

## Moray and Aberdeenshire Forest District Bennachie Land Management Plan



Plan Reference No: LMP 32

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



# FOREST ENTERPRISE - Application for Forest Design Plan Approvals in Scotland

## Forest Enterprise - Property

Forest District:	Moray & Aberdeenshire FD
Woodland or property name:	Bennachie
Nearest town, village or locality:	Insh / Inverurie
OS Grid reference:	NJ670217

## Areas for approval

	Conifer	Broadleaf
Clear felling	174 ha	0 ha
Selective felling	0 ha	0 ha
Restocking	133 ha	73 ha
New planting (complete appendix 4)	0 ha	0 ha

1. I apply for Forest Design Plan approval ~~\*/amendment 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\* /deforestation\*/ roads\*/ quarries\* as detailed in my application.~~

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

November  
2015

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 of the design plan. Consideration of all of the 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 Moray & Aberdeenshire

Conservancy Grampian

Date .....

**Date of Approval:**.....

**Date approval ends:**.....

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# 1. Introduction

Refer to location map.

## 1.1 Location

Bennachie is a site covering 2,391 ha made up of two forest areas separated by the **Bennachie Ridge**. **Back O'Bennachie** lies on the north facing slope of the ridge, and Bennachie and Millstone Hill to the south.

The site is located South of Inch and west of Inverurie. The closest main road is the A96 located to the north east. This road leads directly to Aberdeen 26 miles to the east. It is a very well-known Forestry Commission Scotland (FCS) site and is highly visible as it is the highest point in the surrounding area. The river Don flows at the south. **Bennachie's** location is therefore critical and will have a high impact on the decisions taken in this plan for the management of the area.



*Photo above: View of Back O' Bennachie from A 96*

## 1.2 Setting and Context

The composition of the woodlands in Bennachie is diverse, mainly composed of conifers with some areas of broadleaves. The open lands are mainly composed of upland heathland and mostly located at the top of the hills.

Bennachie is composed of a series of summits ranging from Mither tap 518m, westwards to Oxen Craig 528m, Watch Craig 493m, Hermit seat

Bennachie LMP, 2017 – 2026 / Antoine Le Prêtre – 2017

478m and Black hill 430m. Its lowest point is located close to the river Don (around 100 meters high).

In terms of the Moray & Aberdeenshire Forest District Strategic Plan, Bennachie is located in an area identified with potential for:

- Having a high environmental value.
- Recreational issues and tourism contributing to local economy.
- Growing productive broadleaves.
- Maintaining and building on existing key community partnerships.
- Having a high number of visitors.
- Enhancing visitor experience at highest public value sites for recreation.
- Developing and enhancing cultural heritage opportunities.

□ **Moray & Aberdeenshire Forest District Strategic Plan (Public consultation)**

- <http://www.forestry.gov.uk/fesplans>

### 1.3 Land Management Objectives

The purpose and objectives for managing this land have been identified following a review of:

- the physical context and existing land use;
- the land management objectives already established by statutory bodies;
- the physical capability of the land;
- the locational objectives identified in the Moray & Aberdeenshire Forest District Strategic Plan;
- the views expressed by the public and statutory stakeholders

The primary objective for this plan is to ***maintain the quality of the site for recreation*** in order to further encourage tourism within the site. This will be done considering particularly: the areas of high recreation, the trails and the forest landscape management which is a critical issue at this location.

The secondary objectives will be to:

- ***Maintain / increase the high environmental value*** of the site encouraging tree species and habitat diversity through the creation of functional habitat networks and increasing species and structural diversity. .
- Increase the broadleaf resource.
- Continue to produce high quality timber.

## 2. Analysis of previous plan

The previous Forest Design Plan was approved in 2006.

The main objectives stated in this plan are included in the table below, along with the progress made to date on the achievement of the objective and how this will be carried forward into the new plan.

Since the last plan was approved in 2006 policy themes have been updated and as a consequence previous objectives have had to be categorised to fit with current policy theme descriptions.

<b>Theme</b>	<b>Priority</b> (in current approved plan)	<b>Objective</b> (in current approved plan)	<b>Management action</b>	<b>Progress to date</b> <b>1</b> – Nominal progress <b>2</b> – Some progress <b>3</b> – Progress as per FDP	<b>Proposed action (in this plan)</b>
Access & health		Maintain and enhance the recreational infrastructure	Regular maintenance of the sites infrastructure has maintained a functional, and highly valued recreational resource. All abilities paths have been extended and linkages with long distance and local core paths facilitated.	<b>3</b> – All abilities paths and facilities have been expanded, are monitored and maintained.	Continue to monitor and maintain the current path network to provide a great outdoor experience for the public.

Access & health	High	Maintain & enhance a forest structure conducive to a high intensity recreational environment.	Manage areas as LISS to reduce the perception of radical change that often accompanies clearfelling.	<b>3</b> - Mature forests have been maintained as much as possible around recreation sites and rides.	Continue the past LISS management where appropriate. Clearfells are required in key areas as part of disease management. Clearfells as part of a diverse matrix of silvicultural systems can add to diversity and open up new viewpoints on a temporary basis. Choose appropriate species in order to create a nice atmosphere around high recreation areas.
Climate Change	High	Manage areas of Low impact silvicultural System (LISS) to achieve low impact sustainable regeneration. Produce a sustainable supply of quality timber and biomass. Convert all areas to LISS over time.	Implement active silvicultural management of existing LISS areas. Bring new areas into LISS management. Thin to raise timber quality.	<b>2</b> - Sites identified as LISS recorded in FDP and GIS layers. Coupe plans produced and operations undertaken to manage sites as appropriate. However, some areas need another type of management due to wind-blow.	Continue to manage LISS areas. Continue to produce timber and biomass to substitute for energy intensive products. Use species with good growth rates to sequester carbon and reduce the potential impact of disease. Seek to maintain or expand species diversity during the plan period. Improve air flow through stands, and reduce the proportion of stressed trees by thinning management. Continue to look for areas suitable for LISS (where natural regeneration starts to grow).

Timber	Medium	Produce wood & marketable timber.	Actively manage stands to produce quality timber. Remove low quality and LP infected by DNB.	<b>3</b> -The felling programme has been respected and is still ongoing. LISS stands have been actively thinned to produce timber, and improve crop quality.	Continue to produce a good quality timber in the site. Diversify the range of products in the future in order to increase the species diversity of the site for its benefit regarding resilience to diseases and climate change.
Environmental quality	High	Conserve scheduled monument.	Scheduled Monument (SM) monitored yearly/5 yearly and work undertaken where necessary. Regularly recording archaeology/historical interest features.  Working with Aberdeen University and Baillies of Bennachie researching <b>"Bennachie Colony"</b> .	<b>3</b> - All SM are on Monument Management Plans (MMPS) since 2015. Recorded info shared with Historic Environment Scotland and FCS staff	Continue to conserve Scheduled Monuments by following MMPs. Produce a priorities conservation schedule for <b>"Bennachie Colony"</b> with the help of Baillies of Bennachie. Support research in the Bennachie Landscapes Project.
	High	Where possible broadleaves should be established.	Where native broadleaf source is available, encourage Natural regeneration. Alternatively plant broadleaves where regeneration is not establishing.	<b>3</b> - Partial Clear fell of Plantation on Ancient woodland site and programme is still ongoing. Broadleaves have been planted regarding LMP. However, natural regeneration is difficult to establish over the PAWS.	Continue to encourage natural regeneration where possible and assist this process by supplement planting.

	High	Improve habitat for capercaillie and blackgrouse		<b>1</b> – Presence of Female capercaillie in 2010 – 2013 at Bennachie Centre – under SNH license it was translocated to a forest in Moray with fewer disturbances.	Bennachie is not seen as a main capercaillie area. The management of the forest is however still orientated in order to encourage implementation and diversity of fauna and flora. Blackgrouse has not been seen for a long time within the site which is not a permanent living area for this species. Furthermore, RSPB has not raised any issue concerning this species in Bennachie. However, the wide open heath area within the site is a favourable habitat for the species.
Biodiversity	High	Create permanent habitat networks focussing on the limited riparian areas. Maintain habitats that support specific species of interest on the site.	Establish new NBL areas along riparian zones. Seek continuity of forest cover with good light levels at ground level. Support Saving Scotland Red Squirrel and control of Grey Squirrel occurred during plan.	<b>2</b> – LISS by its nature reduces the options for a radical change of species over short time spans. The process of creating networks of broadleaves has been started. Enrichment planting within these areas has also helped to increase species diversity.	Maintain LISS management where applicable. Continue to maintain the diversity of the forest in terms of species, age class and structure to enhance forest resilience. Where applicable, we will reduce the size of the clearfells if this minimise their impact in the landscape and the environment. When Scots pine woodland is managed as continuous cover we will encourage its natural regeneration where it is possible and when the trees have reach their maximal reproduction abilities. Spruce and western hemlock regenerating in the understorey of Scots pine stand will be managed in mixture along with the existing trees. Expand broadleaf cover to create a fairly

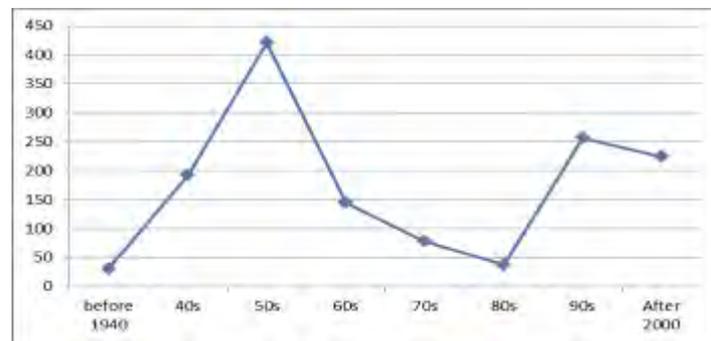
					<p>continuous native broadleaf corridor that links the PAWS site at Donview and SSSI Tilliefoure Oak woodland, along the Birks burn and parts of Clachie burn towards the Bennachie Centre.</p> <p>Continue to support The Saving Scotland's Red Squirrels and allowing them to control grey squirrels where sightings occur.</p>
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### 3. Background information

#### 3.1 History of the site

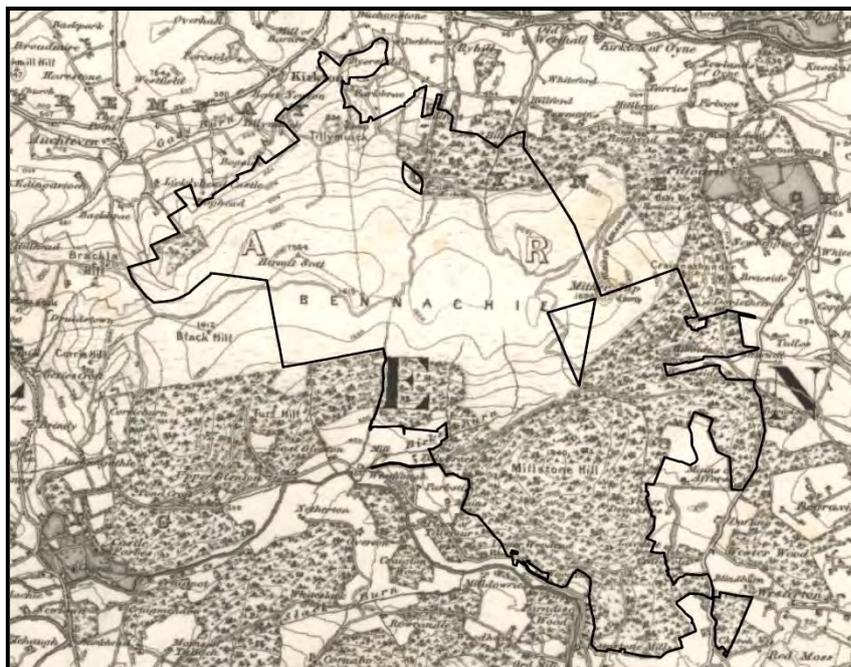
Bennachie was gradually acquired by Forestry Commission Scotland from 1943 to 1956. The oldest remaining stands were planted in 1905 and the forest block is continuously restocked.

54 % of the trees were planted between 1940 and 1960, 9% between 1970 and 1990 and 35 % after 1990 (see graph below). Bennachie has therefore a relatively good age diversity of stands. Half of the stands could be characterised as mature or close to maturity and ready to harvest.



*Figure above: Number of hectares planted from 1905 until today*

In the more distant past it is clear from the extracts of the Ordnance Survey (OS) maps published in 1874 the area has been associated with forestry in the south but was widely opened in the North (see map 1 below).

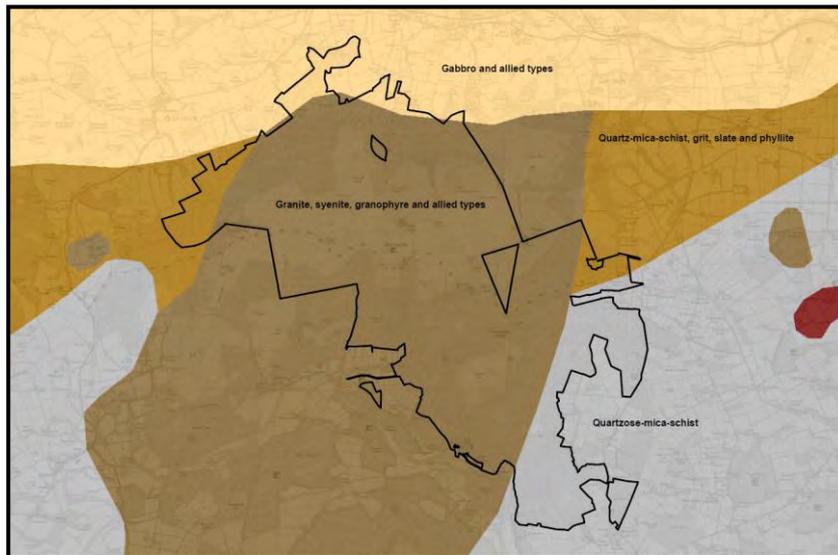


*Map 1: Bennachie, OS One-inch to the mile maps of Scotland, 1st Edition, 1856-1891.*

## 3.2 Physical site factors

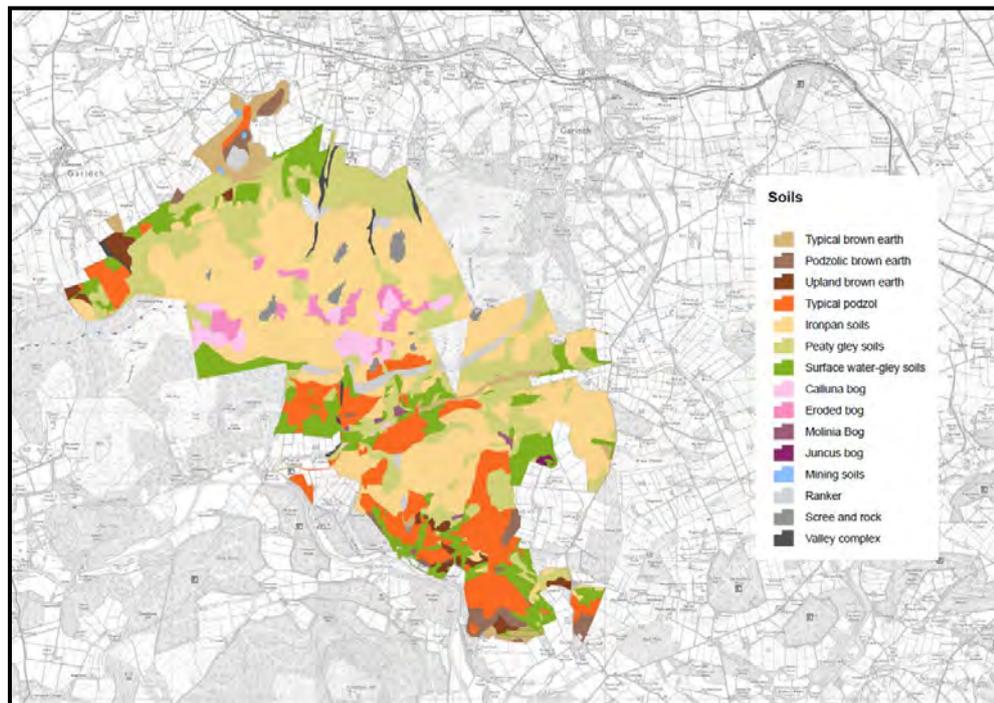
### 3.2.1 Geology, Soils and topography

**Geology** - According to the British Geological Survey Geological Map of the UK the plan area is mainly underlain by granite, syenite, granophyre and allied rocks which generate medium nutrient overlying soils. The north of the site is underlain by gabbro and allied rocks. This rock gives rise to overlying soils with high nitrogen availability at this location. The rest of the site is covered with quartzose-mica-schist soils sometimes accompanied with grit, slate and phyllite.



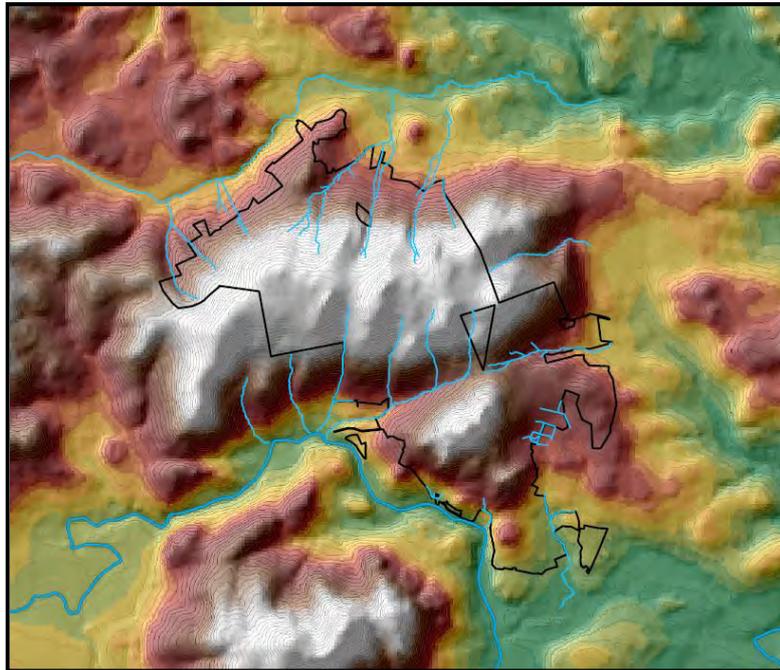
*Map 2: Bennachie's geology. Extract from British Geological Survey, 50k Geology map of the UK.*

**Soils** – The majority of the soils in Bennachie are medium nutrient soils but an area of rich nutrient soils is located in the north of Back O' Bennachie. 38 % of the area is covered with an Ironpan soil and is mainly located at the top of the hills and over the upper slopes. 32 % is typical peaty and brown surface-water gley soil. The other dominant soil material is a typical podzol mainly located over the southern part of Bennachie. On the hill plateau between Oxen Craig and Mither Tap there is a deep peat area up to 4.75m deep.



*Map 3: Soils in Bennachie; map based on an interpretation of the James Hutton Institute soil maps.*

**Topography** – Bennachie has an altitudinal range of 95-529 m (see map below).



*Map 4: Bennachie topography*

### 3.2.2 Water

Bennachie is located in the catchment of the river Don. SEPA has classified the River Don at moderate status. The quality of the water in the River Don tends to be worse whilst approaching Inverurie and Aberdeen. Point source pollution from sewage discharges currently impacts on the River Don (between Inverurie and the tidal limit). Diffuse pollution from agricultural activities is also deteriorating the water quality of the lower River Don and tributaries. Several programs leaded by SEPA have been started in order to help reducing pollution sources.

Several Burns are starting from the site and flows directly to the River Don. To help improving water quality on sites such as Bennachie as part of the National Forest Estate, the UK Forestry standard (UKFS) guidelines for Forest and Water is used as a reference to manage the woodland along watercourses. This series of guidelines sets out the approach of the UK government to sustainable forest management, defining standards and requirements, and providing a basis for regulation and monitoring. To improve water quality and ecology by intercepting possible diffuse pollution and creating dappled shade, native broadleaves will be planted where applicable along watercourses and approximately 50 % of open ground will be left. This will aim to restore those areas as native riparian woodlands. Concerning the plan period, approximately 50% of the restock coupes are crossed over by watercourses (please see restock map). The scale of those riparian

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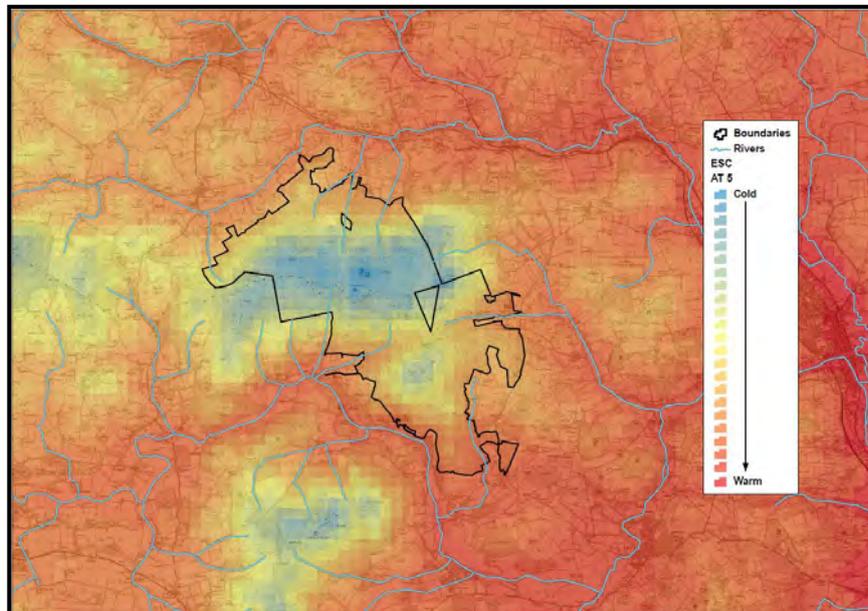
areas being very small, they might not appear on the restock map but the restoration is systematically done in all sites by FES when restocking along watercourses.

### 3.2.3 Climate

According to the Ecological Site Classification (ESC) protocol, the climate at Bennachie is classed as cool, between wet and moist and between Sheltered and severely exposed. Four climatic factors are used to define the climate for any given location. These are warmth, wetness, continentality and windiness. Continentality has the least impact so is dropped from the overall climate zone designation.

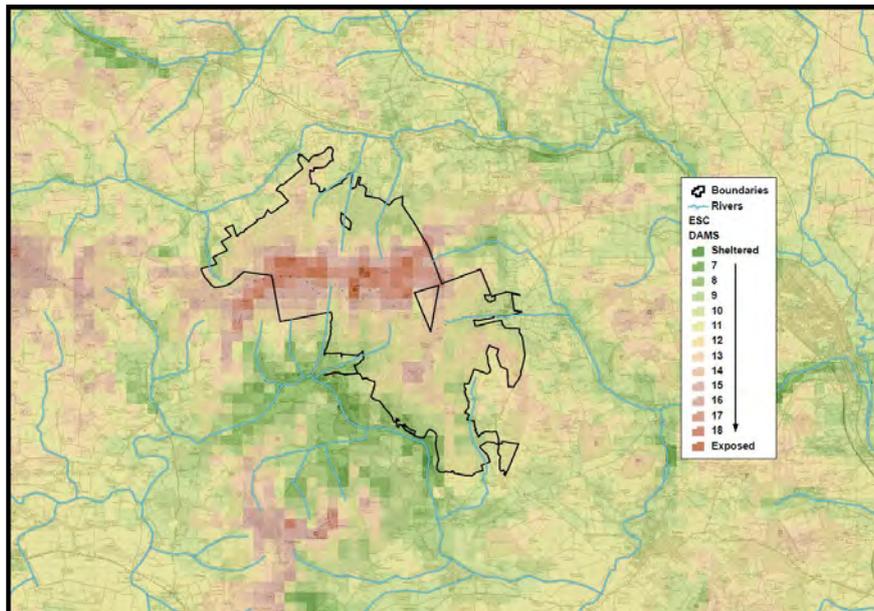
The climate data for Bennachie from interrogating the ESC is:

	AT5	DAMS	MD
Range	688 - 1194	6 - 19	21 - 128



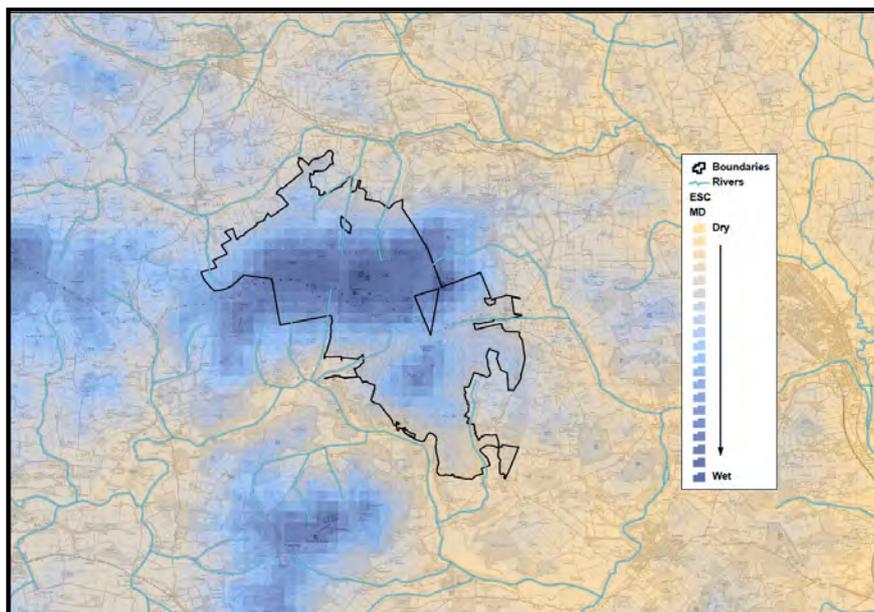
*Map 5: Accumulated total of the day-degrees above the growth threshold temperature of 5° at Bennachie*

**AT5** is the accumulated total of the day-degrees above the growth threshold temperature of 5°, which provides a convenient measure of summer warmth. The results for AT5 place Bennachie in the cool zone. Therefore, a number of species will not be suitable for this site, particularly at the top of the slope where the AT5 is very low.



*Map 6: Detailed Aspect Method of Scoring at Bennachie*

**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. The results place Bennachie between Sheltered and severely exposed at the top of the slopes. Bennachie is furthermore a very sensitive site for windblow.



*Map 7: Moisture Deficit at Bennachie*

**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 Bennachie **between the “wet” and “moist”** zones.

These results will be used to help assist in the choice of tree species in the land management proposals for the site (see section 5). Each tree species has tolerances for these and other factors and they can be used to identify species suitable for the site conditions.

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.

### 3.3 Biodiversity and environmental designations

#### 3.3.1 Designated sites

There are 2 Plantations on Ancient Woodland Site (PAWS) in Bennachie total size being 38 ha:

- **Don view** is 34 ha of PAWS. There are three different forest management operations that have occurred on this PAWS site. 7 ha of this site had the exotic conifers clear felled allowing natural regeneration of birch to occur and small areas were planted in 2004 and 2015 with native broadleaves  
4.0 ha were clear felled in 2015 and it is due to be planted with native broadleaves in 2016/17. 23.04 ha consists of mostly exotic conifers.
- **Parkstyle** is 4 ha of PAWS which was group planted in 1995/6 with native broadleaves.

The management objective of these areas will be to restore native woodlands. Birch, oak and pine will be planted within the next few years and non-native conifers such as Norway spruce or Douglas fir will be gradually removed. Although we will accept up to 10% exotic tree species within the PAWS areas. Also, continuous woodland cover policies will be adopted where possible.

No Sites of Special Scientific Interest (SSSI) are located in the forest block. However, Tilliefoure oak woodland is an SSSI located along the south west boundary of Bennachie. This area of Bennachie is also a PAWS area. Therefore, the efforts put into the restoration of this area will also be beneficial for the nearby SSSI.

Bennachie is a Local Nature Conservation Site (LNCS) which is a non-statutory designation given by local authorities to areas of locally important nature and landscapes. The LNCS states that Bennachie is a large site with geological and morphological interests and supports a number of UK BAP priority habitats including montane heathland, or upland Birch and upland oak woodland which will be maintained in the future (See 5. for management proposals of species and habitats). Bennachie could be designated as a Special Landscape Area by Aberdeenshire Council within the next months (awaiting for approval); this is a landscape designation.

### 3.3.2 Species and habitats

A number of sensitive plants, birds and other species are located within the forest and surrounding area which will require special consideration. Management operations will be planned to ensure that these species are not put at risk, and where practical, work will be undertaken to encourage them and will be executed as per guidelines (See appendix 4).

Of the UKBAP species present, the Red Squirrel is one of the six key species identified in the Forest Enterprise Scotland Biodiversity Action Plan. Capercaillie are not present on the site anymore.

Therefore good forest design and operational practice will be undertaken to benefit red squirrels according to FCS Guidance Note 33: Forest operations and red squirrels. This will include planning forest operations to minimise damage to red squirrel dreys and populations by undertaking survey work to locate dreys prior to felling operations. It will also mean that planning the structure and composition of the forest will be undertaken to suit red squirrels where applicable.

There are also a number of badger sets within the block that will be protected during operations.

FCS will also monitor the dry and wet heath (priority habitat) which is the main component of the large open areas at the top of Bennachie.

### 3.4 The existing forest

#### 3.4.1 Age structure and species

- Age structure

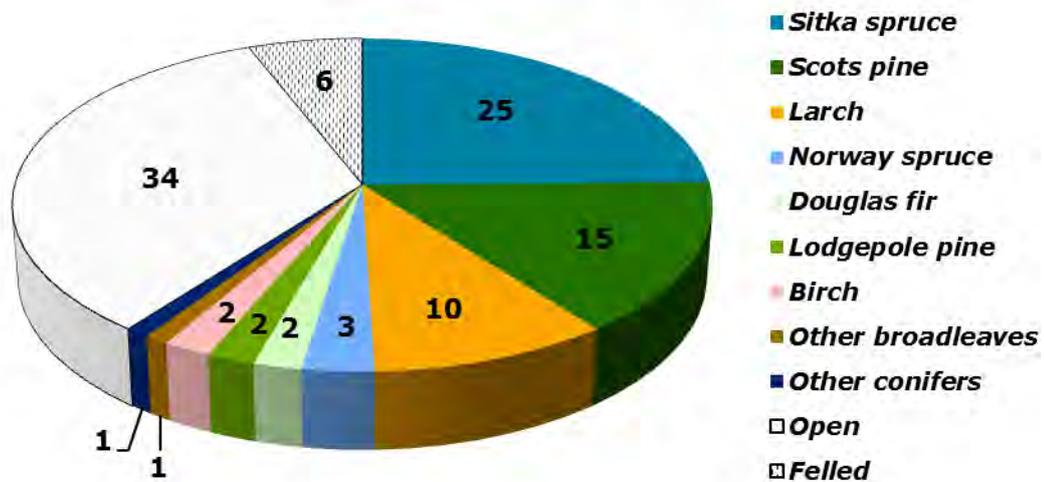
<b>Age of Trees (years)</b>	<b>Successional Stage</b>	<b>Current distribution 2016 (%)</b>
<b>0 – 10</b>	Establishment	9
<b>11 – 20</b>	Early Thicket	12
<b>21 – 40</b>	Thicket & Pole Stage	7
<b>41 – 60</b>	Mature High Forest	15
<b>61+</b>	Old Forest	17
	Open space	34
	Felled	6

The most represented age class in Bennachie is above 61 years old followed by the 41 – 60 years old one. The majority of the forest can therefore be classified as old and mature as it was mainly planted between 1940 and 1960.

- Species

<b>Species</b>	<b>Proportion in 2016 (%)</b>
<b>Sitka spruce</b>	25
<b>Scots pine</b>	15
<b>Larch</b>	10
<b>Norway spruce</b>	3
<b>Douglas fir</b>	2
<b>Lodgepole pine</b>	2
<b>Birch</b>	2
<b>Other broadleaves</b>	1
<b>Other conifers</b>	1
<b>Open and felled</b>	40

### Proportion of Bennachie covered with the current species (%)



The site is dominated by Sitka spruce, Scots pine and Larch. These species are well adapted to the site.

Areas of Sitka spruce have shown good growth, and regeneration is widespread. However, the stands are often affected by windblow as some areas of Bennachie are severely exposed to the wind. The wet condition of the soil is also a factor increasing the risk of windblow.

Pine and Larch are two species appreciated for recreation as they create a nice atmosphere for outdoor activities. Larch shows very good potential for **natural regeneration in some areas such as Back O' Bennachie as it's already regenerating naturally.**

Other conifers such as Norway spruce and Douglas fir produce very good quality timber. Furthermore, Douglas fir is growing very well on the richer soils usually located at the bottom of the slopes. These species are very well adapted to the site and have strong potential to help reaching the objectives of the plan (to diversify the site).



*Photo above: Spruce regenerating naturally*

Lodgepole pine is widely affected by DNB. Clearfells have already been done in order to stop the spreading of the disease. The potential to grow this species in Bennachie and in Moray and Aberdeenshire forest district is therefore very limited.

A range of hardwoods including birch, rowan and oak have grown well in the forest. The lower part of the slopes shows very good potential for natural regeneration of birch and for growing hardwood as the soils are richer than the higher part of Bennachie. Neighbouring lands along the PAWS shows as well a very good potential to growing oak in combination with birch in this area.

Other conifers are also present in the site such as Western hemlock, Noble Fir or Grand Fir...These species are also growing very well in some areas of the site and in mixture with Sitka spruce. Western hemlock is strongly regenerating on the South slope of Bennachie. These species could therefore be used in the future to help diversifying the area.

#### 3.4.2 Access

Access throughout the forest for management and harvesting is generally good and fit for purpose, with a good road network and good public road links.

However some areas are still very remote from the forest roads (up to 2 km away) and have been planted with commercial stands in the past (in the west part on the higher slopes of Bennachie, below the Gordon way walk for example). The cost for harvesting timbers in this area will be high compared with the benefits unless a road is build. No new roads are planned to be built at the moment.

### 3.4.3 LISS potential

**Low Impact Silviculture Systems (LISS) are defined as: 'Use of silvicultural systems whereby the forest canopy is maintained at one or more levels without clear felling.'**

LISS normally implies that no clearfell areas larger than 2 ha will be undertaken. Larch, Sitka spruce, Western hemlock and Birch are the main species which regenerate naturally on the site. Therefore, they present good potential for LISS.

Some additional actions such as scarification of the soils might need to be undertaken in order to encourage implementation of future natural regeneration. This is also very interesting financially as this would cost less than clearfelling and restocking entire coupes. It is also a very good opportunity to use the local seed source which has already proven its ability to grow on the site.

## 3.5 Landscape and use

### 3.5.1 Landscape character, value and visibility value



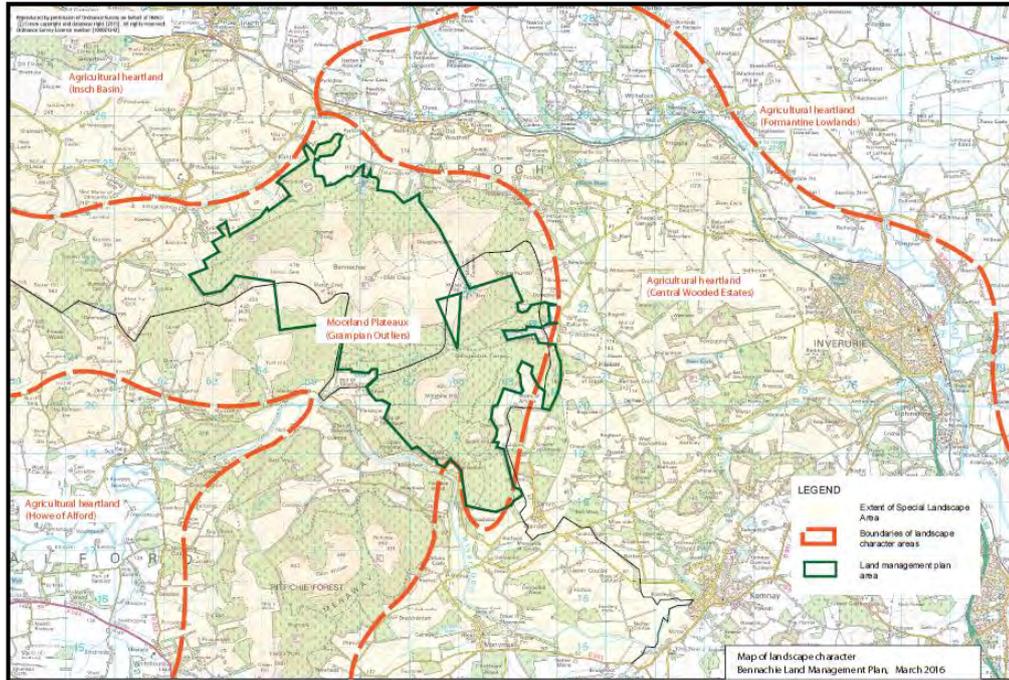
*Photo above: View of Back O' Bennachie from the A 96*

The forests covered by this plan are largely located around the prominent upland ridge of Bennachie of which Mither Tap is the most notable summit of the ridge.

Bennachie ridge is an iconic landform feature which dominates a wide area of Aberdeenshire. Surrounded largely by flat agricultural plains, it has an immediately recognisable and distinctive skyline shape which defines the region and highly visible from the surrounding area. Most living or visiting locally quickly associates its shape on the skyline with the area. The weather has a fundamental influence on the character of it.

Bennachie and upland areas of Pitfichie to the south are designated as Special Landscape Area (SLA) by Aberdeenshire Local Authority. Planning guidance currently being finalised.

The map below identifies the extent of the SLAs and the key landscape character areas which are based on the classification carried out by SNH (1998).



**Map 8: Landscape character areas in Bennachie SNH (1998).**

The forests of Bennachie are located on the side slopes of the upland ridge. Linking with Pitfichie to the south, it forms an upland moorland plateau, one of a number of Grampian outliers.

This upland is typically covered with heather moorland or conifer forest. Under clear skies and strong light the colours purples greens and blues can be vibrant, but during darker days the dark mass of the hillside appears imposing and ominous. The relief of this upland ridge is mostly rolling with both gentle and steeper slopes. Gorges disrupt the smooth flow of the terrain. Rocky outcrops, most noticeable on the skyline, highlight its mountain character.



*Photo above - View form layby of A96 near Oyne: The Bennachie skyline defines a wide part of lowland Aberdeenshire.*

Woodland is continuous around the upland though it is not all within the National Forest Estate. Given the iconic nature of the hill and its dominance over the surrounding area, the forest needs to fully integrate with the landform and be in harmony with the landscape character.



*Photo above: View of Bennachie from Millstone Hill*

Special attention should be given to reflecting the changes in scale between the wide, open, upland moorland to the more intimate spaces on the lower slopes. The upper margin of the wooded areas should appear natural, not encroach unduly onto the open moorland of the higher altitude, and be shaped using forest landscape design principles to respond to the underlying landform. The lower edges should integrate with the dominant field pattern of the agricultural plain that surrounds it. The visual integration between the areas managed by Forest Enterprise Scotland and others should be a key objective of the plan for management over the next five to ten years of the plan, to reduce the impact of the geometric shapes and lines. Forest design principles will be applied to both the coupe shapes and alignment of future species planting to ensure this highly distinctive landscape defines the character of the forest rather than the opposite way round.

The plan area is covered by Scottish Natural Heritage Landscape Character Assessment No102, South and Central Aberdeen, produced in 1998.

### 3.5.2 Neighbouring land use

Bennachie is surrounded either by woodlands or fields. These lands belong to either private individuals or private Estates.

A great majority of the woodlands along Bennachie are composed of broadleaves. These type of woodlands are mainly located at the bottom of the slopes and particularly along the river Don. Conifer woodlands are also located along the site and more especially in the west of the forest. Regarding the consultation feedback from the neighbourhood, no major clearfells have been identified to happen within the next few years. The different phases of clearfells for the Bennachie land management plan are therefore not affected by the rotation of the woodlands surrounding the site for the near future.

The agricultural lands are mainly located along the North and East boundaries of the site. Also, along the north east of the site, the upper heathland is dominant at the top of the slopes.



*Aerial photo of Bennachie (Boundaries in red)*

## 3.6 Social factors

### 3.6.1 Recreation



*Photo above: The Bennachie centre*

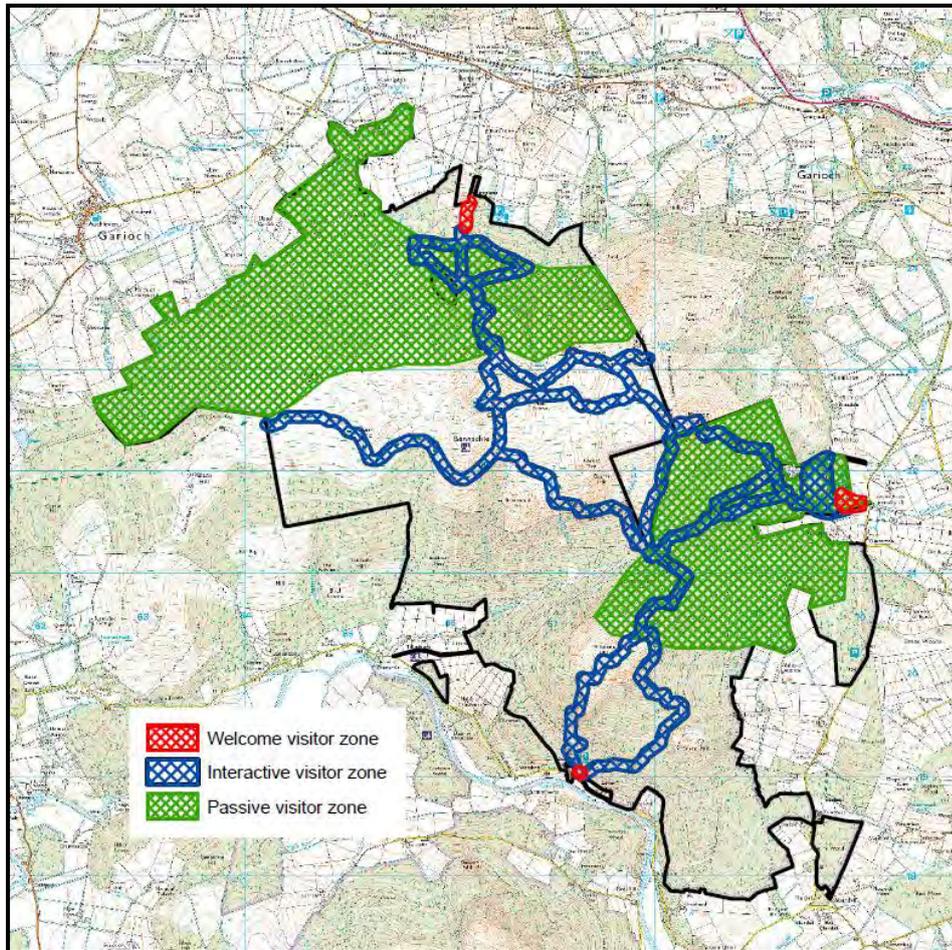
One of the main objectives of the site is to manage Bennachie forest to maintain a high recreation value. Due to its proximity with Aberdeen and its prominence in the landscape, Bennachie is one of the most visited FES's sites in Aberdeenshire with approximately 135,000 visitors a year. The site is also located close to the A96 and is therefore easily accessible.

There are four main car parks giving a direct access to the site: the Back O' Bennachie, the Bennachie centre, the Donview and the Rowan tree. However, the rowan tree is not a FES car Park. FES car parks are located within the "welcome visitor zones", FES term: "arrival" point and associated access, parking and immediate backdrop.

There are other facilities over the site such as the Bennachie visitor Centre where the visitors can enjoy a brief of the history and different issues of the site. There are also Picnic areas (Don View for example) over the site.

There are many tracks crossing over the site that are frequently used for walking. Also, mountain biking is an outdoor activity frequently practiced in Bennachie despite the presence of Pitfichie, more appreciated for this type of activity. The tracks and rides are classified as "**interactive visitor zones**": a 50m buffer either side of a designated facility or well-used informal route. What the visitors directly experience whilst using our facilities.

There are also "**passive zones**": area of landform backdrop close to a facility where a level of management intensity higher than "normal" forestry practice will make a significant improvement to the visitor experience.



*Map 9: Bennachie - visitor zones*

### 3.6.2 Community

There is a strong public use of the forests from Aberdeen and the surrounding towns. The major and closest to Bennachie is Inverurie to the east, Kemnay to the south east and a few smaller scattered settlements.

### 3.6.3 Heritage

The Archaeology Service for Aberdeenshire, Moray & Angus Councils have provided detailed site information for unscheduled ancient monuments in the area.

Further information on the non-scheduled monuments is held in the Forestry Commission S.M.R. sheets and will be used during the planning of operations.

There are 5 Scheduled monuments in Bennachie. The most famous and visible one is the fort located at the top of Mither tap (SM2114). There are also:

The Mithergarth, ring-ditch houses ((SM12018);

The Woodend, cairn and cross-incised stone (SM12009);  
The Newton of Braco, ring-cairn (SM12011);  
The Tillymuick, settlement (SM5316);



*Photo Above: the Mither Tap and its Fort at the top*

All forestry works around their location will be done in appliance with the UK Forestry Standards Guidelines and the Monument Management Plan agreed between FCS and Historical Scotland.

## 3.7 Pathogens and disease

### 3.7.1 Hylobius

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 four. Restocking may take place before then if monitoring, using the Forest Research Hylobius Management Support System, shows that it is safe to do so.

### 3.7.2 Dothistroma needle blight

Dothistroma Needle Blight will be addressed differently depending on the level of current infection in the crop. The severity of infection and crop symptoms produced range from reduced growth rate to high levels of mortality within the stand. The level of mortality is the key concern as once dead the integrity of the tree quickly deteriorates to a state where it cannot successfully be harvested. Categorisation of the infected crop will allow us to prioritise the harvesting of such areas.

### 3.7.3 Phytophthora ramorum

Phytophthora ramorum is the Oomycete plant pathogen also known to cause the disease sudden oak death. The disease kills oak and other species of tree and had devastating effects on the oak populations in California and Oregon as well as also being present in Europe. In the UK, the disease does not seem to affect oaks. However, it is largely infecting Larches particularly in the south Scotland. **Symptoms include bleeding cankers on the tree's trunk and dieback of the foliage**, in many cases eventually leading to the death of the tree. P. Ramorum also infects a great number of other plant species, significantly woody ornamentals such as Rhododendron, Viburnum and Pieris, causing foliar symptoms known as ramorum dieback or ramorum blight. Such plants can act as a source of inoculum for new infections, with the pathogen producing spores that can be transmitted by rain splash and rainwater. P. ramorum was first reported in 1995, and the origins of the pathogen are still unclear but most evidence suggests it was repeatedly introduced as an exotic species. Very few control mechanisms exist for the disease, and they rely upon early detection and proper disposal of infected plant material.

Any infection of Phytophthora ramorum is of relevance to the continued management of the forest, but Larch infection is of particularly concern due to the wide scale outbreak in the Scotland. Protocols are in place if there was an outbreak for the removal of infected species and for alternatives for restocking. Any suspicions of outbreak need to be reported immediately: [treehealthscotland@forestry.gsi.gov.uk](mailto:treehealthscotland@forestry.gsi.gov.uk).

## 4. Analysis and Concept

### 4.1 Analysis and concept table

The information gathered in the previous section (3.0 - Background information) has been analysed for its relevance to the plan. This has informed the design concept plan which is based on the land management objectives (section 1.3).

The results of this process are presented in the table below. This has been set out against the national themes of the FES strategic directions document and the issues highlighted in the Moray & Aberdeenshire strategic plan.

Theme	Key Commitments	District specific Action	Analysis	Proposed Action
<b>Healthy</b>	We are committed to high quality silviculture and increasingly, to using alternatives to clear-felling.	We want to maintain a minimum of 30 % of Low Impact Silvicultural System (LISS) in the district. Thinning will be the preferred option.	The site presents a good potential for LISS. It is also a very high recreation area and clear-fells should be avoided when possible.	Find the most appropriate areas for LISS. Limit the use of clearfelling and use it only when necessary.
	We will help the Estate adapt to climate change and become more resilient to pressure.	The District will continually make good use of Ecological Site Classification to closely fit species to sites, and take into account the anticipated effects of climate change.	The climate of the site is predicted to change in the future.	Use the ESC and <b>its' built in</b> predicted future climate models to help guide the selection of species suitable for planting.
<b>Productive</b>	We aim to provide at least three million cubic metres of sustainable softwood timber every year.	We will maintain a sustainable annual softwood timber production of 350,000 cubic metres over bark standing.	The site has potential to grow or maintain softwood trees.	Identify the most appropriate areas for planting or maintaining soft wood trees.

	We intend to manage at least a quarter of our expanding broadleaf woodlands to produce quality hardwoods and woodfuel.	We will increase our productive broadleaf resource by planting a further 700 ha by 2019. Where economically viable, we will actively manage our broadleaf resource to secure silvicultural improvement and commercial return.	This plan area has been identified as having potential to establishing productive broadleaves.	Plant broadleaves and manage them to secure silvicultural improvement and commercial return.
	We will work with partners to find new ways to harness our natural and cultural heritage and develop the <b>Estate's potential</b> for tourism.	The District work with VisitScotland, local authorities, local tourism organisations, volunteers and businesses to capitalise on visitor attractions at Mither Tap thus benefiting the local economy. We will continue to work with the Bennachie Centre Trust and Bailies of Bennachie to maintain and develop Bennachie as an important local visitor destination.	This plan area has been identify has a high recreational area. Many partners are involved into the site recreation, awareness and discovery.	Continue to manage the site in order to maintain its high recreational value. Work in partnership with the different stakeholders and organise consultations and meetings with them to exchange ideas about this thematic.
	We are committed to maintaining the best open habitats in good ecological condition.	The District will continue to review all open ground management on a regular basis to ensure it is appropriate.	The upper heathland at the top of the hills is a wide protected habitat.	Monitor and maintain the ecological condition of priority open habitats.
<b>Treasured</b>	We want to encourage local people to get involved in using and managing local Estate woodlands, so we will actively	Land Management Plans will be developed in consultation with local communities. We will continue to work with local groups (eg, Bailies	The site is in the centre of interest of local group such as Bailies of Bennachie or visitors coming for recreation reasons.	Organise a consultation programme in order to share ideas about the management of the site and exchange about

	engage with local communities and be open to work in partnership.	of Bennachie).		the LMP process and interest.
	We are committed to creating more uniquely special places across the Estate and to delivering benefits to an increasingly diverse range of <b>Scotland's people</b> .	We want to maintain the highest standards of recreational management to maximise the opportunities for their responsible use.  To enhance the visitor experience, we will continue to make visual and environmental improvements around priority visitor recreation sites and along major tourist routes.	The site is a major tourist area and has a high recreational value. 3 car parks are direct access to the site and many tracks/trails are located within the site.	Identify the main touristic areas and trails and maintain/create the most appropriate habitat in order to increase their value. Consider carefully the impact of the forest management on the landscape.
<b>Cared For</b>	We are restoring around 85% of areas on ancient woodland sites to largely native species – the remaining areas will be enhanced through our management.	Moray & Aberdeenshire District will have 38% of plantations on ancient woodland sites (PAWS) in active restoration within the plan period, with an overall aim of achieving 53% of sites fully restored to native woodland.	PAWS are located in the site.	Localise PAWS and encourage or maintain the growing of native species.

	<p>We will identify particularly vulnerable species for which the National Forest Estate is important and take specific conservation action.</p>	<p>We will employ a best practice approach to ensure that raptors are safeguarded and enhanced by beneficial silvicultural management. We will safeguard existing populations through beneficial management and by supporting a cull programme to constrain the populations of grey squirrels in the Aberdeen area and along the watercourses of the Don and the Dee.</p>	<p>Bennachie is a site which offers good habitats for raptors and squirrels.</p>	<p>Identify the breeding areas of raptors and ensure their protection. Maintain and encourage the creation of habitats favourable to red squirrels and limit as much as possible the propagation of grey squirrels. We will work with North East Biological Record Centre and communities interested in wildlife recording so as to improve our knowledge of wildlife found on the hill</p>
	<p>We will safeguard archaeological sites through our planning and management, and recognise special places and features with local cultural meaning.</p>	<p>We will ensure our significant designated heritage assets are managed according to Monument Management Plans (MMPs) agreed with Historic Scotland.</p>	<p>There are significant archaeological sites in Bennachie with a high heritage value.</p>	<p>We will follow the UK forest guidelines and the MMPs for the management of the lands around the archaeological sites. We will continue to work with communities of interest (such as Bailies of Bennachie) to safeguard non-scheduled monuments.</p>

## 5. Land Management Proposals

See future habitats and species map

### 5.1 Management

Specific features of the site

The objectives of the plan are used as the main general guidance along with the UK Forestry standard guidelines. However, other local issues have to be taken into account in order to reach these objectives. Some issues will be identified in each forest block in Moray and Aberdeenshire forest district such as windblow, wetness / poorness of soils or natural regeneration.



*Photo above: Sitka spruce - winblow*

In Bennachie windblow is a key constraint. The choice of the sequence and location of felling phases is strongly related to wind orientation. Therefore, if the orientation of the strongest wind is west to east clearfells will be started to the east in order to keep the West edge of the woodland stable (as a shelterbelt).

Clearfells will be preferably accomplished before wind damages. Also, clearfells might happen when trees have reached their critical height. The critical height of a tree is when the probability for the tree to blow down is high and can be harvested before it falls under wind pressure.

The landscape has been highly considered in the management of the site. Indeed, clearfells and restock areas have been shaped to improve or maintain the landscape quality where possible. The shapes of clearfells have been designed in collaboration with our FES landscape architect. The current upper lines of the forest have already been improved during the last 10 years period of the previous plan using felling operations and leaving those felled areas as open ground. This is for example the case on the upper margin of the forest located on the **slopes of Back O' Bennachie** and the Mither Tap ridge. Indeed, some of the woodland located on the highest part of the forest has been felled in order to soften the upper line, using landscape design principles based on visual forces which makes it **look "more natural"**.

In this plan, the same landscape principles have been used. The boundaries of the triangle belonging to Monymusk estate will be subject to improvement in the future. The east and west boundaries of the estate land will be softened by felling trees and by restocking the felled areas in order to avoid geometric lines.

All the clearfells for the period of this plan and later on have been designed to ensure that their design will reflect the landform influence and fit to the scene rather than contrast with it and create a disruptive visual effect.

### Clearfells

**The main silvicultural system employed in British forestry is 'patch' clear-felling** followed by planting or occasionally natural regeneration. In order that the timber in this plan area is harvested before the onset of windblow on the poor soil conditions clearfell will remain the most appropriate silvicultural system where LISS is not appropriate (see below for definition).

Although clear-felling can appear to have a negative impact on landscape and habitat it still an important management system.

Clear-felling, to a degree, mimics natural disturbances such as fire or windblow in a forest and as such allows the forester to alter the even aged structure of the canopy over a relatively short period of time. **The adoption of a 'fallow' period before restocking, or natural regeneration establishment,** also creates transient open habitat that is exploited by several species such as voles, deer and raptors such as Kestrel, Buzzard and Goshawks in this area.

Where possible the scale of clearfells will be in keeping with the scale and topography of the local landscape. Therefore in some instances large clearfells will be appropriate in terms of scale.

### Adjacency

Areas of woodland have been planted over short time scale creating uniform age class structure in Bennachie. This is for example the case on Millstone hill slopes (to the North and West) where stands of mature Sitka spruce are very uniform in age. However, those coupes have reached their best economical value and therefore, should be harvested. When such a situation is encountered, in order to break up the size of the harvesting operations and to improve the future design of the forest (breaking up age class), consecutive and adjacent phases will be planned. However, harvesting operations will be undertaken early into phase 1 and late into phase 2. This will provide a 5 – 10 year gap between clearfells of adjacent coupes. No clearfelling will be done if the trees recently planted in adjacent coupes are not 2 meters high as described in the UKFS guideline.

Low impact silvicultural system (LISS) – See appendix 3 and 4

**'Low impact' is defined as the use of silvicultural systems 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 low impact forestry 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, low impact forestry is seen as a means of reducing the impact of clearfelling and the associated changes that this produces in forest landscapes and habitats.

Prescriptions will be written up for each area managed under LISS. Each prescription will be included in the site management plan before any operation commences.

Restocking by natural regeneration will be the aim in some areas. All areas identified for restocking by natural regeneration have been recorded and programmed for inspection on a five yearly basis. If after 10 years, or at any preceding inspection, it is apparent that natural regeneration is not going to be successful then replanting with appropriate species will be undertaken.

Enrichment planting may also be used to increase species diversity, target key recreational/visual areas, or to ensure the rapid establishment of ground cover.

### Thinning

Wherever possible the district will continue to maximise the area managed through thinning. FCS 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.

An active thinning programme is essential for LISS.

Where Lodgepole Pine occurs in mixtures with other crops it will be targeted for removal during thinning operations.

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

## 5.2 Future Habitats and Species

The choice of species for restocking by planting in this plan has been guided by the Environmental Site Classification (ESC) results for this climatic zone and soil types, the primary areas for large scale restocking activity are the clearfells associated with the removal of Lodgepole pine stands. Approximately 50 ha of Lodgepole pine have been felled within the last few years for DNB infection (the main sites being located in the areas of Tillymuick, the Mither tap and Millstone

hill). To achieve the best results ESC needs to be used as a guide in conjunction with local site specific knowledge and experience. The base data used in the ESC process can be fairly broad brush and can overlook the opportunities and pitfalls presented by small scale site characteristics and microclimate. Site specific planting plans following a restock site survey will guide the final species choice and if necessary, an amendment to the plan will be required.

There are big areas of commercial woodland in Bennachie. The site presents very good potential to grow good quality timber. Therefore, species such as Sitka Spruce, Scots Pines and other conifers will continue to be planted. However, alternative species, sometimes already present in the site, will be added in order to diversify habitats of the site. Some of these species are Norway spruce, Douglas fir or European silver fir which are adapted to grow in the area and produce a good quality timber. It is also possible to plant Sitka spruce in mixture with other species in order to increase diversity and the forest resilience to possible diseases and climate change. Furthermore, this will not affect the timber quality produced.

In order to fight against *Phytophthora ramorum*, no Larch will be planted in the near future until the disease threat is better understood. The proportion of larch present in the site might be therefore diminished. However, it is possible to manage it with LISS and to encourage natural regeneration of this species. There are big areas of Larch producing very good timber and already regenerating over the site. Natural regeneration of Larch will be encouraged where applicable. It is also applicable for Scots pine stands and Sitka spruce, widely represented in the site. Silvicultural systems such as uniform shelterwood, group selection, group shelterwood or single tree selection will be used in LISS areas. In some cases preparation of the ground such as scarification will be utilise in order to encourage natural regeneration. Indeed, for species such as Scots pine, it is necessary to have the mineral layer of the soil directly exposed or very close to the surface of the soil to obtain natural regeneration.

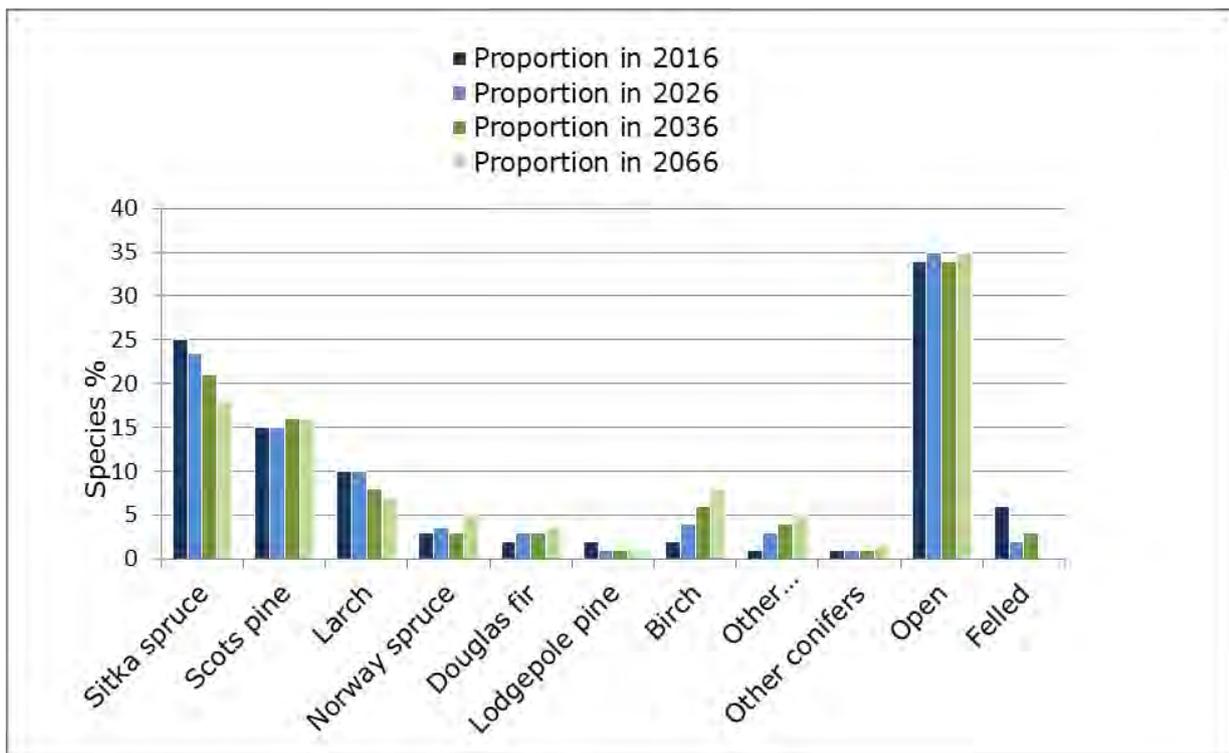
Further diversification will also be achieved through increasing the area of broadleaves, where this will allow the forest itself to surpass the 5% UKWAS threshold and also contribute to both national and forest district policy objectives, which are seeking to increase broadleaf tree cover from the current 8% of woodland cover to around 20% on the National Forest Estate. Commercial management will range from the production of birch, alder, willow, and/or aspen on wet sites for fuel wood (and quality timber, if possible), to the production of quality timber of oak and beech and other broadleaf species on drier and nutrient-richer sites. It is important to note that planting of large seeded broadleaves is acceptable in regards to red squirrels as the forest is not a red squirrel stronghold and also because there are currently only minimal existing linkages which could be advantageous for grey squirrels. Establishment of broadleaves will have multiple benefits which include production of timber and naturalisation of watercourses.

Restocking will be undertaken, or regeneration will be managed to achieve a spacing that will allow a commercial approach. This will usually be 2500 trees/Ha and in some cases higher depending on the objective of the stand and the condition of the local area.

The coupe located at Bruntwood Tap will be restocked with 30% of trees planted in clusters across the coupe. The objective will be to create natural woodland buffering the connection between the dense forest at the bottom and the open moorland at the top of the area. This will also be beneficial to improve the landscape. For the remaining open ground, natural regeneration will be expected to occur within the next 10 years. The site will be surveyed at this point and if no natural regeneration occurred, further plantation will be undertaken.

### 5.3 Species table

<b>Species</b>	<b>Proportion 2016 (%)</b>	<b>Projected proportion 2026 (%)</b>	<b>Projected proportion 2036 (%)</b>	<b>Projected proportion 2066 (%)</b>
<b>Sitka spruce</b>	25	23.5	21	18
<b>Scots pine</b>	15	15	16	16
<b>Larch</b>	10	10	8	7
<b>Norway spruce</b>	3	3.5	3	5
<b>Douglas fir</b>	2	3	3	3.5
<b>Lodgepole pine</b>	2	1	1	1
<b>Birch</b>	2	4	6	8
<b>Other broadleaves</b>	1	3	4	5
<b>Other conifers</b>	1	1	1	1.5
<b>Open</b>	34	35	34	35
<b>Felled</b>	6	2	3	-

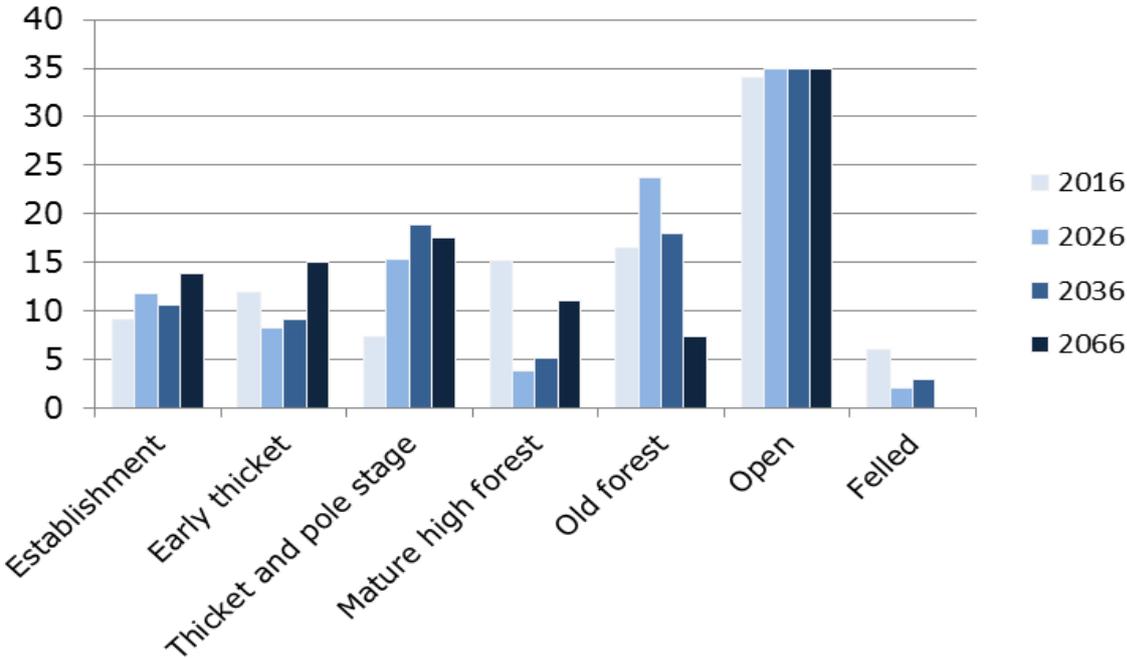


Regarding the figures above, we can see that the future management of the forest will tend to slightly diminish the proportion of two current main species in the site: Sitka spruce and Larch. This will be compensated by increasing the proportion of other species (Fir, Norway spruce, broadleaves or other conifers). This can be explained on one hand by the fact that a wide PAWS is going to be restocked with broadleaves as per guidance. Also, other inaccessible areas will be

restocked with patches of broadleaves: these areas are located too far from the forest road and harvesting operations are too costly to get a positive financial return. Therefore, the objective will not be to grow commercial crops for those areas in the future (see future species map). 30% of the area will be restocked which will be beneficial from a landscape point of view and will allow to have a transition between the lower existing woodland and the open ground at the top of the hill. We will expect to have natural regeneration growing over the remaining open ground. At year +10, these areas will be surveyed in order to assess the success of natural regeneration. Further plantation will be done over the remaining open ground. These figures also show that the objective of increasing diversity over the site is respected regarding the plan proposals.

### 5.4 Age class

<b>Age of Trees (years)</b>	<b>Successional Stage</b>	<b>Current distribution 2016 (%)</b>	<b>Projected distribution 2026 (%)</b>	<b>Projected distribution 2036 (%)</b>	<b>Projected distribution 2066 (%)</b>
<b>0 -10</b>	<i>Establishment</i>	9	12	11	14
<b>11 – 20</b>	<i>Early Thicket</i>	12	8	9	15
<b>21 – 40</b>	<i>Thicket &amp; Pole Stage</i>	7	15	19	18
<b>41 – 60</b>	<i>Mature High Forest</i>	15	4	5	11
<b>61+</b>	<i>Old Forest</i>	17	24	18	7
<b>Open</b>		34	35	35	35
<b>Felled</b>		6	2	3	-



Regarding the figures above, we can see that Bennachie is generally composed of old and mature forests. A lot of the trees in Bennachie have mainly been planted during the 40s / 50s. This will have a large impact on the management of the forest in the close future and particularly on the number of clearfells which will remain the same or might slightly increase. In compensation, these areas will be restocked with young trees after 4 years of fallow. This explains the rise of young trees from 2016 to 2066. This will also help diversifying the future age structure of the forest by felling and restocking gradually.



*Photo above: Mature forest of Sitka spruce and Douglas fir*

In regard of this, we can see that the establishment and thicket & pole stages are likely to increase within the next 20 years.

Most of the stands in Bennachie have already or are going to reach their maximum commercial value and are also likely to blow with the wind as the crops get taller. It will however take time to balance the age structure on the site. For many reasons it is not possible or correct to fell at once all the mature and old forest and replace them by young crops.

## 5.5 Native woodland expansion

We intend to expand the Oak woodland at Tilliefoure onto the adjacent Plantation on Ancient Woodland Site (PAWS). The oak selected will be of local provenance. The PAWS restoration will aim to create a native woodland mainly composed of oak, birch and some Scots pine. We will accept 10 % exotic tree species within these areas. The clearfells of non-native species located within the PAWS will continue. These operations will be done over the long term until the PAWS has been totally restored.

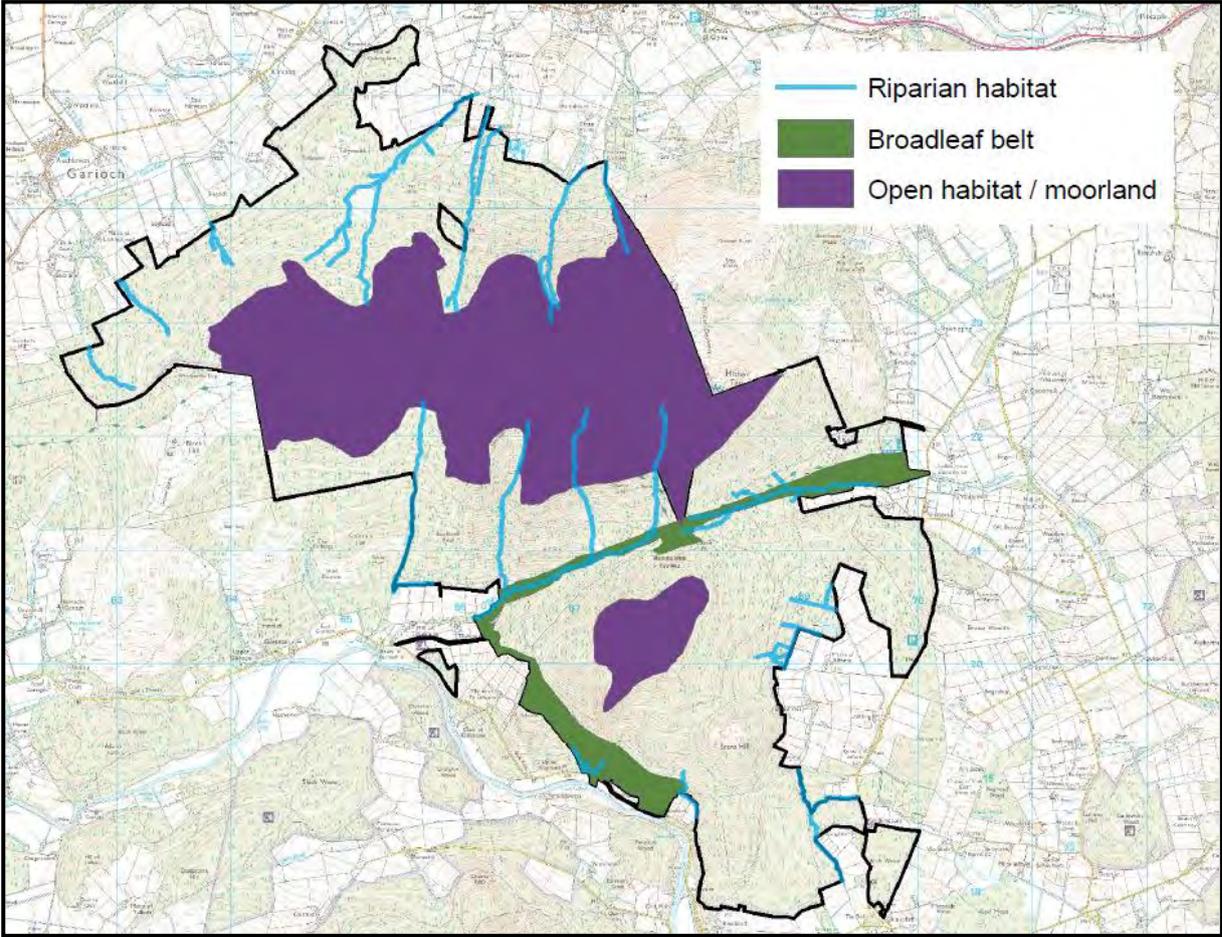
## 5.6 PAWS restoration

The PAWS restoration will aim to create native woodlands mainly composed of hardwood such as oaks and birch and native conifers such as Scots pines. All the clearfelled areas located in the PAWS will be restocked with native species. We

will accept 10 % exotic tree species within these areas once the PAWS will be totally restored. The clearfells of non-native species located within the PAWS will continue once they have reached their commercial value: this will be the case for the area of Sitka spruce planted in 1997 and located in the East of the PAWS for example. These operations will be done over the long term until the PAWS has been totally restored. For the restoration of those areas, we are following the Environmental guidance Note 1A (Management of Paws on the national forest estate in Scotland).

Over the plan period we will develop a broadleaf woodland belt linking the south west and east edge of the area going through the Birks and Clachie burns. This network will also aim to link the neighbouring broadleaf habitats including the SSSI (see map 10 below).

On the open hill, we plan to have a transition from heath to native woodland (Scots pine or upland birch woodland) and where possible we will retain these areas either as Natural Reserves or Minimum Intervention Areas (see map below / see management map for the natural reserves and Minimum intervention areas).



*Map 10: Main current and future habitat networks in Bennachie.*

## 5.7 Non-woodland habitats

### Heathland

The upland heath will be surveyed during this plan. The aim of this survey will be to: ascertain the condition of the heath habitat and species present; find out what monitoring regimes should be in place and develop a management plan for the area so that this priority habitat can be improved for its associated wildlife and maintained in future years.

### Open water, wetland and water courses

**The district will follow “Forest and Water Standard guidelines” during all operations** such as in path/road construction, planting site etc. the River Don runs close to this plan. We have two main pond sites at Bennachie and we will continue to record wildlife species and improve the wetland habitat at these ponds.

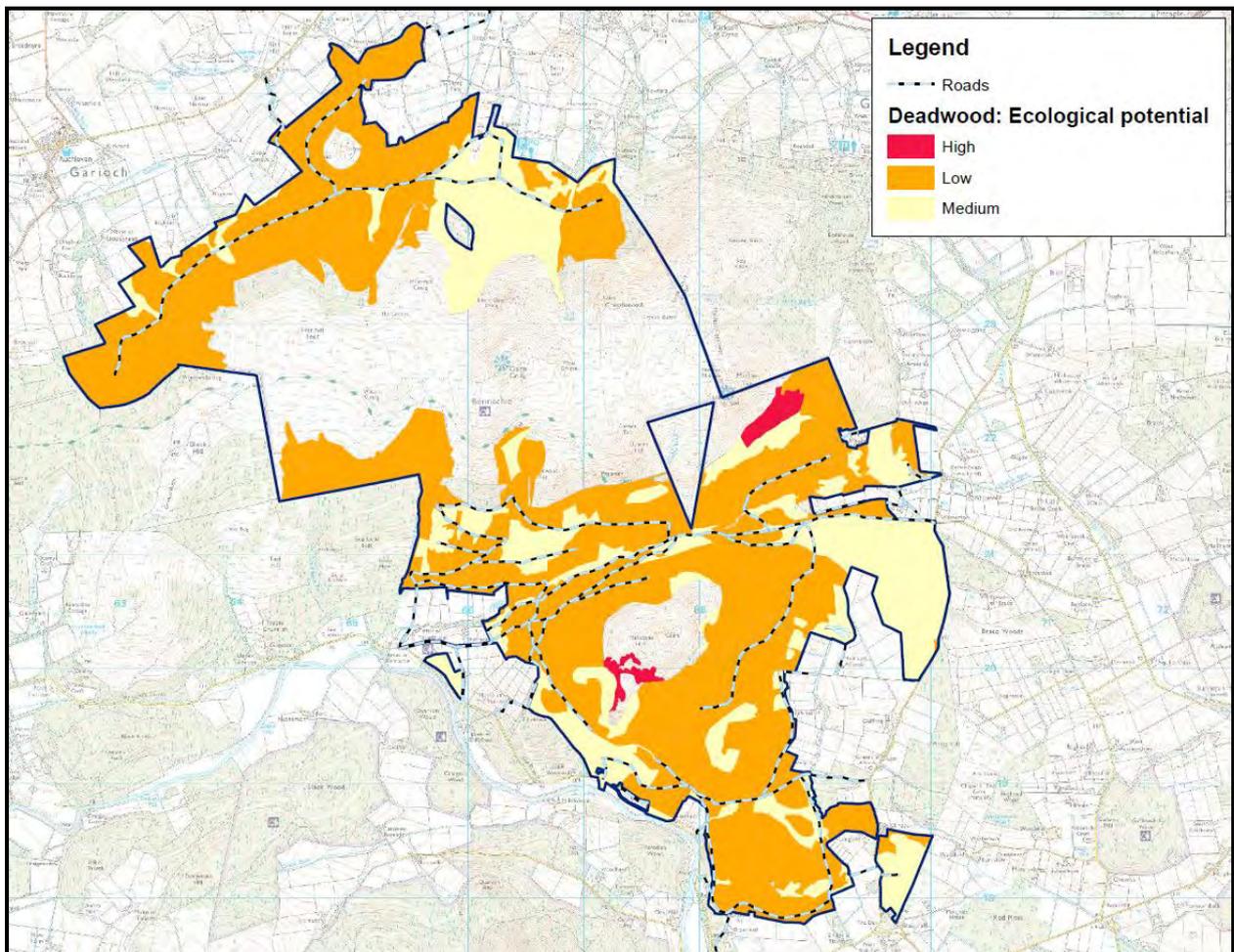
## 5.8 Management of open land

The open ground element required as part of the recreational infrastructure (paths, access tracks and the event site) will be monitored and maintained. In other areas successional vegetation will generally be accepted. The open land at the top of the hills mainly composed of heather will be maintained as it is a priority habitat (no particular management required). Natural colonisation of conifers within open ground will be managed if they are a threat to the integrity of priority habitat such as heath habitats.

Open ground will also be left around archaeology features following our Monument Management Plans.

## 5.9 Dead wood

Current analysis of the deadwood provision in Bennachie forest identifies that it is currently below the target of 20m<sup>3</sup>/ha across the woodland management unit. As per the local deadwood policy all deadwood and uneconomic windblow on high and medium sites (see map 11 below) will be retained where practical and safe to do so. On clearfell sites, the low 1 prescription will be applied to include the retention of one small stand of trees per 20ha. More detailed information on the provision of deadwood will be assessed and included in the work plan for each site regarding the map below (map 11).



High – Areas with high potential to retain dead wood such as natural reserve;

Medium – Areas with an intermediate potential to retain dead wood such as LISS areas;

Low – Areas with low potential to retain dead wood such as clearfells.

*Map 11: Dead wood, ecological potential in Bennachie.*

## 5.10 Species of interest

### *Rhododendron and Japanese Knot weed*

Within the plan area these species will be mapped. The plan is to eradicate rhododendron from the national forest estate and Japanese knotweed will be removed.

### *Selected Priority Species*

There is a wide range of guidance available when working with species and habitats, see Appendix 5, these will be followed within this plan and whilst undertaking forest operations. Forest Operations will be planned to ensure that these species are not put at risk, and where practical, work will be undertaken to encourage them.

### *Juniper*

The district intend to monitor and expand the juniper population on the hill (guidance will be sought on planting of juniper when heath survey commissioned).

### *Red squirrel*

The **district will continue to support Saving Scotland's red squirrels** ensuring no grey squirrels remain at Bennachie. The district will improve the habitat to sustain viable populations of red squirrel such as creating uneven age stands of conifers and adopting continuous cover forestry where possible.

### *Raptors*

The district will continue to work with Royal Society for the Protection of Birds (RSPB) and North East Raptor group (NERG) to secure breeding populations and where possible safeguard habitat.

## 5.11 Heritage

### Scheduled Monuments (SM)

There are no separate Monument Management Plans for sites. Over this plan there are no specific management requirements. Scheduled Monument approval will be obtained from Historic Environment Scotland prior to any potential disturbing/damaging works. SM are monitored yearly/5 yearly and work undertaken where necessary.

### Unscheduled Monuments

**Staff will consult relevant information sources (following "Identifying the historic environment in Scotland's forests and woodlands")** and carry out archaeological surveys as part of the coupe check process to identify heritage features, recording and preserving as required.

Staff will continue to work with Bailies of Bennachie and Aberdeen University **researching "Bennachie Colony" and produce a conservation priorities schedule** for the Bennachie Colony houses.

## 5.12 Deer management

All deer management will be carried out in accordance with OGB 5 - Deer management. Our 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 deer density level of 5 to 7 deer per 100 hectares. Furthermore, the district is currently working on a new deer management strategy plan in order to help deciding what will be the best way to protect restock sites from browsing.

Deer cull plans are prepared for each Deer Management Unit and are the monitored by the Wildlife Ranger Manager.

A deer fence might be required when planting palatable species such as in the PAWS areas. High levels of public use can modify and limit deer grazing/browsing behaviour so fencing is not required in all cases. The necessity of using fences to protect the restock areas will be decided and discussed between the FM Forester and the Wildlife Ranger Manager at a work plan stage.

Fences might have a short term impact on the landscape and access to restock areas as they will be kept until the woodland is established (usually a period of 10 years). However, by planting trees the landscape will be improved in the long term as well as the benefits that woodlands provide to the public.

### 5.13 Access

There are no additional access issues that need to be addressed in the period of this plan.

### 5.14 Pathogens

#### ***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 this valuable young crop. However, on clear-fells 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 on sites identified for monitoring in May and August or both depending on the felling year.

#### ***Dothistroma Needle Blight (DNB)***

Dothistroma Needle Blight will be addressed differently according to the level of current infection in the crop. The severity of infection and crop symptoms produced range from the dropping of a couple of yield classes to high levels of mortality within the stand. The level of mortality is the key concern as once dead the integrity of the tree quickly deteriorates to a state where it cannot successfully

be harvested. Categorisation of infected crop will allow us to prioritise the harvesting of such areas.

The following scale and categorisation has been agreed upon:		Mortality (%)		
Needle retention (years)	Defoliation (%)	<20	20-40	>40
>2.25	0-25	1	2	4
1.51-2.25	26-50	2	3	4
0.76-1.50	51-75	3	4	4
<0.75	>75	3	4	4

From this the priorities for felling are as follows:

**Highest: Category 4** - Once crops reach category 4 there is a marked reduction of marketable products.

**Medium: Category 3** - Category 3 still produce high proportion of timber before its value drops significantly.

**Low: Categories 2 and below** - Once the higher level infection crops have been addresses the prioritisation will move to the lower classes taking into account factors such as rate of infection, area felled already etc.

This has led to the following action plan for dealing with DNB infection:

- Prioritise infected areas to be felled by swapping felling coupes of non-infected crops in the current program.
- Include into thinning operations the felling of any infected crops within the area to minimise costs. Amendments to the forest design plan will be required as specified in the tolerance table for felling such areas.
- Reassess badly affect blocks and consider if a full review is required.
- Due to the moratorium on planting CP and LP on all sites and SP on previously infected areas, plus a 500m buffer zone, planting programs will need to be amended to include replacement species suitable for the site.

There is no area which will be felled for DNB issues during the plan period. However, this could change in the future depending on the DNB survey results.

## ***Phytophthora ramorum***

Any infection of *Phytophthora ramorum* is of relevance to the continued management of the forest, but Larch infection is of particular concern due to the wide scale outbreak in south Scotland. Protocols are in place if there was an outbreak for the removal of infected species and for alternatives for restocking. Any suspicions of outbreak need to be reported immediately: [treehealthscotland@forestry.gsi.gov.uk](mailto:treehealthscotland@forestry.gsi.gov.uk). No infection has been detected in Bennachie until now.

### 5.15 Critical Success Factors

Careful consideration has and will be given to the impact of forest operations on the landscape;

Careful consideration has and will be given to the impact of forest operations along the high recreation areas;

Continue with an active thinning programme to ensure the ongoing success of the LISS areas as described in this plan;

Management of the LISS regeneration will be used to achieve greater species diversity;

Species and structural diversity will be expanded to increase forest resilience;

The current recreational infrastructure will be maintained;

The guidelines in relation to DNB with heavy thinning and LP removal being priority actions will be followed;

React positively to any disease impacts; seek to use any dramatic change in forest structure to deliver un-anticipated benefits. For example open transient views and greater species/structural diversity.

# Appendices

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## Appendix 1 – Consultation record

Statutory Consultee	
SNH – Contacted on 11/2015 – No Reply to date	
RSPB – Contacted on 11/2015	
<p><b>Issue raised:</b></p> <p>Thank you for consulting RSPB Scotland on the preparation of the above plan. As you are likely aware, the main ornithological interests within the forest are specially protected breeding raptors. Care must be taken, during forestry operations, to minimise disturbance to these birds whilst they are nesting.</p> <p>We are keen to see restoration of the PAWS, as this would be of great benefit to the area's biodiversity, particularly as they are located in close proximity to existing natural woodland. This would also improve the amenity value of the land, given the location at one of the main entrances to the forest. Maintaining areas of open ground will also benefit biodiversity and the amenity value of the site.</p>	<p><b>Forest district response:</b></p> <p>The presence and life cycle of raptors is taken into account in the LMP and in the timing of forest operations in order to minimise disturbance to these birds whilst they are nesting.</p> <p>The PAWS restoration will be done in collaboration with our environmental team (see 3.3 for further details).</p>
Aberdeenshire Council – Contacted on 11/2015	
<p><b>Issue raised:</b></p> <p>As you have identified Bennachie is a very important area in terms of landscape, recreation and the historic built and natural environment.</p> <p>1- Bennachie has been identified as a Local Nature Conservation Site (LNCS) by Aberdeenshire Council. LNCS are considered to be of regional importance for either biodiversity or geodiversity, or both.</p> <p>2- The suite of tors forming the various summits of Bennachie are amongst the most impressive to be found in Scotland east of the high Cairngorms. The most prominent hill, Mither Tap which is topped by an Iron Age fort. Also of geological importance is the presence of Macaulayite, a red earthy monoclinic mineral which occurs in a quarry at the foot of Bennachie.</p> <p>3- There is a number of habitats of high environmental value in Bennachie including a rich diversity of woodland plants.</p> <p>4- There is a wide diversity of species in Bennachie including invertebrate and birds such as the narrow bee hawk moth.</p> <p>5- The production of high quality timber production is listed as a secondary</p>	<p><b>Forest district response:</b></p> <p>1- The environmental interests of the site is considered carefully when reviewing the plan or during forest operations. Our environment team is implied in each process of planning and forest operations to give further advice concerning biodiversity and environment. Also, the works undertaken FCS are all done regarding the UK Forestry Standards Guidelines.</p> <p>2- The landscape in Bennachie will be considered carefully and the plan will be done in collaboration with a FCS landscape architect. Significant historic environment features will be protected and managed following the UKFS Forests and historic environment guidelines (2011), the FCS policy document <b>Scotland's Woodlands and the Historic Environment (2008)</b> and the supporting FES Historic Environment Planning Guidelines. The Macaulayite is not located in FCS lands.</p> <p>3-4- See 1</p> <p>5- The land management plan covers the next 10 years. The best areas for</p>

objective of the Land Management Plan after recreation, environment and increasing the broadleaf resource. It is not clear what area of the land needs to be under non-native conifers to achieve this objective so it would be useful if the Land Management Plan could state this and then identify the most productive but least environmentally sensitive areas of land for this purpose. The focus on the future management of other areas could then perhaps be shifted to the restoration of a more natural, but productive woodland, including open habitats where appropriate.

6-Much of the land fringing the open heathland on Bennachie and Millstone Hill is currently under non-native conifers. Some of these areas were probably heathland before being planted but most of the natural vegetation has been lost under the dense shade of Sitka spruce and other non-native conifers. The planted conifers are seeding into the heathland and if allowed to establish in any number, will gradually lead to a change in the soil characteristics and vegetation of these heathland habitats. **The replacement planting of native species such as Scot's pine, oak, birch, rowan and hazel** in these compartments adjacent to the heathland would create a more open woodland structure and whilst allowing some timber production, and may allow a more natural ground flora to re-establish.

For this reason it is a bit disappointing to see the proposal to plant sitka spruce in a compartment adjacent to the heathland on Millstone Hill (NJ673206) and on Bennachie at NJ658218. The more rotations of non-native conifers on this land, the less likely it is that the semi-natural ground flora will be able to re-establish.

The planting of mixed broadleaves on parts of the site are welcomed but there is little detail of the species to be used. As well as the oak and birch mentioned, a diversity of other broadleaved species including hazel, aspen and willow as appropriate would help to diversify the woodlands on Bennachie.

7-The intention to restore the PAWS adjacent to Tilliefoure SSSI is welcomed and this will create a connected stretch of semi-natural broadleaved woodland along the upper banks of this section of the River Don. There are few details of the species mix and spacing of trees to be planted, but it is assumed that they will reflect the mix of the more natural parts of the adjacent native woodlands. A stretch of this site, immediately adjacent to Tillifoure SSSI is currently under Norway spruce and it is not clear what the future plans are for this area, or why there is a proposal to plant larch in **with the Scot's pine in one small area of this woodland.**

growing broadleaves have been identified and will be restocked with broadleaves (see restock map). Also, PAWS and habitat network areas have been identified on the maps and in the text of this plan where broadleaves will be planted. However, productivity is still considered even in native woodland.

6-Alternative species to sitka spruce will be planted when appropriate (and productive) and if the site conditions are suitable for other species. Balance between timber production and environment have to be considered when the species to restock are chosen.

7-Further details have been added to the restock map and shows the details of the species which will be planted in the PAWS. Details about the future management of the PAWS have also been added to the plan (see section 5.6).

<b>SEPA</b> – Contacted on 11/2015 – See Appendix 2	
<b>Issue raised:</b>  See Appendix 2	<b>Forest district response:</b>  We follow the UK Forestry standards guideline for water in order to protect and conserve the water resource in and around the site.
<b>Historic Scotland and Aberdeen Council (Infrastructure service)</b> - Contacted on 11/2015	
<b>Issue raised:</b>  Bennachie contains several archaeological sites that are recognised as being of national importance and are designated as a scheduled monument under the Ancient Monuments and Archaeological Areas Act 1979.  In addition to the Scheduled Monuments noted on the location and key features plan, there are a significant number of undesignated archaeological sites within the management plan area.	<b>Forest district response:</b>  We will follow the UK Forestry Standards Guidelines and the Scheduled Monument Management Plan in order to conserve the monument present in the site.
<b>CONFOR</b> – Contacted on 11/2015	
<b>Issue raised:</b>  I hope you will plan for the greatest possible amount of productive conifer at Bennachie, and I look forward to further detail in due course.	<b>Forest district response:</b>  We will continue to produce a high quality timber in Bennachie.
<b>Bennachie Community Council</b> – Contacted on 11/2015 - No reply to date	
<b>Kemnay Community Council</b> – Contacted on 11/2015	
<b>Issue raised:</b>  We received your letter seeking views from the community about the current plan for Bennachie, and we are happy to contribute.	<b>Forest district response:</b>  Response sent with more details concerning the consultation objectives – No other Reply to date.
<b>Member of Kemnay Community Council</b> – Contacted on 11/2015	
<b>Issue raised:</b>  My main connection with Bennachie is walking up Millstone Hill most Sundays for the last 25 years or so!  Therefore one of my interests would be how the paths are maintained and how the different users share the paths eg walkers runners, cyclists, dogs and children. At the moment there are not too many mountain bikes for it to be much of a problem but it could be if there were greater numbers.	<b>Forest district response:</b>  Forest Enterprise Scotland invests each year in maintenance of recreational facilities around Bennachie. The condition of the official paths is checked at least once a year and every 3 - 4 months for the most frequently used.  There is however no doubt that mountain biking in particular has grown in popularity over the past few years and the Bennachie trails do see some impact of this. While we continue to accommodate this form of access we

	do try to steer mountain bikers to Pitfichie where we had previously invested in specific facilities for them. We will continue to maintain Mountain bike trails at Pitfichie but we are also working with MTB groups in the north east to try and develop a more significant MTB centre.
<b>Donside Community Council</b> – Contacted on 11/2015 – No reply to date	
<b>Cluny, Midmar and Monymusk Community Centre</b> – Contacted on 11/2015	
<b>Issue raised:</b>	<b>Forest district response:</b>
<p>I refer to your email to Hugh Falconer.</p> <p>1-I think it would be a good idea to show the FCS roadway system on the plan as well as the pedestrian paths.</p> <p>2-In the key, it is not explained what DNB means. I presume it refers to the areas of pine which are affected by needle blight.</p> <p>3- Neither of the SSSIs shown on the plan belongs to FCS. They should not be on the plan and therefore I think they should be removed.</p>	<p>1-The roads and the paths are shown on the key feature map.</p> <p>2-DNB has been defined in the core of the LMP text.</p> <p>3-The SSSI is directly located along the site. Therefore, the connection between Bennachie woodland, the neighbourhood woodlands and their designation should be fully considered.</p>
<b>The Bennachie Centre</b> – Contacted on 11/2015	
We are keen to welcome the public consultation for the LMP.	
<b>SSE</b> – Contacted on 11/2015	
No issue raised	
<b>BHS</b> – Contacted on 11/2015	
<b>Issue raised:</b>	<b>Forest district response:</b>
<p>There are a number of horse owners around the hill. These people and their liveries use a number of tracks on a regular basis. There are a lot of rides and tracks in and around Bennachie. One of them is the Gordon way walking route.</p>	<p>We will continue to monitor and maintain the track network in Bennachie the site in order to procure a great outdoor experience for their users. LISS is also undertaken when possible around official tracks.</p>
<b>The Bailies of Bennachie</b> – Contacted on 11/2015	
<b>Issue raised:</b>	<b>Forest district response:</b>
<p>1-One of the attractions of the forest on Bennachie is that it is varied - not all dense and dark like some other Aberdeenshire forestry areas. Also many paths retain a little used aspect which appeals to experienced walkers who do not like the man-made paths.</p> <p>2-Shame about the Sitka spruce</p> <p>3-Want to see more native woodlands</p>	<p>The main objective of the plan is to maintain the recreation value of the site and its management will aim to rich this objective. The objective is also to maintain / increase the high environmental value of the site encouraging tree species and habitat diversity and to increase the broadleaf resource. Where appropriate, broadleaves will be planted, as well as alternative species to Sitka spruce and the PAWS will be completely restored</p>

<p>4-To ensure that commercial interests are met whilst protecting year round access for other users to as many points as possible, which must be difficult. Sympathetic replanting in consultation with other local interest groups (such as Bailies) to ensure future regeneration protects the environment and wildlife. Minimise unsightly areas of brash and operational scarring e.g. Shepherds Lodge area.</p> <p>5-The Forestry Commission was set up as a strategic defence force to produce timber in case of wartime shortage. Presumably, that reason is no longer relevant. Production of high quality timber of species once dominant on the hill - oak, birch, hazel, limited scots pine etc. - might be appropriate for particular zones. The hill was a resource base for all of the local communities surrounding the hill before being enclosed with parliamentary consent as a result of 'enlightenment' thinking garnished with the codification of capitalist ideology during the 18th and 19th centuries. Quality timber aimed at regenerating local, small-scale, craft-based industries might help to address some of the iniquities of the past. Running it as a high-output, timber-producing tourist destination alone, covering it with hardcore path scars and charging car park fees for the privilege is a disgrace to its heritage.</p> <p>6-As a well visited site it would be good to run as an example of well managed ecosystem. Good to see more areas managed for biodiversity.</p> <p>7-Comprehensive network of paths used by walkers, cyclists, horseriders and dog walkers. Important historical features and buildings. Viewpoints across the whole of Aberdeenshire. A safe forest environment for children and other groups to learn about nature. Bennachie Centre providing information and a meeting point - should be open as much as possible.</p> <p>8-Bennachie is designated a Local Nature Conservation Site (LNCS) by Aberdeenshire Council, we therefore suggest that the land management plan should not only recognise this status but also work with the Council to set more ambitious targets for biodiversity in the LNCS; we would also urge a careful balance between recreational development and biodiversity in the LNCS.</p> <p>9-Bennachie lies within one of the new Special Landscape Areas proposed by Aberdeenshire Council. It is an iconic landscape, important to the Aberdeenshire landscape identity, as instantly recognisable with both locals and visitors now and in the future. The expectation is that SLA status will support positive appropriate management of the landscape but discourage inappropriate developments in the landscape.</p> <p>10-Overall it is quite difficult to grasp the long term vision for Bennachie in the draft plan, it is kind of there but is not explicit and hidden amongst the commitments to 'LISS' (this needs to be defined earlier in the text for</p>	<p>with native woodland in the long term. However, the plan also aims to grow high quality timber where appropriate. Heritage features and landscape are also considered in the plan (see section 3.5 and 3.6).</p> <p>The public consultation</p> <p>Suggestions and comments about recreation issues have been transmitted to our recreation team.</p> <p><b>8-One of the main objectives of the plan is to "Maintain / increase the high environmental value of the site encouraging tree species and habitat diversity". Bennachie is therefore considered as a site where tree diversity is encouraged whilst increasing the broadleaf resource; this has been highlighted in several parts of the plan. Within the plan period conifer crops are going to be replaced by broadleaves and other species than Sitka spruce to increase biodiversity. Some species also have a special value regarding FCS policies: guidance is also systematically followed whilst undertaking forest works. This helps to protect and respect the species ecology and cycles (raptor's breeding cycles for example).</b> As the LNCS is a council initiative, we would also suggest that the Bailies raise their concern with them.</p> <p>9-As mentioned in the plan, the primary objective for this plan is to maintain the quality of the site for recreation including an appropriate landscape management. The plan is drawn up in collaboration with the FES landscape</p>
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the reader along with other acronymns). The plan still appears to be a forestry plan rather than a 'land management plan'

11-In the District Strategic Plan for Moray and Aberdeenshire; Bennachie is noted as "block with high environmental potential by creating functional habitat networks"; we are not clear in the plan where these networks are and what are the long term visions for biodiversity and wildlife in the area? The biodiversity actions are not clear within this draft plan. Perhaps this is now an opportunity to work with the Baillies and other landowners on the hill to produce a biodiversity plan for the whole of the hill - would FE be willing instigate this plan? In the species section there is no mention of pine marten and wild cat - there are other species. North East Scotland Biological Record Centre could run a check.

12-We would like to see more native woodland on the hill retained and expanded and more native open woodland by the burns. We would like to see this connecting with other neighboring woodland. We welcome the planned expansion of the oak woodland at Tilliefoure. The proportion of broadleaves stated in the table on page 21 is less than 5%, this is very low given the secondary objectives on page 8 about increasing the broadleaf resource and increasing the high environmental value. In some areas the broadleaves planted in tree shelters have not been looked after and spruce is regenerating around them, can these areas be managed?

13-We would like to see areas that are left for wildlife and not for people access, both within the woodland and on the open hill. Please could you let us know what is the FE plans on the regenerating exotic trees such as spruce/lodgepole pine on the open heathland - are these trees to be gradually removed? What is FE policy on removal of invasive e.g rhododendron. We are concerned that there appears to be a lot of clear fell in phase 1 of the draft plan( next five years) small areas of which are Scots pine. How much timber is Bennachie to generate each year i.e. how many hectares need to be cut/thinned? We greatly appreciate the fact that FE have allowed us informally to manage certain areas of woodland such as "The Widdie" and now the new site close to Shepherd's Lodge in which we can plant a variety of native tree species. Please note that the Baillies of Bennachie received funding as part of the Natural Bennachie Project to analyse the peat deposits on the hill. This work was carried out by Dr Ed Schofield, Aberdeen University between Oxen Craig and Mither tap the peat is approx. 4.75m depth which is a great plant archive (please see attached report).

14-Recreation trails - the Baillies hope that FE continue to maintain the paths on the hill. We are glad to see that the district are improving the

architect in order to minimise the impact of the coupes and improve the landscape.

10-The land management objectives are clearly set out in section 1.3 of the draft plan which allows us to define the long term vision for Bennachie. Further information is given about the future evolution of the forest within section 5 (land management proposals). Furthermore, a LISS map and prescriptions have been added to the plan as well as an article giving the definition of what is LISS in details.

11-More information has been added to the plan concerning habitat networks and biodiversity. The environmental team has been highly involved into the land management plan process in order to consider as much as possible the biodiversity and its management in the site.

12-The objective of the plan is to encourage diversity and increase the broadleaf resource. The plan aims to increase the broadleaf resource in the future. The figure page 8 in the plan is a figure representative of the current broadleaf resource and not the one expected in the future. Table in section 5.3 species table shows the current broadleaf figure of 3% is due to rise to 7% by 2026, 10% by 2036 and 21% by 2066 (figure added to the new draft which will be available for last consultation within the next weeks). These are ambitious targets over such a short period when seen in the context of a full crop rotation period of approx. 60 years. The new broadleaf areas are to be large with the ultimate aim of being productive, to a greater or lesser degree. This should mean that the previous problems of managing small scattered areas of BL are negated. Native woodlands are systematically planted along watercourses where applicable as it is part of the UK Woodland Assurance Standards (UKWAS).

13-There are already several areas which will be left for wildlife in Bennachie (Long term retention, natural reserve, open habitat and minimum intervention areas). Sitka spruce regeneration has already been removed along sensitive areas such as watercourses (along Birks Burn for example). If an exotic species is spreading over a priority habitat, our environmental team will aim to diminish the threat by removing its propagation when applicable. Rhododendron surveys are frequently undertaken in the district. Actions can be undertaken if necessary and applicable to remove rhododendron in some areas. The area of Clearfell for the life span of the plan is specified in page 3 in the draft plan. The thinning area covers approximately 150 ha per year. There are also needs to be a degree of felling to allow the ambitious targets to increase the proportion of broadleaves across the plan area in a reasonable time period. Also, one of the secondary objectives stated in section 1.3 is the production of high quality timber.

<p>paths on the hill, notably the Oxen Craig path. We are happy to work with FE and our monthly voluntary work parties are a testimony to this. We would still like to see the Gordon Way maintained as most of this is actually on FE ground. In wet areas we would like to see the use of stepping stones so that the water in these area is not impeded. We do feel that there should be a working group of all the landowners on the hill to look at the trails on the hill as there are recreation issues e.g the path near to Mither tap is spreading out - this is on the land previously owned by Pittodrie Estate (now owned by Macdonald Hotel) and the turnpike trail is not maintained. Does FE have any intentions to monitor/count the number of visitors to different parts of the hill over the plan period as there are no up to date visitor figures? We assume that over this 10 year plan that the way marking system on the hill will be done again and we would welcome discussions with FE when this takes place. We would also be willing to help with any interpretation/publications about/ on the hill.</p> <p>15-Archeology - the Bailies and Aberdeen University have been studying the archeology on the hill. In recent years, we have been investigating and studying some of "the colony" houses. We have in the past worked with FE staff to produce a management plan for these colony houses so that these building are safeguarded for future generations. We hope that we can continue to be involved in these plans and any interpretation work that is carried out on these houses, as we have now collected a lot of information about these sites which we can and do share with FE through our Bennachie Landscapes Project. We are pleased that FE recently funded LI-DAR work on the hill and over the next few years we hope to undertake more archeological research on the hill and will continue to liaise with district staff, Matt Ritchie and Historic Environment Scotland.</p>	<p>This means that crops of timber need to be felled as they reach maturity and before they start to become windblown, when a lot of their value is lost as operations become more dangerous and costly. However, thinning <b>coupes are surveyed each year and all coupes which are "thinnable" will be</b> thinned consequently on a 5 to 10 years basis in Bennachie. Therefore, the area thinned in the forest will depend on the results of each year survey.</p> <p>14-Bennachie is recognised in the district strategic plan as a block where we plan to maintain the visitor experience as it is one of the district sites with the highest value for public recreation, including access for all abilities. The LMP strategically highlights this objective but the detail of how it is implemented on the ground is beyond the scope of this plan. Please, refer to recreation team to discuss specific areas of interest.</p> <p>15-Management and maintenance of heritage features is highlighted in the table in section 4.1 as an objective for the new LMP.</p>
<p><b>Scottish Wildlife Trust – Contacted on 11/2015</b></p>	
<p><b>Issue raised:</b></p> <p>1-We very much welcome the chance to offer comments on this Management Plan. Initially we were unsure whether we could produce comments within your time frame but we have now discussed the plan and so are pleased to comment as below.</p> <p>2-The area covered by the Management Plan is of crucial importance for the conservation and appreciation of wildlife in NE Scotland. Not only is it a very extensive area of forestry and semi-natural upland grass/heath, but the area is so well visited by the public that it is an ideal opportunity for wildlife to be presented and interpreted. It follows that we regard the area as of great importance.</p> <p>3-Nevertheless, it must be said that the forested part of the Management</p>	<p><b>Forest district response:</b></p> <p>1-No response required.</p> <p>2-Recreation and environmental value have been indeed high-lighted in the objectives of the plan.</p> <p>3-Indeed, FCS focuses more on the environmental value of the woodlands</p>

<p>Zone is actually rather poor for wildlife, compared with other nearby sites such as the Bin Forest. We believe that this is because of the historical management of the plantations and so we greatly welcome the current proposals for a more enlightened approach to forest management. We are excited by the prospect offered by the new approach and congratulate you on this.</p> <p>4-We note that some areas, such as those near the various Visitor Centres at Donview, Bennachie Centre and Rowan-tree Carpark are already more varied and interesting than the main forest blocks and we are encouraged by this.</p> <p>5-The upland grass/heath seems to need little active management and so we do not wish to comment further on this.</p> <p>6-We consider that in the forest area there are too few open areas; with too little diversity in the species making up the tree crop; that the trees are frequently too densely spaced and shady; that the trees encroach too closely on both ride-sides and stream valleys; and that important areas such as the PAWS have until recently been too little considered. We note that all these aspects are now subject to welcome change.</p> <p>7-We wish to encourage you to diversify the crop species used and hope that your extraction and then re-planting activities can be made more extensive than the previous intensive approach.</p> <p>8-We wish to encourage you to increase the extent of locally-native broad-leaved trees and shrubs present, as outlined in your plans.</p> <p>9-In particular we welcome your proposals to enhance the PAWS area near the Donview Centre. We note that you are already encouraging natural birch regeneration and we hope that your other plans for this area come to fruition. Not only is this a particularly interesting area for wildlife but it has easy visitor access and it abuts an adjacent oakwood SSSI.</p> <p>10-We note that you intend to improve the many stream valleys by following the Forest/Water guidelines. Currently many of these are heavily encroached by conifers and so we very much welcome your plans and hope that you can be generous in your adoption of these guidelines, and can include open grassland areas around the main streams.</p> <p>11-We are particularly concerned that much of the current paucity of wildlife is associated with the ways that rides and ride junctions are managed. In many cases the tree crop is very close to the rides, so that they are shaded and have no fringe of grassland, scrub and native trees. Butterflies are often a good indicator of areas where rides are being sympathetically managed and even common species are very rare and localised at Bennachie and so far the rapidly expanding Scotch Argus, Speckled Wood and</p>	<p>than in the past and the plan follows the current policies.</p> <p>4-No response required.</p> <p>5-No response required.</p> <p>6-No response required.</p> <p>7-Diversification is one of the main objectives of the plan. There, we intend to follow this direction for the Bennachie forest.</p> <p>8-No response required.</p> <p>9-No response required.</p> <p>10-Conifers removal actions have been undertaken in Bennachie along the streams and we will continue to do this when possible. Also, when restocking a riparian area, 50% open space is left in order to encourage habitat diversity along streams (as per UKWAS guidance).</p> <p>11-When restocking a site, a buffer zone varying from 5 to 10 meters width along roads and tracks will be left open depending on the width of the track/road.</p>
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<p>Ringlet have made little headway here. Ride junctions are particularly important, in that they offer scope for larger grassy and scrubby areas, and rides which, if opened up more, would have a southerly aspect and so a warm micro-climate are also priority areas. Your own Bin Forest offers an excellent local example of what is possible.</p> <p>12-I hope that you can see that we very much welcome your new Plan and that most of what we wish to encourage is already clearly indicated in your proposals. Thank you for the opportunity to comment.</p>	<p>12-No response required.</p>
<p><b>Grampian orienteers</b> – Contacted on 11/2015 – No reply to date</p>	
<p><b>Forbes Estate</b> – Contacted on 11/2015 – No reply to date</p>	
<p><b>Pittodrie Estate</b> – Contacted on 11/2015 – No reply to date</p>	
<p><b>Fountain Forestry</b> – Contacted on 11/2015 – No reply to date</p>	
<p><b>North East Mountain Trust</b> – Contacted on 11/2015</p>	
<p><b>Issue raised:</b></p> <p>1-EMT strongly supports the primary aim of maintaining the area for recreation (page 8). It is essential to bear this in mind whenever commercial decisions regarding forestry are taken.</p> <p>2-Furthermore, we fully support the secondary aims quoted in the plan.</p> <p>3-NEMT was particularly pleased to see the emphasis on 1) extending the diversity of tree species to include more broad leaf and native trees and 2) the proposed reduction in the use of clear felling in favour of the increased use of Low Impact Silviculture Systems.</p> <p>4-Within the context of maintaining commercial forestry on the hill, NEMT supports 1) the restoration of native species on the Plantation of Ancient Woodland Sites (PAWS) and 2) the use of supplementary planting where natural regeneration is proving problematic. In respect of this, while it is recognised that fencing is sometimes necessary, it should be used only where it is unavoidable because of its intrusive visual detriment.</p> <p>5-While we note that clear felling does have some subsequent benefits for wildlife, the areas of clear felling which have taken place around the Mither Tap in recent years have left 'industrial wastelands' which lessen people's experience of time 'away from civilisation'. Areas adjacent to existing paths should be should not be clear felled. Where clear felling takes place then replanting should take place as soon as it is feasible to do so. We suggest that moves to reduce the extent and visual impact of clear felling in favour of LISS should be actively publicised and would engender widespread public support.</p> <p>6-It is suggested that roads may need to be created for felling in certain areas. While NEMT notes the cost issue of extraction without building roads in these places, we are opposed to road construction as it further 'industri-</p>	<p><b>Forest district response:</b></p> <p>1-No response required.</p> <p>2-No response required.</p> <p>3-No response required.</p> <p>4-Deer fences are used where necessary. When fencing is not considered as required it will be avoided. Fencing is a permanent system used to establish woodlands. Therefore, the fences are usually removed after a 10 year period.</p> <p>5-The area clearfelled around the Mither Tap was infected by DNB. This had therefore to be done as explained in the plan. LISS will be encouraged along tracks/high recreation areas/wherever possible when applicable. Depending on the site conditions, LISS is not always applicable. Replanting after clearfelling is done after a period of 4 years to avoid pests damage (Hylobius, a beetle highly active in the remaining stumps for a period of approximatively 4 years and which can highly infect new plantations).</p> <p>6-No new roads have been planned for the plan period. However, if the necessity of a new road is needed for commercial purposes, this might become a future project.</p>

<p>alises the hill'.  7-It is noted that the paths will be monitored and maintained. The paths do get heavy use but the granite surfacing of the tracks upgraded on the 'Bennachie Plateau' a few years ago has made them very visible. It is important that maintenance of paths is 'low touch, as necessary only'. Contractors working on hill paths have a tendency to over-engineer, making paths more visibly intrusive than is necessary.</p>	<p>7-There is no plan at the moment to upgrade paths in Bennachie. Maintenance is the only operation undertaken.   NB: Some comments received from NEMT do not appear in this plan as they are not related to the plan. However, the information has been transferred to appropriate staff.</p>
<p><b>Bennachie Centre trust</b> – Contacted on 11/2015 – No reply to date</p>	
<p><b>Bennachie Access team</b> – Contacted on 11/2015 – No reply to date</p>	
<p><b>Permit holders</b> – Contacted on 11/2015 – No reply to date</p>	

## Appendix 2 – Response from SEPA

Antoine Le Pretre  
Forestry Commission Scotland  
Moray and Aberdeenshire Forest District  
Portsoy Road  
Huntly  
AB54 4SJ

If telephoning ask for:  
Alison Wilson

22 December 2015

By email only to: [antoine.lepretre@forestry.gov.co.uk](mailto:antoine.lepretre@forestry.gov.co.uk)

Dear Mr Le Pretre

Preparation of the Bennachie Land Management Plan

Thank you for consulting SEPA for scoping advice for the above land management plan by way of your e-mail, which we received on 26 November 2015. Good forest plans can help deliver multiple benefits for people, the environment and the Scottish economy. We welcome this opportunity to assist in your preparation of this plan.

We advise that you address the following issues. We would welcome the opportunity to provide advice on the draft plan to ensure that all issues within our remit have been addressed prior to the formal submission of the plan for consultation.

General issues

Your plan should include a clear analysis of the environmental risks of the proposals accompanied by information on how they will be addressed and, where necessary, mitigated. For example, it should show on maps of 1:2,500 scale or more detailed, areas of peat greater than 50cm, watercourses, lochs and wetlands, and setback of planting and infrastructure from these.

The advice on our website should be referred to. General advice on forestry in relation to our interests can be found on the [Forestry](#) page of our website. RBMP information may be found on the [RBMP information sources](#) page. Other information is identified in the sections below.

Flood risk

We have reviewed the information supplied with this consultation and we note that part of the plan area in the South near to Lower Woodend lies adjacent to the medium likelihood (0.5% annual probability or 1 in 200 year) flood extent of the SEPA Flood Map and the River Don. Part of the plan area in the North near to Kirkton lies close to the Gadie Burn.

There are a number of small watercourses within the plan area including Birks Burn, Clachie Burn and Gillree Burn. There are also other unnamed watercourses and drains within the plan area.

The plan area is centred around steep sided slopes from the high points at Bennachie and Millstone Hill. Therefore the potential for surface water run off to impact on adjacent areas, along with a potential increase in woody debris in watercourses should be considered.

We have historical records of flooding in the region, but no record of flood events within the plan area. There have been incidents of flooding in some of the villages/towns in the vicinity of the plan area such as in Pitcaple.

Vulnerable receptors that may be impacted close to the site plan include a number of single farms, and smaller settlements such as Oyre, Whiteford, Pitcaple. Further downstream there are larger settlements including Kenmay and Inverurie which is within a Potentially Vulnerable Area (PVA). The A96 road also runs close to the plan boundary.

The plan should consider impact of the works on flood risk to downstream receptors. For example, impact on flows, sediment transport, capacity of culverts and potential blockage of culverts need to be considered. Measures may need to be put in place to prevent increase in runoff or woody debris from entering watercourses. Monitoring before, during and after works may need to be implemented.

For background information please note that the [SEPA Flood Maps](#) have been produced following a consistent, nationally-applied methodology for catchment areas equal to or greater than 3km<sup>2</sup> using a Digital Terrain Model (DTM) to define river corridors and low-lying coastal land. The maps are indicative and designed to be used as a strategic tool to assess flood risk at the community level and to support planning policy and flood risk management in Scotland.

River Basin Management Planning

[The UK Forestry Standard](#) identifies that forest management should protect and improve the water environment by ensuring that forestry pressures on the aquatic environment are addressed and thus contributing towards the objectives of the River Basin Management Plan (RBMP).

We have checked the RBMP records and can confirm that the River Don - Alford to Inverurie (WBID 23293) is adjacent to the south of the plan area and is currently at less than good status. However, the RBMP pressures for this waterbody are listed as sewage treatment and fish passage and as such the plan will not be able to specifically address these.

Even when a water body is not downgraded opportunities still exist to deliver environmental improvement. We ask that the plan identify the location of any inappropriately designed or redundant structures which could be removed or improved. Examples include the upgrading of a culvert to allow fish passage or removal of a redundant weir. Opportunities for morphological and ecological improvements should also be considered. Measures could include re-introduction of meanders in artificially straightened watercourses or the planting of appropriate broadleaved species at a suitable density.

The plan should confirm whether or not there are any invasive non native species (such as the North American signal crayfish, Japanese knotweed, giant hogweed,

rhododendron and Himalayan balsam) present in the plan area. If there are invasive non native species present the plan should briefly outline proposals for control and removal.

#### Felling and replanting proposals

As the plan will give permission for the felling and replanting proposals outlined within it, it should provide clear information on how protecting the environment has been considered when deciding on the proposals (for example in relation to the timing of works or size of areas felled at the same time).

Diffuse pollution from planting and felling proposals is a significant threat to achieving and maintaining good water quality. The plan should confirm adherence to [The UK Forestry Standard](#) and related Forestry Standard Guidelines and comply with the requirements of the [Water Environment \(Controlled Activities\) \(Scotland\) Regulations \(CAR\)](#).

The plan should provide clear information on the minimum buffers to be included between the forest edge and each water body or abstraction. This should comply with [Table 5.1 of the UK Forestry Standard](#). Riparian planting within this buffer would be supported.

We ask that the plan identify the percentage of felling proposed in each water body catchment within a three year period. In line with [The UK Forestry Standard](#) we prefer that less than 20% of acidified water body catchments and catchments which are sensitive to nutrient enrichment are felled in any three-year period. If greater than 20% is proposed to be felling in any three year period then the plan should include an assessment of the likely effects this may have on local water bodies and the design mitigation measures proposed to address possible effects.

#### New supporting infrastructure

In line with Appendix 1 of [Forestry Practice Guidance: Forest Design Planning](#) the plan should include information, preferably on a map of scale 1:2,500 or more detailed, on any new infrastructure which may be required to facilitate plan proposals. For example, details should be provided of any new or upgraded tracks and new lay-down areas, borrow pits or temporary welfare facilities or new infrastructure to facilitate public access to the area. This supporting infrastructure should be designed to avoid engineering activities in the water environment wherever possible.

All watercourses and water bodies, including any drainage ditches directly connected to the water environment within planted areas, should be considered as sensitive to effects from forestry activities and identified on a map of scale 1:2,500 or more detailed.

Engineering activities in or adjacent to the water environment are likely to need authorisation under the [Water Environment \(Controlled Activities\) \(Scotland\) Regulations \(CAR\)](#) and should follow the related elements of the [Forests and Water UK Forestry Standard Guidelines](#).

#### Carbon balance and impacts on peat

The soils layer on our GIS indicates that while some soils within the plan area have a peat component it is not the dominant soil type. If there is peat on the site then the plan should include a map showing peat depths across the site and identify any adjacent bog habitats. Proposals for any new planting or replanting should demon-

strate how they comply with the *Supplementary Guidance to support the FC Forestry and Peatland Habitats Guidance Note*.

The map should demonstrate that all new planting has avoided peat exceeding 50 cm depth and the text should outline the measures to be taken to ensure that the hydrology of any adjacent bog habitats is not compromised.

We support peatland restoration proposals in areas which are to be clear felled, but, due to site conditions, not replanted. The plan should identify any such areas, outline the aims of restoration and the methods to be employed to achieve the outlined aims.

Impacts on wetlands

The SEPA Wetland inventory shows a small patch of spring, flush, seepage habitat identified on open hill /forest block boundary down hill from Mither Tap. We welcome compliance with [The UK Forestry Standard](#) which states that managers should "Ensure that wetland features such as springs, flushes and bogs are protected, and take opportunities to restore degraded features." You should consider whether any areas within the plan provide opportunities for peatland and wetland restoration, for example, areas which are not going to be replanted. We wish the plan to include details of any such proposals.

Use of waste on site, including felling waste

Proposals to make use of any waste wood on the site should be outlined in the plan. The proposals should comply with our [SEPA: Guidance: Management of Forestry Waste](#).

Pollution prevention and environmental management

We expect forest activities to be carried out following the best practice guidance outlined in the UK Forest Standard Guidelines and other relevant best practice guidance outlined on the [Forestry](#) page of our website. Please also refer to the [Pollution prevention guidelines](#).

Regulatory requirements

Details of regulatory requirements and good practice advice for the applicant can be found on the [Regulations section](#) of our website. If you are unable to find the advice you need for a specific regulatory matter, please contact a member of the operations team in your local SEPA office at: Inverdee House, Baxter Street, Torry, Aberdeen, AB11 9QA, Tel: 01224 266600.

We would find it helpful if a brief summary of the management planned accompanied the map at the scoping stage to enable us to have a more comprehensive understanding of the proposals.

If you have any queries relating to this letter, please contact me by telephone on 01224 266656 or e-mail at [planning.aberdeen@sepa.org.uk](mailto:planning.aberdeen@sepa.org.uk).

Yours sincerely

Alison Wilson  
Senior Planning Officer

Bennachie LMP, 2017 – 2026 / Antoine Le Prêtre – 2017

Disclaimer

This advice is given without prejudice to any decision made on elements of the proposal regulated by us, as such a decision may take into account factors not considered at the forestry proposal stage. We prefer all the technical information required for any SEPA consents to be submitted at the same time as the forestry proposal. However, we consider it to be at the applicant's commercial risk if any significant changes required during the regulatory stage necessitate a further forestry submission and/or neighbour notification or advertising. We have relied on the accuracy and completeness of the information supplied to us in providing the above advice and can take no responsibility for incorrect data or interpretation, or omissions, in such information. If we have not referred to a particular issue in our response, it should not be assumed that there is no impact associated with that issue. If you did not specifically request advice on flood risk, then advice will not have been provided on this issue.

## Appendix 3 – LISS Coupe prescriptions

Coupe ref. (See map – LISS coupes)		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	Other useful information
1	Group shelterwood 91.6 ha	Diversify age and species structure. Keep a continuous cover for recreational issues. Timber production.	Complex structure. L 40%, SP 20%, BI 20 %, LP 10%.	Age – 7 to 65 years. Trans period - 65 years. Return time – 10 years.	Some regeneration of BI and LP present in patches in mature crops. Uneven ground flora (Spring 2016)	Weed competition and appropriate light levels (Spring 2016). Some scarification will be needed when thick ground flora.	Thinning and respacing/open racks in young crops.	Felling groups to target existing regeneration (Spring 2016).
2	Group shelterwood 15 ha	Diversify age and species structure. Keep a continuous cover for recreational issues. Timber production.	Complex structure. SP 60%, MB 40 %.	Age – 9 to 65 years. Trans period - 65 years. Return time – 7 years for thinning.	Some regeneration of BI and SS present in patches. Uneven ground flora (Spring 2016)	Weed / SS competition and appropriate light levels (Spring 2016). Scarification will be needed when thick ground flora to establish NR.	Thinning both over storey and SS under storey if needed and respacing/open racks in young crops.	Where SS is regenerating below SP, keep thinning until it reaches the top of the pines. Then, fell it leaving the pines. Felling groups to target existing regeneration (Spring 2016).
3	Single tree selection 98 ha	Encourage broad-leaves growth / Remove SS regeneration.	MB 90%, SS 10%	Age – Diverse Trans period – At least 50	Diverse	To obtain NR I the future it will be sometimes	Remove non-native conifer regeneration in	The management of this scattered areas of broadleaves will be

		Hardwood production.		years depending on stand age and growth Return time – Diverse in function of the stand		necessary to fence the coupe areas.	order to encourage broadleaves growth – tending and thinning if necessary	done at the same moment as nearby operations (nearby thinning or clearfells).
4	Group shelterwood 16.7 ha	Encourage Scots pine and Larch Natural regeneration with existing seed source. SS can also be encouraged if SP and L are not regenerating in some places. Timber production.	SP 70%, L 20%, SS 10%	Age – 75 years Tran period – 55 years Return Time – 7 years	Uneven ground flora (Spring 2016) but mostly moss and blueberries. Some SS Regeneration.	Weed / SS competition and appropriate light levels (Spring 2016). Some scarification will be needed when thick ground flora. Some scarification will be needed when thick ground flora.	Thinning both over storey and SS under storey if needed	Where SS is regenerating below SP and L, keep thinning until it reaches the top of the pines. Then, fell it leaving the pines.
5	Group shelterwood 17.2 ha	Encourage Scots pine Larch and birch regeneration with existing seed source. SS can also be encouraged if SP, Larch and Birch are not regenerating in some places. Timber production.	SP 60 %, SS 20%, L 10%, BI 10%	Age – SP/L 75 years SS / BI 15 Years Tran period – 55 years Return Time – 7 years	Uneven ground flora (Spring 2016) but mostly moss and blueberries. Some SS Regeneration.	Weed / SS competition and appropriate light levels (Spring 2016). Some scarification will be needed when thick ground	Thinning both over storey and SS under storey if needed. Thin out western hemlock where possible.	Where SS is regenerating below SP and L, keep thinning until it reaches the top of the pines. Then, fell it leaving the pines.  <b>Need to reassess western hemlock at</b>

						flora. Some scarification will be needed when thick ground flora.		<b>next review. If hemlock to aggressive, possibility to clear-fell the area and restock fast.</b>
6	Group shelterwood 5.1 ha	Encourage Scots pine Larch regeneration with existing seed source. Utilise WH and SS regeneration for FC trees where SP and L regeneration fails. Timber production.	SP 30%, L 30%, WH 30%, SS 10%	Age – SP/L/SS 75 years WH/SS less than 16 years Trans period – ongoing in some places where WH regenerate on felled areas. 55 Years for the pine and Larch. Return Time – asap for respacing WH regeneration – 7 years for thinning mature crops	Uneven ground flora (Spring 2016) but mostly moss and blueberries. WH and SS Regeneration.	Weed / WH / SS competition and appropriate light levels when looking for SP and L regeneration (Spring 2016). Some scarification will be needed when thick ground flora.	Respacing WH and SS regeneration Thinning both over storey and SS/WH under storey if needed	Where SS / WH is regenerating below SP and L, keep thinning until it reaches the top of the pines. Then, fell it leaving the pines.  <b>Need to reassess western hemlock at next review. If hemlock to aggressive, possibility to clear-fell the area and restock fast.</b>
7	Single tree Selection 6.1 ha	Timber production – Hard wood. Young plantation (3150 T/ha).	MB 100 % including AR and Bl.	Age - 1 year Tran Period – 80 Years Return time – 3 to 4 years		No barriers. Frequent monitoring and maintenance necessary.	Remove eventual forks above 80 cm.	Pruning will eventually be necessary if branches (> 2 cm diameter) grow on tree trunks at a minimum height of 5

								- 6 meters. Negative selection will also be necessary when tree height reaches approximately 6 meters (remove the wolves).
8	Group shelterwood 47.2 ha	Encourage Scots pine Larch and birch regeneration with existing seed source. SS can also be encouraged if SP, Larch and Birch are not regenerating in some places. Timber production.	L 60%, SP 20%, SS 10%, BI 10%.	Age - SP/L 68 years some young Larch and SS (10 years old) Tran period - 62 years Return Time - 7 years	Uneven ground flora (Spring 2016) but mainly moss and <i>Luzula sp.</i> gander plants.	Weed / SS competition and appropriate light levels (Spring 2016). Some scarification will be needed when thick ground flora. Some scarification will be needed when thick ground flora.	Thinning both over storey and under storey if needed	Where SS is regenerating below SP and L, keep thinning until it reaches the top of the pines. Then, fell it leaving the pines.
9	Group shelterwood 16.4 ha	High recreation area: encourage recreation by maintaining diverse and open woodland. Encourage Scots pine Larch and birch regeneration with existing seed source. Timber production.	SP 40%, L 40%, BI 10%, SS 10%	Age - SP/L 68 years some young Larch and SS (10 years old) Tran period - 62 years Return Time - 7 years	Uneven ground flora (Spring 2016). Broadleaves and SS regeneration in some places	Weed / SS competition and appropriate light levels (Spring 2016). Some scarification will be needed when thick ground flora.	Thinning	Where SS is regenerating below SP and L, keep thinning until it reaches the top of the pines. Then, fell it leaving the pines.

10	Group shelterwood 4.4 ha	Encourage Scots pine Larch and birch regeneration with existing seed source. Timber production.	L 80 % SP 10 % BI 10 %	Age – SP/L 60 years BI – 60 Years Tran period – 70 years Return Time – 7 years	Uneven ground flora (Spring 2016).	Weed / SS competition and appropriate light levels (Spring 2016). Some scarification will be needed when thick ground flora.	Thinning	Felling groups to target existing regeneration (Spring 2016).
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# Appendix 4 –What is LISS/Continuous Cover Forestry?

**Please be aware that this article has been published in 1999 and that some of policies/definitions have been amended.**

 **Forestry Commission**  
231 Corstorphine Road  
Edinburgh  
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<http://www.forestry.gov.uk>

## What is Continuous Cover Forestry?

### INFORMATION NOTE

BY BILL MASON, GARY KERR AND JAMES SIMPSON

OCTOBER 1999

### SUMMARY

Continuous cover forestry involves the maintenance of a forest canopy during the regeneration phase with a consequent presumption against clearfelling in favour of alternative silvicultural systems. Although there are likely to be cost penalties from the use of continuous cover systems these can be more than offset by the provision of enhanced non-market benefits. The main constraints are the risks of windthrow and of regeneration failure through browsing or vegetation competition, plus the lack of experience of alternative silvicultural systems in British forestry. However, despite these limitations, there is potential for greater use of continuous cover forestry on selected sites throughout Britain as one means of providing more diverse forests for multi-purpose benefits.

### INTRODUCTION

1. The phrase 'continuous cover forestry' has featured increasingly in discussions about the future management of British forests. For example, *The UK forestry standard* (Forestry Commission, 1998) requires managers to 'identify areas which are, or will be, managed under a continuous cover forestry system and to build them into the forest design'. 'Continuous cover' is defined as the use of 'silvicultural systems whereby the forest canopy is maintained at one or more levels without clear felling'. Clearfelling is defined in the text as the cutting-down of all trees on an area of more than 0.25 ha. The distinctive element of 'continuous cover forestry' is therefore the avoidance of clearfelling of areas much more than two tree heights wide without the retention of some mature trees. The *UKWAS certification standard* (UKWAS, 1999) requires favouring of lower impact silvicultural systems such as selection and shelterwood in windfirm conifer plantations (section 3.4.4).
2. The main silvicultural system employed in British forestry is patch clearfelling followed by planting or occasionally natural regeneration. We estimate that this system is employed in at least 90% of managed forests with an average size of clearfelled coupe of between 5 and 10 hectares, although there is appreciable regional variation.
3. The adoption of continuous cover forestry systems on any scale will require changes in silvicultural practices

and management thinking in Britain. There is little British experience of using alternative silvicultural systems to patch clearfelling. Our different species and site conditions mean that regimes developed in other parts of the world must be adapted through field trials of alternative systems on suitable sites and with supporting research. Our aim in this Note is to clarify the first principles involved for those considering continuous cover forest management.

### HISTORY

4. The current discussions about the potential role of continuous cover forestry are the continuation of long-standing debate about the relative merits of regular and irregular silviculture which began in Europe in the middle of the 19th century. For example, the term 'continuous cover' has links with the German term 'dauerwald' or 'continuous forest' which was discussed in the 1920s and 1930s (Helliwell, 1997) and was last seriously examined in Britain during the 1950s and early 1960s.
5. The current attraction of continuous cover forestry lies in the belief 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, continuous cover forestry is seen as a means of reducing the impact of clearfelling and the associated changes that this produces in forest landscapes and

habitats. It does not mean abandoning stand management or timber production. Indeed the felling of trees and the harvesting of their timber is essential in continuous cover forestry to manipulate the stand structure to promote natural regeneration and to provide revenue to offset costs of meeting multiple objectives. Key aspects are discussed in the following sections.

## PRINCIPLES OF CONTINUOUS COVER FORESTRY

6. A crucial point is that continuous cover forestry describes **one approach** to forest management, and therefore it is more than a silvicultural system. Silvicultural systems (e.g. shelterwood, selection, patch clearfelling) are means of implementing the chosen management objectives. Continuous cover forestry has variously been described as a 'close-to-nature', 'holistic' or 'ecological' approach to forest management, but these terms are too vague to be practical. It is more useful to think of certain guiding principles which underpin this approach and are considered below.

### Managing the forest ecosystem rather than just the trees

7. Under continuous cover, the stands in the forest are seen as the framework for an ecosystem from which timber is harvested at intervals but where other aspects such as landscape or wildlife habitat are of equal importance. The manager considers the impact of the harvest upon this framework and adjusts the quantity removed to ensure that the changes brought about do not impair the wider system. It should be noted that this principle is common to all forests managed for multi-purpose objectives. Thus the restructuring of plantation forests through the forest design process is based on a similar principle. Deciding which is a more sustainable approach will depend upon a thorough evaluation of site factors, species requirements and management objectives.

### Using natural processes as the basis for stand management

8. The approach assumes that the use of processes such as natural regeneration is more sustainable than one based upon artificial regeneration and the creation of uniform stand structures of single species. Evidence

for this assumption is generally lacking. Natural regeneration is favoured as a means of achieving greater species diversity and as an assurance that the species are suited to the site.

### Working within site limitations

9. Natural processes will be favoured if the species composition of the forest is appropriate to the site conditions. One would avoid using species that would require high nutrient inputs on nutrient poor sites and adopt a more conservative approach based upon a less demanding species (e.g. favouring Scots pine over Sitka spruce on dry heathland soils). Site variation within the forest would be respected as a source of diversity rather than seeking to impose uniformity by drainage or insensitive cultivation. The advent of the Ecological Site Classification (Pyatt and Suárez, 1997) offers the opportunity to develop a framework of matching species to site in a logical manner.

### Creation of a diverse stand structure with a range of species

10. Many forests planted during this century are composed of trees largely in the stand initiation or stem exclusion phases (see Table 1). As a consequence the stands tend to have a regular structure with a single layer of trees in the canopy, little ground vegetation, little deadwood and few tree species. However, older stands generally have greater diversity of structure a wider range of microsites which are providing niches for more species, and a more favourable regeneration within the stand. Increasing the representation of these later stages in a forest enhances the possibility of providing recreational or wildlife benefits since many of these non-market benefits appear to be linked with the occurrence of older and larger trees.

## STAND DEVELOPMENT

11. A useful conceptual model of stand development has been proposed by Oliver and Larson (1996). They postulate that the development of a regular stand of a single species can be separated as detailed in Table 1. Consideration of these stages indicates that, under a patch clearfelling system, many conifer stands managed for timber production rarely progress beyond the stem exclusion stage and are felled before advance regeneration is apparent in the understorey.

**Table 1** The four stages of stand development after Oliver and Larson (1996)

Stage	Notes
Stand initiation	The period when young seedlings colonise a site after major disturbance e.g. felling, windthrow. Broadly equivalent to the 'establishment phase' defined in plantation forestry.
Stem exclusion	The existing trees dominate the site and there is no further colonisation by young trees. Some trees in lower canopy die as a result of inter-tree competition.
Understorey reinitiation	As the overstorey grows taller, herbs and advance regeneration start to colonise the forest floor. Often they make little growth because of the limited light conditions.
Old growth	Overstorey trees die in an irregular fashion and individuals of the advance regeneration grow towards the upper canopy.

The exceptions are stands of light demanding species such as pines and larches where the comparatively light shade allows other tree and shrub species to colonise the understorey before rotation age is reached. Such stands would be classed in the understorey reinitiation phase and the same is true of many regular broadleaved stands managed on longer rotations. In all these types, an approach based upon continuous cover forestry would try to maintain stand development well into the understorey reinitiation phase to foster the natural regeneration anticipated as a normal consequence of this phase.

## A PRESUMPTION AGAINST CLEARFELLING IN FAVOUR OF THE USE OF ALTERNATIVE SILVICULTURAL SYSTEMS

12. Continuous cover forestry commits a forest manager to using an alternative silvicultural system to patch clearfelling. The choice of alternative system should be based upon an understanding of species requirements, site potential, climatic limitations and linked to management objectives.

13. It is convenient to distinguish between silvicultural systems according to the stand structures they produce (see Table 2). Regular stands are ones where all the trees are of similar height (but not necessarily of the same age) whereas irregular ones contain a mixture of sizes. Systems which promote regular structures require the removal of the overstorey once regeneration is established whereas in irregular systems there will always be some components of the overstorey retained in the stand. It is not our intention to discuss these systems in detail since relevant information can be found in Hart (1995) and Matthews (1989). Some 'regular' systems will involve felling the majority of trees on a site (e.g. seed tree system) and are therefore not as appropriate for continuous cover as the more intimate selection systems. Variants of these systems are described in the literature but these are generally adaptations of a basic model to particular site conditions and/or species requirements.

14. An important factor influencing the choice of silvicultural system is the light requirement of the species to be regenerated. A traditional distinction is drawn between light demanding, intermediate and shade tolerant species (see Table 3) on the basis of the amount of shade that seedlings can tolerate while still making effective growth. Those which are **shade tolerant** can be expected to grow in small gaps (0.05 ha or less) or under the canopy of a mature stand whereas **light-demanding** species will require very light canopies or open areas to achieve adequate growth. **Intermediate** species are those that can regenerate under a canopy, but require this to be opened up rapidly to ensure good seedling growth. Seedlings of all species can occur underneath an overstorey as 'advance regeneration', but only shade tolerant species can survive and grow for any length of time beneath a canopy. Therefore species in the shade tolerant category such as beech and Norway spruce are suitable for selection systems while those such as birch and Scots pine are favoured by seed tree systems.

**Table 2** Classification of some silvicultural systems by stand structure

Regular stand structures	Irregular stand structures
Clearfelling	
Seed tree	Single stem selection
Uniform shelterwood	Group selection
Strip shelterwood	Irregular shelterwood
Coppice-with-standards	

**Table 3** A classification of the main British tree species according to their seedling light requirements

Light demanding	Intermediate	Shade tolerant
European larch	Douglas fir	Western hemlock
Japanese larch	Sitka spruce	Norway spruce
Hybrid larch	Noble fir	Grand fir
Scots pine	Ash	Western red cedar
Corsican pine	Cherry	Yew
Lodgepole pine	Lime	Beech
Birch ( <i>both silver and downy</i> )	Oak ( <i>both pedunculate and sessile</i> )	Hornbeam
	Rowan	Field maple
	Sweet chestnut	Sycamore
	Whitebeam	
	Cherry	

This classification is inevitably relative and does not mean that all species in a given category have identical requirements. For example, there is good evidence to suggest that seedlings of Sitka spruce are less shade tolerant than those of Douglas fir and need increased light intensity for satisfactory growth much sooner than those of the latter.

## ROTATION LENGTH AND YIELD CONTROL

- Most of the silvicultural systems discussed above involve retaining a number of mature trees on site for an appreciable period after the remainder of the stand has been felled. These trees act as a seed source for regeneration, help modify the microclimate (e.g. reduction of frost damage) and provide benefits to biodiversity. Implementing a continuous cover forestry system requires rethinking the definitions of financial or technical rotation age that are integral to silviculture based upon patch clearfelling. For example, a general aim is to retain a stand into the understorey reinitiation phase with manipulation of the canopy to promote regeneration. Given that seed years are intermittent and that it can take 5–10 years for satisfactory establishment of regenerated seedlings of some species, designating a stand under continuous cover forestry management may require prolonging the rotation for some trees by at least 20 years beyond the age determined by maximum mean annual volume increment.
- In addition, in the irregular systems, the focus is less on age than on the target diameter at which trees are considered to be marketable. In selection forests, it is quite common to find target diameters of 60–70 cm which are based on the belief that it is both possible to grow and successfully market large dimension sawlogs. In conifer stands, such target dimensions would again require an appreciable lengthening of current rotations. A number of parameters are used to guide the tending of stands managed under selection systems. Apart from the target diameter these include: the residual basal area to be left after thinning; the ideal stem size distribution on a particular site; and the actual stem size distribution recorded during a periodic inventory. Thinning of a selection stand involves the removal of stems in all size categories to bring the actual distribution closer to the ideal one (see Philip, 1994; pp. 146–149). The health and quality of the individual stems is a further guide as to which trees should be removed.
- It is sometimes stated that stands under continuous cover management, particularly irregular stands, produce higher yields per unit area than regular, even-aged stands. There is no evidence in the literature to support this view and the safest assumption is that the yields are similar in both types of system. However, the product out-turn may vary since continental evidence suggests a higher proportion of large dimension (>50 cm) sawlogs are produced under selection systems (see Schutz, 1997).
- There are no British yield models, and few in other countries, designed for the more complex stand structures which are one of the goals of continuous cover forestry. Existing even-aged yield models can be adapted by assuming that the average productivity of a continuous cover stand is equivalent to that expected of an even-aged stand on a given site and adjusting the model for the percentage of the stand in different size/age categories. However, this is a considerable simplification and stands being transformed to alternative systems should be monitored to check that the response is in line with expectations. This has to include an estimate of regeneration success and understorey development as well as measurement of the overstorey.

## CONSTRAINTS TO CONTINUOUS COVER FORESTRY

19. There are a number of factors which limit the feasibility of adopting a continuous cover forestry approach. In much of northern and western Britain on exposed sites with shallow soils, the risk of windthrow is a major limitation to the possibility of adopting one of the alternative silvicultural systems. The opening up of the tree crowns as a consequence of thinning operations to promote regeneration increases the wind loading on the retained trees substantially and these trees will be very vulnerable to blowdown or stem breakage. Therefore, it would be risky to introduce an alternative silvicultural system on sites of windthrow hazard class 4–6. Even on sites of lower windthrow risk, trees on wet or shallow rooting soils are likely to be vulnerable to wind damage. Despite the magnitude of this constraint, there are appreciable areas of upland forests where better soils and reasonable shelter would make continuous cover systems a feasibility. Paterson (1990) thought that 25% of the upland forest area was a reasonable estimate. By contrast, in lowland Britain, where the return period for catastrophic wind damage exceeds 1 in 100 years, the risk of windthrow is not a general constraint to the use of continuous cover systems.
20. We have assumed that reliable natural regeneration will be necessary if continuous cover forestry systems are to be implemented. Natural regeneration of all major trees (i.e. native and non-native) can occur in British forests provided the parent trees are of sufficient age to produce regular seed crops. The presence of advance regeneration in or near the stand is a useful indicator of the chance of success. If the trees are of suitable age (see Nixon and Worrell (1999) for conifers and Hamer and Kerr (1995) for broadleaves), but advance regeneration is not present, the failure may be due to a host of reasons including lack of seed, vegetation competition and predation. Do not attempt to promote natural regeneration until the limiting factor has been identified and remedial action taken.
21. Trees need to be old enough before they start to seed regularly and for the potential for regeneration to occur. Depending upon species, the beginning of regular seeding is between 20 and 40 years of age, the younger age being characteristic of pioneer light-demanding species such as the pines, and the latter of

shade-tolerant species such as Norway spruce. There is also variation in the frequency of good seed years which, for example, may be every 3 years in birch and Scots pine and 5–8 years in beech.

22. Soil conditions are important for a number of reasons. Deep rooting soils are beneficial to tree stability which is a key consideration with any alternative silvicultural system. Fertile soils ('medium' to 'very rich' in Ecological Site Classification terms) have the potential for vigorous weed growth. On such sites it is important to encourage advance regeneration first and then develop it through progressive opening up of the canopy, so ensuring that small seedlings are not swamped by weeds. In contrast, on less fertile sites ('very poor' to 'poor'), vegetation competition is less intense and a regeneration 'window' for successful seedling establishment can persist for 2–3 years after a canopy is opened up. For this reason, many examples of the successful use of alternative silvicultural systems tend to be on less fertile sites.
23. Young seedlings are very vulnerable to browsing damage and, in areas with high deer densities, it is unrealistic to expect regeneration without reducing the populations below 5–10 animals per 100 ha and/or fencing the zones to be regenerated.

## COSTS

24. There are few examples of continuous cover forestry systems in operation in Britain and it is not possible to provide definitive costings on the implications of changing to this type of management from conventional patch clearfelling systems. Some research is underway at the present time which may help to clarify this aspect. There is general agreement that some cost penalties are involved, either because trees are being maintained beyond financial rotation or because the costs of management per unit area are higher than with conventional systems. However, the increased costs may be offset by benefits in terms of ability to meet landscape, recreation or conservation objectives. In addition, the costs associated with replanting can be avoided provided that natural regeneration is sufficiently profuse and reliable. A further claim sometimes made for the irregular systems is that an all sized stand structure ensures some resilience against the effect of a catastrophic gale since there are always smaller trees to colonise the available growing space.

## ADVANTAGES AND DISADVANTAGES OF CONTINUOUS COVER FORESTRY

25. The advantages and disadvantages of continuous cover forestry, given present knowledge, are summarised in Table 4.
26. There are clearly potential benefits and appreciable risks in embarking on the transformation of regular stands to continuous cover forestry. The benefits are greater the more that a stand or a forest is being managed for non-timber objectives. The long time before the success of transformation can be determined should borne in mind. For example, one of the best known areas of continuous cover management lies in Glentress Forest near Peebles in Scotland where Professor Mark Anderson of Edinburgh University initiated a trial of a group selection system in first rotation conifer stands in the late 1950s. It has taken some 30 to 40 years for the diversity of structure to become apparent and for it to be possible to start to judge the success of this trial. Not all organisations or owners will be prepared to take such a long-term view.

## IMPLEMENTATION

27. We anticipate that an increasing number of owners will be interested in undertaking trials of alternative silvicultural systems in the years ahead and we would strongly advise anybody in this position to start on a trial basis to begin with. The following simple check list is a guide to anyone considering the continuous cover forestry approach.
- Are the stands in question of windthrow hazard class 3 or less and without sign of wind instability?
  - Are the tree species present adapted to the site and of suitable genetic quality?
  - Are the soils freely draining?
  - Are the stands involved in the stem exclusion or very early understorey reinitiation phases?
  - Is the forest floor under the stands bare or with very little vegetation?
  - Is there evidence of advance regeneration of a desirable species? If not, do you know why not?
  - Are deer, rabbits, sheep or other browsing animals under control?

**Table 4** Advantages and disadvantages of continuous cover forestry

Advantages	Disadvantages
Less visual impact than clearfelling.	More complex stand management requiring skilled personnel.
Increased within-stand structural and species diversity.	Yield prediction/regulation is more difficult.
Greater structural diversity with potential benefits for wildlife.	Greater harvesting costs because of small dispersed felling sites.
Less disturbance of forest ecosystem and greater shelter for regenerating seedlings.	More site damage on heavy soils because of less brash to provide brash-mats.
Reduced restocking costs (assuming natural regeneration is successful).	Dependent upon natural regeneration to be cost-effective. Therefore less suited to more fertile sites (weed competition) and/or where there is heavy browsing pressure.
Production of large diameter, high quality sawlogs.	Risks of wind damage when transforming regular stands, particularly on unstable sites.
Structural diversity provides resilience against windthrow (at the stand level).	Time required to determine success.

- Is the site suitable for laying out a system of racks for machine access for harvesting?
- Are you prepared to wait at least 20 years to know whether you have succeeded?
- Have you access to a qualified professional forester who can handle the management and monitoring of these stands for you?
- Are you prepared to forgo the income from some mature trees in the stand?
- Are there other stands on the property to provide income in case of failure?

If the answer to any of these questions is in the negative, then we would advise reconsidering the proposal, possibly by looking for more suitable sites or by obtaining further advice. Further information can be obtained from the references, and from the organisation listed in paragraph 30.

28. Any trial area should have a short management plan outlining the objectives, the silvicultural system(s) proposed and the desired stand structure and species composition, and listing the intended operations. This plan should be reviewed at 5-year and revised at 10-year intervals in the light of the results obtained.

## CONCLUSIONS

29. Continuous cover forestry is an approach to management that fits well with current requirements to manage forests for multiple objectives. The silvicultural systems required to implement such an approach demand species that are adapted to sites and stands that are not subject to regular disturbances such as gales. There are many sites in Britain which do not fulfil these requirements and, given present knowledge, it would be folly to try to introduce such systems in these areas. However, where suitable conditions exist, we believe that a continuous cover approach will have an increasing role to play in the future management of British forests. The transition from the present reliance upon a single silvicultural system to a situation where a mix of systems are used in forest management requires the evaluation of the more promising systems and the development of the knowledge and skills essential for this type of change

to occur. Achieving this type of change will demand time and patience, a readiness to learn from the experience of others and a willingness to manage trials and demonstrations for the long term. Success will not be achieved overnight, but the potential benefits from combining a mixture of systems at a landscape scale should produce more diverse forests to meet the demands of multi-purpose forestry.

## FURTHER INFORMATION

30. There is an active research programme into alternative silvicultural systems and further details can be obtained from the authors on request.

The Continuous Cover Forestry Group hold regular meetings and workshops on these themes. For more details please contact the Membership Secretary:

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## Appendix 5 – Wildlife Guidance references

1. Forest operations & wildlife in Scottish forests; Guidance Note 31 (2006)
2. Forest operations & birds in Scottish forests; Guidance Note 32 (2006)
3. Forest operations & Red Squirrels; Guidance Note 33 (2006)
4. Forest operations & European protected species; Guidance Note 34
5. Bat Habitat use in Forestry Commission Guidance Note 35a
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7. Forest operations & wildcats in Scotland; Guidance Note 35d
8. Forest & Water Guidelines; 5th edition (2011)
9. Creating new native woodlands; Bulletin 112 (1994)
10. Forest operations & badger setts; Practice guide 9

## Appendix 6 – Tolerance table

	Adjustment to Felling period	Adjustment to felling coupe boundaries	Timing of restocking	Change to species	Changes to road-lines	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 2 <sup>nd</sup> 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