Forestry and Land Scotland
Coilltearachd agus Fearann Alba

East Region

Keith Woods

Land Management Plan
Plan Reference No: LMP 31
Plan Approval Date:
Plan Expiry Date:

Signed:

Planning Manager

East Region

Date:

Signed:

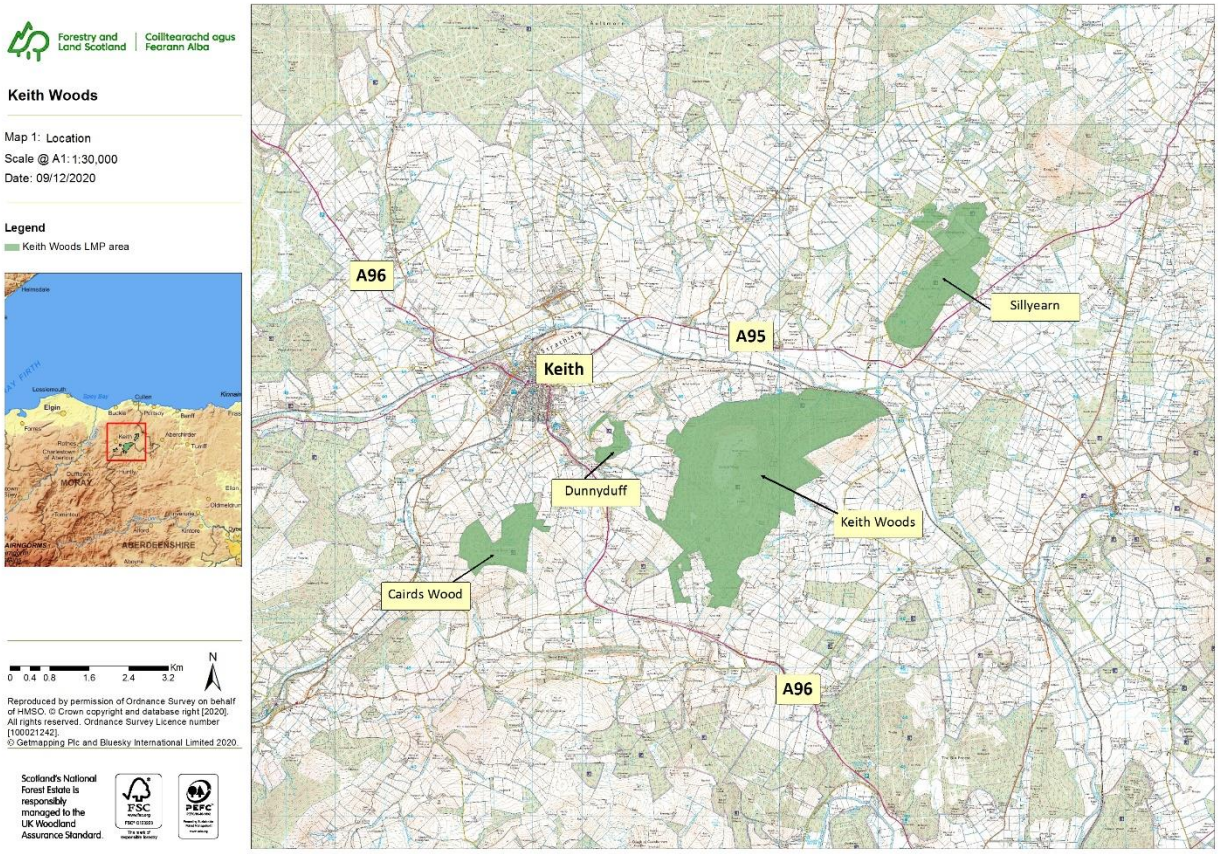
Conservator

Scottish Forestry

Date of Approval:

Date Approval Ends:

1.0 Summary of Proposals



Keith Woods LMP Area Location

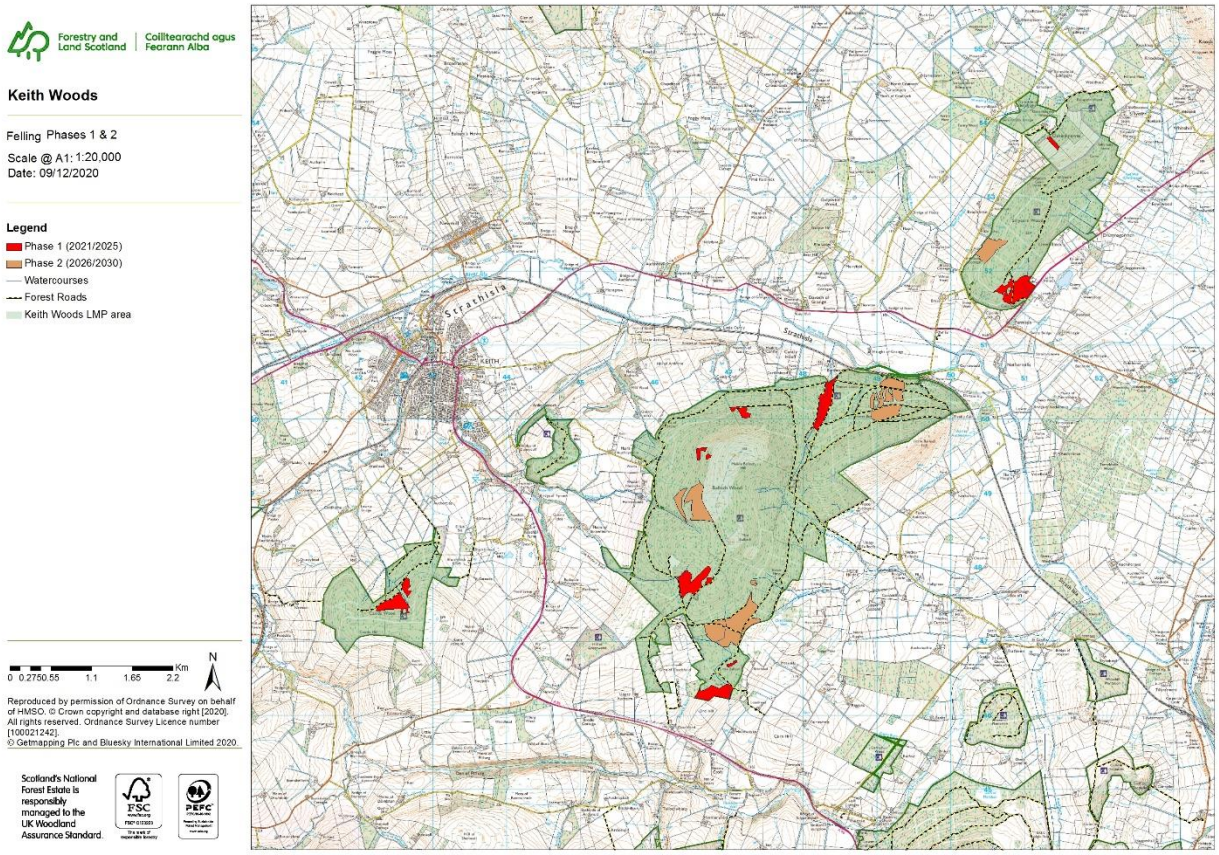
This plan is a review of Forestry and Land Scotland's (FLS) management of Keith Woods, consisting of Sillyearn, Balloch Woods, Dunnyduff and Cairds Wood. The entrance to Balloch Woods is located approximately 12km North-West of Huntly. The plan area extends to 1478ha.

In terms of designations, there are significant areas of Long-Established Plantation Origin (LEPO) woodland in Cairds Wood, Balloch Woods and Sillyearn. Dunnyduff is almost entirely designated as Ancient woodland (PAWS). See Map 2: Key features for more detail.

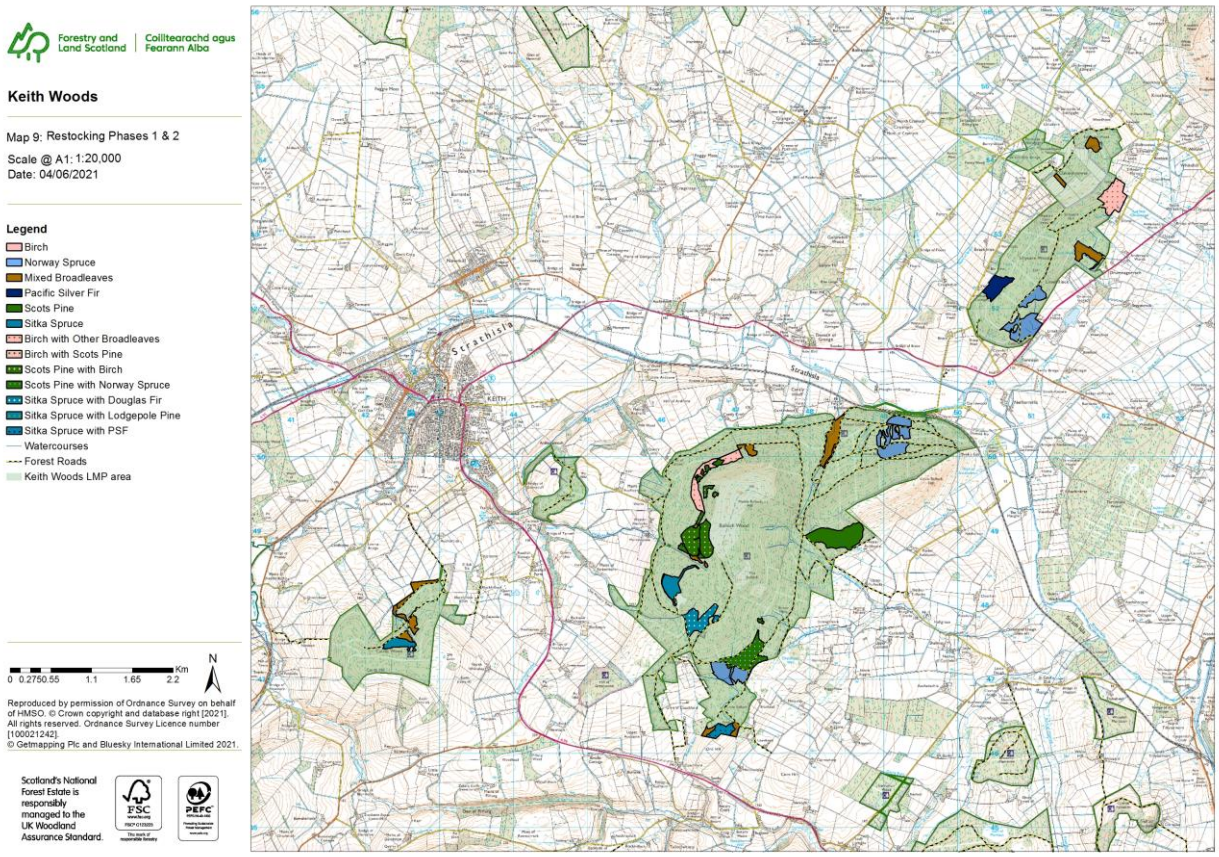
The purpose of the plan is to outline felling and thinning proposals over 20 years with the first 10 in detail along with restocking proposals for the whole plan area.

Planned Operations	2021-2031 plan period
Clearfell	113.1ha
Thinning	1445.5ha
Restock	177.7ha
Road construction	0m
Road upgrade	0m

Planned operations in 10 year plan period



Felling Phase 1 & 2



Restock in LMP period

The plan will be reviewed after five years to ensure the objectives set out in the LMP are still appropriate for the management of the forest in the current conditions. All operations, both planned and completed, will also be reviewed to ensure they are still necessary to achieve the stated objectives.

In addition to this overarching strategic level plan all operations will be preceded with a more detailed operational planning process. This will be guided by the work plan document that provides an opportunity for all sections of FLS (visitor services, environment, civil engineers, etc.) to provide detailed information that pertains to the planned operation. The forest works manager is then able to plan the operation with the fullest and latest information available to enable them to make changes or undertaking mitigation measures to minimise any negative impacts and improve the forest environment.

2.0 Scottish Forestry Regulatory Requirements

This section provides a summary of the elements of the LMP which are regulated by Scottish Forestry, focusing on relevant operations and activities being carried out in the first ten years of the plan.

2.1 Summary of planned operations

Planned Operations	2021-2031 plan period
Clearfell	113.1ha
Thinning	1445.5ha
Restock	177.7ha
Road construction	0m
Road upgrade	0m

Table 1: Planned operations in 10 year plan period

2.2 Proposed felling in years 2021-2031

Proposed felling year	Fell area (ha gross)	% forest area
2021-2025	50.26	3.45%
2026-2031	65.84	4.53%

Table 2: Proposed Phase 1 and Phase 2 felling over this plan period (gross coupe size)

Coupe	SS	SP	LP	NS	RC	Larch	Ash	Total
31002							0.97	0.97
31003	1.47							1.47
31059/31425	1.32	0.06	0.38	0.61	0.4	4.50		7.27
31297	11.69	3.61	0.36	0.16		0.17		15.99
31321	1.85		0.18					2.03
31407		1.31	0.95	1.78		4.74		8.78
31456	9.90					2.62		12.52
31568	5.68	0.93	0.71			2.35		9.67

Coupe	SS	SP	LP	NS	RC	Larch	Ash	Total
31682	9.38			1.93				11.31
31726/31170	14.99	3.45	0.75	4.41		4.88		28.48
31909	7.11	0.55				0.13		7.79
31878	5.75	0.56	0.48					6.79
Total	**69.14**	**10.47**	**3.81**	**8.89**	**0.4**	**19.39**	**0.97**	**113.07**

Table 3: Clearfell details by coupe (ha)

*some coupes have been grouped together as they will be felled in the same operation

Age of trees	Growth stage	Percentage of class at given year	
		2021	**2031**
0 – 10	Establishment	17.46%	12.01%
11 - 20	Thicket	11.76%	16.32%
21 – 40	Pole stage	11.08%	22.21%
41 – 60	Maturing high forest	17.48%	9.22%
61+	Old high forest	23.37%	26.25%
Open	n/a	18.85%	13.99%

Table 4: Change in age class over plan period (%)

2.3 Proposed thinning in years 2021-2031

Coupe	Thinning Year	Area (ha)	Volume (m^3)
31001	2024	114.26	4866
31001	2031	114.26	4920
31057	2022	32.43	710
31057	2029	32.43	802
31200	2021	220.58	5751
31200	2028	220.58	8417
31300	2027	234.09	6016
31400	2024	158.04	3503
31400	2031	158.04	4319
31500	2026	160.81	3969

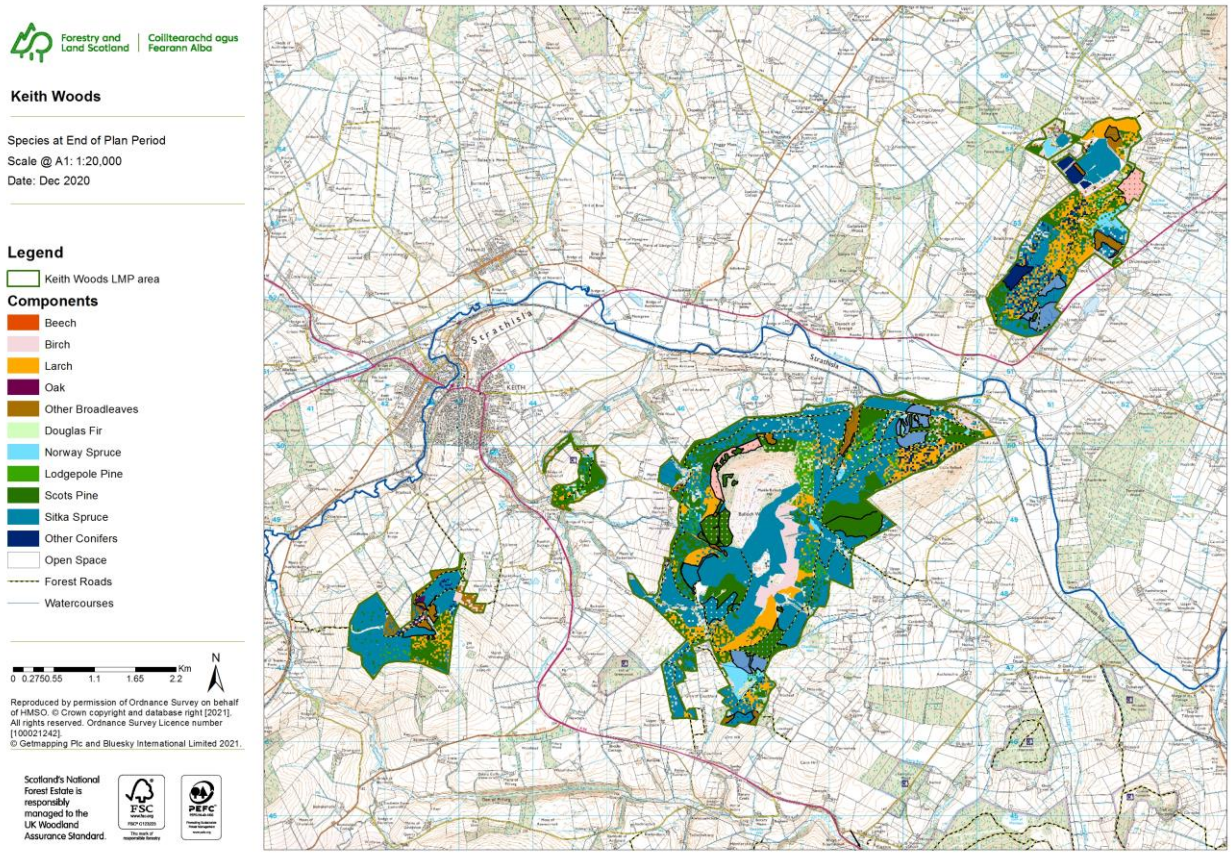
Table 5: Proposed thinning in Phases 1 and 2

2.4 Operational access and predicted volume extracted

Block	Access Point	Phase	Predicted Volume (m^3)
Cairds Wood	Only access	1	8363
Cairds Wood	Only access	2	4920
Dunnyduff	Only access	1	710
Dunnyduff	Only access	2	802
Balloch	South Entrance	1	20089
Balloch	South Entrance	2	41358
Sillyearn	North	2	992
Sillyearn	West	2	992

Block	Access Point	Phase	Predicted Volume (m^3)
Sillyearn	South	1	4324
Sillyearn	South	2	4408

2.5 Proposed restocking in years 2021-2031



Species coverage at end of plan period

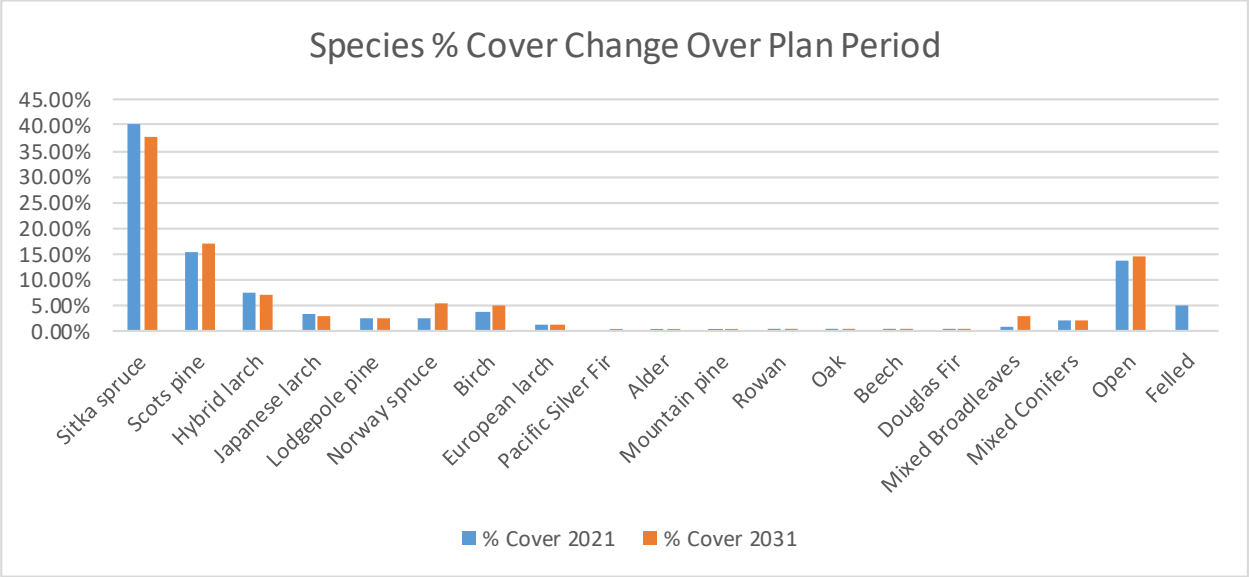
Coupe	SS	SP	PSF	NS	DF	Birch	Mixed Broadleave	Open space	Total
31002							0.97		0.97
31059	3.04		1.30				2.59		6.93
31170/31726		7.02		16.15					23.17
31229		2.04				10.65			12.69
31297				15.88					15.88
31306							2.63		2.63
31321							2.14		2.14
31381							3.50	2.33	5.83
31407							8.57		8.57
31434						7.68	3.29		10.97
31456/31114		6.26				2.68	0.83	0.36	10.13
31456(2)*		3.89				3.89			7.78

Coupe	SS	SP	PSF	NS	DF	Birch	Mixed Broadleave	Open space	Total
31568	4.96				4.96				9.92
31631				4.55					4.55
31658	0.2 (NR)						4.82		5.02
31682				11.33					11.33
31878			6.81						6.81
31909	4.57						3.59		8.16
31938	7.06	0.45		0.45					7.95
31955		17.41							17.41
31003		0.74				0.74			1.48
Total	**19.83**	**37.81**	**8.11**	**48.36**	**4.96**	**25.64**	**32.92**	**2.69**	**180.32**

*Table 6: Restock details by coupe (ha) *coupe 31456 has two different restock prescriptions as described below*

Species	Area (ha) 2021	% Cover 2021	Area (ha) 2031	% Cover 2031
Sitka spruce	597	40.39%	554.8	37.54%
Scots pine	228.2	15.44%	255.5	17.29%
Hybrid larch	108.7	7.35%	104.2	7.05%
Japanese larch	51.6	3.49%	42.6	2.88%
Lodgepole pine	38.9	2.63%	35.1	2.37%
Norway spruce	37.6	2.54%	77.1	5.22%
Birch	53.6	3.63%	79.3	5.36%
European larch	20.7	1.40%	15.0	1.01%
Pacific Silver Fir	0.0	0.00%	8.1	0.55%
Alder	7.7	0.52%	7.7	0.52%
Mountain pine	6.8	0.46%	6.8	0.46%
Rowan	3.4	0.23%	3.4	0.23%
Oak	2.2	0.15%	2.2	0.15%
Beech	1.2	0.08%	1.2	0.08%
Douglas Fir	0.5	0.03%	5.5	0.37%
Mixed Broadleaves	11.2	0.76%	43.1	2.92%
Mixed Conifers	30.2	2.04%	29.8	2.02%
Open	204.5	13.85%	206.7	13.99%
Felled	74.1	5.01%	0	0
Total	**1478.1**	**100.0%**	**1478.1**	**100.0%**

Table 7: Species change over plan period



Graph showing % change in species coverage over the plan period

The increase in broadleaf species shown continues the progress made during the previous plan period where the broadleaf component present was raised from 3.4% of the LMP area to 5.4%. The percentage of broadleaf component will sit at 8.95% by the end of this plan period.

2.6 Access and roading 2021-2031

There are no proposals for new roads in the plan period. There are also no proposed road upgrades. The only work on the existing road network will be ongoing maintenance to ensure all parts of the LMP area are accessible for planned operations.

2.7 Recreation facilities

Current car-parks and waymarked paths will be maintained but no new facilities will be added.

2.8 Departure from UKFS guidelines

The LMP seeks to follow the UKFS in all requirements.

2.9 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 and guidance as well as recent research outputs. A list of these standards and guidance can be found here: Standards and Guidance

In addition Forest Guidance Notes regarding forest operations and specific species, will be adhered to. These can be found here: Forest Guidance Notes

FLS and East region have a full set of national and local policies and plans plus working groups to deal with all major contingencies that may affect the forest during the period of the plan.

2.10 Tolerance table

Please see Appendix III

3.0 EIA screening determination for forestry projects

3.1 Proposed deforestation

There is no proposed deforestation within the plan period.

3.2 Proposed forest road works

There are no roadworks in the period requiring an EIA determination.

3.3 Proposed forest quarries

There are no new quarries or quarry extensions in the plan period requiring an EIA determination.

3.4 Proposed afforestation

There is no proposed afforestation within the plan period. All planting will take place on ground with previous forest cover.

4.0 Introduction

4.1 The existing land holding

Keith woods consists of four separate forest blocks, which lie close to the town of Keith, (grid reference NJ430505). The woodlands are Cairds wood, Dunnyduff, Balloch and Sillyearn. Together the blocks cover a total area of 1478ha.

Cairds wood is 138.3ha and lies about 3km south of Keith at NJ425475. The eastern side of the forest, now designated as LEPO, is shown as woodland on the 1872 Ordnance survey maps for the area with the rest of the block acquired from other landowners in the late 50's. Planting began in 1959 and 1960 and consisted of predominantly conifer plantation with Sitka spruce, Scots pine, Lodgepole pine and larch the main components.

There have been several small scale clearfells within the block since 2009 with most restocking operations consisting of broadleaf planting, however, some areas have also regenerated naturally with Sitka spruce.

Dunnyduff is a small block of 32.4ha which lies around 1.5km south-east of Keith at NJ446496. The majority of the block is designated as PAWS and is shown as woodland on the original OS maps of the area. The remainder of the block as it exists today was planted in 1946. Most of

the commercial planting in the block took place in 1946 and 1958 with the main species planted being Sitka spruce, Scots pine and European larch. There was also a small amount of Norway spruce planting in 1997.

Balloch is the largest block with the LMP area at 1004.2ha, it is situated 4km East of Keith at NJ471490. The 1874 Ordnance Survey map shows that what is now Balloch forest was open moorland, with woodland only occurring at the north of the existing forest. The majority of the planting carried out by the Forestry Commission took place in the 1950's and 60's but small areas are from the 40's and pre-world war two.

The forest has mostly been managed under a clearfell/restock system in the past with some small areas being left open to help restore the moorland habitat at the summit of Meikle Balloch Hill.

Sillyearn is a 303.2ha block of woodland situated 8.5km East of Keith. Like Balloch, the majority of Sillyearn was previously open moorland with conifer planting occurring in the mid-fifties and mid-sixties. There is a small area of 1920's planting and some which also pre-dates this. An area of former agricultural land around Oakenknowes and Stripeside was planted in 2001 and 2002.

Large areas of the woodland were felled to limit the spread of Red-band Needle Blight in 2009, resulting in the majority of the high ground in the block being restocked with conifer mixtures.

More details on the existing physical characteristics and background to the site can be found in Appendix II.

This plan is a revised submission of an earlier plan, approved in 2011.

4.2 Setting and context

All the blocks in the LMP area are situated on prominent hill-tops which rise out of the surrounding farmland and, with high points ranging from 250m to 360m, are highly visible within the local Moray and Aberdeenshire countryside.

Most of the woodland covered by the LMP is also visible from the busy A96 and A95 roads as well as from the main railway running between Aberdeen and Inverness, making landscape impact a key concern.

There is relatively little forest cover in the surrounding area, with the vast majority of the adjacent land utilised for farming. This means that these blocks are an important recreational resource for the local community, in particular for the residents of Keith. Dunnyduff and Balloch both contain long established recreation routes for walking, biking and equestrian activities which are locally well used.

4.3 LMP Presentation

The land holding as a whole will be considered in this LMP but there will be references to the four separate blocks throughout.

5.0 Plan Objectives

5.1 Issues

The main issues to consider in this LMP are:

5.1.1 Cairds Wood

- The block is located adjacent to power supply infrastructure with the potential for further development in the future.
- Some areas identified as being left as open ground in the previous plan have regenerated with dense spruce, leaving limited open space within this block.
- Planted broadleaf areas have significant mixed conifer components.
- Some areas previously identified as suitable for Low Impact Silvicultural System (LISS) management are in exposed locations and showing limited natural regeneration at present.
- Most of block is Long Established (of plantation origin) in SNH Ancient Woodland Inventory.
- Riparian areas have regenerating spruce.

5.1.2 Balloch

- Large area of priority habitat – upland heath present. Some spruce regen encroaching on this area.
- Ponds and wetland priority habitat within block
- Several tributaries to River Isla originate or pass through block
- Well used walking and equestrian routes present
- Main water abstraction point for Keith located within Balloch
- Area of LEPO present in north of block
- Balloch visible in landscape from local A roads and forms a backdrop to Keith – contributing to the landscape setting of the area

5.1.3 Sillyearn

- Part of block designated as LEPO in Ancient Woodland Inventory so LISS should be preferred management system in these areas
- Block prominent in local landscape, clearfell areas are likely to be visible from surrounding area
- Large areas of young larch present across block. If this needs to be removed due to Phytophthora in the future, these areas will potentially return to monoculture spruce
- Felled areas in parts of the block have regenerated well

5.1.4 Dunnyduff

- Entire block to be treated as Ancient Woodland (PAWS)
- High importance locally as recreational resource
- Non-native conifer are regenerating in some previously felled areas
- Significant areas of mature non-native conifer now acting as seed source
- Beech regeneration is suppressing other regeneration in south west of block, although presence of mature beech is adding to appeal and cultural landscape character of this area
- Recent damage to access roads makes haulage and machine access a challenge

5.2 Key Challenges

- How to produce quality timber from blocks high in recreation and environmental value
- How to conduct necessary forest operations without having a detrimental effect on visitor experience
- How to protect priority habitats within LMP area
- How to restore PAWS areas to relevant species effectively, given the current problems with access
- How to manage potential impacts on River Isla catchment
- How to ensure LISS prescription is applied to suitable areas
- How to increase resilience and species diversity within the LMP area
- How to protect priority Red squirrel habitat
- How to conduct felling operations without a detrimental effect on the landscape

5.3 National Spatial Overview

The Forestry and Land Scotland National Spatial Overview includes Keith Woods on the boundary of two zones: Zone 3: Dornoch, Black Isle, North East, Lowland Angus, North Fife and Zone 7: Moray and Aberdeenshire Uplands.

The aims and objectives identified that Zone 3 can best contribute to include:

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

The aims and objectives identified that Zone 7 can best contribute to include:

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

5.4 Management Objectives

5.4.1 Cairds Wood, Balloch, Sillyearn

Objective 1: Ensure that the forest continues to contribute to Region's timber production targets. There are opportunities to produce a significant amount of timber through a combination of clearfell and thinning prescriptions.

Objective 2: Increase resilience of productive conifers by adding more species diversity. Sitka spruce, Scots pine and larch currently make up the vast majority of the species coverage within the LMP area. Opportunity to increase diversity of conifer species to increase resilience against threat from pests and disease while maintaining a future timber resource.

5.4.2 Dunnyduff

Objective 1: Continue conversion of woodland to native species as PAWS restoration. The primary objective for this block is to continue to increase the environmental and biodiversity value by removing non-native conifers and replacing them with native broadleaves while retaining existing Scots pine.

5.4.3 Secondary Objectives for entire LMP area

- **Protect and improve the water environment.** Water quality in the plan areas is currently good, this should be maintained by increasing suitable species coverage in riparian zones and ensuring all operations are carried out in accordance with forest and water guidelines.
- **Maintain current levels of recreational use.** The local population already use the woodlands for recreation, this should be sustained by conducting forest operations sensitively and maintaining current facilities.
- **Maintain Red Squirrel habitat.** Retain suitable species where feasible and increase diversity of conifer species and age class across LMP area.
- **Protect and improve priority habitats.** Upland heath and ponds and wetland priority habitats in Balloch should be protected or expanded where possible.

6.0 Opportunities and Constraints

6.1 Opportunities and Constraints Analysis

The following table details the objectives, opportunities and constraints that have determined the design concept for the Keith Woods LMP.

Objective	Opportunities	Constraints	Concept
Ensure the forest continues to contribute to the region's timber production targets	Several stands are suitable for clear-fell and restock management regimes.	Felling operations are likely to have an impact on recreational use of the forest. Some blocks in LMP area are prominent in landscape	Continue clear-fell operations but ensure close communications with local community and other stakeholders. Ensure felling coupes are planned to be complimentary to the landscape by applying landscape design principles and checking using visualisation software
Increase resilience of productive conifers by adding more species diversity	Some areas suitable for clearfell could be restocked with alternative conifer species	Site conditions may only be suitable for a narrow range of species	Restock sites in suitable areas with alternative conifer species, ensuring they will grow at a productive rate by fully investigating site conditions
Continue conversion of Dunnyduff to native species as PAWS restoration	Opportunity to continue PAWS restoration in Dunnyduff using selective thinnings and restocking where necessary	Mature non-native conifers acting as seed source and regenerating on previously felled areas Large amounts of Beech regeneration in South end of block Recent damage to public access roads means new access may be needed	Continue to target non-native conifers in selective thinnings and remove unsuitable regeneration Beech regeneration to be removed to encourage regeneration of native species Access issues to be discussed and resolved with local council and civils team prior to operations taking place
Protect and improve the water environment	Opportunity to improve riparian habitats around tributaries of River Isla	Several small watercourses have spruce regeneration encroaching on bank	Continue to manage riparian zones by planting suitable, native species adjacent to water courses and removing conifer regeneration

Objective	Opportunities	Constraints	Concept
			All forest operations will be carried out in line with the UK Forestry Standard Water Guidelines as a minimum Any operations carried out near Scottish Water assets will be carried out in accordance with "Guidance on Forest Activities Near SW Assets"
Maintain current levels of recreational use	Locally high number of daily visitors to the woodland, primarily walking dogs and exercising.	Increase in recreational facilities provided is unlikely due to lack of resources.	Continue to maintain current car parking, information boards and waymarked paths, encouraging visitors to continue using woodland.
Maintain Red squirrel habitat	Opportunity to protect and increase existing Red squirrel habitat	Some Red squirrel habitat has reached felling age	Maintain areas of suitable species with LISS prescriptions, ensure continuity of suitable maturing/mature high forest through felling program, restock with suitable red squirrel friendly species where suitable.
Protect and improve priority habitats	Opportunity to expand open ground around upland heath habitat Opportunity to protect established ponds and adjacent wetland habitats	Spruce regeneration occurring on planned open ground at top of Balloch hill Possible shading and non-native regeneration present in priority wetland habitats	Continue felling operations in areas adjacent to upland heath on Balloch hill and remove spruce regeneration. Restock sites adjacent to habitat with less invasive species such as Scots pine and birch. Monitor and ensure any threats are removed – shading. Opportunity to buffer through restock by creating native woodland – wet woodland buffers

6.2 Outcomes/Concept

Please see Map 4: Opportunities and Constraints

7.0 Long Term Land Management Plan Proposals

7.1 Felling

7.1.1 Clearfelling

Please see Map 5: Management for details of which areas are due to be clearfelled within the plan period.

Areas within the LMP which have objectives more focused on commercial benefits will be managed under a clearfell management type, using conventional harvester and forwarder working. 14 coupes are scheduled for clearfell within the plan period (see section 2.2) which constitute around 8% of the plan area.

These clearfell coupes were selected by analyzing a range of different variables. Clearfell coupes are generally programmed to be felled around the time that they reach their maximum annual increment for timber production but the impact on landscape value, recreational use, crop stability and the environment are also considered before felling coupes are designed.

Urea will be applied to stumps as standard in felling coupes which are known to have heterobasidion annosum present to help reduce infection levels.

Clearfelling provides more flexibility for restructuring and adding diversity; the coupes which are due to be felled during the plan period will be restocked using alternative conifer and broadleaf species where possible. However, for some of the felled areas, restocking with more common conifer species ie. Sitka spruce is more likely to successfully achieve the aims of the plan due to the underlying site conditions.

7.1.2 Thinning

Please see Map 6: Thinning Approval for details of which areas will be thinned within the plan period and see table 5 (section 2.3) for the expected volumes.

Wherever possible the region will continue to maximise the area managed through thinning. FLS policy assumes that all productive conifer crops will be thinned. The only exceptions are where:

- Thinning is likely to significantly increase the risk of windblow
- A single thinning operation is likely to require an unacceptably large initial investment in relation to the potential benefits due to access or market considerations;
- Thinning is unlikely to improve poorly stocked or poor quality crops.

There are several areas of young conifer plantation within the plan area which would benefit from thinning as soon as possible, so carrying out thinning activities throughout the area in phase 1 is a priority.
The growth rates within the blocks are good, so they have been placed on a seven year rotation, allowing two thinnings on suitable coupes within the plan period.

All thinning decisions will be guided by Operational Guidance Booklet No 9: "Managing Thinning".

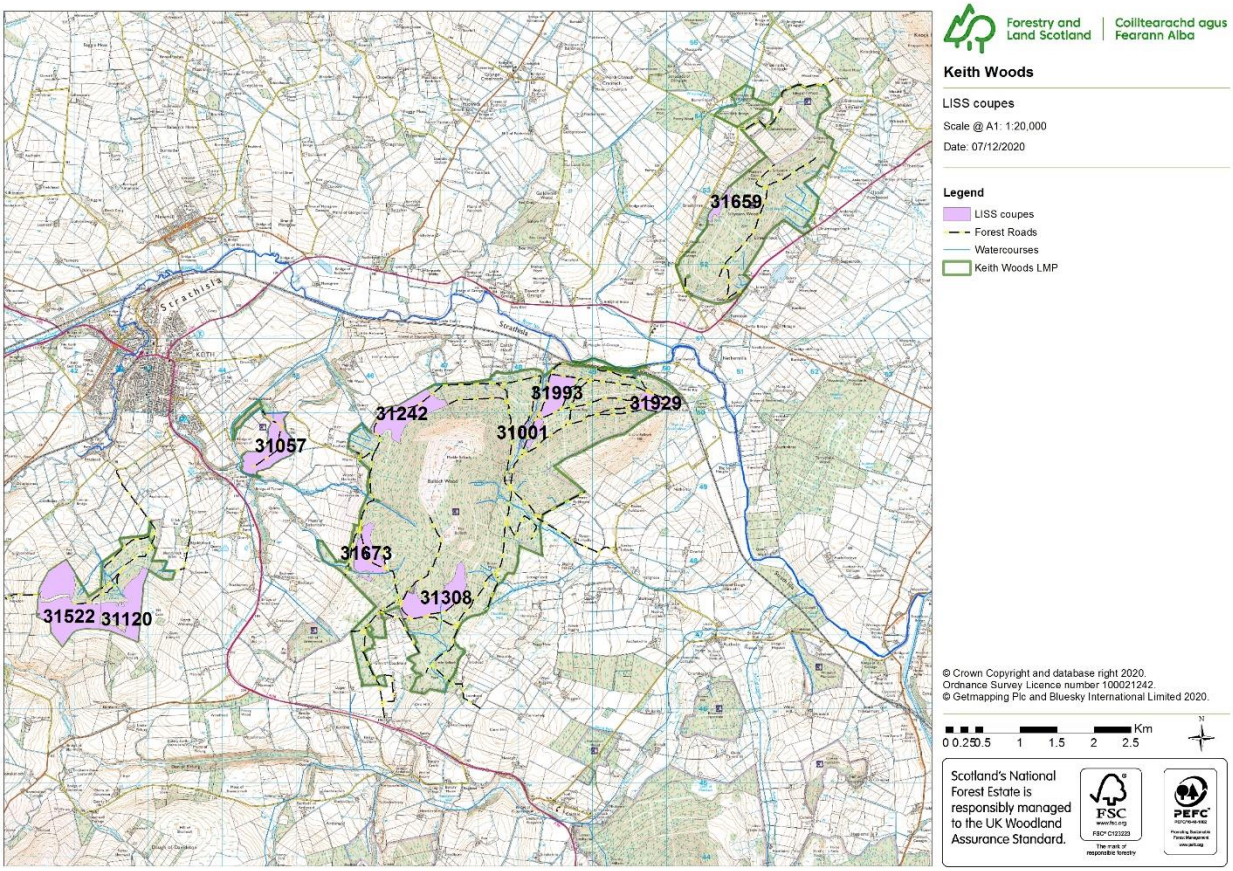
7.1.3 Continuous cover forestry (CCF)/LISS

LISS is defined as a silvicultural system whereby the forest canopy is maintained at one or more levels without clearfelling. Clearfelling is defined as the cutting-down of all trees on an area of more than 2.0ha.

The attraction of LISS lies in the fact that this approach is suited to an era of multi-purpose forestry where environmental, recreational, aesthetic and other objectives are as important as timber production. In particular LISS is seen as a means of reducing the impact of clearfelling and the associated changes that this produces in forest landscapes and habitats. It can also help to create a diverse forest structure which will increase its biodiversity potential. LISS also helps reduce the potential issue of soil erosion and subsequent watercourse siltation.

Within the plan area, the coupes selected for LISS management are in areas where LISS management has been shown to work already or where LISS most suits the objectives for the coupe. For example, areas which have been managed under LISS systems in the previous plan period, stable stands showing strong regeneration potential and stands in high visitor use areas.

Please see **Appendix IV: LISS Prescriptions** for detailed prescriptions of the future management for the coupes shown on the below map.



Keith Woods LISS Coupes

All areas identified for restocking by natural regeneration will be recorded and programmed for inspection on a five yearly basis. At each inspection an assessment will be made to establish whether the natural regeneration has already achieved the objectives for the site, or if it is likely to in the near future. If it is decided that the objectives are not being met, then replanting with an appropriate species will be undertaken. If natural regeneration is occurring but not yet at the required density then the option to review the site in a further five years may be taken. If after two such inspections, that is ten years following felling, it is felt appropriate to wait a further period for natural regeneration then a discussion and agreement will be reached with the Scottish Forestry woodland officer.

Enrichment planting will be used to ensure the target stocking densities of minimum 2500 stems per hectare for conifers and 1600 stems per hectare for broadleaves are achieved if, on inspection, it is thought there is insufficient natural regeneration present to achieve restocking without intervention.

7.1.4 Natural reserves

There are currently no Natural Reserves designated within the LMP area.

7.2 Restocking proposals, future habitats and species

Please see section 2.4 for tables detailing the restock plans for the plan period and Map 9: Restocking phases 1&2, showing the planned restock areas.

The restocking of felled areas is guided by the primary objectives for the plan area, which are to produce a sustainable crop of quality timber and to provide environmental benefits. In order to achieve this, conifers will be planted at a minimum of 2500 trees per hectare and broadleaves at a minimum of 1600 trees per hectare.

The exception to this is in coupes 31456 and 31003 where a Scots pine and Birch 50%/50% mix will be planted at 1600 trees per hectare. These coupes are immediately adjacent to the Upland Heath priority habitat at the top of Balloch Hill and will be planted at graduated densities with the most dense planting taking place adjacent to the productive conifers on the lower slopes at around 3000 trees per hectare, graduating up to around 500 trees per hectare adjacent to the Upland Heath. To aid the monitoring and management of these areas, they will be recorded as separate sub-compartments so that OGB4 surveys can be carried out effectively. In these areas, our deer management policy will be applied as per section 7.6 to assess what deer protection is required. It is likely that tubes will be used to ensure the broadleaf component can be established, particularly in the lower density planting areas. However, if a deer fence is deemed the most suitable choice then this is also a viable option.

The choice of ground preparation for each site will be decided at the operation planning stage by the relevant establishment forester. Ground preparation techniques can vary greatly even across individual sites, so the most up to date advice will be applied at the time of the operation to ensure that soil structure and water quality is preserved whilst also providing an optimal environment for establishment depending on the species and site conditions. Forest and Water Guidelines, UK Forest Standard and UKWAS can all be used to help with the decision making process if required.

Forest Research Information Note ODW 10.01 **Forest Ground Preparation** will be referenced where necessary to help aid in the specific choice applied across any restock sites. The below table is a good indication of what ground preparation techniques will be applied, with the "Best Practice" option the target if possible. The majority of restock operations within the plan period take place on intergrade soils, with Ironpans, Podzols and Brown earths all present so a mixture of scarifying and shallow hinge or inverted mounding will be the most likely ground preparation techniques applied.

Soil Type	Objective	Best Practice	Acceptable Alternative
Brown earths	To create a weed free planting site, to avoid activating the soil seed bank, to provide frost protection especially on flat inland sites with grassy sward and to impose a discipline on the site	Shallow scarification Shallow mounding	Shallow agricultural ploughing for improved grassland Weed control only on freely draining sites

Soil Type	Objective	Best Practice	Acceptable Alternative
Podzols	To achieve a light surface mixing of soil and humus, to break up the compacted horizon or hardpan and provide weed suppression.	Spaced tine ploughing	Deep scarification Shallow agricultural ploughing for lowland podzols Scarification for restock sites
Ironpan soils	To aerate and mix the organic horizon and also to extensively disrupt the compacted horizon and ironpan	Mounding and ripping Spaced tine ploughing Deep scarification (if ironpan is weak or discontinuous)	Mounding or scarification (restock sites that have previously been subsoiled only)
Gley soils (inc surface water gleys and peaty gleys)	To provide a raised planting position and lower water table if possible, creating conditions for symmetrical rooting. Weed suppression and frost protection are also important	Mounding/moling for relatively stone free soils with a loamy texture Mounding/subsoiling for other soils.	Mounding alone is acceptable if slope < 3^{o} or if a restock site **Note:** An open drainage system is usually required on these soils.
Deep peats	To provide a raised planting position and lower the water table if possible	Shallow spaced ploughing Mounding (restock sites only)	Drain mounding **Note:** An open drainage system is usually required on these soils.

Recommended ground preparation techniques based on soil type

For any restock operations with Drinking Water Protected Areas, ground preparation techniques will be discussed and agreed with Scottish Water before any work is carried out.

The species choice for restocking has been guided by the ESC results for this climatic area and soil types (see section II 2.1.1). This has shown that the climate and site conditions make a range of species suitable for restocking. This range will be utilised where possible, provided they will meet the objectives of the plan.

One of the aims of the restocking will be to increase the species diversity within the plan area while also retaining timber productivity. To achieve this, alternative conifer species such as Pacific silver fir will be added and there will be in an increase in the use of productive mixtures such as Scots pine/Birch and Sitka spruce/Douglas fir. This will provide environmental benefits, increase resilience to pests and diseases, and ensure there is a sustainable crop of timber in the future.

FLS is following a chemical reduction strategy. This involves the limiting of chemical application only to occasions when they are essential. To allow this strategy to be followed the Hylobius management support system will be applied and the minimum recommended fallow period

used prior to restocking. This reduced fallow period will also reduce the potential need for herbicide applications to restocked areas.

Restocking and/or planting in PAWS will use native broadleaves of local origin (201/2/3) unless these cannot be sourced within the required time-frame, in which case alternative sources will be discussed with Scottish Forestry. Out with these areas, native broadleaves of local origin such as birch, aspen, oak and willow will be preferred if available. If not available then trees from an alternative origin will be used provided this origin makes them suitable to grow and thrive in the prevailing site conditions. Where Sitka spruce is to be used for restocking, we will endeavour to use improved SS transplants, provided the nursey is able to supply them in sufficient quantities. If appropriate sites present themselves, i.e. good soils, low risk of Hylobius attack and the potential of yield class 14 or higher crops, then VPSS will be used if available. Over and above this, only certified material will be used for species covered by the Forest Reproductive Material Regulations.

7.3 Open land

The intention is that any land identified as "Open" in the plan area will managed to keep tree cover to <10%. Where the land is described as "Open/Successional", regeneration of native species at low densities will be accepted.

At the end of the plan period, the managed open space will total 14% of the plan area.

The most significant area of open land within the LMP area is the Upland Heath area on Balloch Hill.

The restock species around the edge of the Upland Heath priority habitat have been chosen to reduce the amount of non-native conifer regeneration occurring in the future, with Scots pine and birch forming most of the transitional habitat. Please see Map 8: Future Species for the long term composition of the Balloch Hill area. A program of non-native conifer removal will help ensure that only native species will be present in these transitional areas.

There are also two areas of open water with associated open ground surrounding them within Balloch woods, these areas will have conifer regeneration removed from them periodically to maintain an open habitat.

The below table shows details of the priority open habitat zones within the plan area which will require non-native conifer removal within the plan period. This task should be carried out once within each plan phase or every 5 years. The areas quoted are gross figures only, the actual area cleared will vary based on the density and distribution of regeneration and will be decided at the work planning stage.

The presumption is that the areas of Upland Heath conifer removal will be undertaken using the <10cm dbh FPA exemption as the growth is slow in this area and removal occurring regularly. Some of the regeneration around the ponds and wetlands has already grown past this stage so permission for felling will be sought via the thinning area map.

Coupe	Habitat type	Gross area (ha)
31837	Upland Heath	73.1
31360	Upland Heath	8.3
31686	Upland Heath (transition)	2.9
31844	Upland Heath (transition)	11.7
31560	Ponds and Wetland	0.8
31604	Ponds and Wetland	2.9
31342	Ponds and Wetland	10.3

Other areas of open land or riparian habitat with non-native conifer regeneration present at low densities will be cleared as part of the standard 7-year thinning cycle and therefore have been added to thinning permission map.

7.4 Visitor zones, public access and core path

The main visitor zones within the LMP area are at the car parks within each block, primarily at Dunnyduff and Balloch Wood. There is no plan to change the way these are managed within the plan period; all necessary maintenance will continue as normal.

Both Dunnyduff and Balloch Wood have well established recreational routes, with waymarked routes in Balloch. There are also core paths which travel through both of these blocks which will be impacted by thinning and felling operations during the plan period. The relevant local authorities will be notified by the harvesting teams prior to any works commencing and any mitigation measures being put in place, including path reinstatement if required.

Public access will be encouraged throughout the LMP area as per the Land Reform (Scotland) Act 2003.

7.5 Operational access

The existing internal road network allows access to all Phase 1 and 2 coupes and should not require upgrading. However, we will continue to undertake a program of maintenance and post operation repairs.

FLS is an active member of the Timber Transport Group. We will liaise with this group and the local highway authorities to ensure that during felling and timber transport operations other road users are not put at risk. This will include the use of the appropriate traffic control

measures during felling operations adjacent to public roads and the erection of any necessary warning signage.

There has recently been a large amount of damage to the road which runs between the town of Keith and the waterworks exit of Balloch Woods, this road is also the only haulage route from Dunnyduff Woods. Although this does not affect haulage for operations within Balloch Woods as there are alternate routes available, it means no haulage can take place from Dunnyduff and even transporting machines to site to perform the planned thinning operations may be difficult.

It is assumed that the necessary repairs will be carried out to the public road within the LMP period to allow operations to continue in this block, with operations potentially delayed to the 2nd phase of the plan under tolerance table allowances. If necessary, a new access could be created at Dunnyduff, in which case the usual planning process involving liaison with relative third parties, EIA determination and PNOT will be followed.

A minimum of two months consultation prior to haulage operations should be carried out with the local council roads department.

Map 10: Operational Access & Predicted Volume shows the main access points and the volume of timber that will be leaving the forest in each felling phase for the duration of the plan.

7.6 Deer management

Wild deer of the National Forest Estate are managed in accordance with the Scottish Government's strategy "Scotland's Wild Deer: A National Approach" and under the auspices of the Code of Practice on Deer Management.
The strategy and Code of Practice makes recognition of the fact that wild deer are an asset, an integral part of Scotland's biodiversity and provide healthy food and recreational opportunities. The challenge of managing wild deer originates in a need to balance the environmental, economic and deer welfare objectives of the Scottish nation with the objectives of private landowners for forestry, agriculture, sporting and other forms of land use.

The principal legislation governing the management of deer in Scotland and hence on the NFE is the Deer (Scotland) Act 1996.

It is therefore FLS deer policy to:

- Prevent adverse deer impacts on commercial tree crops and the wider habitat. In doing so to carry out deer culling in an exemplary and humane way
- Work closely with relevant organisations and neighbours to make sure that there are integrated deer management plans which seek to recognise the interests of all parties.

- Take opportunities to optimise income from venison from sporting activities where this does not conflict with our primary objective of maintaining deer impacts at an acceptable level, in line with the Quality Meat Scotland accreditation in the form of The Scottish Quality Wild Venison (SQWV) Assurance Scheme.
- Take all practicable steps to slow down the expansion of deer species into areas where they are not currently present.

All deer management will be carried out in accordance with OGB 5 – Deer Management. The aim is to manage deer density safely and humanely at a level which is consistent with acceptable impacts on forests and other habitats. This is likely to be at a density level of 5 deer per 100 hectares.

Deer cull plans are prepared for each Deer Management Unit and are the responsibility of the Wildlife Ranger Management. Deer damage assessments are carried out to evaluate the current density of the deer population and the level of cull required.

Deer fencing has been used within the LMP area in the past to help allow the successful establishment of broadleaves, the decision on future fencing requirements will be taken by the FM forester and WRM in conjunction. Fencing should not be required to establish any conifer components.

7.7 Management of invasive species

At the moment there are no significant issues with invasive species within the LMP area. Should any be identified, suitable measures will be taken to manage and remove them wherever possible.

7.8 Riparian management

Any existing riparian zones within the LMP area will be retained or improved by the introduction of native broadleaf species or management to encourage native broadleaf regeneration, including the removal of non-native conifers in riparian areas.

Riparian restoration will primarily take place as part of the standard felling and restock program in any coupes containing relevant areas, in this plan the coupe with the most riparian planting is 31407 in the gulley in the North of Balloch Woods. Non-native conifer removal will be identified and removed periodically in a separate operation or as part of thinning operations where regeneration has reached a mature size. To ensure the relevant felling permission is in place, riparian areas which are expected to need non-native conifer removal have been added to the thinning areas map.

7.9 Deadwood management

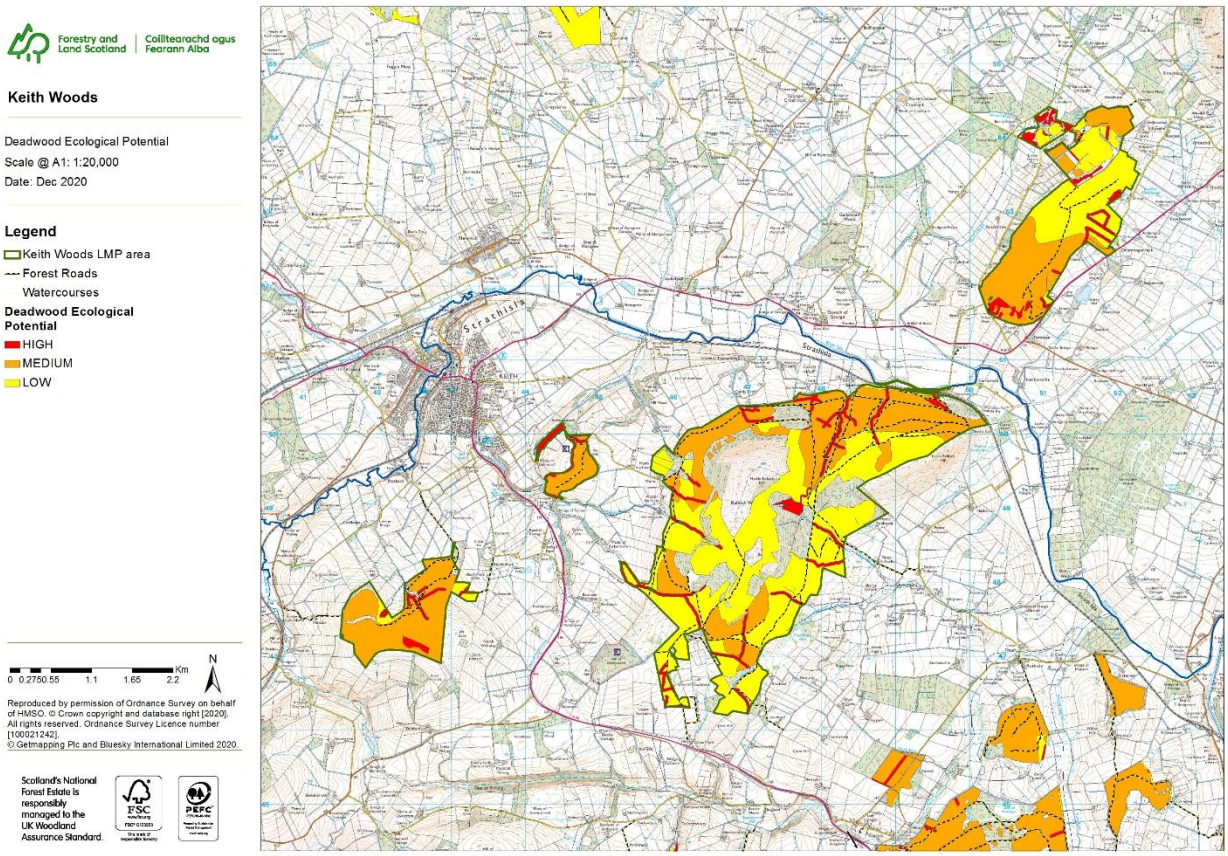
Deadwood will be managed in accordance with the FCS Practice Guide: Managing Deadwood in forests and woodlands (Humphrey & Bailet, 2012) and supplemented by the FLS Guidance note: Deadwood Management – Summary Guidance for FLS Staff (Kortland, 2016).

Key principles applied:

- Retain and create as much deadwood as possible and create new deadwood on a continuing basis
- Retain and create as many kinds of deadwood as possible
- Favour native tree species when creating and retaining deadwood
- Favour the retention and creation of large-diameter deadwood
- Retain and create high stumps and snags (standing deadwood) within woodland and permanent open areas (but not on clear fells that will be restocked)
- Design the distribution of deadwood to maximise connectivity at the woodland management unit and coupe scale, ensuring they are not in obtrusive locations within the landscape

The following map shows the ecological deadwood potential of Keith Woods, based on the following criteria:

Deadwood Ecological Potential (DEP) class	FES woodland management categories included in this DEP class
High	Natural reserves, ancient semi-natural woodlands, native pinewoods, riparian buffers along watercourses, PAWS with high ecological potential, wood pasture
Medium	Minimum intervention areas of broadleaved woodlands, PAWS, LEPOs, long-term retentions, LISS coupes
Low	All other stands (i.e stands where timber production is the priority)



Keith Woods Deadwood Ecological Potential

(DEP) class	Deadwood Management Prescription
High	1. Retain all existing veteran trees and deadwood apart from that which is a health and safety risk or where it would be highly obtrusive in the landscape 2. Retain all wind blow apart from that which is a health and safety risk 3. Deadwood distributed throughout the coupe 4. Seek opportunities to create particularly valuable deadwood e.g. import some large-diameter logs from nearby coupes when they are thinned or clear felled.
Medium	1. Retain all existing veteran trees and deadwood apart from that which is a health and safety risk 2. Only harvest windblow of significant value or which poses a health and safety risk 3. Seek opportunities to create particularly valuable new deadwood e,g when felling big trees, retain some large diameter logs at the edge of the coupe 4. Where windblow is harvested, retain some blown trees in a group as 'future deadwood' where not obtrusive in the landscape
Low	*During thinning* 1. Retain all existing deadwood apart from that which is a health and safety risk

(DEP) class	Deadwood Management Prescription
	2. Take obvious opportunities to create particularly valuable new deadwood e.g. when felling big trees, retain one or two large diameter logs at the edge of the coupe 3. Where wind blow is harvested, take opportunities to retain a few blown trees in a group as 'future deadwood' in a location that will not restrict future operations and that is not obtrusive in the landscape e.g. in the corner of a coupe *During clearfelling* 1. Retain all deadwood and living trees in areas that are uneconomic or too difficult to harvest (e.g. wet, steep or rocky areas) where it is not obtrusive in the landscape 2. Where an obvious opportunity arises, create new deadwood in a location that will not restrict future operations e.g. a pile of logs and brash in the corner or along the edge of a coupe. *Additional notes for Low DEP class areas* 1. Deadwood should only be retained in areas that will not restrict future operations 2. Standing deadwood (snags) should not be retained on clearfells, except in areas that will not restrict future operations and that do not pose a health and safety risk e.g. in the corner of a coupe 3. Large diameter (>20cm) deadwood logs and snags are particularly scarce in the NFE. Take opportunities to retain this kind of deadwood. When harvesting large diameter trees, seek opportunities to retain some standing deadwood, if it is safe to do so, and consider retaining a few large diameter logs on site in a location that will not restrict future operations. 4. Large diameter deadwood from native broadleaves is particularly scarce. When harvesting large diameter native broadleaves, retain standing deadwood, if it is safe to do so, and retain some large diameter logs on site in a location that will not restrict future operations. 5. Deadwood should only be retained in areas which are not deemed to be in obtrusive locations i.e. open hillsides in landscape sensitive areas

7.10 Phytophthora ramorum management

There have not yet been any recorded cases of Phytophthora ramorum within the LMP area, but given the current trend of an eastward progression of the disease it is likely that there will be a case and an associated mandatory felling within the upcoming plan period.

As part of the planning process, areas containing larch have been identified and checked to ensure that there would be no significant issues with access or adjacency, should a Statutory

Plant Health Notice be served within the plan period. In particular, the need for new forest roads which may require a long lead time was investigated.

It was found that, should the need for emergency felling of larch be required, the felling and extraction of timber is feasible at short notice and should be able to be completed with an acceptable impact on landscape and adjacency.

7.11 Long Term Retentions

Please see Map 5: Management.

All LTR areas within the LMP fall under the following categories and will be managed as such:

- Broadleaf planting for environmental or amenity value, including riparian zones, visitor zones or where broadleaf species have been planted to increase biodiversity. These areas will managed under the standard thinning cycle where thinning is needed and are unlikely to be clearfelled in the next 50 years.
- Old growth native species which are being retained to increase the range of age classes within the block and therefore increase the resilience and biodiversity value. These areas will be monitored but should require limited management unless there is an unforeseen windthrow or disease event.

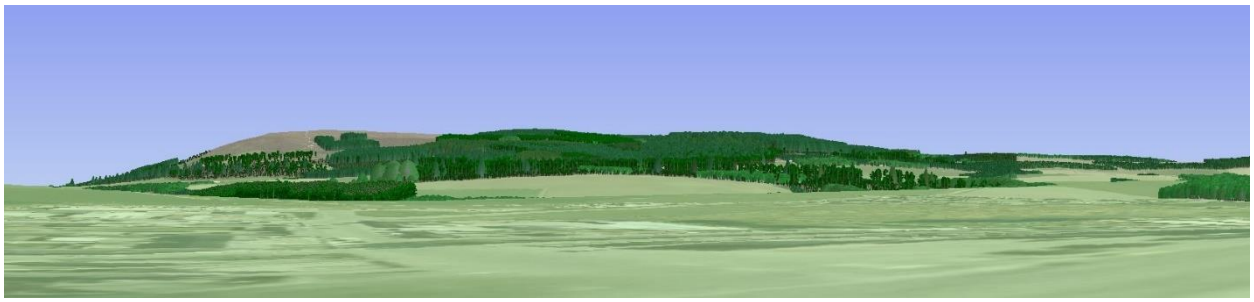
8.0 Critical Success Factors

- Thinning and clearfell operations to be carried out on schedule to ensure timber production targets are met and to avoid adjacency issues.
- Protect and improve water environment during all forestry works.
- Effective deer control over restock sites is imperative to ensure successful establishment.
- Forestry works carried out with protecting recreational use as a priority.
- Access issues to Dunnyduff Wood need to be resolved within plan period

9.0 Visualisations

Please see Map 2: Key Features for the location of each viewpoint selected. The viewpoints were selected by identifying roads or towns where the forest blocks are highly visible by a significant number of people, either resident or travelling through the area. Only operations in Balloch Woods and Sillyearn will change the appearance of the landscape during this LMP period so visualisations have only been created for these blocks. The key for the management coupe visualisations is as displayed below:

9.1 Viewpoint 1: Balloch Woods from Keith town centre (Dunnyduff in foreground)

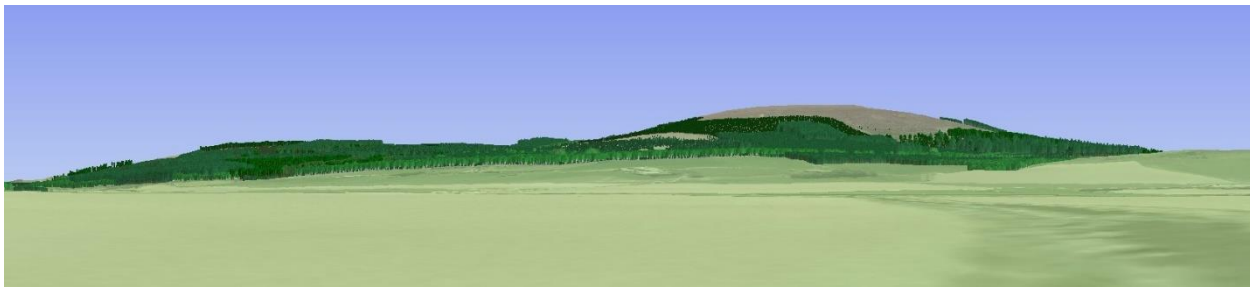


Current view

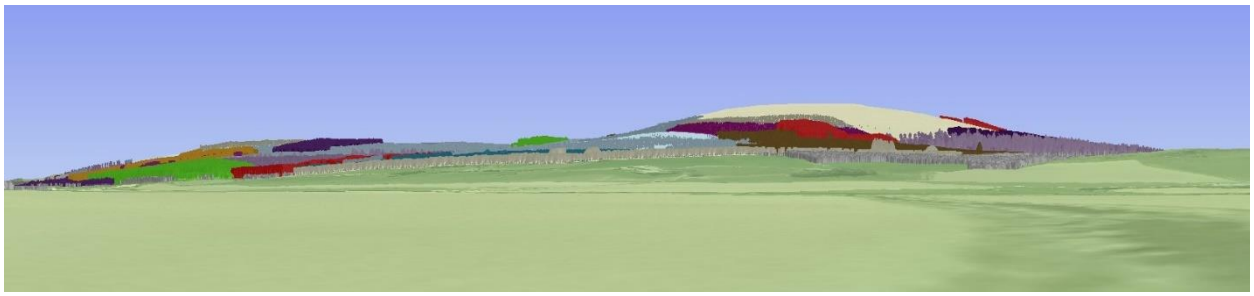
Management proposals

View at end of plan period

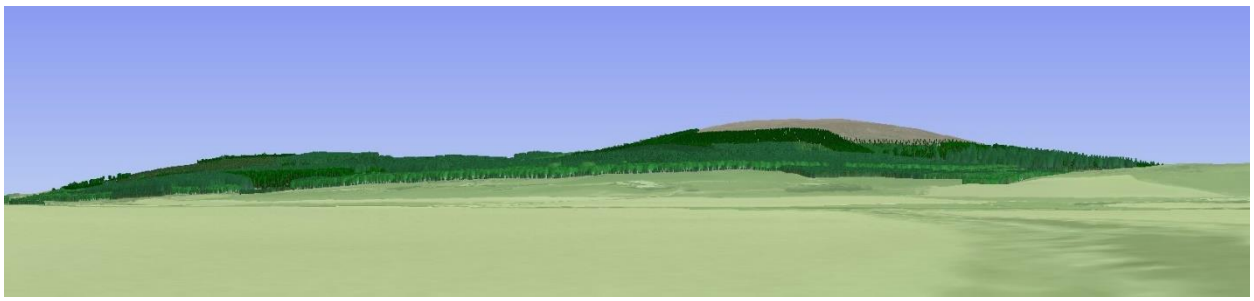
9.2 Viewpoint 2: Balloch Woods looking south from the A95



Current view

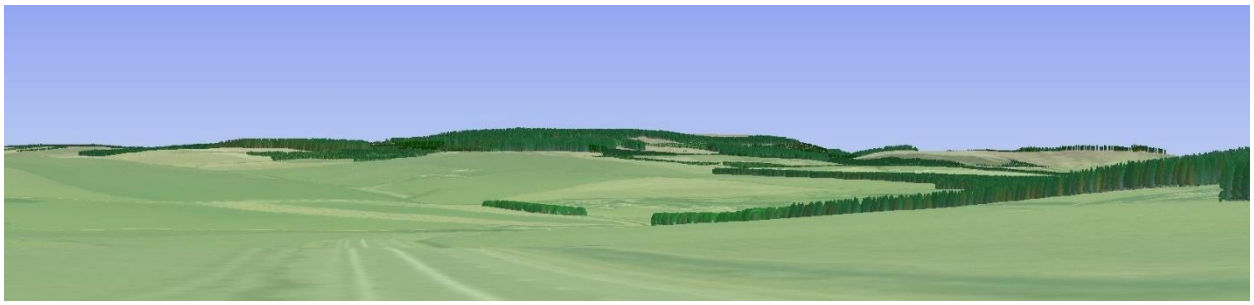


Management proposals

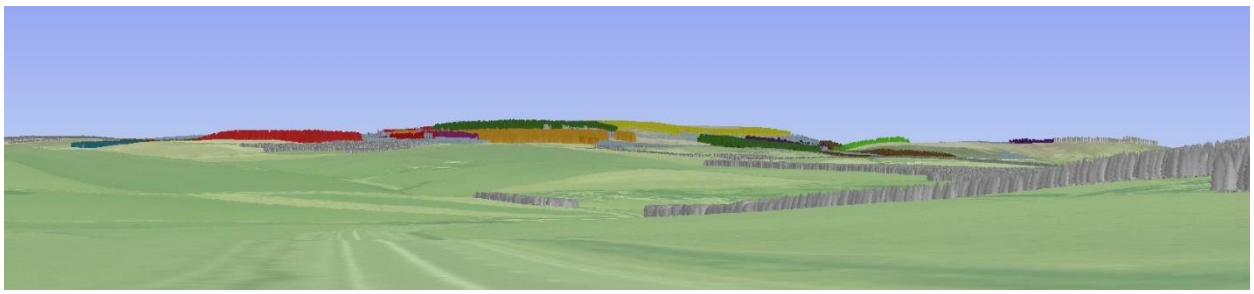


View at end of plan period

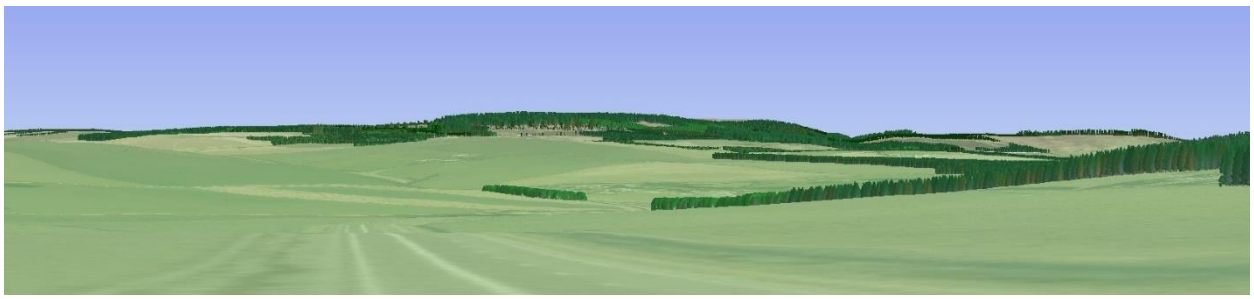
9.3 Viewpoint 3: Balloch Woods looking north from the A96



Current view

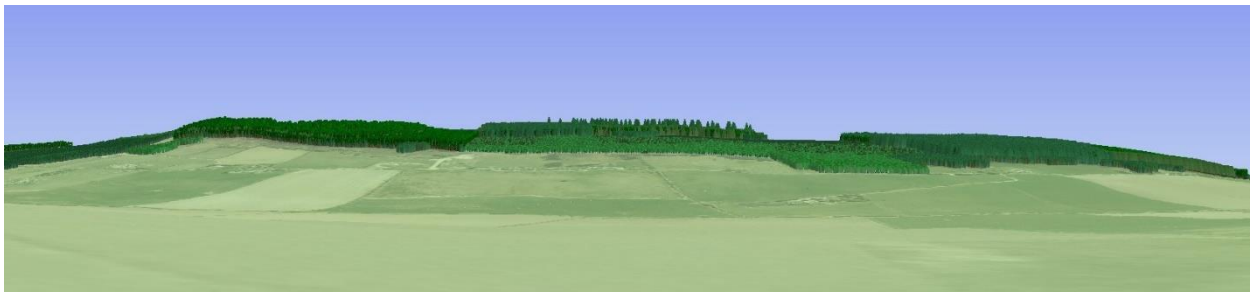


Management proposals

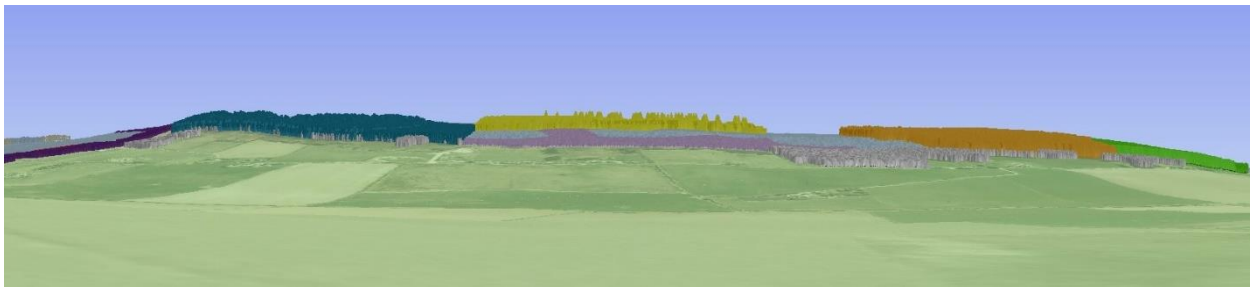


View at end of plan period

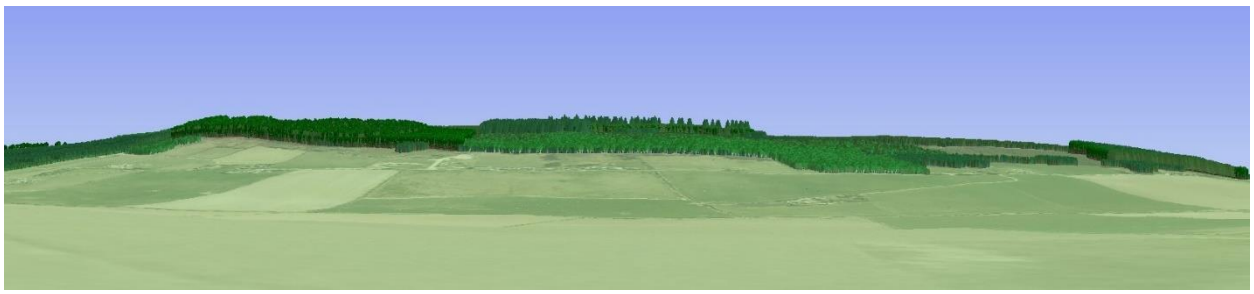
9.4 Sillyearn view from the north-west



Current view



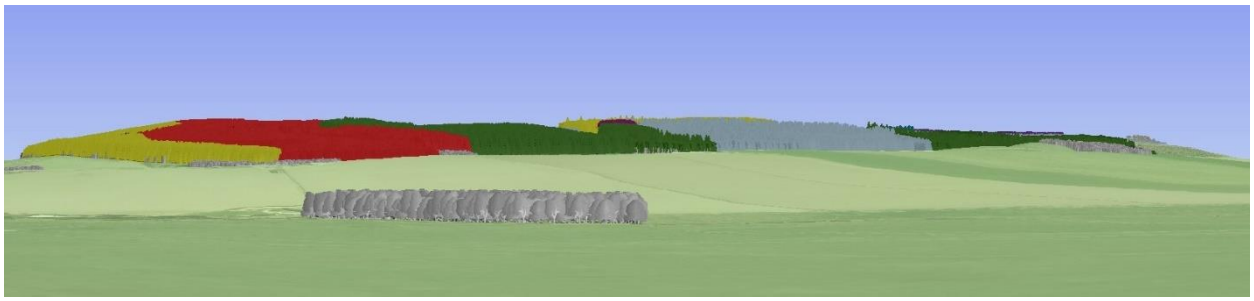
Management proposals



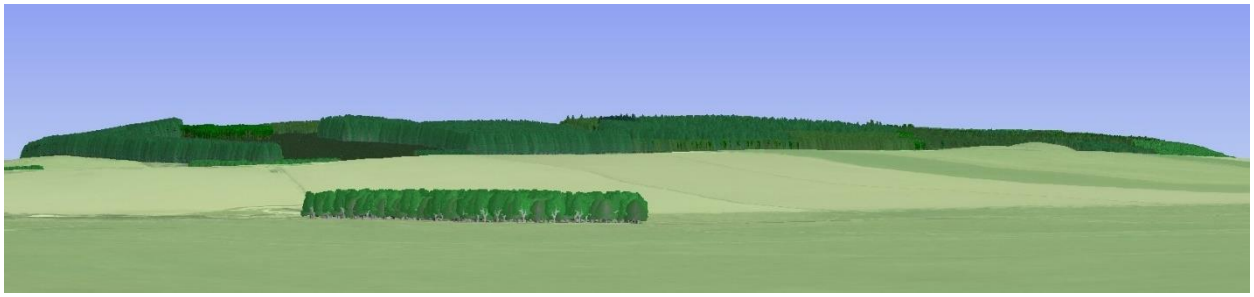
View at end of plan period

9.5 Sillyearn view from the south-east

Current view



Management proposals



View at end of plan period

Appendix I: Land Management Plan Consultation Record

Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
Scottish Forestry	31/08/20	No response	n/a	n/a
Aberdeenshire Council	31/08/20	17/06/21	Response from archaeologist raised following points: • NJ55SW0002 – remains of a prehistoric field system (in part within a thinning approval area), recorded by FC survey by C Shepherd The FC SMR (SIL005) records that at least some features had been previously damaged by forestry, and some cairns were subsequently scarified and replanted. • NJ55SW0003 – King's Cairn, remains of a large probable burial cairn. • NJ55SW0001 – remains of a large cairn. There are also a number of other cairns on Sillyearn Hill, including a small cairnfield on the east side of the hill recorded by FC survey (FC SMR SIL013 (not yet on the HER)), with potential for additional upstanding or buried remains. Given that FC SMR SIL013 is within an area identified for restocking in Phases 1 & 2, and that the FC noted that the full extent of the cairnfield could not be established at the time of survey	-The features mentioned were already present on our constraints layer and confirmed that these features will be visited prior to any forest works being undertaken in the vicinity, the features surveyed and appropriate buffer zones marked on the ground. -The restock operation around FC SMR SIL013 was carried out during the final stages of this approval process, the feature was visited, surveyed and buffer zones applied as per UKFS guidance. No additional features were recorded. - Added additional text to Appendix II: 2.6.3 regarding laws surrounding treasure trove and human remains.

Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
			owing to windblow and undergrowth, we would recommend archaeological survey ahead of restocking to locate and record any features which should be maintained as open ground to inform detailed restocking plans	
Moray Council Roads	31/08/20	06/07/21	- Request for two months minimum consultation for haulage operations - Noted that planned access points for Sillyearn and Cairds Woods may require upgrade for haulage access - "The exit from both Balloch Woods at the Water Treatment Works and the Dunnyduff Wood near Ardiemannoch onto the U44H Auchoynanie Road into Keith is not an agreed timber route and at the time of writing the structural condition of this road, would not sustain any timber traffic movements due to previous extraordinary damage, without significant investment to strengthen this road, currently not budgeted by Moray Council. At present there is also a temporary bridge over the Burn of Drum on the U44H, which is capable of carrying normal C&U traffic, but the original failed structure is not due for replacement in the Moray Council Capital Bridge Replacement programme until 2029/30 at the earliest."	- Request noted and added to **section 7.5** - **A**ccess points will be reviewed at operational planning stage by our civils teams and any maintenance necessary carried out - Text added to **sections 5.1.4, 5.2, 6.1, 7.5 and 8.0** to reflect this constraint and planned mitigations. - Planned haulage volume via waterworks entrance to Balloch Woods diverted to Coachford entrance in the south of the block.

Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
SEPA	31/08/20	28/09/20	- Water quality in area is currently good which should be emphasised in plan - Opportunities to improve riparian and wet habitats should be taken - UKFS Water Guidelines should be followed - Private water supplies and public water supply located in Balloch Woods - Steep slopes and peaty soils increase risk of phosphate and nitrate leaching into water environment. Appropriate mitigation should be prescribed in the plan for any operations with potential to increase leaching or sedimentation in watercourses identified as downslope receptors - Any non-native invasive species in LMP area should be referenced and future management plans provided - Any new tracks or track upgrades should follow all available guidance.	- Addressed in secondary objective "Protect and improve the water environment" **Section 5.4.3** - Addressed in **sections 7.3, 7.8** -Addressed in Opportunities and Constraints table - Water supplies all noted on FLS constraints layer and will be protected during operations - Mitigations for steep slope working will be applied as per current Forest and Water guidelines - Addressed in **Section 7.7** - New tracks will be constructed as per current guidance and prior notification sought where necessary.
NatureScot	31/08/20	No response	n/a	n/a
RSPB	31/08/20	24/09/20	No specific comments	n/a
SSEN	31/08/20	No response	n/a	n/a
HES	31/08/20	02/09/20	No specific comments	Plan will adhere to standard guidance on protecting historic features
Scottish Water	31/08/20	09/09/20	- Drinking Water Protected Area at Herricks entrance in Balloch Woods	- Scottish Water will be consulted 3 months prior, or with as much

Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
			adds several additional considerations to operations in area. - Several water mains and washouts located throughout Balloch Woods - Limehillock Service Reservoir is within Sillyearn boundary - Several water mains run through parts of Dunnyduff	notice as possible, prior to forest operations in any DWPA within plan area. - All water mains, water sources, washouts and reservoirs are noted in FLS constraints layers which is consulted before all operations and mitigations applied as per Forest and Water Guidelines.
Network Rail	24/09/20	No response	n/a	n/a

Non-Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
Forest Research	31/08/20	01/09/20	Experimental plot within LMP area, should be no action required during LMP period	Noted and no operations will be planned in research plot.
CONFOR	31/08/20	No response	n/a	n/a
Saving Scotland's Red Squirrels	31/08/20	No response	n/a	n/a
Native Woodland Ecologist	31/08/20	No response	n/a	n/a
Keith Community Council	31/08/20	06/10/20	Requested: - Plan is complimentary to visual appearance - Natural habitats are maintained - Suitable species are planted - Dialogue with public maintained and recreational access protected	 - Felling coupes and species planned using visualisation software - Natural habitats protected and improved where present - Species choice based on scientific evidence and local knowledge - Public consultation carried out at beginning and end of plan review
Strathisla Community Council	31/08/20	No response	n/a	n/a
Moray Equestrian Access Group	31/08/20	No response	n/a	n/a
The Deveron, Bogie and Isla Rivers Charitable Trust	31/08/20	No response	n/a	n/a
Keith and District Amateur Athletics Club	31/08/20	No response	n/a	n/a
Cycle Grampian	31/08/20	No response	n/a	n/a
In Keith Website	31/08/20	03/09/20	Confirmation link to scoping documents shared on website and Facebook group	n/a
Wild Things	31/08/20	No response	n/a	n/a
Scottish Endurance Riding Club	14/09/20	No response	n/a	n/a
General Public	Documents added to website: 31/08/20	07/09/20 07/09/20 02/10/20	- Request for a bench to be added at existing viewpoint in Dunnyduff - Request for additional access gates at Cairds wood	- Passed to recreation team to consider and plan if necessary - Passed to recreation team to consider and plan if necessary

	Signs placed at car parks and entrances: 04/09/20		-Request for additional seating in waterfall area of Dunnyduff	- Passed to recreation team to consider and plan if necessary

Appendix II: Supporting Information

II/1.0 Analysis of previous plan

1.1.1 Aims of previous plan and achievements

Objectives from the previous plan were as follows:

Objectives	Assessment of objectives met during plan period
Production of a sustainable timber crop	Timber has been produced within the plan period via thinnings and clearfells. Areas have been restocked or are programmed to be restocked.
Management of DNB infected crop	The previous iteration of the LMP was renewed 3 years earlier than required due to the large areas of DNB associated felling required in some of the blocks. This felling has been completed and the areas have been restocked.
Increase area of CCF forestry	The areas now designated as LISS are now greater that they were in the previous plan. The majority of these areas are now showing good indications of an understory developing but some require further thinning to encourage regeneration.
Increase area of open space on hill tops for landscape and habitat benefits	Part of the felled area around Balloch hill will be left open, benefitting the landscape value at the top of the hill and helping to protect the area of upland heath. It was decided that part of the area planned for additional open space should be restocked as there was too much open space in the block already.
PAWS restoration of Dunnyduff woods	Some areas of non-native species have been felled and are regenerating with native species. There is still a significant component of non-native conifer present in the block however, which is producing unwanted regeneration.

1.2.2 How previous plan relates to today's objectives

The objectives of the previous plan were broadly similar to those in the current LMP. The new set of objectives seek to build on and refine the objectives identified in the previous plan.

Managing DNB crops will be much less of a priority in the next plan period due to the extensive felling which took place previously.

II/2.0 Background information

II/2.1 Physical site factors

2.1.1 Geology, Soils and landform

According to the British Geological Survey Geological Map of the UK, Cairds Wood and Dunnyduff are both underlain with bedrock from the Mortlach Graphitic Schist Formation and Corryhabbie Quartzite Formation.

Balloch Wood is almost entirely underlain by the Corryhabbie Quartzite Formation with a small section in the central valley situated on Ailnack Phyllite and Limestone.

Sillyearn is underlain mostly by bedrock of the Durn Hill Quartzite Formation but some of the low lying areas in the North-West and East sides of the block are situated on Fordyce Limestone.

The soils in Cairds wood are comprised mostly of Iron Pan and Podzolic Surface Water Gleys, with some small patches of Typical Brown Earths. Dunnyduff, however, is dominated Podzolic Iron Pan soils with an area of Surface-Water Gley to the East of the block.

In Balloch Woods and Sillyearn, the areas of higher ground consist of Iron Pan and Podzolic Iron Pan soils with lower slopes and valley bottoms composed mostly of Podzolic Surface-Water Gleys. There are also sporadic patches of Podzol, Iron Pan and Brown Earth soils throughout both blocks.

The elevation of the LMP runs from a low point of around 120m in Dunnyduff to 366m at the highest point in Balloch Woods. Cairds Wood, Balloch and Dunnyduff are all situated on prominent peaks in the surrounding area, with forest cover running down the slopes until it reaches agricultural land. There are fairly steep sides and some valleys and gullies present in both Balloch Woods and Sillyearn.

2.1.2 Water

The main watercourse to consider in this LMP area is the River Isla, with nearly all water shed from the forest blocks eventually finding its way there.

Water quality in the area is currently high and there are no high risk flood zones within the LMP area. Focus in this plan should be on maintaining the water-quality and improving riparian areas where possible.

A secondary objective included in this LMP is “Protect and improve the water environment.” This will be achieved firstly by following UKFS Forest and Water Guidelines and the UK woodland assurance standard.

There are several water mains and private water supplies within the LMP area and the main drinking water abstraction point for Keith is located within Balloch Woods. Any operations planned in this area will have adhere to Forest and Water guidelines and consultation with Scottish Water must be undertaken before any groundworks are started.

In addition to this, any historic drains connected to watercourses will be disconnected as best practice during any forest operations in this LMP period.

2.1.3 Climate

The climate data for this area has been obtained from the Ecological Site Classification System and is displayed below.

Forest Block	Accumulated Temperature	Exposure (DAMS)	Moisture Deficit
Cairds Wood	937-998	14-17	73-92
Balloch Wood	864-1100	10-18	54-108
Dunnyduff	1069-1099	11-13	100-109
Sillyearn	1022	11-14	94-115

Accumulated Temperature is the accumulated total of the day degrees above the growth threshold temperature of 5^{o}C, which provides a convenient measure of summer warmth.

DAMS is the Detailed Aspect Method of Scoring. This represents the amount of physically damaging wind that forest stands experience in the year.

Moisture Deficit reflects the balance between potential evaporation and rainfall and therefore emphasises the dryness of the growing season.

The high range of vales recorded in Balloch reflects the variation present within the block; from upland heath at the top of Balloch hill to sheltered valley bottoms in other areas

II/2.2 The existing forest

2.2.1 Age structure, species and yield class

The species breakdown for the LMP area can be found below.

Species	Area (ha)	Percentage
Sitka spruce	597	40.39%
Scots pine	228.2	15.44%
Hybrid larch	108.7	7.35%
Japanese larch	51.6	3.49%
Lodgepole pine	38.9	2.63%
Norway spruce	37.6	2.54%
Birch	53.6	3.63%
European larch	20.7	1.40%
Alder	7.7	0.52%
Mountain pine	6.8	0.46%
Rowan	3.4	0.23%
Oak	2.2	0.15%
Beech	1.2	0.08%
Douglas Fir	0.5	0.03%
Mixed Broadleaves	11.2	0.76%
Mixed Conifers	30.2	2.04%
Open	204.5	13.85%
Felled	74.1	5.01%
Total	**1478.1**	**100.0%**

The age structure ranges from a few coupes planted at the turn of the century and 1920's which predate forestry commission planting, to first rotation conifer plantation planted in the 1950's and 60s. There has also been a significant amount of restocking and planting recently, with 27% of the forest cover being planted in the last 20 years. Please see table 4, section 2.2 for further details on the current age class composition.

The current yield class composition is shown below:

Yield Class	Percentage
24	1.4%
22	1.0%
20	2.5%
18	4.9%
16	7.0%
14	17.2%
12	16.7%
10	20.7%
8	13.5%
6	11.6%
4	2.8%
2	0.7%

2.2.2 Access

The existing road network should be sufficient for all timber extraction required during the plan period, there may however be some work required in terms of clearing and re-instating existing roads. This not expected to require any road construction.

2.2.3 LISS potential

LISS is defined as "Use of silvicultural system whereby the forest canopy is maintained at one or more levels without clearfell of areas over 2.0 ha".

All blocks have areas suitable for LISS systems with the exception of the highest points, which have DAMS scores of 14 to 18, marking them as moderately exposed. For this reason, most areas designated for LISS management are on lower slopes or where a very stable crop is already present.

2.2.4 Thinning potential

All areas within the LMP have the potential to be thinned. The exact prescription will vary between species and the objectives for each coupe.

II/2.3 Land use

2.3.1 Neighbouring land use

The vast majority of the neighbouring land use is agriculture, with a combination of cattle, sheep, and crops all present on adjacent land.

Adjacent to Cairds Wood is a large electricity substation and a water treatment plant is located next to the main recreational access to Balloch Woods. There is also a section of Balloch Wood where the railway line between Inverness and Aberdeen forms the boundary to the land owned by FLS.

There are some small areas of privately owned woodland and which share a boundary with Sillyearn and Balloch. Associated with these bits of woodland, some houses have small areas of land which also have shared boundaries with parts of Sillyearn.

II/2.4 Biodiversity and environmental designations

2.4.1 Designations

PAWS & LEPO – Dunnyduff is a plantation on ancient woodland site which is currently conifer plantation managed as LISS to favour native broadleaf and conifer, reducing the non-native element at each intervention. There is a further area that appears on the ancient woodland inventory as "Other" on Roy Maps, which was planted with mixed broadleaves in 2004. Further areas of LEPO are present across the LMP area as per Map 2: Key features.

2.4.2 Habitats and species

There are some areas of Upland Heath on the top of Balloch Hill and a number ponds and wetlands, also primarily situated in Balloch Woods.

There are a number of key Scottish Biodiversity Action Plan and FLS 6 key species recorded in Keith Woods LMP area, including red squirrels and numerous badger setts. There are also a number of woodland raptors recorded in the blocks and Ospreys are regular seasonal visitors.

Herb paris is recorded in Dunnyduff.

2.4.3 Riparian habitat

A number of watercourses across the plan area are tributaries to the River Isla and water quality is good, but there is currently only a limited amount of valuable riparian habitat within the LMP area. The LMP includes plans to add and improve riparian habitat going forward.

2.4.4 Invasive species

No invasive species present

2.4.5 Pests and diseases

Although heavily affected by DNB and the associated felling in the previous plan period, DNB is not as pertinent an issue going forward although the planting of susceptible species such and Corsican and Lodgepole pines will be avoided as a precaution. There is, however, an ongoing DNB tree health survey which covers all areas containing a large pine component. These coupes are surveyed every 3 years and the data collected is used to inform the felling program if there is a significant decline in tree health detected.

There is a presence of Ash dieback in some areas of the LMP but current guidance is only to fell infected Ash where it poses a risk to the public so no widespread remedial works should be necessary. There is however, a 1ha patch of young Ash within Sillyearn which is unlikely to survive, and should be felled and restocked with an alternative species within the upcoming plan period.

There is Peridernim pini present in without the woods although not at problematic levels. Any pine which show symptoms of this disease will be identified at the initial felling survey and felled during standard thinning operations

II/2.5 Landscape

2.5.1 Landscape character

Under the SNH Landscape Character Assessment, Cairds Wood, Dunnyduff and Sillyearn all fall into the designation of **Upland Farmland** while Balloch Wood is classed as **Farmed Moorland Edge**.

The **Upland Farmland** landscape character type in Moray is represented by one area of mid-elevation, coastal uplands, to the north-east of the Spey. The Key characteristics of this area are described below:

- Broad shallow valleys.
- Large scale, open landscape with a simple vegetation pattern.
- Predominance of farming in valleys and the central basin.
- Backdrop to farmland provided by the *Low Forested Hills,* with steeper north and western sides and shallow southern and eastern slopes, covered with extensive conifer forests, and simple, undulating skyline.
- Broad, sweeping, rectilinear fields of the central farmland, interspersed with patches of smaller fields, peaty soils, marginal pastures and small plantations.
- Relatively well settled farmland area, with an even distribution of farms accessed by a network of rural roads.
- Small farmsteads often partially enclosed by isolated woodland pockets.
- Views from top areas to Cairngorms and higher moorland edges to south, and to east across Buchan plain.
- Limited visual diversity.

The **Farmed Moorland Edge – Aberdeenshire** landscape character type lies on the edge of higher moorland summits and plateau, forming a transition between these upland areas and the lowland agricultural heartlands of Aberdeenshire. The key characteristics of this area are listed below:

- Low rolling hills and valleys with some rocky ridges on higher slopes.
- Dark heather-clad and forested hills often form the backdrop to these upland fringe areas.
- Areas of moorland are interspersed with farmland on higher slopes.
- Marginal upland farming, sheep grazing and patches of gorse scrub, birch and willow occurs at the transition with the uplands.
- More intensive farmland is present on softly rolling ground..
- Areas of waterlogged ground and small bogs in places, particularly at the transition with moorland or in wetter valley bottoms.
- Scrubby patches of birch, willow and Scots pine occur in more marginal areas.
- Clumps of broadleaf trees and shelterbelts pattern farmed lower slopes.
- Mixed policy-influenced plantings more common in some areas. .
- Farm buildings of grey/brown stone are often marked by clumps of trees.
- Derelict buildings are particularly evident on marginal upland areas.
- Prehistoric monuments and artefacts, including stone circles, carved stone balls and souterrains.
- Strong sense of history and culture, giving the landscape a timeless character.

2.5.2 Landscape designations

The Keith Woods LMP area is not located within any nationally designated landscape areas; it is, however, located with a Local Landscape Area which means the scenery is highly valued locally and has been given a local designation. For this reason, considerations on the effect of felling and restock operations on the landscape are an important consideration for the upcoming plan period.

2.5.3 Visibility

Cairds Wood, Balloch and Sillyearn are all located on prominent hilltops in the area, will Balloch woods in particular very visible for the inhabitants of Keith. Cairds Wood is also readily visible for anyone travelling along the A96, as is Dunnyduff, although to a lesser extent.

The A95, connecting Keith to the coast, runs directly past Sillyearn and alongside the western side of Balloch woods so there are multiple viewpoints to be considered for Balloch Woods specifically. These viewpoints are marked on Map 2: Key Features, and were used to generate the visualisations in Section 9.

II/2.6 Social factors

2.6.1 Recreation

Both Dunnyduff and Balloch Wood have well established recreational routes, with waymarked routes in Balloch. There are also core paths which travel through both of these blocks. These blocks are widely used by the local population with various equestrian and running clubs using the forests regularly.

Please see Map 2: Key features for details on existing recreation routes.

In Cairds Wood and Sillyearn, recreation is more limited to local residents using the blocks for dog walking and exercise, with no waymarked routes or official car parks present. Further detail on how recreation provisions will be protected can be found in section 7.4.

2.6.2 Community

The main communities making use of the blocks in the LMP area are the residents of Keith, the surrounding villages and scattered areas of housing and farms.

There is evidence that people travel from slightly further afield in Moray and Aberdeenshire to make use of the walking and equestrian routes present in Balloch Woods, centered around Balloch Hill.

2.6.3 Heritage

There are no scheduled monuments in the Keith Woods area. There are, however, a number of unscheduled monuments, including boundary stones, clearance cairns and enclosures. In Dunnyduff, there is an area of field systems, a large cairn and a couple of hut circles.

All of these features appear on the FLS database, which is updated regularly at a national level, and will be protected during any forest operations.

Any new findings will be reported to the regional archaeologist as standard.

Given its archaeological sensitivity, for the wider area of Sillyearn Hill/Edingight Wood in particular (but as generally applies), those working on the ground should be aware the legal requirements in Scotland:

- There is a legal requirement in Scotland under the laws of bona vacantia, to report any objects/artefacts found to the Treasure Trove Unit. We would also ask that the Service is also notified as regional archaeologists for the Aberdeenshire area.
- There is a legal requirement in Scotland to notify the Police if human remains are uncovered. In this event, please also contact ourselves at the Archaeology Service.

II/2.7 Statutory requirements and key external policies

The legal status of the land is purchased.

The forest plan is in accordance with the guidance supplied in:

- UK Forestry Standard
- UK Woodland Assurance Scheme
- Scotland's Forest Strategy 2019-2029
- FLS Corporate Strategy

Appendix III: Tolerance Table

	Adjustment to Felling period	Adjustment to felling coupe boundaries	Timing of restocking	Change to species	Changes to roadlines	Designed open space	Windblow Clearance
FC Approval not normally required	Fell date can be moved within 5 year period and between phase 1 and phase 2 felling periods where separation or other constraints are met	Up to 10 % of coupe area	Normally up to 2 planting seasons after felling. Where hylobius levels are high up to four planting seasons after felling subject to the wider forest and habitat structure not being significantly compromised.	Change within species group e.g. conifers, broadleaves.		Increase by up to 5% of coupe area	
Approval by exchange of letters and map		Up to 15 % of coupe area	Between 2 and 5 planting seasons after felling subject to the wider forest and habitat structure not being significantly compromised.		Additional felling of trees not agreed in plan Departures of more than 60m in either direction from centre line of road.	Increase by up to 10%. Any reduction in open ground within coupe area.	Up to 5 ha
Approval by formal plan amendment may be required	Advanced felling (phase 3 or beyond) into current or 2nd 5 year period	More than 15% of coupe area	More than 5 planting seasons after felling subject to the wider forest and habitat structure not being significantly compromised.	Change from specified native species. Change between species group.	As above depending on sensitivity.	More than 10% of coupe area. Colonisation of open areas agreed as critical.	More than 5 ha

Appendix IV: LISS Prescriptions

Coupe ref.	Management Type and area	Management objective/Reason for selection	Long-term structure and desirable species	Regeneration and ground flora	Observations (e.g. likely barriers to achieving objective)	Next treatment required	Other useful information
31001	Uniform Shelterwood 2.1ha	Riparian area, regeneration of MB and MC present currently	Native broadleaf, mixed age woodland comprising of suitable riparian species	SS, SP, CAR, BI, ROW, Wild Cherry	Continued SS regeneration, Deer pressure	Non-native conifer removal	
31057	Uniform Shelterwood/Single Tree Selection 27.3ha	PAWS restoration	Native upland oak/birch. NVC W11 and W17 with small patches of W9 and W7	SS, BI, ROW in previously felled areas. ROW, BI, SP under canopy. Heather, grasses, bracken in places	Non-native conifer regen, BE regen, deer pressure, high public use	Single tree selection of seed bearing SS/NS, uniform thinning of SP, Larch areas	Hand removal of BE regen in SW of block required ASAP.
31120	Uniform Shelterwood 28.3ha	Stable, mature crop, productive timber achievable through thinnings	SP/BI W18 woodland	SP, Larch, LP, SS. Predominantly heathery ground cover	SS, Larch regeneration. Deer pressure. Light availability	Uniform thin, targeting larch in mixed species areas	SP underplanting may be required in future interventions
31242	Uniform Shelterwood 28.9ha	Pine/larch area, stable crop, good access.	SP/BI W18 Woodland	SP, Larch, BI, SS. Heathers and grasses	SS regen, Larch regen, deer pressure	Uniform thin, opening canopy, targeting large and other non-native conifers	
31308	Uniform Shelterwood 27.5ha	Predominantly larch area, stable crop, good access, more thinning required	SP/Bi W18 woodland	Limited regeneration at present due to lack of light	Dense canopy in areas, deer pressure, SS regen	Uniform thin to open canopy to encourage SP regeneration	If Phytophtora infection occurs in block, this area may need to be clearfelled. Felling in adjacent blocks may need reviewed.

31522	Uniform Shelterwood 50.4ha	Stable SS crop, with good access. Regeneration present in areas with open canopy	Productive SS crop achieved through uniform thinning and nat regen	SS, LP regeneration present where canopy is more open	Couple of areas where stability may become an issue, to be monitored after next intervention	Uniform thin, targeting pine species at first intervention	
31659	Uniform Shelterwood 4.9ha	Dense SS/BI natural regeneration area.	BI/MB crop at productive density.	Grasses, rushes, BI, MC regen	Some areas of wet ground may cause access issues for machines, manual felling may be required	Remove all spruce component at first intervention	
31673	Uniform Shelterwood 18ha	Stable SP crop, good access	SP W18 Woodland	Currently SS understory developing	SS regen, need for more light, SP not producing much seed yet	Uniform crown thin SP at 1st intervention, Felling of SS understory at 2nd	It is hoped that after a crown thin and subsequent removal of SS understory at 2nd rotation, conditions will be favourable for SP/BI regen
31929	Uniform Shelterwood 10.4ha	Relatively old SP crop, stable, good access	SP W18 woodland	SS, SP, Larch, BI. Predominantly heather ground flora	SS and larch regen, deer pressure	Uniform crown thin favouring SS in fell out	
31993	Uniform Shelterwood 19.7ha	Stable, relatively old crop, good access	Majority SP woodland where SP already forms canopy. NS in patch at south of coupe	SP, BI, ROW, SS. Heather, blueberry, grasses	SS regen, deer pressure.	Uniform crown thin, target LP and SS in mixed areas	