Forestry and Land Scotland
Coilltearachd agus Fearann Alba

East Region

Castlehill and Balnacoul

Land Management Plan

Plan Reference No: LMP 8

Plan Approval Date:

Plan Expiry Date:

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.

The mark of responsible forestry

Signed	……	Signed	……
	Regional Manager		Conservator
	East region		Grampian conservancy
Date	……	**Date of Approval**	……
		Date approval ends:	……

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1.0 Summary of proposals

This plan is a review of Forestry and Land Scotland's management of Castlehill and Balnacoul woods. The plan area includes Castlehill, Balnacoul, Blackburn, Trochelhill, stymie and Blackdam blocks.

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

The **primary objective** is the management of the woodland for the production of a sustainable quality crop of timber.

In order to work towards achieving this objective taking into account limitations imposed by the current makeup of the forest has led to the following range of operations.

Planned Operations	**2020 – 2029 plan period**
Clearfell	0 ha
Thinning	572.5 ha
Restock	11.4 ha (by natural regeneration)
Road construction	None
Road upgrade	None

Due to the species currently growing across the blocks, the site conditions and the previous management much of the area has been managed under LISS prescriptions. This will continue during the lifetime of the current plan with thinning being the main operation being undertaken. There are no plans to undertake any felling within the LISS areas at this point in time due to the age of the current crops.

2.0 Forestry Scotland Regulatory Requirements

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

2.1 Summary of planned operations

Proposed felling, restock and infrastructure works are shown on Map 5 Management, Map 6 Thinning, Map 7 Future habitats and species and Map 8 LISS.

Table 1 Planned operations over this LMP period

Planned Operations	**2020 – 2029 plan period**
Clearfell	0 ha
LISS felling	0 ha
Thinning	572.5 ha
Restock	11.4 ha (by natural regeneration)
Road construction	None
Road upgrade	None

2.2 Proposed felling in years 2020 - 2029

There is no clearfelling or felling within LISS coupes proposed within the plan period.

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

Age of trees	Growth stage	Area (ha) 2020	% 2020	Area (ha) 2029	% 2029
0 - 10	Establishment	16.5	2.9	11.4	2.0
11 - 20	Thicket	0.5	0.1	16.5	2.9
21 - 40	Pole stage	46.4	8.1	6.1	1.1
41 – 60	Mature high forest	49.5	8.6	64.4	11.2
61+	Old high forest	413.1	72.1	445.5	76.7
	Open	28.7	4.1	35.2	6.1
	Felled	17.9	4.1	0	0

2.3 Proposed thinning in years 2020 - 2029

Proposed thinning coupes in Phases 1 and 2 is shown in Map 9 Thinning.

Table 5 Thinning details by coupe

Coupe no.	Next thin year	Area (ha)	Volume (m^3)
8001	2021	99.5	1981
8002	2023	139.2	2772
8004	2026	127.3	2535
8005	2021	69.6	1386
8009	2024	136.9	2726
Total		**572.5**	**11399**

Table 6 Summary of thinning coupes in Phases 1 and 2 (percentage of forest area)

Proposed thinning year	Total coupe area (ha)	% of forest area
2020 - 2024	308.3	53.9
2025 - 2029	264.2	46.1

2.4 Proposed restocking in years 2020 - 2029

Proposed restocking species is shown on Map 10 Future habitats and species.

Table 7 Restock details by coupe (ha)

Coupe	SP	MB	Other	Open	Total	

			conifer			
08897		6.0		6.0	12.0	Natural regeneration
08080	1.1	0.4	0.4	0.2	2.1	Natural regeneration
08136	0.9	0.4	0.4	0.1	1.8	Natural regeneration
08655	1.0	0.4	0.4	0.2	2.0	Natural regeneration
Total	**3.0**	**7.2**	**1.2**	**6.5**	**17.9**	

Table 8 Change in species composition over plan period (%)

Species	Area (ha) 2020	% 2020	Area (ha) 2029	% 2029
Scots pine	324.3	56.6	327.3	57.2
Sitka spruce	97.4	17.0	97.4	17.0
Douglas fir	33.1	5.8	33.1	5.8
Corsican pine	28.6	5.0	28.6	5.0
Larch	12.7	2.2	12.7	2.2
Other conifers	12.1	2.1	13.3	2.3
Broadleaves	17.8	3.1	25.0	4.3
Open	28.7	5	35.2	6.1
Felled	17.9	3.1	0	0

Due to the use of LISS management across the majority of the plan area there is very little opportunity to change the species composition during this plan period as there will be no selective felling due to the age of the current crops. There is a small increase in both broadleaves and open space within the plan period as areas currently awaiting regeneration will be managed to favour broadleaves and open space.

Two coupes are planned for clearfelling beyond the plan period. Both will be restocked with native broadleaves and open space. These coupes total 25.6ha and will bring the broadleaf woodland area to 37.8ha, or 6.6%, and the open space to 48.0ha, or 8.4%, this along with the open space created during selective felling operation will bring the total to over 10% as per UKFS guidelines.

2.5 Access and roading 2020 – 2029

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

2.6 Departure from UKFS Guidelines

The LMP seeks to follow the UKFS guidelines in all requirements.

2.7 Standards and guidance on which this LMP is based

This land management plan has been produced in accordance with a range of government and industry standards and guidance as well as recent research outputs. A full list of these standards and guidance can be found here: https://scotland.forestry.gov.uk/managing/plans-and-strategies/land-management-plans/links

2.8 Tolerance table

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

3.0 EIA Screening Determination for forestry projects

3.1 Proposed deforestation

No deforestation is proposed within the LMP unless required to achieve UKFS guidelines or for the overriding benefit to the area. This would include riparian protection or the enhancement of habitats or biodiversity.

3.2 Proposed forest road works

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

3.3 Proposed forest quarries

There are no proposals to undertake quarrying work within the plan period.

3.4 Proposed afforestation

There are no plans for any afforestation within the plan period.

3.5 Additional regulatory considerations

There are no additional regulatory considerations within this plan period.

4.0 Introduction

Refer to Map 1: Location

4.1 Setting and context

Castle Hill and Balnacoul woods including Blackburn, Trochelhill, Stynie and Blackdam woods and cover a total area of 572.6 hectares. They are located at close to Mosstodloch (see map 1 location).

Name	Area (ha)
Castlehill	126.9
Balnacoul	127.3
Blackburn	34.7
Trochelhill	34.9
Stynie	238.9
Blackdam	9.9
Total	**572.6**

4.2 History of the forest

Records show that the woods of Stynie and Balnacoul were first planted with Scots pine by the Gordon Castle Estate in 1735. These trees were felled in the early 1800's and no trees from this time are known to have survived. The first edition OS maps from 1874 shows that the majority of the area was wooded at that time, indicating that the felled areas had been replanted. This is confirmed by the Ancient Woodland Inventory of Scotland which identifies the forest in 1873/74 as being long-established woodland of plantation origin. It is highly likely that much of this woodland cover was removed during the First World War, and that for a time the area became open grazed moorland. The Forestry Commission acquired the majority of the area in 1947, after being re-afforested during the late 1940's and early 1950's.

4.3 Land management objectives

The purpose and objectives for managing these blocks of woodland have been identified following a review of:

- The physical context and existing woodland;
- The land management objectives of other statutory bodies;

- The physical capability of the woodland;
- Interim Corporate Plan (https://forestryandland.gov.scot/what-we-do/plans-and-strategies/corporate-plan)

Analysis of the available information has led to the **primary objective** being the management of the woodland for the production of a sustainable quality crop of timber.

5.0 Analysis of previous plans

Since the last plans were approved policy themes have been updated, and as a consequence previous objectives can't be directly compared with the current aspirations for the National Forest Estate. The following table highlights the main priorities set out in the previous plans. It describes how and if those aims were met and what the proposed management intent is to carry these objectives forward in this plan.

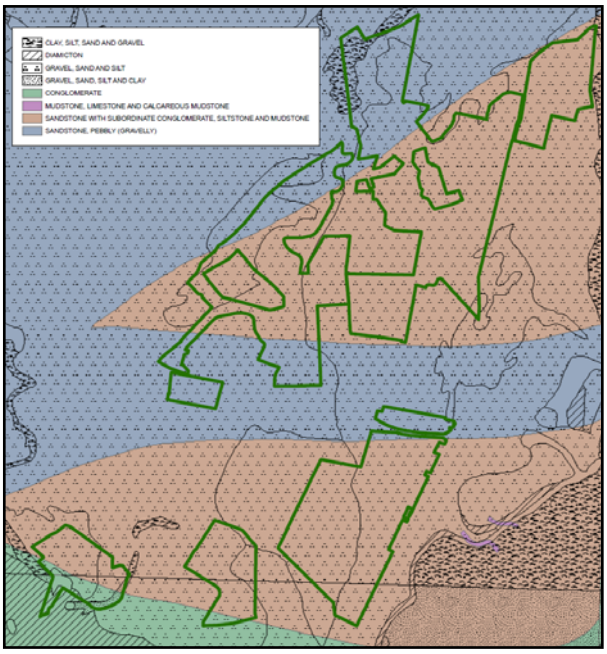
Theme	Issue	Plan Objective	Progress to date **0 –** No progress in plan period **1** – Nominal progress **2** – Some progress **3** – Progress as per plan	Proposed action (in this plan)
Economic	Timber supply	Maximise the use of Continuous Cover systems.	**3** – The majority of the thinning and felling operations approved in previous plan have been completed.	This will not be an objective in the new plan. However if LISS management continues to be the most appropriate system to achieve the objective of producing a sustainable crop of quality timber it will continue to be the used.
Environmental	Structural and species diversity	Increase the naturalness of the woodland to improve its ecological value.	**3** – The majority of the thinning, felling and restock operations approved in previous plan have been completed.	This will be one of the outcomes of implementing the new plan but is not an objective in its own right.
Social	Recreation	Ensure the forest remains an attractive venue for recreation.	**3** – The majority of the thinning, felling and restock operations approved in previous plan have been completed.	This will be one of the outcomes of implementing the new plan but is not an objective in its own right.

6.0 Background information

6.1 Physical site factors

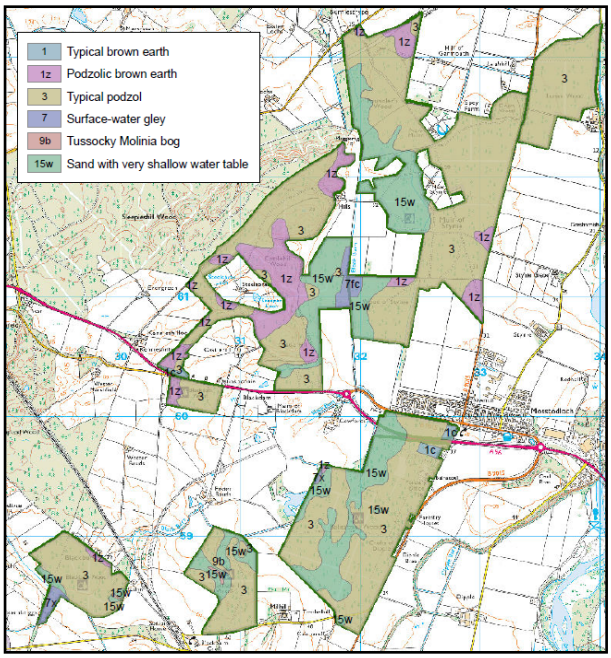
Refer to Map 4: Key Features.

6.1.1 Geology, Soils and Topography

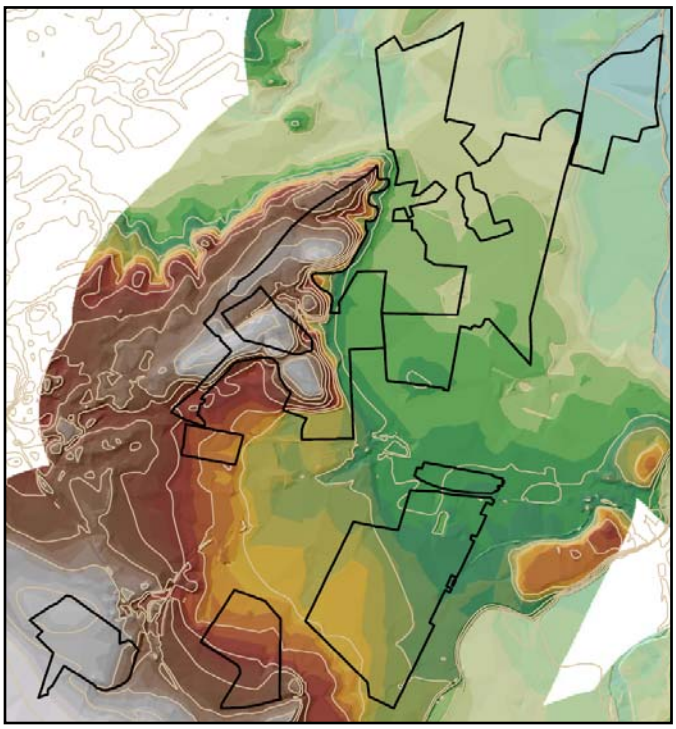


Geology - According to the British Geological Survey the plan area is underlain entirely by sedimentary rocks, mostly sandstone with drift deposits of glacial gravel, sand and silt.

These geological conditions lead to soils with low levels of nitrogen available for tree growth.



Soils – The majority of the soils in the Castlehill and Balnacoul blocks are typical podzols (69%), sand with a very shallow water table (20%) or podzolic brown earth (10%). These soils have a range of moisture regimes from very wet through to slightly dry and nutrient regimes that run from very poor to rich. These factors influence the species of trees that will grow successfully in these woodlands.

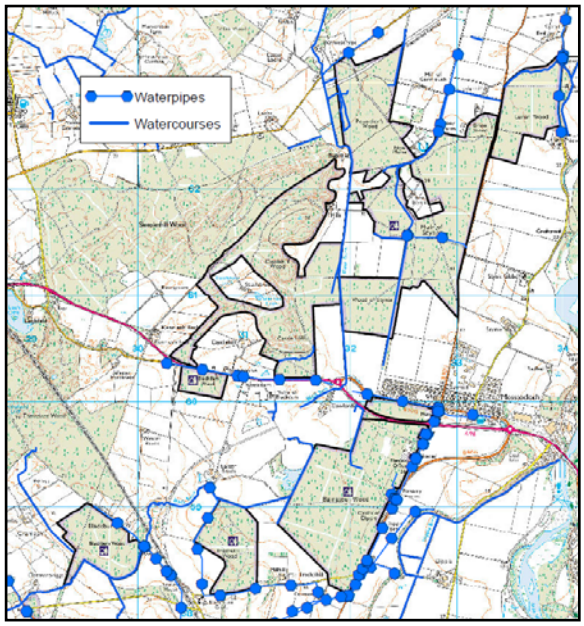


Topography - The woodlands are situated on the low-lying coastal plain between 10 and 80 meters above sea level. The woodlands generally have a flat topography, except for Castle Hill which lies on the east facing side of a small hillock with a complex of small ridges and valleys.

6.1.2 Water

All the woodlands that make up the Castlehill and Balnacoul land management plan are within the river Spey major catchment.

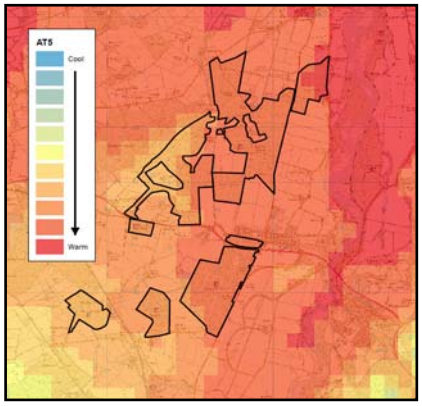
According to the SEPA website all the blocks are within a Potentially Vulnerable Area (PVA) for flooding. This is PVA 05/04 Spey Bay. The main flood risk is associated with floodplain of the river Spey east of Garmouth and the tidal reaches around Spey Bay. The PVA report does not highlight natural flood management studies or works as an action that will have a major impact on alleviating the flooding threat. However all forest operations will be undertaken in accordance with the forest and water guidelines to ensure no additional flooding risk is created. If opportunities present themselves to undertake work to help alleviate flood risks during the course of operations these will be discussed with the relevant flood management authority and undertaken if appropriate.



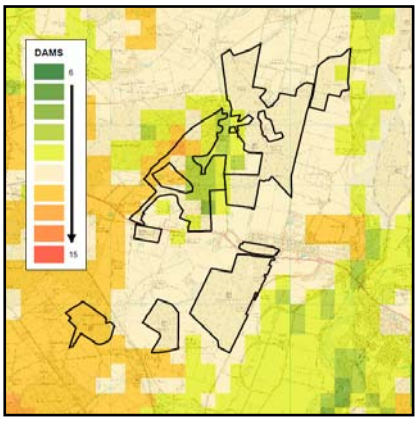
6.1.3 Climate

The climate data for the design plan area is obtained from the Ecological Site Classification system (ESC).
The results of interrogating this system gave the following data.

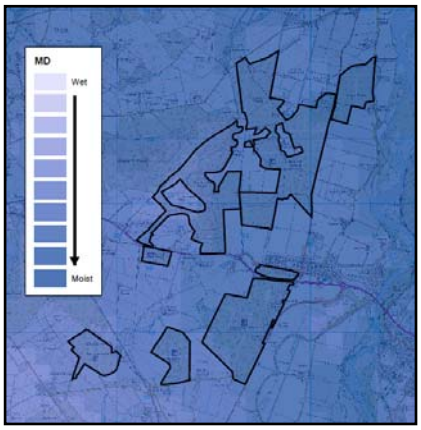
AT5	DAMS	MD
1176 - 1253	8 - 13	122 - 141
cool - warm	sheltered – moderately exposed	moist



AT5 (Accumulated Temperature) is the accumulated total of the day-degrees above the growth threshold temperature of 5º, which provides a convenient measure of summer warmth. The results for AT5 place nearly all these blocks in the “warm” zone.



DAMS is the Detailed Aspect Method of Scoring. This represents the amount of physically damaging wind that forest stands experience in the year.
The range of DAMS is from 3 to 36 and windiness is the most likely limiting factor to tree growth at higher elevations in Britain. All the blocks in the plan area are in the sheltered category so windblow should not be a major factor in their management.



MD is the Moisture Deficit for the area. Moisture deficit reflects the balance between potential evaporation and rainfall and therefore emphasises the dryness of the growing season (rather than the wetness of the winter or whole year). These results place the blocks in the moist zone.

Each tree species has tolerances for these and other factors and they can be used to identify species suitable for the site conditions. The results above will be used to help assist in the choice of tree species for restocking in this plan.

Further information on these criteria and the application of ESC can be found in Forestry Commission Bulletin 124 - An Ecological Site Classification for Forestry in Great Britain.

6.2 Biodiversity and environmental designations

See Map 3 Biodiversity and environmental areas

Although a wide range of species occurs within the plan area there are no specific designated sites or particularly rare species. This may be a reflection of the small scale of the individual woodlands and the fact that are surrounded by intensive agriculture and lack a graded edge or variety of habitats. Due to the small area of the woodlands the scope to diversify the range of habitats is very limited.

6.2.1 Designated Sites

There are no designated sites within the plan area however the entire area lies within the catchment of the River Spey Special Area of Conservation (SAC) (See 6.2.5 Water Environment).

There are no areas of Ancient semi-natural woodland (ASNW) or Plantation on ancient woodland site (PAWS) however the vast majority of the plan area is classed as woodland Long Established of Plantation Origin (LEPO).

6.2.2 Native woodland

Although the most common tree species in the plan area is Scots pine, a native species, the area is managed predominantly for production rather than for biodiversity so the woodlands do not contain the other elements of a native woodland.

6.2.3 Priority Open Habitats

There are no priority open habitats within the plan area.

6.2.4 Priority Species

Juniper – There are occasional bushes found within the plan area but these tend to occur as single plants. There are no obvious colonies of bushes.
Red Squirrel – Red Squirrel are found throughout the plan area and are not restricted to the Scots pine areas. Pre-operational surveys have located numerous dreys in the past which may suggest a large population. This may be due to the large amount of connectivity to other woodland habitat, especially Sleepieshill Wood which lies immediately to the west of the plan area.
The work plan process ensures that these types of survey are carried out prior to all operations. The population size is assessed and any mitigation measures required are put in place. In some cases this may require felling outside of the Red Squirrel breeding season.

Other species – A number of other plants, birds and mammals are found within the LMP, some protected, and occasional sightings of rare species are also recorded.

Badger are very common with a large number of setts recorded. Pine Marten are regularly recorded. Buzzards nest at several locations across the plan area and sightings of Red Kite were made in 2010. Other notable bird sightings include Barn Owl and Spotted Flycatcher.

Plants of note in the plan area, apart from Juniper, are Heath Cudweed and White Ramping-fumitory.

The Regional Environmental Team maintain a database of all known species (flora and fauna) in the forest, made up of sightings and previous surveys. In addition FLS has access to public biological records and datasets from both statutory conservation bodies and NGO's such as the Botanical Society of the British Isles. These records and sightings are used, along with pre-operational site checks, to ensure mitigation or habitat improvement is written into the regions work plans and budgets. Where necessary, operations can be scheduled to take place outside the relevant breeding season or, in the case of protected species, carried out under licence conditions from SNH.

6.2.5 Water Environment

There are no major watercourses or areas of open standing water within the plan area. There is however a minor unnamed watercourse which flows through Lunan Wood into the River Spey SAC.
Strict adherence to the UK Forest Standard's Forest and Water guidelines during all operations will protect the qualifying interests of the SAC.

6.3 The existing forest

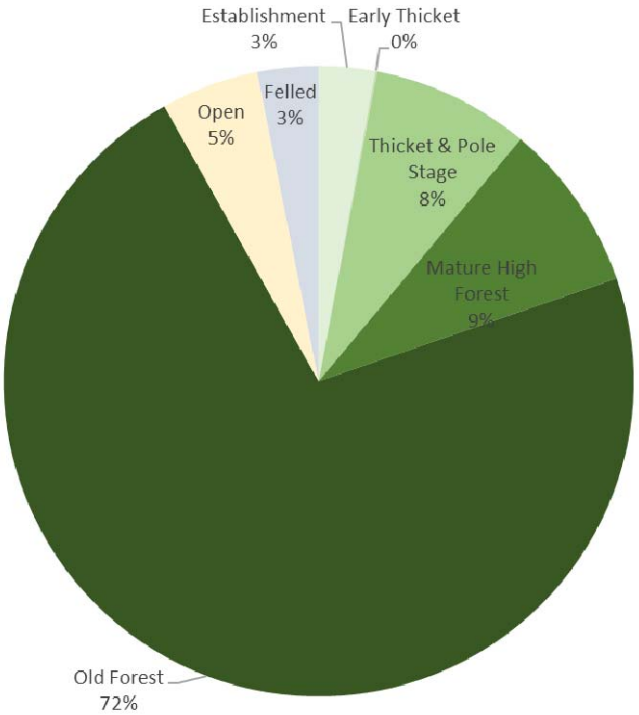
6.3.1 Age structure, species and yield class

Age Structure

As can be seen from the following table and chart the spread of age classes across the plan area is heavily weighted towards old forest. This is a consequence of having a high proportion of Scots pine, a tree with a long rotation period, and managing the blocks with LISS.

The area of open ground within the blocks is below the guideline of 10% and therefore this plan will be seeking opportunities to increase this.

Ages of Trees (years)	Successional Stage	Area (ha)	%
0 -10	Establishment	16.5	2.9
11 – 20	Early Thicket	0.5	0.1
21 – 40	Thicket & Pole Stage	46.4	8.1
41 – 60	Mature High Forest	49.5	8.6
61+	Old Forest	413.1	72.1
	Open	28.7	5.0
	Felled	17.9	3.1

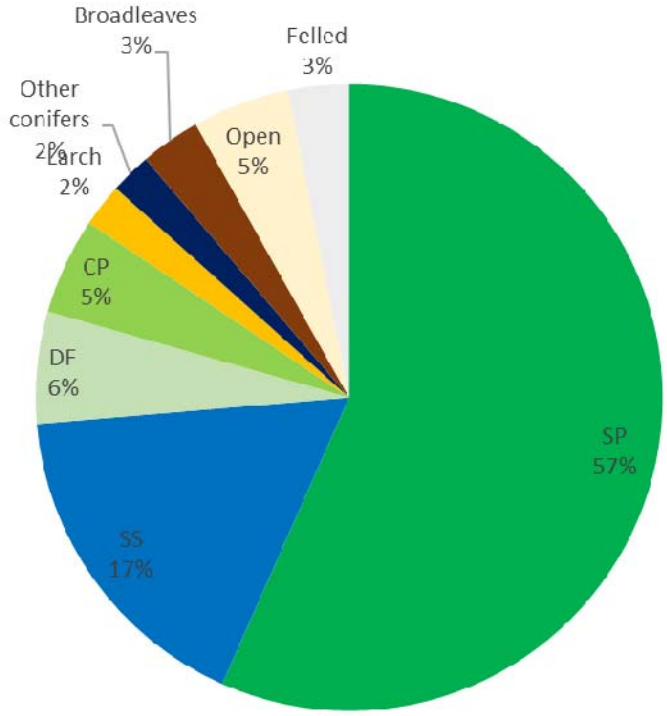


Species

Scots pine makes up the largest components of the plan area with just over half of the forest area. Broadleaves are currently at 3.1% of the area and opportunities to increase will be sort during the planning process.

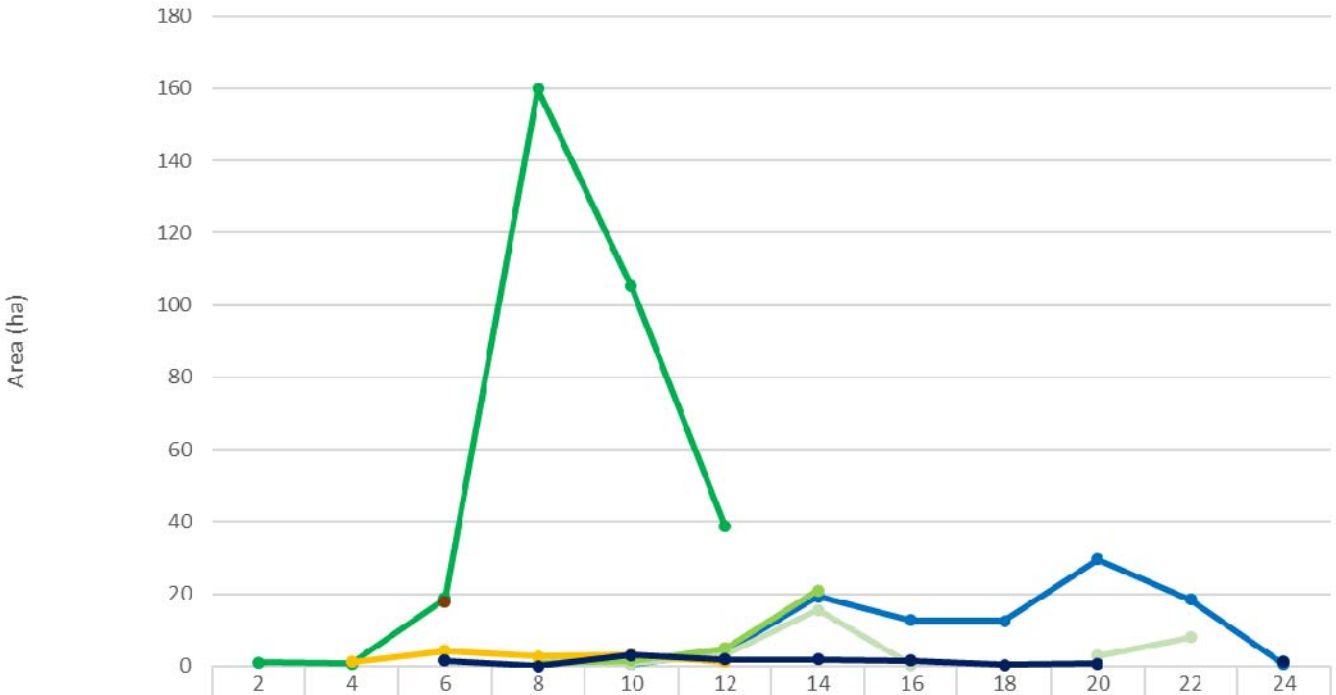
The Shannon index for the plan area is currently 1.23 which puts it in the "moderate" category for diversity. The 56.6% cover of the dominant tree species (SP) also puts it in the "moderate" category. Therefore the aim of this plan will be to increase the current level of species diversity while still ensuring the species are suited to the site conditions and the productivity of the forest is maintained.

Species	Area (ha)	%
Scots pine	324.3	56.6
Sitka spruce	97.4	17.0
Douglas fir	33.1	5.8
Corsican pine	28.6	5.0
Larch	12.7	2.2
Other conifers	12.1	2.1
Broadleaves	17.8	3.1
Open	28.7	5.0
Felled	17.9	3.1



Yield Class

The yield classes for all species are around what would be expected given the climate and soil types within the forest. The average yield class of Scots pine is 8 while Sitka spruce at 18.



	2	4	6	8	10	12	14	16	18	20	22	24
SP	0.97	0.63	18.81	159.94	105.14	38.73						
SS					0.45	4.15	19.24	12.59	12.53	29.62	18.42	0.43
DF				2.48	0.68	3.09	15.53	0.41		2.87	7.99	
CP				0.78	1.55	4.94	20.95		0.39			
Larch		1.26	4.28	2.65	3.27	1.26						
Other conifers			1.48	0.09	3.05	1.82	1.91	1.54	0.41	0.63		1.18
Broadleaves			17.75									

6.3.2 Access

Access both to and within most of the plan area is good. The A96 runs through the area which is connected to the forest road network by several minor roads that are agreed transport routes (http://www.timbertransportforum.org.uk).

The forest road network is adequate and well maintained.

6.3.3 LISS potential

Currently 464ha or 81% of the plan has been designated for some form of LISS management.

These are defined as '… silvicultural systems whereby the forest canopy is maintained at one or more levels without clear felling.' This means there will be no felling areas larger than 2 ha.

The potential for LISS is based on the wind hazard class of the crop, the soil nutrient regime, the suitability of the species to the site and the past management of the crop, has it been sufficiently thinned.

All areas of LISS will be assessed and if it is clear that this is not the best system to use to achieve the objectives of the coupe then it will be changed to clearfell.

6.3.4 Current and potential markets

The current breakdown of the timber being harvested from this design plan area across the range of sites, species and ages is shown in the table below.

Material	End product	Percentage
Small/Short roundwood	Chip board, Orientated strand board (OSB), Paper, Fuelwood	30
Fencing	Posts & rails	5
Short log	Pallets & slats	10
Log	Construction	55

Most of this production is sold into markets in the north east of Scotland as part of long term contracts. The majority of the logs, short logs and fencing goes to James Jones, Tilhill, Tullochs or John Gordons. The remainder goes to smaller local sawmills. The bulk of the short roundwood goes to Norboard at Dalcross for the production of orientated strand board (OSB).

6.4 Landscape and Land Use

6.4.1 Landscape character and value

Castlehill and Balnacoul is part of the Coastal Farmlands – Moray & Nairn Landscape Character Type which runs east-west between Inverness and Cullen, in a broad, continuous band some 90km long. This landscape character type lies on the coastal plain between the coastal shore and forests to the north and farmed and wooded foothills to the south.

Key characteristics

- Expansive, open, flat to undulating coastal plan landscape with frequent, small landforms of fluvio-glacial sands and gravels, often topped with forests, gorse or rougher grasslands.
- Predominantly simple agricultural landscape, punctuated by stone built farms and villages which are connected by an extensive network of rural roads.
- Mainly light, sandy soils and yellow seasonal flowers of gorse and broom.
- Broadly meandering burns and the lower reaches of rivers, often associated with native woodland and wetlands, providing relatively natural features in a highly modified landscape.
- Variation in field pattern, forms of enclosure, tree cover, settlement, road patterns and water bodies which illustrate distinctive differences between the flat former wetland and the more undulating, drier soils.
- Patchwork of mixed arable and pasture fields, yellow flowering gorse and broom, with shelter belts and plantations on drier land.
- Conifer plantations which coalesce to create elongated bands of dark colour contrasting strongly with the paler colours of arable land.
- Broadleaf woodlands and shelterbelts associated with gardens and designed landscapes.
- Established main communication routes of rail and trunk roads linking the larger settlements, off which run the network of minor rural roads.
- Prominence of occasional built elements in a relatively flat, open landscape, particularly large or vertical structures, including grain silos and single and small groups of commercial turbines associated with larger farms.
- Expansive, open long-distance views along the farmland belt, up to the moorland hills, and occasional views to the sea, mixed with more intimate views, foreshortened by undulations and folds in the landform, tree groups, small forests and coastal forests.

6.4.2 Visibility

Despite their small size the blocks of woodland that make up the plan area are prominent in the landscape due its relatively flat nature and the proximity of both public roads and areas of habitation.

6.4.3 Neighbouring land use

Land use around the woodland is mostly mixed agricultural land with some privately owned woodland along the north western boundary of Castlehill wood. See aerial photograph below.

6.5 Social factors

6.5.1 Recreation

There are no formally promoted recreational facilities within the plan area although the woods are well used for informal access due to their proximity to Mosstodloch.

Core paths run adjacent to or through several of the blocks (see map 2 key features). We will work in collaboration with Moray council when operations are planned within the blocks that will affect the core paths.

6.5.2 Community

Community interaction in the plan area is low currently despite the proximity of Mosstodloch.

6.5.3 Heritage

A check of both internal records and the SMR has been undertaken to establish the location of these features. The details of these will be included in the work plan that is drawn up for every operation carried out within the plan area.

6.6 Pathogens and diseases

The upsurge in the disease threat over the last decade has a range of causes linked to globalization and associated climate change. Disease risk management has always been an integral part of forestry management; however the pace of recent events has created a great deal of uncertainty. While specific outcomes for species are hard to predict, the general principles for creating resilient forests are well known, and these include such actions as promoting diversity in all its forms.

Given the dynamic nature of the disease threat it is proposed to focus on creating a more diverse forest during the plan period and thinning to promote tree vigour and adjust microclimate.

6.6.1 Hylobius

Hylobius can cause extensive feeding damage to young trees used to restock clearfell sites but damage is often highly variable. Previously it has not been

possible to predict damage and so insecticides have been routinely used to protect the trees to try to safeguard the young crop. However on clearfells where Hylobius numbers are low this treatment may be unnecessary and conversely when numbers are very high the treatment may be unable to protect the trees. Both of these situations result in losses in valuable resources.

6.6.2 Dothistroma needle blight (DNB)

Dothistroma needle blight is a fungal pathogen affecting the woods within Scotland.

Dothistroma needle blight is an economically important disease affecting a number of coniferous trees, pines in particular. The disease has a world-wide distribution but until recently was mainly of concern in the southern hemisphere. In much of the world, including Britain, it is caused by the fungus Dothistroma septosporum. Dothistroma needle blight causes premature needle defoliation, which results in the loss of timber yield and, in severe cases, tree mortality. Since the late 1990s the incidence of the disease has increased dramatically in Britain, particularly on Corsican pine. More recently the disease has caused significant damage and death to Lodgepole pine and Scots pine. Due to the extent and severity of the disease there is now a five-year moratorium on the planting of Corsican Pine on the national forest estate.

The reasons for the increase in the incidence of this disease are unclear but could be due to increased rainfall in spring and summer, coupled with a trend towards warmer springs, optimising conditions for spore dispersal and infection. Such conditions may become more prevalent in Britain over the next 20 years if current trends in climate change continue. On the national forest estate disease management is currently focused on silvicultural measures to reduce inoculum loads and the use of alternative, less susceptible species in future rotations.

It is not a major issue within the plan area at present. Currently the low levels of infection are not having a significantly impact on the forest structure. We will continue to monitor the situation and keep up to date with the latest research and implement the guidelines produced.

6.6.3 Hymenoscyphus fraxineus (previously Chalara fraxinea)

Ash dieback is an aggressive fungal disease and is caused by

Hymenoscyphus fraxineus (previously Chalara fraxinea). The disease causes leaf loss and crown dieback in affected trees, and usually leads to tree death. Ash trees suffering with the infection have been found widely across Europe since trees believed to have been infected with this newly identified pathogen were reported dying in large numbers in Poland in 1992. These have included forest trees, trees in urban areas such as parks and gardens, and also young trees in nurseries. The map shows the confirmed infection sites based on the OS 10km grid squares and is based on information current as of 4 September 2018.

6.6.4 Phytophthora ramorum

P. ramorum is a fungus-like plant pathogen which attacks a wide range of tree and shrub species. It was first found in nursery stock in Scotland in 2002 and in an established garden in September 2007. It was first detected on Japanese larch in south west England in 2009 and in Scotland late in 2010.

Although European and hybrid larch are also susceptible to P. ramorum, current evidence indicates that the impact of the disease is greatest on Japanese larch which can die within one to two seasons, with consequential economic, environmental and amenity impacts. The disease on larch showed a significant expansion in 2013 with a core area of some 5-6000 ha of larch within South West Scotland showing extensive signs of infection. Further, smaller and more sporadic infections have also been identified along the western seaboard of Scotland principally in the Argyll and Cowal areas. There have been isolated outbreaks in the north east of Scotland. The total infected area within Scotland is estimated to be now in excess of 6,500 ha.

7.0 Analysis and Concept

Refer to Map 6: Analysis and concept.

Theme	Analysis	Concept
Timber	Despite the predominance of soil with a poor or very poor nutrient regime a quality crop of timber is growing across much of the plan area.	Optimise thinning and LISS management to achieve a sustainable yield of quality timber over a longer rotation period.
Access & health	Core paths run through or adjacent to several of the blocks.	During thinning and felling operations ensure the core paths are not damaged or are reinstated after the work is complete.
Environmental quality	There are several watercourses that run through the plan area and feed into the river Spey.	During thinning and LISS operations take the opportunity to remove non-native conifers from riparian zones.
Infrastructure	The proposed route for the duelling of the A96 passes through Balnacoul wood.	Work with the developer to ensure sufficient access to and within the block is maintained to ensure ongoing management is not compromised.

8.0 Land Management Plan Proposals

8.1 Management

Refer to Map 7: Management.

8.1.1 Thinning

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

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

Castlehill and Balnacoul has a history of successful thinning. This will continue to ensure crops become more suitable for the LISS conversion stage in the future.

All the blocks are on a seven year cycle due to their good growth rates and the species mix (predominantly Scots pine).

All thinning decisions will be guided by Operational guidance Booklet No 9 'Managing thinning.'

8.1.2 Low Impact Silvicultural Systems (LISS)

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

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

While reviewing LISS coupes other factors are also taken into consideration:

- Does LISS meet the objectives for that area of the forest?
- Is there sufficient site suitability information available (soils, wind hazard data, thinning history)?
- What level of ground vegetation competition is there with any natural regeneration?
- Are the existing species suitability for the site?
- Is any advanced natural regeneration present?

Most of the crops within the plan area are suitable for LISS management.

Most of the crops are showing signs of natural regeneration or have the potential to do so. The main issue that needs to be addressed for successful regeneration is the continued thinning of the crop to produce stable trees that are able to produce large quantities of seed. Eventually the crops will need to be manipulated to prevent the ground cover be dominated by grass. Scots pine and larch do not regenerate well in these conditions so any grass mat will need to be broken up to expose mineral soil. This will either be undertaken during harvesting operations or shortly after.

Areas selected for LISS management are highlighted on the Management map. The general prescription for this area will be to manage it with a uniform shelterwood system as this system works well with Scots pine crops who need a lot of light at the establishment stage. Detailed prescriptions have been prepared for each area and can be seen in appendix 3. Each prescription will be included in the site management plan before any operation commences.

Restocking by natural regeneration will be the aim in these areas provided this will meet the plan objectives of producing a quality crop of timber. For this to be successful deer numbers will need to be controlled and a figure of 5 deer per 100ha is seen as the appropriate level.

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

Enrichment planting will be used to ensure the target stocking density is reached if there is insufficient natural regeneration.

8.1.3 Clearfell

Ensuring a forest has a varied structure in terms of age, species and open space provides a range of benefits. It endows the forests with the resilience necessary to cope with emerging threats and changing climatic conditions, and will provide for flexibility in management options.

Structural diversity can be increased through phased felling and restocking to ensure that, over time, a varied woodland, including open space, develops. As part of this, some trees are retained as long-term forest cover to produce standing and fallen deadwood.

In this plan due to the species in the blocks and how they have been managed in the past we are able to achieve these outcomes by the use of LISS management. So only two clearfell coupes have been planned, although not in this plan period. Both are in areas where access to and/or within the woodland are difficult. This makes the repeated interventions required for successful LISS management unrealistic. Therefore these areas will be clearfelled and restocked with native broadleaves which will not require the same level of intervention. This will also have the benefit of increasing the area of broadleaf area within the plan area by 12.8ha, increasing the current percentage figure of 3.1% to 5.3%, thus meeting the UKWAS requirement.

8.2 Future Species

Refer to Map 10: Future habitats and species.

8.2.1 Restocking

The restocking of felled areas is guided by the objective for the plan area which is the production of a sustainable crop of quality.

As the vast majority of the plan area is under LISS management natural regeneration will be the aim in these areas provided this will meet the plan objective.

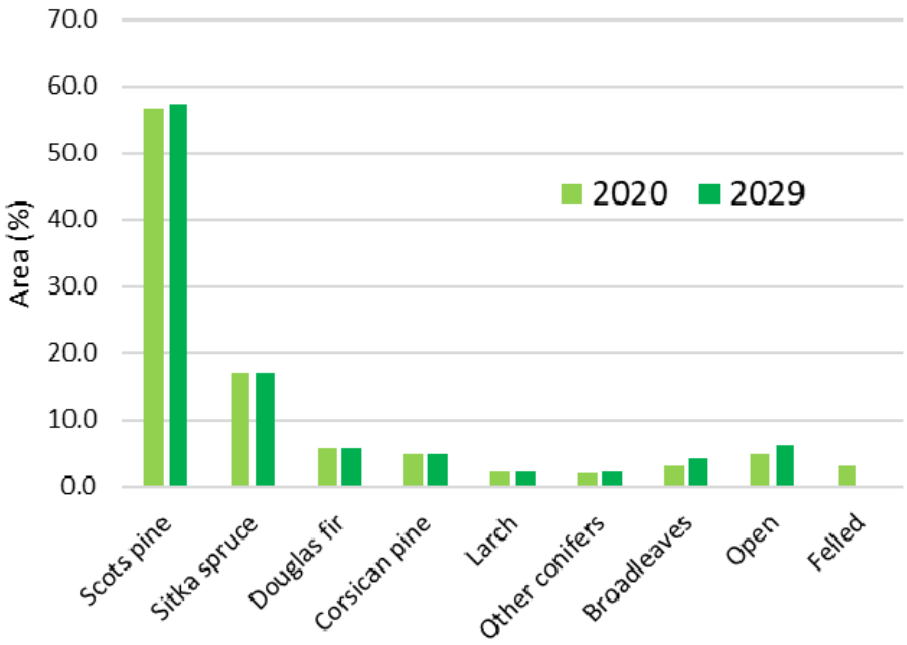
The aim of the restocking will be to maintain the current level of species diversity despite the fact that we are unable to include larch in the planting mix.

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

Enrichment planting will be used to ensure the target stocking density is reached if there is insufficient natural regeneration.

8.3 Species tables

Species	Area (ha) 2020	% 2020	Area (ha) 2029	% 2029
Scots pine	324.3	56.6	327.3	57.2
Sitka spruce	97.4	17.0	97.4	17.0
Douglas fir	33.1	5.8	33.1	5.8
Corsican pine	28.6	5.0	28.6	5.0
Larch	12.7	2.2	12.7	2.2
Other conifers	12.1	2.1	13.3	2.3
Broadleaves	17.8	3.1	25.0	4.3
Open	28.7	5	35.2	6.1
Felled	17.9	3.1	0	0

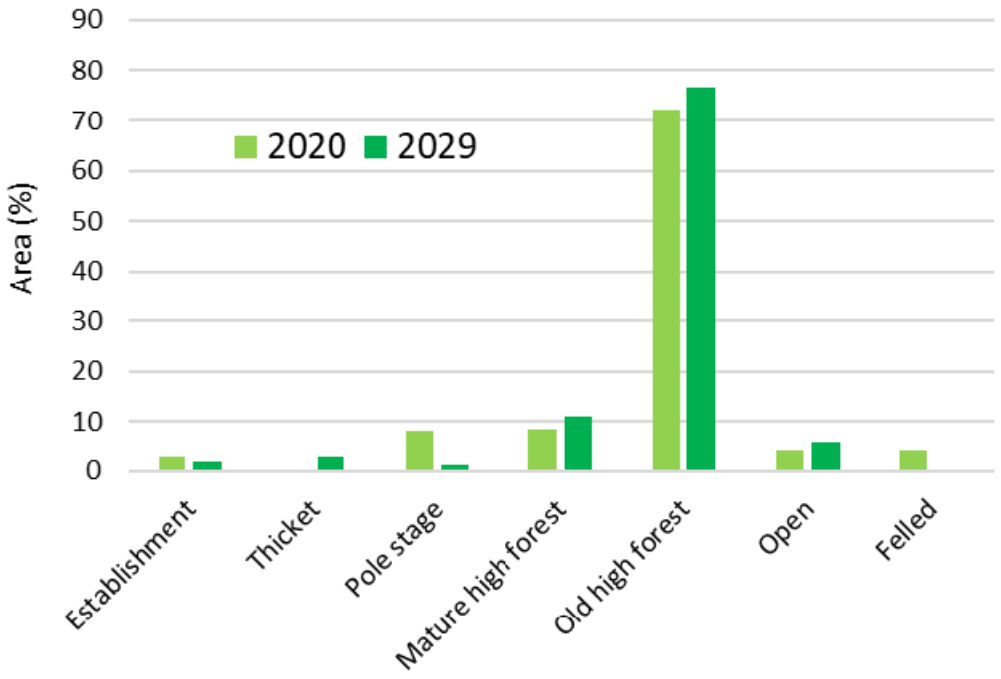


Due to the use of LISS management across the majority of the plan area there is very little opportunity to change the species composition during this plan period as there will be no selective felling due to the age of the current crops. There is a small increase in both broadleaves and open space within the plan period as areas currently awaiting regeneration will be managed to favour broadleaves and open space.

Two coupes are planned for clearfelling beyond the plan period. Both will be restocked with native broadleaves and open space. These coupes total 25.6ha and will bring the broadleaf woodland area to 37.8ha, or 6.6%, and the open space to 48.0ha, or 8.4%, this along with the open space created during selective felling operation will bring the total to over 10% as per UKFS guidelines.

8.4 Age Structure

Age of trees	Growth stage	Area (ha) 2020	% 2020	Area (ha) 2029	% 2029
0 - 10	Establishment	16.5	2.9	11.4	2.0
11 - 20	Thicket	0.5	0.1	16.5	2.9
21 - 40	Pole stage	46.4	8.1	6.1	1.1
41 – 60	Mature high forest	49.5	8.6	64.4	11.2
61+	Old high forest	413.1	72.1	445.5	76.7
	Open	28.7	4.1	35.2	6.1
	Felled	17.9	4.1	0	0



8.5 Management of Environmental Assets

8.5.1 Designated Sites

SAC

As stated in 6.2.1 there are no designated sites within the plan area. However the entire plan area lies within the catchment of the River Spey SAC. All operations will adhere to the UK Forest Standard's forest and Water Guidelines to protect the integrity of the SAC.

8.5.2 Priority Species

Juniper – Isolated bushes occur across the plan area. These will be identified during pre-operational surveys and protected from damage by machinery/felling.

Red Squirrel – The presence of Red Squirrels will be confirmed during pre-operational surveys looking for feeding signs and dreys. If necessary, operations will be scheduled to occur outside the breeding season.

Other species – Pre-operational surveys are, and will continue to be, carried out in advance of all forest operations and activities. Mitigation is included at the work plan level in line with relevant policy and procedure.

8.5.3 Water Environment

See section 8.5.1.

8.5.4 Heritage

Our key priorities for archaeology and the historic environment are to undertake conservation management, condition monitoring and archaeological recording at significant historic assets; and to seek opportunities to work in partnership to help to deliver *Our Place in Time: the historic environment strategy for Scotland* (2014) and *Scotland's Archaeology Strategy* (2015). Significant archaeological sites will be protected and managed following the *UK Forestry Standard* (2017) and the FCS policy document *Scotland's Woodlands and the Historic Environment* (2008). Harvesting coupes, access roads and fence lines will be surveyed prior to any work being undertaken in order 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. Where appropriate, significant historic assets are recorded by archaeological measured survey, see active conservation management and may be presented to the public with interpretation panels and access paths. Opportunities to enhance the setting of important sites and landscapes will be considered on a case-by-case basis (such as the views to and from a significant designated site).

The *Regional Historic Asset Management Plan* includes conservation management intentions for designated historic assets on the National Forest

Estate. Details of all known historic environment features are held within the *Forester Web Heritage Data* and included within work plans for specific operations to ensure damage is avoided. Significant historic environment features will be depicted on all relevant operational maps.

Objective	Opportunities	Constraints	Concept
Caring for the Historic Environment	We will ensure positive conservation management at significant historic assets, undertaking scrub control, condition monitoring and archaeological recording where necessary.	We will undertake suitable work practices on operational sites with known historic assets (and those discovered during operations).	We will ensure that historic assets (both designated and un-designated) are included within our land management and operational plans and are managed in line with *UK Forestry Standard*.

Unscheduled Archaeology

All known unscheduled monuments will be included in the work planning process and will be identified on site plans and marked on the ground to protect them during operations. All operational sites will be surveyed prior to any work being undertaken in order to ensure that any historic environment features are identified and marked with an appropriate buffer.

8.6 Deer management

Wild deer on the National Forest Estate (NFE) are managed in accordance with the Scottish Government's strategy "Scotland's Wild Deer a National Approach" and under the auspices of the Code of Practice on Deer Management.

The strategy and Code of Practice takes recognition of the fact that Wild deer are an asset, an integral part of Scotland's biodiversity and provide healthy food and recreational opportunities. The challenge of managing wild deer originates in a need to balance the environmental, economic and deer welfare objectives of the Scottish nation with the objectives of private landowners for forestry, agriculture, sporting and other forms of land use.
The principal legislation governing the management of deer in Scotland and hence on the NFE is the Deer (Scotland) Act 1996.

It is therefore FCS deer policy to;

- Prevent adverse deer impacts on commercial tree crops and the wider habitat. In doing so to carry out deer culling in an exemplary and humane way.
- Work closely with relevant organisations and neighbours to make sure that there are integrated deer management plans which seek to recognise the interests of all parties.
- Take opportunities to optimise income from venison from sporting where this does not conflict with our primary objective of maintaining deer impacts at an acceptable level, in line with Quality Meat Scotland accreditation in the form of The Scottish Quality Wild Venison (SQWV) Assurance Scheme
- Take all practicable steps to slow down the expansion of deer species into areas where they are not currently present.

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

8.7 Access

Access to and within Castlehill and Balnacoul is good so there are no plans for additional roading within the period of the plan. However we will continue to undertake a programme of maintenance and post operation repairs.

8.8 Pathogens

The large pine weevil (*Hylobius abiatis)* can cause extensive feeding damage to young trees used to restock clearfell sites but damage is often highly variable. This species lays its eggs in deadwood/stumps on clearfell sites and the emerging adults feed on the bark of young trees, often with devastating effect on newly planted conifer crops.

Previously it has not been possible to predict damage and so insecticides have been routinely used to protect the trees to try to safeguard this valuable young crop. However, on clearfells where *Hylobius* numbers are low this treatment may be unnecessary and conversely when numbers are very high the treatment may be unable to protect the trees. Both of these situations result in losses in valuable resources.

The *Hylobius* Management Support System (MSS) is based on a simple monitoring protocol using billet traps to measure *Hylobius* numbers on individual clearfell sites. The numbers recorded are used, with other information entered into the *Hylobius* MSS software, to determine the best way to manage clearfell sites for successful, cost effective and environmentally friendly restocking. This Support System will be used along with past results and experience to determine the optimal time to restock while minimising the use of chemicals.

Restocking has traditionally taken place within two years of sites being clearfelled. However, many seedlings were badly damaged or killed by the Large Pine Weevil, *Hylobius abiatis.* Due to the expected high level of Hylobius and the adopted policy for environmental management to "reduce the use of Insecticides where feasible" restocking is planned to take place at the end of year 4. Restocking will take place before then if monitoring, using MSS shows that it is safe to do so.

Ash dieback is an aggressive fungal disease and is caused by Hymenoscyphus fraxineus (previously Chalara fraxinea). The disease causes leaf loss and crown dieback in affected trees, and usually leads to tree death. The whole of the Clash falls within 10km survey squares where an outbreak of ash dieback was first recorded in 2015. There will be no planting of ash trees as there is currently a moratorium on the planting of ash within FC woodlands to try and help slow the spread of the disease.

Phytophthora ramorum is a fungus-like plant pathogen which attacks a wide range of tree and shrub species. European and hybrid larch are particularly susceptible to P. ramorum but current evidence indicates that the impact of the disease is greatest on Japanese larch, which can die within one to two seasons, with consequential economic, environmental and amenity impacts. Therefore there is currently a moratorium on the planting of larch within FC woodlands to try and help slow the spread of the disease. We will try to retain existing larch stand and encourage their natural regeneration where practical to maintain the species diversity within Castlehill and Balnacoul.

8.9 Critical Success Factors

- Undertake the planned thinning and felling and regeneration programmes in order to increase the quality of the timber within the plan area and to meet the production targets.

- Undertake the thinning planned for the LISS areas in order to manage the light levels to encourage the development of the appropriate ground vegetation and natural regeneration.

- Continue with the maintenance of the forest road network to allow forest operations to be successfully completed.

- Control of deer populations to allow natural regeneration within LISS areas and successful establishment of restocked crops.

Appendix 1 – Scoping report

Prior to the scoping we assessed the impacts of our potential proposals on the local community and local interests. This was discussed at an internal scoping meeting. We agreed key issues, and which stakeholders should be included in the scoping exercise. Scoping was undertaken by email, and below is the list of stakeholders that we contacted. Copies of documents sent out for scoping attached.

The scoping exercise highlighted the difference in opinion between different stakeholders on certain issues. We will use best evidence/research/experience to determine the best course of action.

Stakeholders			
A copy of the pre-scoping map and a summary of the woodland were sent to the following stakeholders.			
Name	Organisation	Address	Response received
Ian Douglas	Moray Access Manager	Ian.Douglas@moray.gov.uk	Yes
	SEPA	Planning.aberdeen@sepa.org.uk	No
Darren Westmacott	Moray Council Planning	Darren.Westmacott@moray.gov.uk	Yes
	SNH	TAYSIDE_GRAMPIAN@snh.gov.uk	No
	RSPB	Hywel.Maggs@rspb.org.uk	Yes
Jamie Farquhar	CONFOR	jamie.farquhar@confor.org.uk	Yes
Caroline Palmer	Archaeology service	caroline.palmer@aberdeenshire.gov.uk	Yes
	Spey fisheries research trust		No
	Innes community council		No
	Crown estate		No

Fiona Maxwell	SSE	Fiona.Maxwell@sse.com	No
Members of public			Yes

Part 2 – Key Issues			
Key Issues	Raised by	Issue raised	Action(s) to be taken to address key issues and identify location within Forest Plan
Heritage	Caroline Palmer	There is a small number of sites recorded within plan area.	These will be taken into consideration during the work planning stage of operations.
Recreation (core path)	Ian Douglas	Core path should be protected and remain open at all times. Continue voluntary access agreement.	Core path will be protected and if closure is required for H&S during operations we will work with access officer to find suitable alternative where practicable. The voluntary access agreement has been superseded by SOAC and all access will be managed under it.
Recreation (informal)	Member of public (x3)	Pleased to see recreation to be continued.	Informal access to be maintained including avoiding damage to established routes where possible.
Recreation (informal)	Member of public	Do not wish to see clearfelling and damage to established routes.	LISS management will be used where practical and informal access to be maintained including avoiding damage to established routes where possible.

Appendix 2 – Final consultation record

To be completed following final consultation.

Appendix 3 – LISS prescriptions

- The size and number of groups in the group selection is indicative only. The actual size will depend on the conditions found in each coupe.
- The shape of the groups in the group selection coupes do not have to be circular. Oval shaped with the long axis orientated to receive the most light is preferred.
- The location of the felling areas in the group selection coupes will be located to reflect the conditions in each coupe. Felling areas will be located to:
    - expand existing groups,
    - start new groups taking advantage of existing natural regeneration,
    - start new groups in areas where there is currently no natural regeneration.
- The preferred restocking method is by natural regeneration. However if restocking by natural regeneration is
  not successful within 10 years of felling then the option of replanting will be discussed with FCS.

LISS no. (See map 8)		Management objective / Reason for selection	Long-term structure and desirable species	Age Trans. period and return time (years)	Regeneration and ground flora	Observations (e.g. likely barriers to achieving objective)	Next treatment required
1	Uniform shelterwood 32.2ha	Timber production. Use natural regeneration for restocking.	Simple structure. 60% SP, 25% SS 15% MC/MB	Age – 70 years Trans period – 150 years Return time – 7 years	Some SS regeneration under SP & larch crops. In the other parts regeneration is sparse due to current light levels.	Incorrect thinning to create future stable seed trees. Weed/ground flora competition.	Selective thinning.
2	Uniform shelterwood 35.0ha	Timber production. Use natural regeneration for restocking.	Simple structure. 30% SS, 30% SP, 15% DF, 25% MC	Age - 65 years Trans period – 150 years Return time – 7 years	Some SS regeneration under SP & larch crops. Very little SP & larch due to grassy ground flora.	Incorrect thinning to create future stable seed trees. Weed/ground flora competition.	Selective thinning.

3	Uniform shelterwood 49.3ha	Timber production. Use natural regeneration for restocking.	Simple structure. 35% SP, 30% SS, 35% MC	Age - 70 years Trans period – 150 years Return time – 7 years	Little regeneration due to low light levels.	Incorrect thinning to create future stable seed trees.	Selective thinning.
4	Uniform shelterwood 59.0ha	Timber production. Use natural regeneration for restocking.	Simple structure. 25% SP, 35% SS, 10% DF, 30% MC	Age – 70 years Trans period – 150 years Return time – 7 years	Some SS regeneration under SP & larch crops. In the other parts regeneration is sparse due to current light levels.	Incorrect thinning to create future stable seed trees.	Selective thinning.
5	Uniform shelterwood 99.5ha	Timber production. Use natural regeneration for restocking.	Simple structure. 80% SP, 15% SS, 5% MC	Age – 70 years Trans period – 150 years Return time – 7 years	Some SS regeneration under SP & larch crops. Very little SP & larch due to grassy ground flora	Incorrect thinning to create future stable seed trees.	Selective thinning.

6	Uniform shelterwood 56.8ha	Timber production. Use natural regeneration for restocking.	Simple structure. 35% CP 25% SS, 10% SP, 10% MB, 20% MC	Age – 60% >40 years, 40% <40 years Trans period – 150 years Return time – 7 years	Some SS regeneration under pine crops. Other areas too young for successful seeding.	Incorrect thinning to create future stable seed trees.	Selective thinning.
7	Uniform shelterwood 55.2ha	Timber production. Use natural regeneration for restocking.	Simple structure. 85% SP, 10% SS, 5% MC	Age – 70 years Trans period – 150 years Return time – 7 years	Some SS regeneration under SP crops. Very little SP due to grassy ground flora	Incorrect thinning to create future stable seed trees.	Selective thinning.
8	Uniform shelterwood 80.1ha	Timber production. Use natural regeneration for restocking.	Simple structure. 85% SP, 5% SS, 10% MC	Age – 70 years Trans period – 150 years Return time – 7 years	Some SS regeneration under SP crops. Very little SP due to grassy ground flora	Incorrect thinning to create future stable seed trees.	Selective thinning.

9	Uniform shelterwood 40.2ha	Timber production. Use natural regeneration for restocking.	Simple structure. 95% SP, 5% MC	Age – 70 years Trans period – 150 years Return time – 7 years	Some SS regeneration under SP crops. Very little SP due to grassy ground flora.	Incorrect thinning to create future stable seed trees.	Selective thinning.
10	Uniform shelterwood 9.2ha	Timber production. Use natural regeneration for restocking.	Simple structure. 80% SP, 20% MB	Age – 70 years Trans period – 150 years Return time – 7 years	Little regeneration due to low light levels.	Incorrect thinning to create future stable seed trees.	Selective thinning.