Forest Enterprise Scotland
Managing the National Forest Estate

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Lambhill & Easter Muirhead Woodlands

Land Management Plan

Scottish Lowlands Forest District

CSM 6 Appendix 1b

FOREST ENTERPRISE - Application for Forest Design Plan Approvals in Scotland
Forest Enterprise - Property

Forest District:	Scottish Lowlands
Woodland or property name:	Lambhill & Easter Muirhead Woodlands
Nearest town, village or locality:	Blairingone
OS Grid reference:	NT 007 961
Local Authority district/unitary Authority:	Perth & Kinross/Fife

Areas for approval

	Conifer	Broadleaf
Clear felling	6.6 ha	4.9 ha
Selective felling		
Restocking	11.5	
New planting (complete appendix 4)	82.8 ha	70.3 ha

1. I apply for Forest Design Plan approval for the property described above and in the enclosed Forest Design Plan.

2. * I apply for an opinion under the terms of the Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 for afforestation/roads as detailed in my application.

3. I confirm that the initial scoping of the plan was carried out with FC staff on Mar 2016

4. I confirm that the proposals contained in this plan comply with the UK Forestry Standard.

5. I confirm that the scoping, carried out and documented in the Consultation Record attached, incorporated those stakeholders which the FC agreed must be included.

6. I confirm that consultation and scoping has been carried out with all relevant stakeholders over the content of the design plan. Consideration of all issues raised by stakeholders has been included in the process of plan preparation and the outcome recorded on the attached consultation record. I confirm that we have informed all stakeholders about the extent to which we have been able to address their concerns and, where it has not been possible to fully address their concerns, we have reminded them of the opportunity to make further comment during the public consultation process.

7. I undertake to obtain any permissions necessary for the implementation of the approved Plan.

Signed ..... Forest District Manager

Signed ..... Conservator

District .....

Conservancy .....

Date .....

Date of Approval .....

Date approval ends: .....

*delete as appropriate

CSM 6 Appendix 4

FOREST ENTERPRISE - Application for Approval of Woodland Creation

1. Forest Enterprise – Property

Forest District:	Scottish Lowlands
Woodland or property name:	Lambhill & Easter Muirhead Woodlands
Nearest town, village or locality:	Blairingone
OS Grid reference:	NT 007 961
Local Authority district/unitary Authority:	Perth & Kinross / Fife

2. Proposed areas to nearest tenth of a hectare

New Planting	133.3
Natural Colonisation	
Open Ground	19.9
Total	153.2

3. Special areas and protected land

Designation	Area Name or Number	Comments
Special Landscape Area	Cleish Hills	Area around Cult Hill

4. Proposal details of woodland creation

Area Name or number	Gross Area (Ha)	P Year	Spp	Area (Ha)	Open Ground (Ha)	Comments
Productive conifers	82.8	2017/18	Sitka spruce, Douglas fir, Norway spruce	74.5	8.3	
Productive broadleaves	40.0	2017/18	Alder, Aspen, Birch, Oak, Norway maple, Sycamore, Wild cherry	36.0	4.0	
Native broadleaves	30.3	2017/18		22.8	7.6	
						Areas in Lambhill to be planted in 2017, Barnhill in 2018

I apply for authority to create a woodland as above and as shown on the attached map.
I undertake to obtain the necessary permissions from the appropriate statutory body before commencing work under any approval which is granted.

Signed ……Signed…….
Forest District Manager Conservator

District ……Conservancy……

Date ……**Approval Date**…….

Date approval ends ……..

Complete this form to find out if you need consent, from the Forestry Commission (under the EIA Regulations 1999), to carry out your proposed work.

Section 1 Proposed work							
Please put a cross in the box to indicate the type of work you are proposing to carry out. Give the area in hectares and where appropriate the percentage of conifers and broadleaves.							
Proposed work	cross	Area in hectares	% Conifer	% broadleaves	Proposed work	cross	Area in ha
Afforestation	x	153.1	54	46	Forest roads	x	0.95
Deforestation					Forest quarry		
Location and District			Lambhill & Easter Muirhead Woodlands, Scottish Lowlands				

Please attach map(s) showing the boundary of the proposed work and also give details of the operations.

Section 2 Property details	
Property Name	Lambhill & Easter Muirhead Woodlands
Grid Reference (e.g. AB 123/789	NT 007 961
Local Authority	Perth & Kinross / Fife
Nearest Town	Dunfermline

Section 3 Applicant's category *(please put a cross in one box)*			
PE Personal occupier		PU Public ownership	x
BU Business occupier		OT Other	
VO Voluntary organisation		CT Crofting tenant	

Section 4 Applicant's type *(please put a cross in one box)*			
LS Lessee		OW Owner	x
TE Tenant		TR Trust	

Section 5 your agent or woodland manager's details							
Title		Initials		Surname			
Organisation							
Address							
				Postcode			
Tel No				Mobile			
Fax				e-mail			
Is this the address for correspondence?				yes		No	

Section 6 Applicant's details					
Title	Mr	Initials	R	Surname	Clamp
Organisation	Forest Enterprise Scotland				
Address	Five Sisters House, Five Sisters Business Park, West Calder				
			Postcode	EH55 8PN	
Tel No	0300 067 6725		Mobile	07801 213304	
Fax			e-mail	robert.clamp@forestry.gsi.gov.uk	
Is this the address for correspondence?			yes	x	No

Section 7 Sensitive Areas: Give the area of the proposal that is covered by any of the following designations	
Sensitive Area as listed in "Schedule 2" of the 1999 EIA Regulations Area (ha)	Area in hectares
a. Sites of Special Scientific Interest (SSSI) or Proposed Sites of Special Scientific Interest (PSSSI)	
b. SSSI's with a Nature Conservation Order (Section 29 of the Wildlife and Countryside Act 1981)	
c. National Park (NP)	
d. The Broads	
e. World Heritage Site	

f. Scheduled Ancient Monument (SAM)	1.85
g. an area designated as National Scenic Area	
h. Area of Outstanding Natural Beauty (AONB)	
i. “Natura 2000” site - *(European network of special areas of conservation and special protection areas under the Wild Birds Directive)*	

Contents

Version History

Version	Date	Comments
1.0		Initial Draft
1.1	November 2016	Species choices revised following internal review
1.2	February 2018	Corrections to maps and text made by S. Towers
1.3	August 2018	Tidy up for web publishing

1.0 Introduction

1.1 Setting & Context

Lambhill is situated immediately south of the A977 and east of the A823, near the village of Blaringone, and covers ~360 ha. Easter Muirhead is a small (~18 ha) block of mature predominantly conifer woodland situated south of the minor public road that provides access to the southeast corner of Barnhill. The surrounding landscape is predominantly agricultural with a multiplicity of small woodland blocks and shelterbelts.

See **Map 1.1 Location**

The majority of the site falls within Perth & Kinross Council, except for approx. 75 ha around Cult Hill which comes under the jurisdiction of Fife Council.

The current land matrix is as follows:

Table 1.1a – Current land usage

Site	Land Type	Area (ha)
Lambhill/Barnhill	Existing woodland	119.7
	Open ground (inc. agriculture)	239.4
	Open water	0.9
	Total	**360**
Easter Muirhead	Existing woodland	13.2
	Existing woodland (windblow)	5.1
	Total	**18.3**

1.2 Site History

Lambhill was acquired by Forestry Enterprise Scotland in 2009, and comprises around 200 ha, of which approximately 120 ha is restored ground on a former opencast site which at the time of purchase was largely given over to short rotation willow coppice. Barnhill Farm, which lies immediately adjacent to Lambhill, was acquired more recently in 2014, and comprises 160 ha of primarily agricultural ground.

A Forest Design Plan covering Lambhill was approved in 2011, and some progress has been made in implementing the management actions proposed. However,

following the acquisition of Barnhill the decision has been taken to amalgamate the two sites and produce a new land management plan to treat the combined area as a single coherent unit.

Easter Muirhead is managed by FES on a 99 year lease (which is due to expire in 2065) and was planted in 1969, predominantly with commercial conifer species. Due to the isolated nature of the site (there is currently no operational access), FES will be looking to revert the lease as soon as practicable.

2.0 Analysis of previous plans

Objective	**Proposed management actions**	**Progress to date** **1 - Little / No progress** **2 – Some progress** **3 – Progress as per LMP**
Continue to grow quality timber sustainably.	Remove willow SRC and undertake soil remediation.	3 – All but one field of willow coppice removed, and majority of previously restored ground improved through intensive remediation programme (remaining areas to be covered as a separate operation in 2016)
Continue to grow quality timber sustainably.	Establishment of productive conifer crops	2 – Approx. 40 ha of productive crops established, remainder to be planted in 2016/17
Continue to grow quality timber sustainably. Carbon sequestrations increased by extending low impact silvicultural systems.	Thinning/Felling	1 – Young crops still too small for thinning, and mature SS currently not scheduled for felling until 2020.

3.0 Background information

3.1 Physical site factors

3.1.1 Soils & landform

Approximately 120 ha at Lambhill is comprised of former opencast, with the original restoration of relatively poor quality with significant compaction leading to issues with drainage that impacted on potential rooting depth and tree growth. A programme of further restoration work has been undertaken to address this, leading to site conditions much better suited to the growing of productive crops.

Out with the restored ground, the majority of the site is a mixture of high quality brown earths and surface water gleys, with some poorer soils in a few wetter areas.

Soil Moisture Regime provides an indication of the moisture and oxygen availability within the soil, both of which are essential for root growth. Soil conditions vary across the site but are generally in the Moist to Fresh range, in addition to some wetter areas corresponding to the poorer ground, suggesting a wide range of tree species will grow successfully.

Soil Nutrient Regime is a measure of both the availability of soil nutrients for plant growth, and the acidity of the soil (which impacts on the solubility and hence availability for uptake of most nutrients). Soil conditions vary across the site but are generally in the Medium to Rich range, making the site eminently suitable for growing a wide range of tree species.

See **Map 3.1.1 Soil Type**

Elevation varies between 100m ASL at the north-western edge, rising to 257m at the summit of Cult Hill. The majority of the site sits below 150m and is lowland in character, with a contrast between the generally flat ground in Lambhill (due to the former opencast operations) and the more undulating ground at Barnhill, which gradually rises until reaching the foot of Cult Hill which is more prominent in the surrounding landscape.

3.1.2 Current climate & exposure

The majority of the site falls within the Warm/Moist climate zone, except for the upper slopes at Cult Hill which are Cool/Moist.
Detailed Aspect Method Scoring (DAMS) is a measure of windiness of a site using the angle to the horizon in the eight compass points, weighted towards the

prevailing wind direction. Scores range from 0-24: The higher the score the greater the exposure, with scores below 13 regarded as sheltered and above 22 as too high for commercial forestry.

The majority of the site is relatively sheltered, with DAMS scores of 13 or lower and hence is potentially suitable for thinning.

3.1.3 Future climate

Climate data projections for 2050 and 2080 have been used to predict the anticipated future climate, which is expected to have warmer and drier summers, but with an increase in the frequency and severity of winter storms. Although this suggests that the range of suitable species may expand to accommodate more demanding species, and that the growing season may extend, it may also indicate an increased risk of drought which may limit the site suitability of e.g. Sitka spruce during the next rotation.

3.1.4 Hydrology

There are a few minor watercourses, the most significant of which is the Lambhill Burn which runs east to west through the south end of the site and ultimately joins the River Devon, which in turn joins the River Forth.

As part of the remedial work at Lambhill a fairly extensive drainage network has been created, including ~2km of open swales, in order to address some of the issues caused by the original restoration works.

There are two small areas of open water within the site, totalling just under 1 ha, and an existing reed bed covering ~1ha adjoins the Lambhill burn.

3.2 The existing forest

3.2.1 Age structure, species & yield class

There are several areas of mature woodland: a single stand of Sitka spruce (which is approaching felling age) at Broom Plantation in Lambhill, and several pockets of broadleaved woodland (predominantly birch, but also oak, sycamore and beech) scattered across the site.

The former opencast area contains several discrete areas of woodland which were established circa 2000, the majority of which is likely to have been on poorly

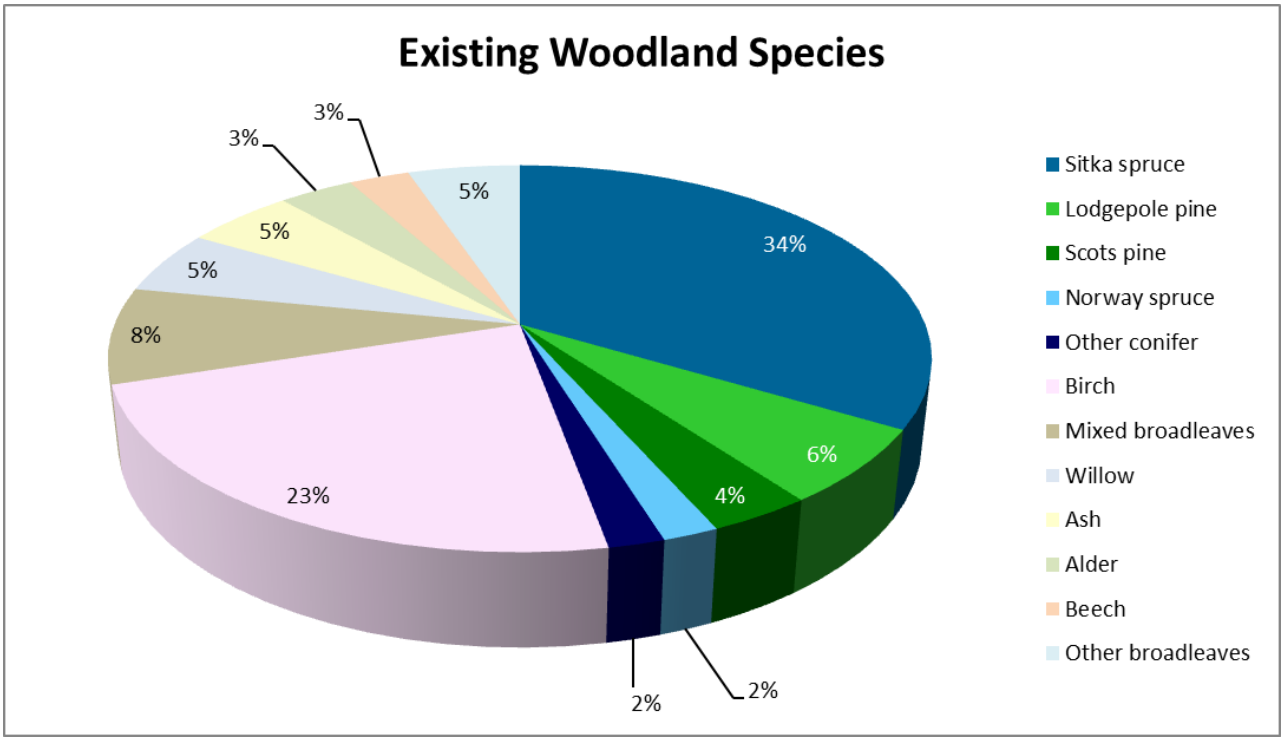
restored ground. Several discrete areas of broadleaves were planted, but the initial wide spacing used, and the dispersed nature of the stands, suggests it would be difficult to manage them effectively on a productive basis. Similarly, the pockets of conifer established around this time (primarily an intimate mix of Sitka spruce and pine) are also contained within isolated stands, although one of two of these are adjacent to proposed new conifer planting and may be viable for thinning if they are ultimately to be included in a larger productive coupe.

As part of the existing Lambhill management plan, approximately 40ha were planted in 2015 – primarily Sitka spruce, but also some areas of Norway spruce, birch and alder.

See **Map 3.2.1 Existing Woodland**

Table 3.2.1a – Existing woodland

	Species	Area (ha)
Existing Woodland	Sitka spruce	46.3
	Lodgepole pine	8.7
	Scots pine	4.8
	Norway spruce	2.6
	Other conifer	2.6
	Birch	31.7
	Mixed broadleaves	11.1
	Willow	7.3
	Ash	7.0
	Alder	4.8
	Beech	3.9
	Other broadleaves	7.2
Open ground		239.4
Open water		0.9
		378.3


Existing Woodland Species
34%
6%
4%
2%
2%
23%
8%
5%
5%
3%
3%
5%
Sitka spruce
Lodgepole pine
Scots pine
Norway spruce
Other conifer
Birch
Mixed broadleaves
Willow
Ash
Alder
Beech
Other broadleaves


Existing Woodland Age Classes
Area (Ha)
50
45
40
35
30
25
20
15
10
5
0
0-10
Establishment
11-20
Thicket
21-40
Pole
41-60
Mature
61+
Old
Growth phase

3.2.2 Operational access

Access within the site varies significantly between the original site at Lambhill and the newly acquired ground at Barnhill. The former area is well served by the existing internal road infrastructure, totalling approx. 4km (although this may require some upgrading prior to usage by heavy operational machinery).
Barnhill has very few options in terms of operational access currently – the entrance at the southwest corner is on a road unsuited to anything more than light vehicles, and although there is an internal network of approx. 2.5km of farm tracks these do not currently link to the existing road infrastructure and are concentrated in two discrete areas, with no linkage of any description currently along the narrow corridor joining Barnhill to Lambhill.

See **Map 3.2.2 Current Operational Access**

3.2.3 Low Impact Silviculture Systems (LISS) potential

Although the existing stand of mature Sitka spruce at Lambhill has missed the thinning window, and is thus unsuited to management under LISS, the relatively low DAMS scores and good ground conditions suggest that the newly established crops may be suitable for managing under LISS regimes in due course. Provided suitable operational access is achievable, the remaining areas to be planted with productive crops should also be suitable for LISS management where appropriate.

3.2.4 Pathogens

3.2.4.1 Dothistroma Needle Blight (DNB)

DNB (also known as Red Band Needle Blight because of the colourful symptoms it shows on pine) causes premature needle defoliation, resulting in loss of yield and, in severe cases, tree death. Recent surveys have shown outbreaks of DNB across Scottish Lowlands Forest District, and all of the pine stands established around the turn of the century have been infected.

3.2.4.2 Pytophthora ramorum (P. ramorum)

P. ramorum is a fungus-like pathogen of plants that is causing extensive damage and mortality to trees and other plants in parts of the United Kingdom. Larch in particularly is extremely vulnerable, and high infection and mortality levels are currently causing significant issues in Galloway Forest District. A couple of isolated instances *P. ramorum* have been detected within any Scottish Lowlands Forest District forest blocks at the time of writing, although these were both isolated trees rather than large-scale infections. No infections have been found in any of the Fife forest blocks to date, and the site falls within the lowest risk zone in the FCS Action Plan for Larch in Scotland.

3.2.4.3 Chalara fraxinea (Ash dieback)

Ash dieback is a serious disease of ash trees caused by a fungus, resulting in leaf loss, crown dieback and, potentially, tree death. The young ash stands established around the turn of the century have been confirmed as infected with Chalara.

3.3 Landscape & Land use

3.3.1 Landscape character

The site lies across the boundary of two of the landscape areas described by SNH in their 1999 Landscape Character Assessment, key elements of which are reproduced below:

Table 3.3.1a – Landscape character assessment

	Tayside	**Fife**
Landscape Type	Lowland Basins	Upland Slopes
Key characteristics and features	• Considerable areas of arable and grazing land, generally of semi-open character. • Commercial woodland is largely absent.	• Gentler, smoother, open, regular landform and land cover of Cleish slopes west. • Distinctive backdrops, edges and skylines to other landscape types. • Generally open semi-natural land cover. • Woodland cover strongly related to landform, shelter, aspect etc. • Extensive, panoramic and elevated views across substantial distances and many other landscape types.
Landscape guidelines	• Encourage appropriate woodland planting where this can contribute to positive land management. • Encourage management of hedges and semi-natural woodland.	• Cleish slopes west have the capacity to accept carefully designed and located planting. • General openness of the upper parts of Cleish slopes should be protected.

The ground on and around Cult Hill, which falls within Fife Council, is part of the designated Cleish Hills Special Landscape Area (SLA). Although much of the remainder of the site used to fall within the Perth and Kinross Area of Great Landscape Value (AGLV), this designation has been superseded by the SLA, and the AGLV designation is no longer applicable.

The Cleish Hills are visually dominant in the surrounding local area with a number of key characteristics forming the existing landscape character:

- Visually prominent with steep slopes on the southern flanks.
- Coarse grassland covers the tops of these hills while semi-improved pasture extends on the lower slopes, patterned with gorse colonising the sleeper slopes.

- The steep slopes of one of the three hills (Wether Hill) is 'masked' with dense coniferous forestry.
- A strong enclosure pattern of field and roadside trees and beech hedges provides a distinctive geometry in the Balgonar area.
- Scots pine shelterbelts and stone walls, together with more naturalistic clumps of broadleaved trees also feature.

3.3.2 Visibility

With the exception of the upper slopes of Cult Hill, which are widely visible from the surrounding countryside to the west, much of the site is generally only visible at a more local level from the immediately adjacent ground.

3.3.3 Neighbouring land use

The majority of the surrounding land is given over to agriculture. There are also several areas of woodland, a woodfuel processing facility at the entrance to Lambhill and a number of residential properties at various locations around the perimeter.

3.4 Biodiversity & environment

3.4.1 Priority Habitat Types

PHT's are protected under the UK Biodiversity Action Plan, and FES policy is to protect, enhance and expand these habitats where suitable. There are a broad range of open space and woodland types covered by the plan, a number of which are present on site.

In 2014 a contract survey was commissioned, covering the newly acquired ground at Barnhill, to classify the area using the National Vegetation Classification (NVC). The majority of the site was assessed as grassland or pasture of types not covered by the plan, but there were several areas of conservation interest:

- Birch-dominated woodland at Lambhill Moss
- Wet willow woodland and species-rich rush mire in the wet hollow SW of Barnhill Farm.
- Complex of woodland, wetland and acid grassland to the SW of Cult Hill.

3.4.2 Ancient Woodland

There is only one area of woodland classified as being ancient of semi-natural origin, comprising approx. 1ha of the existing wooded area southwest of Cult Hill. A further 13 ha of mature woodland, concentrated in several pockets across the site, is classified as Long Established of Plantation Origin (LEPO).

3.4.3 Breeding Birds

Parts of the site offer potential habitat for species such as lapwing, oystercatcher & curlew, although during initial consultations RSPB did not express any concerns regarding potential planting.

3.4.4 Protected Species

Badger are known to be present on the lower slopes of Cult Hill, bats are likely to be present in some of the mature broadleaf trees across the site and there is some evidence suggesting otter may use one or two of the watercourses (although it is not clear if any holts are present).

3.4.5 Wildlife

Roe deer are present on site, and any new planting of soft species is likely to result in medium to high pressure from the resident population in the surrounding countryside. Hare are also known to be present around Cult Hill.

3.4.6 Non Native Invasive Species

Rhododendron ponticum is present within several of the mature broadleaved stands across the site.

3.5 Heritage

FES maintains extensive archaeological records for the NFE within our heritage database. Important historic environment features are surveyed, recorded, mapped and monitored by SLFD to ensure and demonstrate Forestry Commission Scotland compliance with the UK Forestry Standard. This ensures that undiscovered historic environment features are mapped and recorded prior to forestry management operations and ensures the continued comprehensive protection of the known archaeological resource.

3.5.1 Scheduled Monuments

The prehistoric fort on the summit of Cult Hill is the only scheduled monument on site, and is categorised as being of national importance.

3.5.2 Non-scheduled Archaeology

A walkover survey and desk based assessment of the newly acquired ground at Barnhill was undertaken in 2015. A number of areas of interest were identified which add to the known archaeological record of sites (e.g. the former Lambhill Colliery), generally relating to post-medieval agricultural usage in the form of areas of rig and furrow, field boundaries and quarry pits which would be regarded as of local importance. The remains of the walled garden at Lambhill were identified as being of regional importance.

3.6 Recreation & Community

Apart from the small village of Blairingone to the northwest of Lambhill, there is a sparse local community comprised mainly of scattered farms and houses. Lambhill and the majority of Barnhill falls within Perth & Kinross Council, with the eastern end of Barnhill falling within Fife. Two of the existing farm tracks form part of the Perth & Kinross Core Path network, and one of these is also a public Right of Way.

4.0 Analysis & Concept

Through survey work and research, a broad range of factors have been identified which are potentially relevant to the future makeup and management of the land. These have been analysed in order to better understand the way these interact, and to draw out the most important features and trends.
See **Map 4a Opportunities & Constraints**

This analysis was used to develop an initial design concept highlighting general themes and outlining key considerations and activities which are likely to be most relevant during the plan period, and which formed the basis for the initial consultation with both the general public and key stakeholders.
See **Map 4b Design Concept Proposals**

5.0 Management Proposals

5.1 Forest Stand Management

All proposals have been designed in accordance with sound silvicultural and environmental principles, falling within the framework outlined by the UK Forestry Standard, the UK Woodland Assurance Scheme, FC Bulletin 112 Creating New Native Woodlands, FC Bulletin 115 Alternative Silvicultural Systems, FC Bulletin 124 Ecological Site Classification for Forestry and the current FC edition of Forest & Water Guidelines.

The intention is to create a mixed woodland with the majority of conifer production focused on the restored opencast ground at Lambhill, whilst taking advantage of the favourable conditions on the natural ground at Barnhill to develop economically higher-value productive broadleaf crops. In addition, existing areas of native woodland will be used as the starting point to develop better semi-natural habitat network links both within and out with the site.

See **Map 5.1 Management Approach**

5.1.1 Clear felling

Patch clear felling will be the most appropriate management approach for stands within the former opencast area, and will also be applied to one or two stands immediately adjacent, where landscape impact and/or site sensitivity remains low.

During the plan period, the mature stand of Sitka spruce at Broomhill plantation will be felled (6.5ha, ~2,500 m^3), and the final remaining area of Willow Short Rotation Coppice (6.5ha) will be removed.

5.1.2 Thinning

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

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

All thinning decisions will be guided by Operational Guidance Booklet 9 - Managing Thinning, and the current SLFD Thinning Plan.

The existing pockets of conifers planted circa 2002 will be thinned where they are of sufficient scale and easily accessible from the existing road infrastructure. It may be worth timing first thinning to coincide with the felling of the mature Sitka stand at Broom plantation if this improves the economic viability of the operation.

The existing stands of mature birch around Lambhill Cottage will be thinned with a view to opening out the stands sufficiently over time to allow under-planting with a productive broadleaf crop.

The young stands of mixed broadleaves south of Lambhill Cottage will be thinned in due course with a focus on retaining the species most likely to yield a productive crop in due course (primarily Alder, Oak and Sycamore).

See **Map 5.1.2 Proposed Thinning**

Although the majority of the Sitka spruce planted at Lambhill will be managed on a patch clear-fell basis, it is still anticipated that these stands will be thinned in due course to maximise volume and the potential for a better proportion of quality sawlog material.

5.1.3 Low Impact Silvicultural Systems (LISS)

The generally favourable conditions in Fife (in terms of both climate and soil suitability) lend themselves to management through LISS regimes, which potentially can be beneficial in terms of timber quality, biodiversity, recreational usage and visual amenity.

Given that the majority of stands which will be managed under LISS have yet to be established, a detailed LISS plan will not be produced during this plan period. Broadly speaking, the intention will be to manage the crops on the better soils outside the former open cast area under a group selection system, whereby small pockets within the forest will be progressively felled and restocked through a combination of natural regeneration and/or planting depending on future objectives.

5.1.4 Access

Given the current difficulty in gaining operational access to the newly acquired ground at Barnhill several upgrades to the existing farm track infrastructure are proposed, in conjunction with the construction of a new road linking these to the existing internal road infrastructure within Lambhill:

- Upgrade ~1km of internal farm track running from existing internal road at Lambhill to the boundary with Barnhill Farm.
- Construct ~750m of new track from the existing upgraded farm track into the eastern half of the Barnhill section of the site.

The new track will be constructed sufficient to allow operational access for all machinery required during the establishment phase. It is envisaged that this track would then be upgraded at time of 1st thinning (~20 years later) to allow timber haulage, and a number of spur road extensions would also likely be undertaken at that time.

A small (~200m) spur will also be required prior to felling to access the mature Sitka stand at Broom plantation.

See **Map 5.1.4 – Proposed Operational Access**

5.1.5 Minimum Intervention areas & Natural Reserves

Approximately **7 ha** (2%) has been designated as Long Term Retention, **20 ha** (6%) as Minimum Intervention and **4 ha** (1%) as Natural Reserve.

The mature birch woodland at Broom Plantation & Lambhill Wood has been classified as Long Term Retention, due to its potential to be brought into productive (LISS) management following clearance of the Rhododendron.

The wet woodland by Barnhill Farm and mature mixed woodland at Dam Wood has been classified as Natural Reserve, whilst several areas of existing semi-natural woodland have been classified as Minimum Intervention.

5.2 Future habitats and species

Taking into account all the survey and analysis information, and the objectives set out in the brief, a mix of productive conifer, productive broadleaf and native woodlands are proposed, along with areas of open ground.

The woodlands will be matched to the soils and ground vegetation, using the guidelines set out in the Forestry Commission's Ecological Site Classification (ESC) Bulletin 124, which uses climatic zone, exposure, soil moisture, and soil nutrient levels to inform the type of woodland most suited to particular areas within the site.

A little over half of the site will comprise productive woodland (of which 20% will be broadleaves), with woodland managed for amenity and/or biodiversity accounting for a further quarter. The remaining open ground will be managed for a variety of purposes including grazing, wayleaves & access, landscaping, heritage features and biodiversity.

5.2.1 Proposed Species

Sitka spruce will form the primary component on the restored ground at Lambhill, which is eminently suited to a plantation forestry approach. Elsewhere, the favourable soils and benign climate offer some of the best silvicultural conditions within the district and so the primary focus will be on higher-value conifers (Douglas fir and Norway spruce), with some areas of high quality productive broadleaves.

The overall proportions of the productive woodland elements proposed are, broadly speaking: 60% Sitka spruce, 20% other conifer, 15% broadleaf (timber) and 5% broadleaf (biomass).

Productive broadleaf species will be primarily grown for high quality timber, and the focus will largely be on native species which have a long record of successful management (principally Oak, but also Birch, Sycamore, Norway maple & Cherry). Where ground conditions are less favourable broadleaves will be grown on shorter rotation for biomass (Alder, Aspen & Birch).

Areas of native broadleaves, in combination with judicious use of open ground, will be used to soften the landscape impact of the productive stands and ensure that the overall woodland sits well within the wider landscape.

Table 5.2.1 – Proposed species

Species	Gross area (ha)	%	Net area (ha)
Sitka spruce	104	28	93.5
Douglas fir	36.8	10	33.2
Lodgepole pine	8.7	2	8.7
Norway spruce	4.9	1	4.4
Mixed conifer	2.7	1	2.5
Oak	18.3	5	17.0
Birch	10.9	3	9.5
Sycamore	6.0	2	5.4
Wild cherry	2.8	1	2.5
Norway maple	2.1	1	1.9
Alder	1.4	0	1.2
Aspen	0.7	0	0.6
Mixed broadleaves	92.9	25	67.9
Open ground	85.8	23	
Total	**378**	**100**	**248.3**

See **Map 5.2.1 – Future Species**

5.3 Prescriptions

5.3.1 Productive Conifers

Sitka spruce will form the primary conifer component, as it should be well suited to the conditions on the newly restored ground. Although the majority of the Sitka crop will be managed on a clearfell-and-restock basis, the favourable silvicultural conditions suggest that thinning regimes should still be undertaken in due course in order to maximise quality sawlog output.

Douglas fir and Norway spruce both have biodiversity benefits as a feed source for red squirrel, whilst offering the potential for higher economic returns and also helping to diversify the productive crop in order to mitigate against future risks (in terms of both climate and pests/diseases). Douglas fir will be planted on some of the lower slopes across the site (mostly pure but also in intimate mix with Sitka spruce on the slightly more exposed edges) whilst Norway spruce will be located on the flatter, wetter ground.

Conifers will be planted at an initial density of **2,700 trees/ha**, with the intention of achieving a final density at year five of 2,500 stems/ha (where the objective is sawlogs) or a reduced year five target where the objective is small roundwood or chip/pulp (~2,250 stems/ha).

5.3.2 Productive Broadleaves

Although species-specific management objectives have been stated below, these should only be taken as indicative goals at this stage. It is only once the trees have established, and potential future management interventions such as leader forming, pruning, re-spacing and thinning taken into account, that a clearer determination may be made as to whether to advance or delay first thinning (with corresponding implications for final clean bole length and target girth).

5.3.2.1 Oak, Oak/Birch mixture

Oak will form the major broadleaf component, and will be planted both pure and in mixture with Birch (in the latter case, with the Oak located on the better/more sheltered ground).

Oak will be grown with the objective of achieving quality sawlogs from trees with a target diameter at breast height (dbh) of **50+ cm** and a clean bole of **6-8m** on a rotation of 100+ years. If trees are self-pruning successfully management interventions should be minimal until time of first thinning, although selective removal of undesirable trees (e.g. wolf trees) may be necessary. Thinning should commence when the majority of final crop trees have achieved the desired clean bole length (potentially around 30-40 years). Once thinning is underway,

underplanting should be considered in order to suppress epicormic growth and control ground vegetation.

Birch will be grown with the objective of achieving quality sawlogs from trees with a target dbh of **30+ cm** and a clean bole of **3-6m** on a rotation of 30-40 years (if possible timed to coincide with first thinning of the Oak). Thinning operations are likely to commence around 15 years.

5.3.2.2 Sycamore/Norway maple

Sycamore and Norway maple will be planted both pure and as a group mixture, with the latter included to increase resilience through species diversity, and to enhance amenity value in more prominent areas due to its attractive autumn foliage.

Both will be grown with the objective of achieving quality sawlogs from trees with a target dbh of **60+ cm** and a clean bole of **6-8m** on a rotation of 90+ years. Thinning operations are likely to commence after 25-30 years.

5.3.2.3 Wild Cherry

Cherry will form a minor component that will increase the visual amenity and biodiversity value of the productive stands. It also has the benefit of producing timber on a relatively short rotation, thus providing an interim crop in the years after initial biomass production has subsided but before the main timber stands are due for harvest.

Cherry will be grown with the objective of achieving quality sawlogs from trees with a target dbh of **30+cm** and a clean bole of **6-8m** on a rotation of 50-60 years.

5.3.2.4 Aspen/Alder/Birch mixtures

A mixture of Aspen/Alder or Birch/Alder, planted in groups, will be used on some of the wetter/poorer areas to increase biodiversity and visual amenity (in comparison to coniferous species) whilst still maintaining productive potential as a biomass crop over relatively short rotations (e.g. 30 years).

5.3.2.5 Broadleaf spacing

Stocking densities may vary between species according to the optimal spacing requirements for encouraging good vigour, form and self-pruning capacity. However, in order to reduce operational complexity and facilitate cost-effective

establishment, stocking densities should generally remain uniform within discrete planting areas.

Table 5.3.2.5 – Stocking density

Species	Trees/ha	Gross area (ha)	Net area (ha)
Oak	6,000	17.5	16.3
Birch	3,000	8.9	8.0
Sycamore	5,000	9.8	9.2
Norway maple	5,000	2.1	1.9
Wild cherry	500	2.8	2.5
Aspen	3,000	0.7	0.6
Alder	3,000	1.3	1.2
Average stocking	**4,100**		

Where trees are stocked at higher densities (over 4,000/ha), the spacing between trees should be adjusted from a 'square' to a 'rectangular' planting pattern by increasing the distance between rows whilst shortening the distance between trees within a row. This will facilitate future management operations by allowing quad bike access for e.g. top up sprays or inter-row mowing.

Oak will be planted in groups at **6,000**[1] **trees/ha**. When planted in mixture with Oak, Birch will be planted in groups at **3,000 trees/ha** in order to facilitate ease of operations (i.e. prepare the ground as though for Oak, and then plant every alternate position).

Sycamore and Norway maple will be planted pure or in groups at **5,000 trees/ha**.

Cherry will be planted at **500 trees/ha** in small groups. Due to its poor self-pruning ability, it will predominantly be planted in long, narrow strips along the side of tracks/roads in order to facilitate future management access for pruning operations.

Aspen, Alder or Birch grown for biomass will be planted in groups at **3,000 trees/ha**.

5.3.3 Semi-natural woodland

[1] Where Oak is planted in mixture with Sycamore, it will be at a stocking density of 5,000 trees/ha in order to simplify ground preparation.

Native woodland types, as classified in FC Bulletin 112 Creating New Native Woodlands, have been identified as suitable:

Table 5.3.3 – Woodland Types

Woodland Type	Location	Species
W4 (Birch woodland)	Poorer ground	Primarily Downy birch, Alder and Willow with an additional component of Rowan and shrubs.
W7 (Wet woodland)	Streamsides and waterlogged areas.	Primarily Alder, but also Willow, Downy birch, Oak, Rowan, Bird cherry and a range of other shrubs.
W10 (Lowland mixed broadleaved woodland)	Gently undulating ground and valley bottoms	Mostly Oak and Silver birch, but also Gean, Aspen, Downy birch, Rowan, Hazel, Holly, Hawthorn, Blackthorn & Elder
W11 (Upland oak-birch woodland)	On more exposed upper slopes.	Mostly Sessile oak and Birch, but also Rowan, Aspen, Holly, Hazel, Hawthorn & Juniper.
W16 (Lowland oak-birch woodland)	Valley sides and lower slopes.	Mostly Oak and Birch, but also Aspen, Rowan, Holly & Elder.

Within riparian areas along existing watercourses, planting will generally be a variant on W7 woodland, and will include a significant (30% or more) element of open space. In accordance with current Forest & Water Guidelines, a 5-10m buffer zone will be left open, dependent on localised width.

Around the edges of the main, more densely planted stands, a more open 'transitional' woodland will be planted. This may incorporate a higher level (typically around 30%) of open ground, with the woodland planted in clusters whose density decreases with distance from the main stands.

Elsewhere, a more diverse range of native woodland types will be planted according to local conditions.

Plant as an intimate mix at **1,600 trees/ha**.

5.3.4 Open ground

Approximately 15% of the site will be managed as open ground primarily for grazing, operational access or wayleaves, with a further 10% open ground managed principally for biodiversity and/or landscaping value.

5.4 Biodiversity & Heritage

5.4.1 Habitat Management

The forest design illustrated in the Future Species Map considered the various heritage feature within the site.

Appropriate buffers have been applied by our Environment & Heritage Forester to all the different features across the sites which are recorded within our heritage database. This is done in accordance with the guidance provided in the Forests and Historic Environment guidelines (2011), the FCS policy document: Scotland's Woodlands and the Historic Environment (2008) and the supporting FES Historic Environment Planning Guidelines. Features generally have buffers ranging from 5-10 metres depending on their nature but these can be wider or even have no buffer. Such constraints are identified and surveyed by Forest District staff prior to any work being undertaken in order to ensure that upstanding historic environment features can be marked and avoided. For operations, work prescriptions protect relevant historic environment features apportioning appropriate buffers clear from ground disturbing operations and planting. Opportunities to enhance the setting of important sites are considered on a case-by-case basis.

The existing area of open ground and woodland to the southwest of Cult Hill which is designated as a mix of ASNW and LEPO will be underplanted with a selection of broadleaves in order to maintain its existing character.

The wet woodland to the west of Barnhill Farm will be monitored and any appropriate management actions undertaken, in order to maintain the existing high quality habitat.

Approximately **9 ha** of mature birch woodland are scheduled for clearance and/or follow-up control of *Rhododendron ponticum* during the plan period (5 ha at Lambhill Wood and 4 ha at Broom Plantation).

5.4.2 Protected Species

The plan aims to improve habitats for protected species, and their presence has been accounted for in the location and choice of tree species.

Careful design, particularly with regard to species choice, has been used in order to maximise the potential benefit to red squirrel within the future woodland habitat. The use of Norway spruce, Douglas fir and small seeded broadleaves such as birch and aspen should all increase the potential of the woodland to provide a beneficial habitat, providing an opportunity for the red squirrel population in the wider environment to expand its range.

There is the potential to create optimal denning sites for Pine marten (which are known to be in the wider area) by retaining the existing mature broadleaf trees on site, and increasing the woodland cover around them.

All operations will adhere to SNH approved FCS Guidance notes and appropriate operational buffer zones will be established prior to the commencement of any works. If required, licenses to carry out operations will be applied for.

5.4.3 Deadwood

The aim is to use natural processes by retaining dead, windblown or snapped stems or those created during previous operations. Deadwood can be trees or limbs in the early stage of decomposition, e.g. veterans or dying individual trees. These should be retained wherever possible to create an even mix of standing, fallen or stacked deadwood.

Deadwood will be concentrated in areas where it will provide the highest ecological benefit, such as;

- Riparian and wet woodland areas
- Natural reserves and long-term retentions
- Ancient semi-natural woodland
- Areas of significant existing deadwood

The UKWAS target is for an average of 20m^3/ha, although it is expected that actual concentrations will vary widely across the site.

Table 5.4.3 – Assessed Deadwood Ecological Potential (DEP)

Assessed DEP	Area (ha)	Future Volume Estimate (m^3/ha)	Total Future Volume (m^3)
High	6.2	150	930
Medium	75.1	90	6,759
Low	278.9	10	2,789
	360.2		**10,478**

Total future potential is thus estimated at **29m^3/ha**.

Given that a relatively high total volume of deadwood is expected to come from High & Medium DEP areas, in line with FES Deadwood Policy the following approach should be adopted in the remaining Low DEP areas:

- Take any obvious opportunities to retain deadwood in a coupe e.g. large veterans, deadwood in wet areas or inaccessible areas.
- Consider harvesting wind blow only when it is economic or required to make site safe.

5.4.4 Wildlife Management

Deer control is vital to successful crop establishment, and the proposed introduction of 'soft' conifer and productive broadleaves species means that there will be potentially vulnerable crops in a number of areas across the site, and deer numbers will need to be controlled by culling to minimise damage. Although deer fencing will only be considered as a secondary option, the use of potentially vulnerable tree species may require small enclosures to be erected in order to minimise damage during establishment. Careful planning will be required as to the size and location of such enclosures so that deer welfare is not compromised.

Full details of proposed deer management can be found within Scottish Lowlands Forest District Deer Management Strategy (in conjunction with the Deer Overview Map), but the relevant objectives within the Fife Deer Management Unit are:

- Where possible, enable restocking to take place without the need for deer fencing, and to achieve a suitable stocking density at year five.
- Keep leader damage levels below 10% in productive coupes.
- Maintain a sustainable deer population.

5.4.5 Heritage

Management of fort at Cult Hill will continue to be carried out in accordance with the Historic Environment Scotland-approved Monument Management Plan, which details any required management actions for all scheduled monuments within the district.

A suitable operational buffer will be maintained around all non-scheduled archaeological features, which will be managed in accordance with UK Forestry Standard Guidelines on Forests and the Historic Environment, with appropriate steps taken to ensure the protection of any such feature.

5.5 Water Quality

All operations will follow best practice as detailed in the current Forest and Water Guidelines. Timber extraction will normally avoid crossing burns or main drains, but, where necessary, each crossing point will be piped or bridged. Branches will be kept out of watercourses and trees will generally be felled away from the watercourses. Restocking of areas around watercourses will take into account suitably sized buffer areas as per Forest and Water Guidelines.

5.6 Community & Recreation

Scottish Lowlands Forest District Staff will actively engage the local community to encourage use of the forest, and FD Ranger staff will look for opportunities to build links with local community groups and schools.

Existing informal recreation routes will be maintained, and an informal route to the fort on the summit of Cult Hill will be maintained through any woodland that is established on the lower slopes. Opportunities to improve access to the site from Blairingone will be explored where appropriate.