost features and increase the abundance of invertebrates;
- Creation of ponds and scrapes to maximise species richness and abundance of invertebrates;
- Retention of mature woodland to serve as habitat islands.

Pine Marten & Red Squirrel:

Both red and grey squirrel are present within this land management plan area. To help support and bolster the threatened red squirrel populations FLS will continue to work with partner organisations by supporting the active trapping and dispatch of grey squirrels on our land holdings.

In order to support the populations of both pine marten and red squirrel within this land management plan area FLS will employ the following measures:

- Replant areas of felled woodland with a diverse mix of coniferous and broadleaved tree species ensuring a variety of food sources and habitat niches as the woodland matures;
- Areas of mature woodland will be identified and retained as long term retentions to provide habitat islands for both pine marten and red squirrels in the short term whilst adjacent areas of woodland mature;
- Installing pine marten den boxes to provide valuable habitat for the expanding marten population and increase the survival rate of the young marten by reducing the chances of predation.

Otter:

Otter are present throughout this LMP area. The following actions intend to improve habitat conditions and food resources for this species:

- The removal of non-native conifers from streamside margins and replacing with low density broadleaved species;
- The creation of scrapes ponds and other wetland habitats;
- The restoration of mire habitats and bog pools;
- The diversification of tree species on site and planting of soft edged scrub around productive woodlands.

Water Vole:

Surveys were conducted in between 2021 and 2023 in an attempted to locate populations of water vole in historically occupied habitat patches along the Lochornie and Pieries burn. Unfortunately no current signs of their presence were recorded, suitable habitat still persists in areas and the proposed actions will restore and secure habitat for this species whilst creating connections between isolated habitats.

- The removal of non-native conifers from streamside margins and replacing with low density broadleaved species;
- The creation of scrapes ponds and other wetland habitats;
- The restoration of mire habitats and bog pools;
- The retention of open marshy grassland areas in streamside margins.

5.10.2 LEPO woodland, native woodland and deadwood

LEPO Woodland

LEPO zones are shown on Map 7.

Within LEPO areas, veteran trees and heritage features are more frequent. The future species and habitats plan has been designed to protect and enhance these features in the long term. Planting will be undertaken to replace veteran trees along avenues where appropriate.

LEPO areas will have a higher proportion of LISS stands and long term retentions. Tree mixtures will be more diverse and have a higher proportion of, native woodland, long-lived tree species and ornamental conifers.

Native Woodland

Native woodland will significantly increase as the future species and habitats plan is implemented. The aim is to:

- Improve connectivity of and expand existing native broadleaves;
- Enhance and protect hydrological features;
- Buffer proposed peat mire habitats;
- Enhance visitor zones, designed landscapes and heritage features.

The majority will be under low intensity management but some areas, on productive sites, will incorporate niche timber production.

Deadwood

In terms of deadwood resource, the UK Woodland Assurance Standard (*UKWAS*) target is an average of 20 m^3 per hectare (*both standing and fallen deadwood*).

Table 12 (below) shows the proportions of the plan area currently having high, medium and low deadwood potential:

Assessed Deadwood Potential	Area (Hectares)	Future Volume Estimate (m3/ha)	Total Future Volume (m3)
High	158.53	100	15853
Medium	322.54	30	9676.2
Low	844.18	15	12662.7

Total future potential in the plan area is estimated to be 28.81 m3/ha.

A range of management tools will be utilised to increase deadwood resource and these should be included in operational workplans:

- Broadleaved deadwood will be prioritised for retention;
- Veteran trees will be retained and protected where safe to do so;
- Deadwood will be concentrated where it will provide the highest ecological benefit and in areas less likely to be disturbed by future operations, such as riparian and peat edge woodland, broadleaved long-term retentions and minimum intervention areas;
- Where conifer stands are clear felled or thinned, a proportion of windblown stems will be made safe and left in situ;
- In long-term retention and LISS thinning areas, a proportion of standing injured or dying trees will be retained - where away from visitor zones, roads and march boundaries.

5.10.3 Management of riparian zones and water supplies (Map 3)

Riparian margins will be sensitively managed to maintain and improve habitat quality for a range of species and to improve water quality. They have been designed as a mosaic of open space and low density native broadleaves, to provide filter zones, dappled shade, lower water temperatures and bank stability. Areas of open grassland will be retained in wet inundated margins to support water vole populations and provide room for species expansion along the riparian corridors, as the habitats mature. Where present, non-native conifers will be removed from sensitive riparian zones.

Loch glow, loch fitty and roscobie reservoir are the largest open water bodies in the plan area and are all designated as local wildlife sites. Although not within the plan area their inlets are partially sourced from the forest. Large buffers have been designed along these, and also where loch glow sits adjacent to the forest boundary. These buffers comprise a mix of open space and native woodland under low intensity management.

There are several private water supplies that could be affected by forest activities. FLS is committed to protecting these supplies and has worked with supply owners to record the location of abstraction points, associated infrastructure and wider catchments for surface water supplies.
Forest design mitigation for these supplies is described above (riparian zones), utilising open space and low density native broadleaves. Extra restrictions will be applied when planning and implementing operations within abstraction point buffers in accordance with UKFS Forest & Water Guidelines. Within ‘catchments’ for surface water abstraction points, special precautions will be taken to protect water quality & hydrological features.

5.10.4 Open habitats

Peat mire restoration and open space associated with peat fringe woodland is proposed for delivery over the next 15 years. It will be concentrated in the west of the forest (Map 11a) where there is a cool wet climate conducive to its long term development and viability. Intended timing of restoration, habitat type and hectarage is detailed in Section 5.9. In the long-term, this restored habitat will significantly diversify habitat composition and structure within the plan

area. It is also expected to help moderate catchment water flows from the forest and act as a carbon sink to help mitigate the impacts of climate change. Mire restoration along the forest boundary will link to open habitats adjacent to the plan area. This is hoped to improve open habitat connectivity in the Cleish hills.

Other open habitats are proposed throughout the plan area to improve resilience to wind and fire, improve landscape design, protect and enhance riparian zones and create alternative habitats for wildlife.

The wildflower meadow at Clentry (Map 7) will be retained. The current cutting regime will be maintained to promote the original wildflower mix and associated pollinators.

5.10.5 Woodend Local Wildlife Site

Woodend Wildlife Site is a non-statutory conservation site, the eastern half of which falls within the plan area (Map 7). It comprises some coniferous plantations (planted in 1980 and 1999), scrub habitat, semi and unimproved grassland, NVC W11 Oak woodland (planted in 1980), heritage features, open water and wetland habitats.

The future species and habitats plan will maintain existing open habitats and wetlands. Native broadleaves will be expanded to form a more connective woodland network managed for conservation and to help enhance riparian zones and wetlands.
Some thinning is proposed to remove larch. This was planted in small groups with Scots pine throughout the broadleaved matrix at the southern end of the site. The larch will most likely be cut to residue in situ using motor-manual delivery.

5.10.6 Invasive Non-Native Species (INNS)

Currently the main threats are from several plant species in small localised areas in the east of the forest.

- Annual operations are ongoing to control small areas of Rhododendron (*Rhododendron ponticum*) along the Kelty burn. Further control is planned for the next 5 years and survey work is being undertaken on the eastern boundary to assess levels of this species in mature mixed woodland close to Blairadam Estate.
- Annual operations to control Himalayan balsam have taken place since 2015 along lower stretches of the Drumnagoil burn and a tributary to the Kelty burn.
- Three annual operations to control a small area of Japanese knotweed were undertaken from 2015 to 2018. No further record of this species has been identified.

A follow up INNS survey will be conducted within the lifetime of this land management plan. If found to be present any INNS will be scheduled for treatment and removal as necessary in line with current best practice guidance.

5.11 Heritage and designed landscapes

5.11.1 Roscobie enclosures scheduled monument

This is of prehistoric origin and comprises three circular enclosures with associated low turf and stone banks. Over the next ten years a small area of Sitka spruce plantation (p2002) within the monument boundary is proposed for removal (as per HES[10] advice). HES will be consulted prior to work commencement and the monument will be inspected on an annual basis, in coordination with HES, to ensure compliance with the scheduling conditions.

The future species and habitats plan has been revised to increase open space around the monument and species composition of adjacent stands has also been updated to reduce future potential for Sitka spruce colonisation within the scheduled area.

5.11.2 Designed landscapes

Baseline information on designed landscapes is provided in Appendix I, Section 14. In order to protect and enhance designed landscapes and associated heritage features FLS have produced a Designed Landscape Management Plan which identifies remnant features within the forest that are integral to historical landscapes of Blairadam Estate. The plan also provides guidance on protection, buffer zones and future management. The management of key features is described below and these are shown on Map 7a.

5.11.3 Woods of Ornament &Policy

These were zones historically managed for landscape design and aesthetics as part of Blairadam Estate. Within the land management plan area, several key features have been identified for proactive management:

Keiry Craigs Viewpoint (Coupe 06042)

The intention is to enhance views of Kiery Craigs from visitor zones and from within Blairadam Estate, reflecting the original design intended by William Adam. The mature spruce immediately to the north of Keiry Craigs rock face will be removed in phase 1 of the LMP. The mature Scots pine and mixed broadleaves just above the rock face will be retained. Cleared spruce areas will be replanted with non-productive native mixed woodland – Scots pine, Silver birch, Aspen.

[10] Historic Environment Scotland

Ground in front of the rock face will be kept open whilst retaining a few widely spaced native broadleaves within Kelty burn riparian zones.

Squires Wood (Coupe 06011)

Beech is the main component, with Japanese larch, mixed conifers and other broadleaved species. Squires wood will be managed as a LISS[11] stand with larch and larger groups of spruce removed. Broadleaves and alternative conifers will be retained, and thinned where feasible. Areas of cleared larch will be planted with native broadleaves and a small proportion of alternative/ornamental conifers.

The Glen

The Glen incorporates coupe 06038 and 06039 and contain attractive path networks and mixed woodlands. There is a large concentration of landscape and industrial heritage in these areas, with interpretation infrastructure at various points.

Coupe 06038 contains the 100 year old spruce which has become increasingly attractive as it moves towards its 'old growth' phase. The objective is to retain these stands for as long as possible under LISS management, with periodic thinning interventions to give the largest trees room to further expand. It is recognised there will be a significant impact when these stands are eventually removed, so a regeneration programme will be undertaken to establish an understorey of ornamental conifers including Coastal redwood and Silver firs. There are a number of ornamental bridges which cross the Kelty burn, identified by their narrow arches. The aim is to retain this specific design during future maintenance and ensure these arches are visible from the path network.

Coupe 06039 is predominantly mixed broadleaves with groups of conifers scattered through. It sits to the north of the Kelty burn and has a winding path network re-connecting to the burn at various points. The main path runs through a diverse range of woodland types from mature Beech and Sycamore, Grand firs, Birch, Norway spruce, Cherry and Oak woodland. These will gradually be regenerated under LISS management, with the diversity of woodland types retained.

[11] LISS = Lower Impact Silvicultural Systems Including group selection, shelterwood or underplanting, small coupe felling, coppice or coppice with standards, minimum intervention and single tree selection systems.

Keltyhill Glen

Located to the east of the main visitor car park, this small glen contains Drumnagoil burn and a surfaced path. The area immediately around Drumnagoil burn was restocked in 2014 with native mixed broadleaves. These will be managed as non-productive woodland and are included in proposed thinning areas to allow removal of spruce regeneration. Further east is a maturing mainly conifer plantation approaching 60 years old. This will be managed as a long term retention and is programmed for thinning in the next 10 years. Eventually it is proposed to be converted to native woodland, allowing for up to 20% mixed conifers for ornamental purposes.

5.11.4 Boundary features and remnant avenues

A wide variety of boundary features exist throughout the plan area. These include drystane dykes, ha ha's[12] and remnant veteran tree avenues. Stone features and banks will not be planted over and machine crossing should be avoided or otherwise at agreed points, with adequate protection measures. Sufficient open space should be retained along avenues and veteran trees to allow their continued free growth and protection. Where opportunity arises, avenues will be enhanced by planting replacement avenue trees using Oak, Beech and Sweet chestnut.

5.11.5 Sir Walter Scott viewpoint

This viewpoint overlooks Loch Leven and the 'Lowland Basins' landscape character area. Management to date has involved clearance of spruce natural regeneration within broadleaved planted areas. The main objective going forward is to retain the external view (looking north) and ensure the track, running to the viewpoint, is kept clear.

5.11.6 Industrial heritage and hydrological infrastructure

In addition to the designed landscapes created by the Adam Family a wide range of industrial heritage is present. This includes the remains of water supply infrastructure, mineral and coal extraction, brick production works and railway transport. Actively used bridges will continue to be inspected and maintained in their original style. The future species and habitats plan and management coupe specification have given due regard to these features through the use of LISS management, open space and non-productive woodland.

[12] These are ditches with a wall on their inner side below ground level. They are designed to confine grazing animals without interrupting the view and creating the illusion of openness. They can be thought of as a sunken wall or fence.

5.12 Crop protection and management of herbivores

Control of deer is currently at its highest level since records began and future control over the plan period will be revised only to reflect changes in the deer population. A critical part of this control strategy will be the creation and maintenance of long term management infrastructure such as deer glades, ATV access and deer shooting mounds. Another key management focus will be clearance of dense conifer regeneration in targeted areas to allow clear line of sight. Hare populations will continue to be monitored and control measures employed if necessary.

In relation to physical guarding, alternatives to plastics will be utilised where such materials have proven to be effective. Individual tree guarding will be targeted on more susceptible tree species. Plastic guards within the forest will be recycled on new restock and woodland creation sites where practicable or recycled as a waste product. The use of deer fencing for woodland creation will be considered where proactive deer control is restricted, for example, due to high visitor usage. Access provision such as pedestrian gates will be installed on deer fences where core paths and well-used desire lines are present.

A feasibility study will be undertaken for a new deer larder on the hardstanding area at Grid ref: NT 1156 9315. This would support deer control operations in this part of the Region.

5.13 Landscape

Appendix I, Section 10.0 and Map 5 provide the landscape context for the plan area. This includes landscape character types, local landscape designations and sensitive/important viewpoints.

5.13.1 Proposals for the west of the forest

This area forms the eastern half of the 'Cleish Hills' local landscape area (LLA). 'Upland Hills' is the predominant character type, distinguished by expansive, large scale rolling hills. Average coupe size is larger to reflect the scale of the landscape and structural and species diversity will be achieved by increasing habitats such as open mire, riparian and peat edge woodland. Woodland boundaries will continue to soften as more geometric 1st rotation conifer crops are restocked. The design has specifically considered views from key transport routes such as the Cleish minor council road, A823 and B913.

Amenity mixed woodland has been located adjacent to Loch Glow fishing club in order to enhance this boundary and maintain shelter from winds along the Loch shores.

Retention of expansive views from forest roads will be achieved through use of open space and lower density native woodland.

The area around Roscobie Scheduled Monument has a slightly smaller scale setting. The forest boundary design and species will reflect this scale and diversity. Edge views have also been softened and enhanced close to neighbouring properties such as the holiday homes at Yellowscott and residential properties along the Cleish minor road.

5.13.2 Proposals for the east of the forest

The east contains two influential character types (Rugged Lowland Hill & Hill slopes) which provide a more diverse landscape setting for the forest. Smaller scale forest boundaries have been designed using a wider range of tree species, mixture types and stand management regimes to take advantage of more fertile soil types and sheltered conditions. Particular consideration has been given to high usage visitor zones close to Kelty town and the designed landscapes linked to Blairadam House. Amenity and native woodland will be used to improve internal views around visitor zones and close to residential areas. The enhancement of specific designed landscapes is described in Section 5.11 (above).

Consideration has also been given to views along forest roads, particularly long, straight stretches. Design in this respect, has aimed to diversify these stretches using different woodland types and stand management regimes.

5.13.3 Proposals for southern areas (woodland creation)

Southern areas fall within 'Hill Slopes' and 'Lowland Loch Basins' landscape character types but are also heavily influenced by former open-cast workings. A key objective is to sympathetically integrate proposed woodland creation, establishing a more continuous, diverse wooded landscape linking to Loch Fitty (Map 14).

Consideration has also been given to:

- Native woodland creation proposals to the east and south of the plan area.
- Existing core paths and desire lines.
- Retention of open space and internal views.
- Design of forest boundaries surrounding the large mound of overburden.
- Woodland design close to open water bodies.
- Woodland design close to residential & business properties.

Amenity and native woodland have been located to enhance forest edges, riparian zones and link with adjacent native woodland (within and outside the plan area). A significant proportion of designed open space has been incorporated. This will ensure internal views are retained along tracks and paths, as well as to achieve other objectives (resilience to wind/fire, open habitats, etc).

5.14 Operational Access

Proposed forest roads and upgrades are displayed on Maps 13. This also identifies expected timber haulage from forest entrances .

5.14.1 Planned forest roads & upgrades

Proposed **new forest roads** amount to 3,433 metres or 3.433 hectares (net footprint). This includes turning and passing points, welfare and storage areas. In order to facilitate road installation 4.42 hectares of road line felling is proposed. Approximately 19% of this felled area will become green verge subsequent to construction. In addition, 958 metres of **upgrade work** is required on existing forest roads. A more detailed breakdown is provided in Appendix II Management Tables.

Planned new roads are required to:

1. Reduce disruption to users of the tarmac access road leading to the main visitor car park.
2. Allow the peat restoration programme to proceed.
3. Provide management access for:
    a. Commercial thinning.
    b. Pre-emptive removal of larch.
    c. Woodland creation on former opencast workings.
    d. Restructuring the remaining 1st rotation conifers.

FLS will continue to work with residents and businesses at Clentry to reduce disruption on the tarmac access road during forest operations. The long term strategy is to reduce timber haulage on this route, as productive conifer plantations are replaced with lower intensity mixed & native woodlands. Proposed new roads/upgrades in this area will help reduce disruption during timber loading and decrease the volume of timber being hauled on this route.

The minor council access road leading from the B914 to Cleish village is identified as a timber transport consultation route to the north of the forest. FLS will continue to consult with Fife Council roads department regarding this route. The current agreement is that all timber and other HGV transport travels south to the B914 rather than north to Cleish Village.

To allow harvesting of coupe 06105, approximately 268 metres of new road is required on deep peat soils. The road will be removed once harvesting is complete and prior to mire restoration.

5.14.2 Forest quarries

There is one active forest quarry within the plan area (Map 13) named ‘knockhill’. This provides is a vital source of high quality stone and is proposed for continued use over the next 10 years. Additional deposits of this stone have been identified immediately north and east. A

topographical survey will be commissioned in the next five years to assess how the quarry can be expanded without affecting nearby peats. Based on these survey results, an amendment application will then be submitted with appropriate design and mitigation measures.

5.15 Communities & Recreation

(See supporting Map 6)

The proposed management during the period of this plan:

1. Maintenance of existing recreational infrastructure, including regular inspections and programmed maintenance.
2. Continue working with local communities and partner organisations to maintain and increase access to the forest for health and education.
3. Woodland management in visitor zones (see Section 5.16 below)

Recent land acquisitions at Thornton wood and St. Ninians have opened these former opencast areas up for informal recreation. FLS staff have recorded increased use of these areas with new desire lines being created. Over the coming years FLS will monitor access demands in these areas, as well as other parts of the forest, and review access infrastructure and resources.

FLS will continue to work with local communities, particularly with schools and Fife Council to encourage families into the forest.

FLS will be a key partner in the 'Junior Forester Award Scheme' which aims to encourage young people into the forest industry. This will involve working with Secondary Schools and Fife Council and offer youngers the opportunity to learn forestry and outdoor practical skills.

FLS are open to working with new local partners and outdoor interest groups to consider the following opportunities where resources are available and other key objectives are not affected:

- Improved walking links and recreational activities.
- Outdoor education and well-being events.
- Improved awareness and interpretation.

5.16 Woodland Management in 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 access routes. Visitor Zones are shown on Map 6. In these areas, 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 to maintain existing views.

Woodland in these zones will 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.

6.0 Critical Success Factors

The success of this plan will be based on the following:

1. The achievement towards the management objectives set out in Section 1.0.
2. The implementation of operations set out in Section 2.1 and management proposals set out in Section 5.0.
3. Compliance with the UK Forestry Standard and UKWAS guidelines.

Objective Appraisal, Monitoring & Evaluation Table in Appendix V details how each management objective will be appraised, where and when each objective will be monitored; by whom and where it will be recorded. This will enable an evaluation of success as part of the mid-term and end of term plan reviews.