Forestry and Land Scotland
Coilltearachd agus Fearann Alba

South East Fife Woods Land Management Plan 2025 – 2035

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.

FSC
www.fsc.org
FSC® C123223
The mark of responsible forestry

PEFC
PEFC/16-40-1002
Promoting Sustainable Forest Management
www.pefc.org

Table of Contents

(Appendices (I to VI) and Maps (M1 to M15) attached separately.)

Version History (LMP Text)

Version	Date	Comments
v1	15.11.2024	Initial draft LMP for internal consultation.
v1.1	22.11.2024	Revised draft LMP for internal consultation following initial Planning Manager feedback.
v1.2	10.01.2024	Updated text following internal review.
v1.3	26.02.2024	Text updated for accessibility.
v1.4	26.02.2024	Table of contents updated and corrected volume information in section C2.3.

A Description of Woodlands

A.1 Property Details

A.1 Property Details			
Property Name:	Forestry and Land Scotland – South East Fife Woods (Benarty, Pitcairn, Cardenden, and Cullaloe Forest Blocks)		
Business Reference Number:	N/A	Main Location Code:	N/A
Grid Reference: (e.g. NH 234 567)	NT 1652 9761 NT 1961 9635 NT 2256 9356 NT 1832 8852	Nearest town or locality:	Lochgelly
Local Authority:		Fife Council	
LMP Plan area (hectares):		420.10	

Owner's Details			
Title:		Forename:	
Surname:			
Organisation:	Forestry and Land Scotland	Position:	Central Region
Primary Contact Number:	0300 067 6600	Alternative Contact Number:	N/A
Email:	enquiries.central@forestryandland.gov.scot		
Address:	Five Sisters House, Five Sisters Business Park, West Calder, West Lothian		
Postcode:	EH55 8PN	Country:	Scotland

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

Declaration

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

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

I have read and understand Scottish Forestry's Privacy Notice, a copy of which is available at https://forestry.gov.scot/privacy-complaints-freedom-of-information-and-requests-for-information

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

Signed:		Print:		Date:	

A.2 Location and Background

The South East Fife Land Management Plan (LMP) covers the four Forestry and Land Scotland landholdings of Benarty, Pitcairn, Cardenden, and Cullaloe, located between Loch Leven and the Firth of Forth. Collectively, these sites cover 420.10ha and are the most easterly located sites managed by FLS Central Region.

The northernmost site, Benarty (59.53ha), occupies part of the south and east facing slopes of Benarty Hill between Loch Leven and Loch Ore and is directly adjacent to the settlement of Ballingry to the east. Main entrance: NT 1669 9741

Pitcairn (91.21ha) lies roughly 1.7km south-east from Benarty, on a reformed hill south of Westfield. The settlements of Lochore and Auchterderran are located to the north-west and south-east respectively, but do not directly border the site. Main Entrance: NT 2034 9732

Cardenden (234.29ha), including South Dundonald, is situated roughly 2km to the south-east of Pitcairn, and is bisected by the A92 trunk road. This site shares a significant boundary with the village of Cardenden and is relatively close to the settlements of Kirkcaldy and Lochgelly, located respectively to the east and west of this block. Main Entrance: NT 2331 9318

Cullaloe (35.06ha) is relatively isolated from the other sites in this Land Management Plan, being located in the Cullaloe Hills approximately 4.5km south-west of Cardenden, approximately halfway between Cowdenbeath and Aberdour. Main entrance: NT 1872 8902

See map **M1** Location.

A.3 Existing Schemes & Permissions

Table: Existing Schemes & Permissions

Type (e.g. Felling Permission)	Ref. No.	Details
Forest Plan	032/14/03	Fife Woods Forest Enterprise Design Plan 2015-2025 (active)
Forest Plan	032/12/01	Pitcairn and South Dundonald Farms Forest Design Plan 2013-2023 (expired)

A.4 Stakeholder Engagement

Table: Stakeholder Engagement Summary	
Scoping – Main Points	**LMP Reference (section/page):**
Public access and green networks The woodlands are highly valued for local access and contain a range of designated and undesignated routes, which should be protected; and route diversions provided during operations.	**A5**, **A6.7**, **B1**, C2.5, **C2.6**, C2.7 **C12**
Native and LEPO woodland habitats The value of LEPO woodland habitats should be specifically noted and these should be managed accordingly.	**A5**, **A6.9**, **B1**, C2.2, C2.3, C2.4, C2.7, **C2.14**
Wildlife The woodlands contain a variety of wildlife of conservation interest which should be protected.	**A5**, **B1**, **A6.9**, C2.4, **C2.14**
Flooding (Ballingry) Flooding of property in Ballingry has been attributed to previous felling operations – although other causes are more likely.	**A6.4**, **B1**, **C2.8**
Road upgrades and timber haulage The poor condition of the U018 at Ballingry should be noted, and the impact/benefits of forest road upgrades or new roads on public access should be considered. Haulage from all blocks will exit onto timber transport consultation routes and require consultation with the Local Authority. All haulage should adhere to relevant guidelines.	B1, **C2.11**

A full record of comments raised during public consultation is available in Appendix I.

A.5 Long Term Vision and Management Objectives

The long-term aim for these woodlands is to maintain their function as key components of Fife's Green Network, providing amenity, recreational and biodiversity value; but also contributing a sustainable supply of timber and other products, helping to achieve financial sustainability and a lower carbon economy. The ambition is to manage these areas primarily under Low-impact Silvicultural Systems (LISS), where suitable, although areas of clearfelling will be still required due to issues such as tree health and stand stability.

Management Objectives		
No.	**Objectives (including environmental, economic and social considerations)**	**Indicator of objective being met**
1	Maintain attractive woodland settings which provide amenity, landscape and recreation value in the context of local green networks.	Local assessment by FLS Staff, feedback from communities. Diversity of species within forest.
2	Continue to produce a range of products which support positive management, financial sustainability, and the rural economy.	Stocking density and stem quality in productive areas. Active woodland management and suitable volume outputs.
3	Maintain and enhance habitat quality where possible; including native woodlands and areas benefiting priority species such as red squirrel.	Population estimates, site observation and environment records. Woodland condition and proportion of native species.
4	Prepare for threats posed by tree pests and diseases such as *Phytophthora ramorum*, and improve woodland resilience (e.g. to windblow).	Risks identified in LMP and prompt planning/delivery response to emerging issues.
5	Establish new areas of productive woodland which will contribute to long-term carbon sequestration and a low-carbon economy.	Areas of productive and native woodland established as per plan and achieving suitable yield class.

A record of progress against the previous LMP objectives is recorded in Appendix II.

A.6 General Site Description

A.6.1 Topography

Elevation within the LMP area ranges from c.80m in the Carden Den to around 300m on the shoulder of Benarty Hill. Although collectively these sites straddle four separate 'Landscape Character Types' (NatureScot/Scottish Natural Heritage), they can be broadly divided between the more remote and naturalistic upland landscapes of Benarty and Cullaloe, and the more heavily settled and modified lowland landscapes of Cardenden and Pitcairn.

Benarty occupies the southern and eastern flanks of Benarty Hill, with some steep slopes and crags, particularly on the southern aspect, but generally becoming more gently sloped further down and elevation rising from 160m at Benarty Village to over 300m on the northern shoulder of Benarty Hill.

Pitcairn occupies a reformed natural hill (of 100m to 145m in height), associated with late 20th century open-cast mining. This has given the site an almost entirely manmade profile with a straight ridgeline running south-west to north-east and highly uniform, moderately steep, slopes to the north and south. The 'Four Sevens' shelterbelts which divide the hill contribute to this manmade influence and are considered a local landmark.

A.6.2 Geology and Soils

Bedrock geology comprises a mix of igneous and sedimentary rock types, with igneous microgabbro and quartz-microgabbro occurring at Benarty, Cullaloe and the Sunnyside Plantation (Cardenden). Limestone formations are the major bedrock types at Cardenden and Pitcairn; including limestone coal formations which have seen extensive historic mining. Glacial till is the main superficial deposit, although peats and sand, gravel and silt are also present (British Geological Survey). Superficial geological deposits are not recorded at Benarty, on the Sunnyside ridge at Cardenden, or in parts of Cullaloe, where bedrock is closer to the surface; and are also largely absent in parts of the Carden Den.

Soils are varied within and between all four blocks, and generally reflect the underlying geology. Typically, basic brown earths occur over igneous bedrock, and gleyed soils over limestone and till. At Benarty the predominant soil type is basic brown earth (1d), which is recorded as slightly dry and of medium nutrition levels (ESC SMR and SNR), with a smaller area of gleyed soil on

more gently sloping land to the north. At Pitcairn the main soil types are recorded as surface water gleys (7) or gleyed brown earths (1g), although it is recognised these are predominantly man-made soil types which are now becoming more naturalised.

Cardenden contains the greatest variety of soil types with significant areas intergrading between gleys, brown gleys, and gleyed brown earths in the majority of the block; with peaty gleys (6), blanket bog (11b), ironpans (4) and podzolic brown earths (1z) common within the Tullylumb Plantation. There is also an area of notably stony basic brown earth (1d) occupying the Sunnyside ridge where bedrock occurs close to the surface.

Prior to the recent expansion of Goat Hill Quarry, the main soil type occupying Cullaloe was basic brown earth (1d). With much of this area now undergoing mineral extraction, the remaining wooded areas are predominantly underlain by gleys (7) and brown gleys (7b), with a smaller area of basic brown earths (1d).

All areas of basic brown earth are also recorded as being ‘stony’ (1ds) and with a ‘slightly dry’ Soil Moisture Regime (SMR). On these soil types, especially given the location on the drier east cost of Scotland, consideration should be given to drought tolerance in the future species used.

While the majority of soil types are recorded as being of ‘medium’ or ‘rich’ Soil Nutrient Regime (SNR), there are some areas of ‘poor’ or ‘very poor 3’ soils (notably within the Tullylumb Plantation and Torbain Moss), which will be more limiting in terms of species choice and expected growth rates.

See map **M3** Soils.

A.6.3 Climate

These sites fall within a predominantly warm, moist climate with annual rainfall for the two nearest weather stations being 1082mm at Kinross and 797mm at Kirkcaldy; giving an average of 940mm across the LMP area, which lies roughly between these two sites (Met Office Data). Notably, this is at the limit of the climatic preferences for some Pacific conifers such as Sitka spruce, which requires a minimum annual rainfall of 900-1000mm.

Forestry and Land Scotland policy is to plan for at least 2°C of global warming by 2100. For this area, current models suggest this would result in an increase in winter rainfall of 13%, a decrease

in summer rainfall of 16% and in increase in average annual temperatures of 1.3°C over a 1981-2010 baseline.

See map **M4** Climate.

A.6.4 Hydrology

The main watercourse present in the LMP area is the Den Burn (named the Gelly Burn at South Dundonald), which flows within and adjacent to Cardenden. This waterbody is assigned 'moderate' condition overall, with water quality being the limiting condition (SEPA Water Environment Hub). Forestry operations do not currently affect the water quality of this river, however the watercourse presents a significant barrier for operational access to the west side of the Carden Den. It is also located in close proximity to the forest road network within the Carden Den, although this is generally only considered suitable for recreational and light-vehicle use in it's current condition.

Minor natural watercourses are located in other areas of Cardenden (mainly feeding the Den Burn), and at Cullaloe and Benarty.

A single spring-fed private drinking water supply is located at Cullaloe, supplying Cullaloe Cottages. Hydroecological assessments conducted for the expansion of Goathill Quarry (Planning ref. 19/03702/EIA) indicate this supply originates from two chambers capturing groundwater flow. No operations are proposed which would affect this supply, however contact should be made with the owner prior to any works within the vicinity of the two intake chambers and the holding tank.

These blocks do not occupy a significant proportion of their respective river catchments and forestry operations are not likely to affect to flooding at either a catchment or a local level. This is supported by an independent hydrological study conducted for Fife Council, which concluded Natural Flood Management would have negligible impact on identified flooding vulnerabilities within Cardenden Village. Although there have been issues of flooding in Ballingry, local information and assessment of the catchment area indicates this is not the result of, nor likely to be influenced by, forestry activities.

See map **M2** Landscape.

A.6.5 Windthrow

All sites are generally sheltered or moderately exposed with typical DAMS scores between 11 and 14. More exposed areas are located in elevated parts of South Dundonald, Cullaloe, and Benarty with DAMS scores between 15 and 18.

Windblow risk is an important consideration at Benarty Hill, where ForestGALES modelling (available from Forest Research) suggests the mature stand of P1980 larch and spruce is now at risk of significant windblow. This is modelling supported by the spread of blow from the upper edge of the existing stand since c.2015, and around two thirds of this stand have been lost over the past 10 years. The risk of windthrow in this stand therefore necessitates the use of clear-felling over low-impact silviculture (LISS).

Sporadic windthrow is also occurring in Norway spruce at Sunnyside Plantation (Cardenden), but due to the generally sheltered location and sporadic nature of damage it is felt this stand can continue to be managed through LISS.

Sporadic windthrow is also occurring in Norway spruce at Sunnyside Plantation (Cardenden), but due to the generally sheltered location and sporadic nature of damage it is felt this stand can continue to be managed through LISS.

Map-based ForestGALES modelling developed by Forest Research has been used to assess the levels of risk associated with different stands in each forest block, and management types and felling years assigned accordingly. However, a changing climate and more frequent and unpredictable storm events may cause additional areas of windthrow, which may require subsequent approvals for clearance via LMP amendments.

In the medium-term (from Phase 3 onwards) we may explore felling of Sitka spruce within the Carden Den to mitigate potential windblow risks and other treats in this area, as described in Appendix VI. In the short-term, this stand is considered to be relatively stable.

A.6.6 Adjacent Land Use

Mixed agriculture is the predominant adjacent land use. In addition, there are small areas of adjoining woodland, small urban areas (at Cardenden and Benarty), energy infrastructure (at Pitcairn and in future at South Dundonald), and mineral extraction (at Cullaloe). There are also several areas with more targeted recreational use, such as at Loch Ore Meadows (south and

west of Benarty); and the Cardenden Motorcross track and Lochgelly Raceway (at Cardenden/South Dundonald respectively).

Adjacent agricultural use is predominantly pastoral land at Benarty, Pitcairn and Cullaloe; and arable and pastoral land at Cardenden.

A.6.7 (Public) Access

FLS forests provide a key recreational resource within Fife (e.g Fife Council 2013 Forest and Woodland Strategy), and the sites within this LMP are all well-used for public access and recreation. In particular, Benarty and Cardenden provide key greenspaces in close proximity to major population centers and are within the 1km Woodlands in and Around Towns (WIAT) boundary. Several core paths, rights of way, and undesignated trails are located throughout the woodlands and are well used by the local communities. (See map **M5** Public access).

A.6.8 Historic Environment

There are no scheduled ancient monuments within or close to the LMP boundary. However, a number of other historical features are present and contribute to local interest within these sites. These include former limeworkings at Benarty, a historic burial ground at the Keir Brae Plantation in Cardenden and the category C listed Cullaloe Tower (see map **M6**).

A.6.9 Biodiversity

There are no statutory designated sites present within or adjacent to the LMP area, although Benarty adjoins the Benarty Hill Local Nature Conservation Site (Local Authority designation).

The main habitats of interest are Long-established Plantation Origin (LEPO) woodlands (as recorded on the Ancient Woodland Inventory) and native semi-natural woodlands (as recorded on the Ancient Woodland Inventory) and native semi-natural woodlands (as recorded in the Native Woodland Survey of Scotland). Habitat interest is considered especially high where these features overlap and contain a high degree of species and structural diversity – such as in the Tullylumb Plantation at Cardenden. (See map **M6**.)

Veteran trees are located sporadically throughout the LMP area, largely contained within the LEPO woodlands, and there is scope within these areas for future veteran trees to develop naturally over time.

Red squirrel are present throughout the LMP area, however grey squirrels are also present and the future of red squirrel populations in this area is uncertain; with the first record of squirrelpox in Fife being reported in April 2024. Badgers, pine marten and bats are also present and the latter species will benefit from the presence of existing veteran trees; with pine marten also potentially benefiting red squirrel populations through increased predation of grey squirrels.

A.6.10 Invasive Species

Rhododendron ponticum and Himalayan balsam are present at Cardenden but are so far not known to occur in other locations. Grey squirrel are present throughout the area.

A.7 Woodland Description

Long-established plantation origin (LEPO) woodlands occupy a significant area within these forests, including circa 34ha at Benarty, 66ha at Cardenden and 18ha at Cullaloe. The character of these woodlands varies significantly between different sites – likely reflecting historic differences in management and ownership. Native woodlands, as recorded in the Native Woodland Survey of Scotland, are located in significant areas at Cardenden (c.27ha),with smaller areas at Pitcairn (c.1.8ha) and Cullaloe (<1ha).

At Benarty, around 60% of the larger LEPO woodland area comprised 20th Century Corsican pine, which was removed during the previous plan period due to heavy infections of *Dothistroma septosporosum*, and has now been restocked with mixed native broadleaves in a matrix with open ground. The remainder of this LEPO area is dominated by mature mixed broadleaves (predominantly sycamore), with scattered larch and pockets of late 20th century Sitka spruce. The remainder of the forest comprises young (predominantly native) restocking on the site of a former 20th century conifer plantation; and smaller area of residual mature conifer, much of which has windblown and some of which is on LEPO.

Pitcairn is dominated by a young (P2014) conifer plantation mainly comprising Sitka spruce and larch spp. This has been established between existing (P1980) Sitka spruce shelterbelts, known locally as ‘The Four Sevens’. These are currently stable but have not historically been thinned

and exhibit poor growth, presumably due to poor restoration of the underlying soil prior to planting. There is also a small area (<2ha) of native semi-natural LEPO woodland.

Cardenden has a wide variety of woodland types – including pine-dominated LEPO woodland at the Tullylumb Plantation, and beech and sycamore dominated woodland with mixed conifers at the Sunnyside Plantation. These woodland are becoming increasingly diverse in species and age structure as a result of management, with sporadic but extensive birch regeneration at Tullylumb, and beech at Sunnyside. There are also several areas of native semi-natural woodland, most of which have established within historic conifer plantations. The most significant of these is the New Carden Plantation where a mixed native woodland has developed, with scattered areas of Sitka spruce and some sycamore and other species. Other areas of Cardenden comprise various 20th century conifer stands, including some P1934 Sitka spruce within the Carden Den; native semi-natural and other broadleaved woodlands; and more recent areas planted with various mixed broadleaf and conifer species.

Cullaloe hosts mixed coniferous plantations and LEPO woodland, mainly comprising Scots pine and Norway spruce, with some elements of mixed broadleaves. Although previously thinned, this woodland does not currently have the same diversity of age or species as at Cardenden, although some additional diversity has previously been introduced through small-scale felling and restocking, and it is likely diversity will continue increasing over time.

See maps **M6** (Environment and heritage) and **M7** (Current species).

Table 1 - Area by species

This shows the current and future species composition within the entire Land Management Plan area.

Area by species						
Species	**Current***		**Year 10***		**Year 20***	
(Add relevant species groups, or OG/OL)	**Area (ha)**	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**
Aspen	9.9	2%	9.5	2%	9	2%
Beech	8	2%	7.3	2%	5.5	1%
Birch (downy/silver)	33.1	8%	40.9	10%	45.6	11%
Bird cherry	0.9	0%	1.6	0%	1.5	0%
Common alder	0.5	0%	0.5	0%	0.5	0%
Corsican pine	1.9	0%	1.2	0%	0.5	0%
Crab apple [1]	0	0%	1	0%	1	0%
Douglas fir	2.9	1%	14.6	3%	15.2	4%
Downy birch	0.5	0%	0.5	0%	0.4	0%
European Ash	0.3	0%	0.2	0%	0.2	0%
European Holly	2.8	1%	2.3	1%	1.9	0%
European larch	3.4	1%	3.1	1%	3	1%
European silver fir [2]	0	0%	0.6	0%	3.3	1%
Goat willow	0.2	0%	0.2	0%	0.1	0%
Grey willow	0.2	0%	0.2	0%	0.2	0%

Area by species						
Species	**Current***		**Year 10***		**Year 20***	
(Add relevant species groups, or OG/OL)	**Area (ha)**	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**
Hawthorn species	5	1%	6.1	1%	5.8	1%
Hazel	4.9	1%	5.6	1%	5.3	1%
Hybrid larch	23.5	6%	15.2	4%	12.2	3%
Japanese larch	3	1%	1.9	0%	1.6	0%
Mixed broadleaves	37.5	9%	42.1	10%	51.3	12%
Mixed conifers	0.1	0%	2	0%	6.7	2%
Native Mixed broadleaves	2.1	0%	5.6	1%	14.6	3%
Norway maple	0.2	0%	0.2	0%	0.2	0%
Norway spruce	9.4	2%	28.5	7%	33.9	8%
Oak (robur/petraea)	2.2	1%	2.1	0%	2.1	0%
Other Alders	0.6	0%	0.5	0%	0.4	0%
Other broadleaves [1]	1	0%	0.9	0%	0.9	0%
Other Elms	1.6	0%	1.5	0%	1.3	0%
Pedunculate/common oak	0	0%	0.3	0%	0.3	0%
Rowan	0.7	0%	0.6	0%	0.5	0%
Scots pine	28.3	7%	21.3	5%	17.4	4%
Sessile oak	3	1%	3.9	1%	3.7	1%

Area by species						
Species	**Current***		**Year 10***		**Year 20***	
(Add relevant species groups, or OG/OL)	**Area (ha)**	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**
Silver birch	5	1%	3.8	1%	2.4	1%
Sitka spruce	98	23%	81.4	19%	62.4	15%
Sweet chestnut	1.6	0%	1.6	0%	1.8	0%
Sycamore	16.6	4%	14.3	3%	11.9	3%
Wild cherry/gean	0.5	0%	3.2	1%	3.1	1%
Not Applicable/other/open [3, 4]	125.6	30%	94.2	22%	92.7	22%
Total**	**435.2**	**104**	**120.5**	**100**	**120.5**	**100**

* Of whole LMP area (including open ground (OG)). Any mixtures such as Mixed Conifer (MC) should be broken down and included as an individual species component where a species occupies more than 10%.

** Differences between report and LMP area are due to presence of multiple storeys in the sub-compartment database resulting in a correct double count of species. Difference between current and Year 10 and Year 20 areas are due to inability to account for multiple storeys in the future restock areas layer.

[1] Other broadleaves includes a small area of predominantly fruit trees.

[2] Approximately 0.15ha of European silver fir is already present but not accounted for in the sub-compartment database.

[3] Includes approximately 15.87ha under mineral extraction.

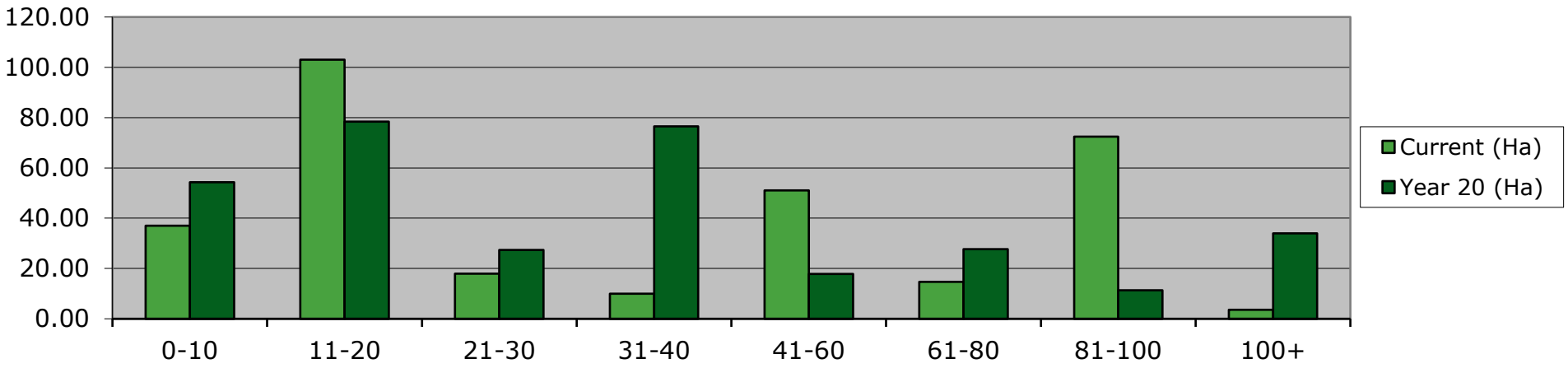
[4] With the exception of approximately 1.3ha at South Dundonald, Cardenden, all areas of open ground are considered to be successional and tree or woody shrub regeneration will typically not be actively managed, unless required to facilitate access, preserve sightlines, or maintain wayleaves.

Table 2 – Area by age

This shows the woodland area broken down by age class and will show how well the woodland is distributed across the age classes.

Age class (years)	Current Area (ha)	Year 20 Area (ha)
0-10	37	54.3
11-20	103	78.4
21-30	17.9	27.4
31-40	10	76.5
41-60	51	17.8
61-80	14.7	27.7
81-100	72.4	11.3
100+	3.6	34
N/A	125.6	92.7
Total*	**435.2**	**120.5**

* Differences between report and LMP area are due to presence of multiple storeys in the sub-compartment database resulting in a correct double count of species. Difference between current and Year 20 areas are due to inability to account for multiple storeys in the future restock areas layer.


120.00
100.00
80.00
60.00
40.00
20.00
0.00
0-10
11-20
21-30
31-40
41-60
61-80
81-100
100+
Current (Ha)
Year 20 (Ha)

A.8 Plant Health

Phytophthora ramorum is currently the foremost tree health concern within FLS Central Region, but has not so far been recorded within this LMP area with the nearest infections being recorded at Devilla Forest (over 18 km to the west) in 2022. The high proportion of larch, particularly in the younger stands, in some parts of the LMP area does however make *Phytophthora* an ongoing risk and necessary consideration.

Dothistroma needle blight (DNB) has been recorded at Cardenden and Cullaloe in both Scots and Corsican pine, and historically in Corsican pine at Benarty. Several areas of Corsican pine in Benarty, Cardenden and Cullaloe were consequently felled during the previous LMP period due to DNB infection. There is some Corsican pine still present within Cardenden, but generally the risk posed to existing stands is considered low-moderate. Periodic DNB surveys have been carried out to assess the development of this disease within certain stands, with the most recent survey data (2021-2024) for the main stands of Scots pine in Cardenden recording crop scores of between 1.5 and 2.5 indicating a moderate level of infection.

Dendroctonous micans has been found in several forests across the Scottish Lowlands but was not recorded within either Cardenden or Benarty during a recent targeted survey. As with *Phytophthora ramorum*, the closest known infection has been recorded at Devilla Forest. It is worth noting that in 2023, much of the spruce at Cardenden appeared to be in poor health, possibly as a result of dry weather conditions during the spring and early summer, and/or heavy aphid infestation. If these events become more frequent due to climate change then there may be a greater risk of dieback in spruce and/or secondary infestation by bark beetles, including *Dendroctonous* and *Ips* species.

Ash dieback is now present across Scotland and is causing widespread mortality of ash trees within the Scottish Lowlands. As there are limited areas of ash on these sites, the impact of this disease will be restricted to the management of individual trees from a tree safety perspective, as per Scottish Forestry guidance.

The presence of grey squirrel is likely to increase and may affect the health of broadleaved species; and particularly the stem quality of some productive broadleaves.

B. Analysis of Information

B.1 Constraints and Opportunities

B.1 Constraints and Opportunities		
Factor	**Constraint**	**Opportunity**
Recreation/ Public Access	High public usage and numerous designated and undesignated routes can impact, and be impacted by, forestry operations.	Maintain recreational provision, protect key routes during operations wherever possible, and provide suitable diversions as appropriate.
Biodiversity	Presence of wildlife may impact the ability to conduct forest operations, especially during summer.	Significant areas of LEPO and native woodland greatly contribute to biodiversity and environmental value.
Forest Resilience	Some stands are likely to become increasingly vulnerable to a range of threats including pests and diseases (e.g. *Phytophthora ramorum*, spruce aphid), as well as drought, windthrow, and fire.	Existing species and structural diversity (encouraged by previous management) contributes to overall forest resilience, as well as biodiversity, amenity and environmental values.
(Operational) Access	Access to many parts of these sites is limited by (forest) road quality, ground conditions, topography, and stand structure – limiting options for proactive and contingency management. Lack of on-site stone contributes to significant costs of road construction and upgrades.	Some areas have good access and the potential for continued or future management under LISS. New and existing operational access routes can provide additional opportunities for public recreation.
Silviculture and (timber) production	Several areas of unthinned or poorly thinned woodland limit management choices; and soil types limit species choice in some areas. Many areas have been recently established with short-lived	Significant areas of LEPO and other woodlands with a history of thinning; favorable climate and topography with a diversity of soil types. Productive broadleaves contribute to biodiversity value and could possibly

	productive broadleaves (e.g. birch, aspen), where productive conifer would have been highly suitable.	be managed as an interim crop with a mixed stand of conifers and broadleaves re-established in future.
Operations	The small-scale and fragmented nature of some woodland areas creates challenges for delivering operations economically.	Explore alternative delivery methods and consider packaging smaller operations to achieve economies of scale in delivery.
Landscape	Several areas are important for their local landscape value. In particular, Benary and Pitcairn are highly visible, while Benarty and Cullaloe fall within Local Landscape Areas.	Maintain or enhance existing landscape values and minimise negative impacts where possible.

Concept

- Much of the woodland areas will be managed under Low-impact Silvicultural Systems (LISS); including Minimum Intervention and Continuous Cover Forestry (CCF) to benefit recreation/amenity and biodiversity/environmental values. Active LISS/CCF management over the next 10 years will be targeted in areas which benefit from existing access and where interventions will have the most positive impacts.
- Areas of Long-Term Retention (LTR) have been identified where stands contribute to amenity, biodiversity/environmental value in the short-medium term but vulnerability to threats such as pests and diseases or windthrow preclude LISS/CCF management.
- Areas containing larch potentially vulnerable to infection by *Phytophthora ramorum* have been identified and contingency felling plans developed to be implemented and help expedite felling approvals in the case of *P. ramorum* infection.
- Areas of mature Sitka spruce in the Carden Den which are currently stable but which may become increasingly vulnerable to a range of threats have been outlined as LTR with proposed felling to commence during the next LMP period (2035 - 2045).
- Areas of LEPO and native woodland will be retained under LISS/CCF wherever possible and generally managed to maintain or enhance their existing values.
- To overcome the challenges of small-scale operations, these may be packaged to help achieve economies of scale, or alternative delivery methods explored (such as woodlot licences to achieve LISS management objectives).
- Natural regeneration will be encouraged and managed, and restocking and underplanting also employed, as appropriate, to favour species diversity and timber quality.

The above analysis is presented on map M8

C. Management Proposals

C.1 Silvicultural Practices

A range of silvicultural prescriptions will be used dependent on the site and previous management, including clearfelling, thinning, LISS/CCF management, and restocking by either planting or natural regeneration.

Older stands which have not been historically well-thinned are identified for clearfell or LTR, along with many areas containing larch vulnerable to *Phytophthora ramorum*. Previously thinned and younger stands with suitable access will be continue to be thinned where viable, and LISS/CCF management implemented where appropriate.

Restocking will predominantly be via a mixture of planting and natural regeneration, with the former being employed on larger felling sites and/or where species diversification is desired. Over time, areas of short-lived productive broadleaves on former coniferous woodland areas may be transitioned back to a coniferous/broadleaved woodland mixture (via a combination of felling/restocking/underplanting and/or natural regeneration), in order to achieve a greater range of harvestable wood products; provided this does not significantly impact the ecological values of any existing native woodland areas.

Areas of new woodland creation will be established at South Dundonald, utilising a mix of diverse productive conifer and productive and non-productive broadleaved species to fit with areas of new woodland previously established in 2014 and deliver productive and environmental benefits.

See Maps:
M9 Felling and management coupes; **M10 Thinning**;
M11 Future habitats and species; **M12 Restocking**; **M13 Woodland creation**;
M14 Tree protection; and
M15 Roads and Timber haulage

C.2 Prescriptions

C.2.1 Clearfelling

Clearfelling will be employed where stands are considered most vulnerable to windthrow, where whole stands may need to be removed due to disease (e.g. *Phytophthora ramorum*), or to remove areas of undesirable species.

Within the next ten years this will include stands of mature Sitka spruce and larch in Benarty (coupe **04474**, 9.08ha), and Sitka spruce at Cardenden (coupe **01020**, 1.72ha).

It is expected that additional clearfelling will be carried out in Cardenden during phase 3 (coupe **01516,** 12.89ha) and phase 4 (coupe **01014**, 1.8ha).

While recently established native broadleaves adjacent to coupe **04474** may not have achieved >2m height by the time of felling, stability issues will override adjacency concerns; and the proposed restocking will result in higher levels of structural diversity in future

C.2.2 Thinning and Respacing

Thinning and respacing will be employed where appropriate in order to:

- Improve stand structure and resilience
- Diversify future management options
- Improve timber quality, and
- Improve biodiversity and amenity value

Thinning will normally be carried out at, or below, the level of marginal thinning intensity (i.e. removing no more than 70% of the maximum MAI, or YC, per year). Higher intensities (no more than 140 % of maximum MAI, or YC, per year) may be applied where thinning has been delayed, larger tree sizes are being sought or as part of a LISS prescription. Where trees need to be removed to accommodate facilities to support approved thinning and CCF, including stacking areas, ramps and access racks within adjacent management coupes, this should ideally be identified in thinning maps and thinning plans as part of the LMP submission. Where this is not the case, additional felling necessary for reasonable infrastructure can be agreed by exchange of email. 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.

Pre-commercial respacing (generally of stems <10cm DBH) may also be carried out in certain areas to reduce densities in thicket stage stands, and improve stand structure and stem form at an early age (e.g. coupe **04602**, 3.56ha). In other areas, mixed thicket/pole stage stands will be left to develop naturally until the time of first thinning (e.g. coupe **01276**).

C.2.3 LISS/CCF

Many of these sites have the potential to be managed under Low-impact Silvicultural Systems (LISS) / Continuous Cover Forestry (CCF), based on stand, soil, and climatic characteristics; and social and environmental considerations.

Within the current lifetime of the plan, few areas will actively be managed under LISS, with the exception of the New Carden Plantation (coupe **01019**). However, several areas across all sites may be brought into active LISS management in future plans.

Details of the proposed LISS area at the New Carden Plantation (coupe **01019**) are as follows:
Total area c.12.5ha, largely consisting of birch and sycamore with varied stocking and elements of Sitka spruce (coupe **01020**), primarily around the edges of the stand.
Birch net 9.73ha; top height 17m; 1300st/ha; average DBH 14cm; volume 117m^3/ha. Estimated total volume for felling is 240m^3 (at c.20% removal), but may be up to 400m^3.
Sycamore net 0.41ha; top height 14m; 50st/ha; average DBH 15cm. Estimated total volume for felling is 46m^3 (at 100% removal).
Sitka spruce (majority in coupe **01020**); estimated total volume to be felled is 842m^3 (at 100% removal).

The management objective for this area is to improve biodiversity (and amenity) value through improved age structure and targeted removal of non-native species (sycamore and Sitka). The intended management of sycamore and birch (coupe **01019**) is through thinning/coppicing with larger areas of Sitka being be clearfelled and replanted with native broadleaves (coupe **01020**); although the above prescription is indicative only and may be amended to suit operational delivery requirements.

Further areas of LISS management in the Tullylumb Plantation/Torbain Moss area of Cardenden are proposed for Phase 3 (Phase 1 of the next LMP), with similar objectives to the above in addition to productive outcomes. These coupes (01014, 01273, 01274, and 01276) have been

packaged together to improve operational practicalities and economies of scale, especially considering the likely need for forest road upgrades; but may be brought forward through LMP amendment(s) if alternative delivery mechanisms become available (e.g. management under a woodlots license). The key objectives of this management are to: 1) remove SS regen from the native woodland area in coupe 01276, 2) remove the mature SS overstorey from coupes 01273 and 01274 as an undesirable species and to prevent further regen; and 3) to enable suitable restocking and enrichment planting in the respective areas.

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

Long-term retentions have been identified primarily in coniferous stands where retention beyond the conventional felling age is considered beneficial for amenity and/or biodiversity values, particularly as habitat for red squirrel, and which are generally considered to be stable based on current data (i.e. ForestGALES modelling). These include some areas which contain larch and may therefore require felling to be brought forward due to infection by *Phytophthora ramorum* (see C.2.15 and Appendix III). Generally, the intention is to retain LTR areas until they become vulnerable to significant windthrow, at which point they will be felled.
Total area of LTR = 34.65ha

Minimum Intervention areas have generally been identified in broadleaved woodland where regular management is considered to be either impractical or not significantly beneficial. MI areas may still be managed through infrequent or one-off interventions such as thinning, or brought into active management in future plans (e.g. application of LISS/CCF).
Total area of MI = 73.9ha

An existing Natural Reserve at Cullaloe has been redesignated as Minimum Intervention, and a new area of Natural Reserve identified at Cardenden as part of the broader Scottish Lowlands Natural Reserves review. Natural Reserves are intended to be managed through minimum intervention in perpetuity for ecological benefits.
Total area of NR = 3.6ha

C.2.5 Other Tree Felling in Exceptional Circumstances

FLS will normally seek to map and identify all planned tree felling in advance through the LMP process. However, there are some circumstances requiring small scale tree felling where this

may not be possible and where it may be impractical to apply for a separate felling permission due to the risks or impacts of delaying the felling.

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

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

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

The maximum volume of felling in exceptional circumstances covered by this approval is 75 cubic metres per Land Management Plan per calendar year. A record of the volume felled in this way will be maintained and will be considered during the five year Land Management Plan review.

C.2.6 Woodland Management 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 visitor sites or access routes. Visitor Zones are currently identified at Benarty and Cardenden and are depicted on map **M5**.

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 also be thinned, or trees re-spaced, for safety reasons (including to increase visibility to ensure that sites are welcoming and feel safe), and where it is necessary to enhance the experience of the forest setting; such as through the development of large trees, or preferential removal of trees to favour a particular species.

C.2.7 Restocking Proposals / Natural Regeneration

Coupe **04474** in Benarty will be restocked with Douglas fir to link with the establishing area of P2019 Sitka spruce currently isolated from the forest road. DF should be well suited to the 1ds soil type within this area, and it is expected to closely match the projected yield class of adjoining

SS. However, given the elevation and aspect it is possible that DF could be damaged by exposure and/or frost and in this instance Norway spruce will be used as a replacement. Mixed broadleaves will be established around an ephemeral watercourse and lower areas will be established with oak, tying in with the existing (P2019) broadleaf planting.
As the majority of Benarty now comprises broadleaved species, and considering it's location and prominence within the surrounding landscape and green network(s), a longer-term restocking strategy may be to convert the whole site to broadleaved woodland. This is not, however, achievable in the short term due to the aforementioned P2019 Sitka spruce (and other conifers, including NS and DF), and will instead be considered in future LMPs.

Larger areas of Sitka spruce cleared from the New Carden Plantation (coupe **01020**) will be restocked with native broadleaves and/or native woody shrubs to enhance biodiversity value and edge habitats. Otherwise small-scale LISS felling/thinning in this area will be restocked via natural regeneration/coppice of the existing species (predominantly birch and sycamore).

Outwith these areas, there is expected to be widespread natural regeneration of mixed species including major components of birch, beech, sycamore, and spruce; and minor components of pine, oak, and other broadleaves or conifers. Some underplanting may also be carried out, primarily for the purpose of species enrichment, within the specifications of the future habitats and species map and associated LMP tolerances (see map **M11**).

Conifers will be established to achieve a minimum density of 2500 stems per hectare and broadleaves typically 1600 stems per hectare by the time of establishment. A lower density of broadleaves may be accepted down to 500 stems per hectare in small areas where this may be beneficial for ecological or silvicultural reasons. Where establishment is through natural regeneration, assessments on the progress of regeneration will take place at most 5 years following felling with subsequent replanting as necessary to achieve adequate stocking where there are significant failures identified.

Douglas fir and or Norway spruce/European silver fir will be of the best available provenance for timber production considering form, yield and resilience. Native broadleaved species will preferentially be of seed originating from provenance zone 203, or 204, 109 or 202 (East); or from another British seed zone if these are unavailable, with a preference for provenance regions 40 and 20.

Table 3 – Felling

This shows the scale of felling within the felling phases in the context of the whole LMP. This includes any areas of 'LISS – Fell' (i.e. removal of final overstorey).* See map **M9**.

SCALE OF PROPOSED FELLING AREAS (including LISS final fell areas)												
Total LMP Area:		420.10	hectares									
Felling	Phase 1	%	Phase 2	%	Phase 3	%	Phase 4	%	Long Term Retention**	%	Area out-with 20yr plan period	%
Area (Ha)	10.8ha	2.6	0	0	0	0	1.8	0.4	12.9	3.1	85.2	0

* As all areas of proposed LISS management will have some overstorey trees retained over the next 20 years, no areas of 'LISS – Fell' are listed.

** Long-term retention area in the Carden Den (coupe 01516) will be felled in Phase 3.

Table 4 – Thinning

This shows the area of thinning over the first 10 years of the LMP (see map **M10**).

Species*	**Thinning coupe ref**	**Thinning (ha)****
SS (10%), DF (60%), (MB 30%)	04501	3.81 (gross)
Bi (50%), ASP (50%) (respacing <10cm)	04602	3.56
SS (70%), HL (30%)	03501	45.30
Bi (90%), SYC (5%), SS (5%)	01619	10.63 (gross)
SS (90%), (MB 10%)	01502	14.21 (gross)
MB (100%)	01602	8.11 (gross)
SS (80%), HL (20%)	01506	10.14
Total		**95.76**

* Percentages are given for the respective sub-compartment areas and not representative of the proportion of each species being removed in thinning prescriptions.

** Gross coupe areas given where net area of thinning operations is likely to be significantly less.

Table 5 – Restocking

This table provides information on the restocking proposals for the first 10 years of the LMP listed on a coupe by coupe basis (see map **M12**).

Felling Phase	Map Identifier(s)	Species *	Area (ha) to be planted
Phase 1	01020A	BI (natural regeneration)	0.62
Phase 1	01020A	MB (natural regeneration)	0.31
Phase 1	01020B	NMB	0.61
Phase 1	01003A**	ESF	1.8
Phase 1	01003A**	NS	1.8
Phase 1	04474A	DF	3.57
Phase 1	04474A	BI (natural regeneration)	1.79
Phase 1	04474B	MB	1.3
Phase 1	04474C	SOK	1.12
Phase 1	04474D	HAW	0.16
Phase 1	04474D	CAP	0.03
Phase 1	04474D	OK	0.03
Total Restocking Area			

*Establishment is expected to be by planting unless otherwise stated.
**Optional underplanting of young productive sycamore area.

C.2.8 Hydrology

All operations will adhere to the latest version of UKFS (Forest and Water Guidelines), and associated standards. No operations are proposed which will significantly affect natural watercourses or other hydrological assets and no issues relevant to flooding or water supplies have been identified. There are known flooding issues upstream of the Cardenden Road bridge in Cardenden (NT 2194 9528) and for that reason, as far as practicable, care will be taken to avoid increasing the volume of woody debris entering the Den Burn during any forestry operations in this area (i.e coupes 01502, 01602; 01516).

C.2.9 Protection

Both roe deer and brown hare are present in the local area, with the latter likely to cause the most issues in terms of the tree establishment proposed at Benarty and Cardenden (including South Dundonald).

Deer management is guided by local site considerations and the wider Scottish Lowlands Deer Management Plan (SL DMP). We aim to prevent unacceptable damage to commercial tree crops and in key areas to maintain or enhance biodiversity and protect all designated sites. This will be done in a professional, humane and cost effect way, ensuring the physical wellbeing of the remaining deer populations within the forest boundaries.

Key targets for deer management include

- Achieving less than 10% leader browsing damage on all Phase 1 felling coupes.
- Ensuring adequate stocking densities to the point of stand establishment.
- Lowering deer densities to 2-5 per km^2 to meet the above objectives sustainably.
- Ensuring all designated sites are in favorable condition.

Deer population models have been built using historical cull and recruitment data and this population model well help guide the setting of cull targets to help ensure FLS objectives will be met whilst also ensuring the cull is sustainable.

In line with the wider SL DMP, stalking will remain the primary method of protecting replanting from deer damage, and encouraging natural regeneration, within the LMP area. Suitable glades/sighting rides to facilitate deer management have been identified in consultation with qualified local delivery staff and contractors, and will be maintained to preserve adequate sight

lines which may include brashing of existing trees and/or small-scale clearance of trees as required. Within the current LMP period, deer glades/sighting rides have been identified for management at Cardenden (including South Dundonald); and the requirement for any new glades at Benarty will be identified at the time of felling and restocking of the existing stand (coupe **04474**). In general, these glades, are not expected to exceeded 50% open ground, or in the case of sighting rides, 5-10m in width.

Tree tubes and/or fencing will be the primary method for protecting the most vulnerable productive species (e.g oak and cherry) from hare damage. Deer fencing may also be employed for areas of new woodland creation at Cardenden if deemed necessary.

Sheep trespass has been a historic issue at Benarty, resulting in circa 2.62km of march stock fencing being replaced in 2017.

Indicative protection measures are shown on map **M14**.

C.2.10 Fence Erection / Removal

Some deer fencing has been used at Cardenden and Benarty during the last plan period to protect broadleaf restocking and woodland creation sites. This will be removed once the broadleaves have become suitably established, which is likely to be within the next 5-10 years, depending on growth.

C.2.11 Road Operations and Timber Haulage

Approximately 1.82km of road upgrade is required on Torres Loan at Pitcairn, in addition to three new access spurs totaling 300m, and associated turning points. This will gain access to the proposed first thinning areas (coupe **03501**; estimated formation year 2028/29), containing significant elements of larch. A further 80m of upgrade and 150m new road with associated turning point may also be constructed to access the area further west although this is likely to be delayed until future LMPs (or as required to deliver SPHN felling).

Approximately 420m of new road plus associated turning point and new entrance will also be required to facilitate woodland creation at South Dundonald (coupe **01000**; estimated formation year 2027/28), while two spurs totalling c.150m (plus associated turning points) are outlined for

thinning coupe **01506**; (estimated formation year 2033/24). In total, the area of new roads proposed within the next 5 years (as shown on map **M15**) is less than 1ha.

Timber haulage from Benarty, Pitcairn and Cardenden will exit onto timber transport consultation routes (by default) and as such prior consultation will be undertaken with the relevant Local Authority (Fife Council) and the local Timber Transport Project Officer (TTPO), and notifications given to the relevant local Community Council(s), as required. Haulage will be compliant with any subsequent conditions agreed as part of this consultation, and at all times with the Timber Transport Forum's '*Transporting Timber on Public Roads Consultation and Engagement Guidance (Scotland)*', and other relevant applicable guidelines. Details of projected timber haulage for over the next 10 year period are shown on map …, and below:

Benarty entrance (NT 1669 9741) onto U018: estimated 3500 tonnes in period 2025-2030;
Pitcairn entrance (NT 2034 9733) onto B9097: estimated 5000 tonnes in period 2025-2030;
Cardenden Sunnyside Road (NT 2302 9495) onto Sunnyside Road and B981: estimated 950 tonnes in period 2025-2030.

C.2.12 Public Access

FLS welcome responsible public access in accordance with the Scottish Outdoor Access Code. Within these sites, there are numerous formal and informal/undesignated trails, including several core paths, rights of way, and popular 'desire lines'. Recreational provision is managed by the Visitor Services Team with operational support from the Stewardship Team, including regular safety inspections for designated or promoted routes and appropriate management.

With the exception of assisting with the rerouting core path R738 at Cullaloe due to the aforementioned quarry expansion, there are currently no proposals to alter the existing recreational provisions within these sites.

Where trails are affected by forestry operations, appropriate temporary closures will be implemented and, where possible, suitable diversions provided to maintain access while ensuring public and operator safety. Access to key routes such as core paths and rights of way will be maintained and restored as required after operations. Liaison with the Local Authority Access Officer will continue to be carried out as appropriate.

C.2.13 Historic Environment

No management is proposed for any of the heritage features present.

All known heritage features are mapped on the FLS GIS database which allows these to be suitably identified and protected during operations. Works to improve the setting of heritage features may be undertaken as part of general forestry operations, although no such activity is currently proposed. Harvesting coupes, access roads and fence lines will be surveyed prior to any work being undertaken to ensure that upstanding historic environment features can be marked and avoided. At establishment and restocking, work prescriptions remove relevant historic environment features from ground disturbing operations and replanting.

The Regional Historic Asset Management Plan includes conservation management intentions for those designated historic assets in Scotland's national forests. Details of all known historic environment features are held within the Forester Web Heritage Data (built using national and regional historic environment records) and included within specific operational Work Plans to ensure damage is avoided. Significant historic environment features will be depicted on all relevant operational maps.

Any previously unmapped heritage features will be recorded and protected as necessary, including notification of the relevant authorities if appropriate.

C.2.14 Biodiversity

Areas of LEPO woodland will typically be managed under LISS (including minimum intervention) in order to maintain and enhance their ecological values and conservation interest, although in the future some clearfelling may be necessary (e.g. for unthinned stands of conifers).

Native woodlands (as identified in the NWSS) will be managed in accordance with their biodiversity value to ensure that ecological values and conservation interests are maintained or enhanced in the context of sustainable forest management. Within the lifetime of this LMP, the only native woodland area proposed for active management as such is the New Carden Plantation (coupe **01019**), while other areas such as young native woodlands in the Tullylumb Plantation/Torbain Moss area (coupe **01276**) are outlined for management in future plan periods, when active management interventions are likely to be more financially viable. Where possible opportunities will be taken to increase the volume of standing and fallen deadwood in line with FLS policy and the UK Forestry Standard.

In terms of priority species, where possible, coniferous stands have been identified for management as LISS or Long-Term Retentions for the benefit of red squirrel (and public amenity); however earlier felling of these areas may be required in some instances (for example due to disease or windblow events). Unfortunately, due to high levels of public access throughout the woodlands, it has not been possible to identify many potential breeding locations for pine marten or priority raptor species (such as osprey or red kite). However, at Benarty some of the existing windblown area will be retained as potential habitat for pine marten and other species and at Cardenden and new Natural Reserve has been identified within the core of the Tullylumb Plantation.

All operations will be conducted to ensure adequate protection of habitats and species as advised by suitably qualified/experienced staff, the Scottish Forestry '*Wildlife and Forest Operations*' guidance notes and other relevant guidance, and/or relevant species licenses and statutory consultees.

C.2.15 Tree Health

Phytophthora ramorum presents a serious potential threat to stands of larch within the LMP area. This area currently falls within the Priority Action Zone of Scottish Forestry's Phytophthora ramorum Action Plan where the 'prioritisation of survey and regulatory efforts will ensure Statutory Plant Health Notices (SPHNs) are issued quickly, with felling needed, wherever possible, before the end of August in the year [P. ramorum] was found.'
Given this context, and considering larch is often intermixed with other species which would require additional felling approval, this LMP has identified all areas containing larch within coupes which can be quickly brought into felling approvals should the need arise. These coupes are identified in Appendix III.

The current FLS management strategy for Dothistroma (DNB) is to prioritise felling in stands with a crop score of 3 or 4 (indicating significant infection or mortality), and to thin younger stands to improve resilience where possible. Unfortunately, the younger unthinned stands within Cardenden are now beyond their first thinning age/height and therefore no active management is currently proposed to address the presence of DNB within the site. Other areas of young pine such as P2011 stands at Cullaloe are considered too small for active management and diverse enough to self-thin in favour other species (e.g. NS) in the event of significant DNB infection. Going forward, infected stands should be re-assessed at the 5 year LMP mid-term renew and 10 year LMP renewal, with management proposals updated as required per stand condition and the

most recent management strategy. Coupes where DNB may influence future management are also identified in Appendix III.

Ash trees will continue to be monitored through routine tree safety inspections, and removed as and when necessary to protect people or property, as per Scottish Forestry's '*Guidance on the management of individual ash trees affected by ash dieback in Scotland*'; with a presumption to fell any trees in condition class 3 or 4 (i.e. less than 50% canopy cover) where these are within striking distance of an asset in usage zone 1 or 2 (as defined in the guidance), including all mapped forest roads. Removal of trees which meet this criteria will therefore be considered approved in addition to the 75m^3 felling exemption detailed above.

C.2.16 Invasive Species

Forestry and Land Scotland will explore opportunities to work with local conservation organisations, adjacent land owners and stakeholders to achieve common objectives to protect and enhance priority species and habitats wherever possible.

Control of invasive non-native species, including *Rhododendron ponticum* and Himalayan balsam, will be carried out as budgets and resource allocation allows with areas for control being identified and prioritized by FLS Planning and Environment staff on a Regional basis. Within the next 10 years, small areas of Himalayan balsam will be controlled by hand pulling and areas of *Rhododendron* may be controlled subject to wider environment priorities.

Subject to available resource and funding Forestry and Land Scotland will work with local and national partners to implement sustainable grey squirrel monitoring and control in order to help protect red squirrel populations within Fife. Local pine marten populations will be supported through the inclusion of minimum intervention areas, long term retentions, and deadwood retentions to create denning sites and increase habitat quality for this species.

C.2.17 New Planting

43.04ha of new woodland creation (excluding areas of mapped open ground) is proposed at Cardenden, as shown on map **M13**. The majority of this will be established on gleyed soil types, with some areas of brown earths and significant areas of remediated mining soils.

The chosen species, described below, have been selected to meet the objectives of sustainable timber production, carbon sequestration, and biodiversity enhancement. These species will be appropriate within the landscape, and are considered suitable under the current and predicted future soil and climatic conditions. Ecological Site Classification Decision Support Software (ESC-DSS) has been used as a basis to support species choice, alongside other literature (e.g. Forest Research species profiles), and staff knowledge. The woodland creation area is classified as land capability grade F2 for forestry by the James Hutton Institute ('very good flexibility for growth and management of tree crops') and as such the entire scheme will be established with 'diverse' conifer species (Norway spruce and Douglas fir), and native broadleaves.

The proposed species are as follows:

Species	Map identifier	Stocking Density	Area
Norway spruce (60%) Douglas fir (20%) Birch nurse (20%)	**01000C**	2500st/ha	7.78ha
Norway Spruce (50%) Douglas fir (50%)	**01000A**	2500st/ha	12.43ha
Norway spruce (70%) Birch nurse (30%)	**01000B**	2500st/ha	10.62ha
Norway spruce (50%) Birch nurse (50%)	**01000F**	2500st/ha	3.98ha
Native woody shrubs	**01000E**	1600st/ha	5.03ha
Oak (70%) Birch nurse (30%)	**01000H**	1600st/ha	0.41ha
Wild cherry	**01000G**	500st/ha	2.79ha

Norway spruce and Douglas fir will be of the best available provenance for form and yield. Native woody shrubs will be of seed originating from provenance zone 203, or 204, 109 or 202 (East) in order of preference, or from another British seed zone if these are unavailable, with a preference for provenance regions 40 and 20. Wild cherry should of best available British-origin stock for stem form, or otherwise sourced as per the native woody shrubs.

Detailed establishment techniques for each area will be determined by local delivery staff. In line with the '*Guidance on ground cultivation for Forestry and Land Scotland staff*' (Forest Research),

less-intensive cultivation techniques will be the default option, with sub-soil ripping and/or mounding being the primary methods employed in order to break up heavily compacted soils. There will be a presumption against the use of artificial drainage and application of fertilizer to aid tree establishment, with birch being established as an element of productive conifer areas on historically remediated soils.

An EIA Screening Opinion Request has been prepared and submitted in Appendix IV, along with an Agricultural Impact Assessment in Appendix V.

[*N.B The above proposals may need to be revised subject to the final location of a proposed new high voltage underground transmission line, which is yet to be determined.*]

C.2.18 Wildfire

FLS work closely with the Scottish Fire and Rescue Service (SFRS) to ensure a safe and consistent approach to help tackle wildfires on Scotland's national forests and land. Fire risk has been assessed as part of the LMP development and there is a history of fire outbreaks within the LMP area with parts of Cardenden being considered particularly vulnerable.

The general approach to managing fire risk will be to maintain suitable access to key areas of the woodland for fire control purposes and to avoid management actions which would further exacerbate fire risk, especially where the threat to key assets is particularly high. Fire risk has been assessed in accordance with *Forestry Commission Practice Guide 22: Building Wildfire Resilience into Forest Management Planning*; including consideration of forest management and restocking proposals.

C.2.20 Other

N/A

C.3 Environmental Impact Assessment and Permitted Development Notifications

Total area (hectares) for each project type and provide details as requested by sensitive or non-sensitive area.

Type of Project	Sensitive Area		Non-sensitive Area		Total
Afforestation	%Con	%BL	81%Con	19%BL	43.04ha
Deforestation	%Con	%BL	%Con	%BL	0ha
Forest Roads	0ha		<1ha		<1ha
Quarries	0ha		0ha		0ha

See section C2.17; Appendix IV and map M13. The above percentages of conifer and broadleaf assume all areas where birch is included as a nurse species as being 100% conifer. No other schemes are believed to have been approved in this area within the previous 5 years.

C.4 Tolerance Table

	Map Required (Y/N)	Adjustment to felling period*	Adjustment to felling coupe boundaries**	Timing of Restocking	Changes to Restocking species	Changes to road lines	Designed open ground ***	Windblow Clearance****
FC Approval normally not required	N	Fell date can be moved within 5 year period where separation or other constraints are met	Up to 10% of coupe area	Up to 2 planting seasons after felling	Change within species group e.g. evergreen conifers or broadleaves		Increase by up to 5% of coupe area	
Approval by exchange of email and map	Y		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	Y	Felling delayed into second or later 5 year period Advance felling 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

Note

*Felling sequence must not compromise UKFS in particular felling coupe adjacency. Felling progress and impact will be reviewed against UKFS at 5 year review.

** No more than 1 ha, without consultation with Scottish Forestry, where the location is defined as 'sensitive' within the Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017.

*** Tolerance subject to an overriding maximum of 20% designed open ground.

****Where windblow occurs, Scottish Forestry must be informed of extent prior to clearance and consulted on clearance of any standing trees.

D. Production Forecast

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

Appendices

Item number	Title
I	Public Consultation Record
II	LMP Objective Monitoring and Analysis
III	Tree Health Contingency Plans
IV	EIA Screening Opinion Request
V	EIA Agricultural Impact Assessment
VI	Carden Den Future Management

Maps

Item number	Title
M1	Location
M2	Landscape
M3	Soils
M4	Climate
M5	Public Access and recreation
M6	Environment and heritage
M7	Current species
M8	Analysis and Concept
M9	Felling and management coupes
M10	Thinning
M11	Future habitats and species
M12	Restocking check scale
M13	Woodland creation
M14	Tree Protection
M15	Forest Roads and Timber Haulage

Please note, the above maps are designed to be viewed at A0 and some features may be obscured if viewed at smaller sizes.