Moray and Aberdeenshire Forest District

Aberdeen Woods

Land Management Plan

Plan reference no: LMP 24

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.

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FOREST ENTERPRISE - Application for Forest Design Plan Approvals in Scotland

Forest Enterprise - Property

Forest District:	Moray & Aberdeenshire FD
Woodland or property name:	Aberdeen woods
Nearest town, village or locality:	Aberdeen
OS Grid reference:	NJ840020

Areas for approval

	Conifer	Broadleaf
Clear felling	69.8ha	
Selective felling		
Restocking	71.1ha	24.1ha
New planting		

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

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:…….

FOREST ENTERPRISE - Request for Approval of Thinnings

To: Conservator

Grampian Conservancy
Portsoy Road
Huntly
Aberdeenshire
AB54 4SJ

I apply for Authority to carry out a programme of thinnings within Aberdeen woods in Moray & Aberdeenshire Forest District during the 10 years commencing from the date of approval.

I undertake to identify any statutory designations which apply to any of the land to be subject to thinning, and to obtain the necessary permissions from the appropriate statutory body before commencing work under any approval which is granted.

Signed…….. Signed……..
Forest District Manager Conservator

District Moray & Aberdeenshire Conservancy Grampian

Date …….. **Date of Approval**……..

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Land Management Plan Summary

This plan is a renewal of the Forestry Commission Scotland's land management plan of the thirteen discrete woodlands collectively managed as Aberdeen Woods.

The purpose of the plan is to set out management objectives and prescriptions for the forest for the next ten years in detail, and in more broad terms for the following twenty years, which will fulfil the requirements of the UK forestry standards.

In Countesswells and Foggieton the primary objective is the management of the woodland to provide a recreational resource for Aberdeen and the surrounding area. For the rest of the blocks the primary objective is the production of a quality crop of timber.

An additional secondary objective for the management of all the woodlands is the control of grey squirrels and delivering management regimes to benefit red squirrels.

The management will include a mixture of clearfelling and restocking and Low Impact Silviculture Systems (LISS) with natural regeneration depending on the current crops and the objectives for the crops. Wherever possible we will continue to maximise the area managed through thinning.

The aim of restocking will be to use a range of species to create diverse habitat networks within the forest by linking existing broadleaf areas with additional broadleaf planting and open space.

Areas of broadleaved woodland with the potential to become commercially productive will be managed as such, provided the site and access is appropriate.

Areas not suitable for commercial management include broadleaved woodland that is not able to be managed productively along with open habitats. Areas designated as permanent open space have been chosen to aid public access; to help diversify the woodland edges; to enhance riparian areas and complement areas of broadleaves; to protect archaeological features or where there are other biodiversity benefits.

1.0 Introduction

Refer to Map 1: Location.

1.1 Setting and context

This plan covers the thirteen woodland blocks that were formerly covered by three land management plans, that is Maryculter woods, Peterculter woods and Countesswells woods.

Management plan area	Woodland block	Area (ha)
Maryculter woods	Clochandighter	43.0
	Duff's Hill	35.8
Peterculter woods	Badds	24.2
	Drum	15.9
	Newmill Hill	69.2
	Collonach	41.1
	Leucher Moss	55.4
Coutesswells	Countesswells	166.6
	Foggieton	71.1
	Wester Ord	15.6
	Hazelhead	9.1
	Total	**546.8**

Maryculter Woods are located to the north-west of Portlethen, Peterculter Woods are west of Peterculter and Countesswells woods are south of Westhill. (See Map 1 – Location)

The woods are predominately coniferous plantations.

Clochandighter and Duff's Hill were originally established in 1961 and 1960 respectively but have been substantially felled and replanted since. Duff's Hill has little access by the public. Clochandighter has a number of informal paths that have developed along the wayleaves and is well used by dog-walkers. There is no formal recreational provision within these three woods.

The most significant feature of Countesswells is their location on the edge of Aberdeen, resulting in a very high level of usage for public access and recreation. There are car-parks, formally way-marked footpaths and horse trails.

The Peterculter woods are fairly even aged and have extensive areas of mature pine which gives them a distinctive open character. These are more rural in their location and public access is low.

There has been felling over the last ten years as crops have reached maturity or as windblow has developed to critical levels. This has been especially the case in Clochandighter and Baads. Most of the older stands have been thinned.

1.2 Land management objectives

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

- The physical context and existing woodland;
- The land management objectives of other statutory bodies;
- The physical capability of the woodland;
- The locational objectives identified in the Moray & Aberdeenshire Forest District Strategic Plan.

Analysis of the available information has led to two **primary objectives** for these blocks. In Countesswells and Foggieton the primary objective is the management of the woodland to provide a recreational resource for Aberdeen and the surrounding area.

For the rest of the blocks the primary objective is the production of a quality crop of timber.

An additional **secondary objective** for the future management of all the woodland has been identified as:

- The control of grey squirrels and delivering management regimes to benefit red squirrels.

2.0 Analysis of previous plans

The previous plans were approved in 2002 and 2004. The table below compares the outcomes achieved against the objectives of these plans.

The objectives set in the previous plans do not fit neatly with the current FES national themes. However the table below attempts to set the objectives of the previous plans against these current themes and summaries the progress made towards achieving them during the last plan period. It also shows which of the objectives, if any, will be carried forward into the next plan period, as they still meet our current aspirations for the management of the blocks.

Woodland block	**Objective**	**Work proposed in previous plan**	**Outcome over plan period**	**Objective achieved**
Drum	Expansion of Native Woodland	Clearfell exotic conifers and invasive, non-native broadleaves (Sycamore).	New planting has been overtaken by vigorous natural regeneration of birch, sycamore and conifers.	No
	Restore the continuation of the oak wood into western perimeter of wood	Establish native oakwood using local origin plants from Old Wood (NTS).	The few planted oak were smothered by natural regeneration of other species and have largely failed to establish.	No
	Provide continuation of habitat for the Red Squirrel	Establish areas of Scots Pine, Norway Spruce and native, small-seeded broadleaves.	Woodland is still mainly even aged and probably too young to provide habitat. In itself, but is next to older woodland.	In progress
	Provide diverse woodland habitats	Allow the wet area to develop naturally, encouraging the regeneration of native broadleaves and characteristic ground flora.	Natural regeneration is reasonably homogenous, little visual or structural diversity.	No

Woodland block	Objective	Work proposed in previous plan	Outcome over plan period	Objective achieved
Drum (contd)	Encourage recreational access	Improve visual amenity by incorporating permanent open space and broadleaf networks during restock.	Woodland is almost impenetrable, no formal access provision.	No
Newmillhill	Preservation and enhancement of visual amenity on the highly visible northern ridge	Use continuous tree cover based around the irregular shelterwood system	Little clear- felling carried out in this area.	Yes
	Creation of diverse woodland capable of supporting a variety of woodland flora and fauna	Establish areas of open space and permanent networks of native broadleaves. Vary thinning intensity to create varied stand structure.	Some open space created but much of this is filling with birch and scrub regeneration. Variable density thinning to stimulate natural regeneration not carried out.	Partially
	Preservation and enhancement of Red Squirrel habitat	Retention of permanent areas of Scots Pine and increase proportion of small-seeded native broadleaves	Scots pine retained. Broadleaf areas are discrete and not integrated with the mature pine areas	Yes
Collonach	Preservation and Expansion of Alder Woodland	Systematically remove exotic conifers adjacent to Alder woodland and encourage natural regeneration, supplemented by planting as required	No removal of conifers. Main body of woodland is too dry and not suited to alder.	No
	Conservation and enhancement of current visual amenity	Use of continuous tree cover, incorporating areas of open space Introduction of irregular shelterwood system incorporated with regular thinning interventions to select trees of good crown depth	No introduction of irregular shelterwood or selection of seed trees. Woodland retains high amenity value due to absence of any clear felling.	Partially

Woodland block	Objective	Work proposed in previous plan	Outcome over plan period	Objective achieved
Collonach (contd)	Encourage natural regeneration of Scots Pine and development of semi-natural Pinewood	Use of continuous tree cover, incorporating areas of open space Introduction of irregular shelterwood system incorporated with regular thinning interventions to select trees of good crown depth	No introduction of irregular shelterwood or selection of seed trees. Woodland retains high amenity value due to absence of any clear felling.	Partially
	Develop varied woodland habitats	Avoid naturally open, wet areas during operations and allow to develop naturally.	Little progress.so far	No
	Provide a sustainable level of timber production	Carry out thinning on a five year cycle.	Low thinning carried out in 2014	Yes
Leuchar moss	Preserve and anchor woodland in the landscape	Use continuous tree cover, opening up existing areas of broadleaves and establishing new areas of broadleaves.	Thinning has been carried out.	Yes
	Protect and enhance habitat for Red Squirrels	Maintain cover of Scots Pine and develop structure through the use of an irregular shelterwood system.	No introduction of irregular shelterwood system or selection of seed trees. Woodland retains high amenity value due to absence of any clear felling.	Partially
	Improve wildlife habitat	Introduce areas of open space and increase broadleaf component	Little open space, broadleaves have been planted on the northern boundary.	No
	Maintain a sustainable level of timber production	Carry out thinning on a five year cycle	Thinning has been carried out.	Yes

Woodland block	Objective	Work proposed in previous plan	Outcome over plan period	Objective achieved
Baads	Improve aesthetic and wildlife value of wood	Clearfell windblown crop. Restock with mixed conifers specific to site, incorporating a permanent network of broadleaves and open space.	All clearfelled and restocked with broadleaves, conifers and open ground	Yes
	Reduce impact of powerline and straight forest boundary on landscape	At restock, increase areas of broadleaves and open space on forest edges and scallop the tree line along the wayleave	All clearfelled and restocked with broadleaves, conifers and open ground	Yes
Countesswells	Improve and expand public access		New paths have been created.	Yes
	Improve transition with neighbouring farmland		Little felling on woodland edges has yet been carried out.	Not yet
	Improve quality of the woodland edge and diversity of internal views		Some felling has opened up the woods but little diversity or structure to woodland edge due to lack of felling. So far.	Partially
	Protection of heritage sites		No felling to open up sites or interpretation has been carried out yet.	No
	Diversify woodland structure and improve habitat for red squirrel.		Some progress but felling coupes have been large. Open space is filling with birch scrub.	On-going
	Improve riparian habitats		Conifers were felled but mixed restocking and open ground has been smothered by vigorous birch regeneration.	Partially

Woodland block	Objective	Work proposed in previous plan	Outcome over plan period	Objective achieved
Countesswells (contd)	Sustainable timber production		Regular thinning and some felling has been undertaken	Yes
Clochandighter & Duff's Hill	Improve visual amenity, encouraging informal recreational access	Clearfell dark, impenetrable and windblown crops and introduce open space and native broadleaves at restock.	Diversity in species with open space introduced when restocking	Yes
	Increase and improve variety of woodland habitats	Develop habitat around the ponds in Clochandighter by encouraging the regeneration of native broadleaves and the establishment of ground flora. Increase open space at restock	No felling has yet taken place around the ponds, but open ground created elsewhere	On-going
	Improve aesthetic and wildlife value of the wood	Restock with site suited conifers, incorporating a permanent network of open space and broadleaves.	A variety of species have been used.	Yes
	Improve habitat for Red Squirrel to sustain a viable population and discourage the spread of Greys	Restock to include Scots Pine, Norway Spruce, European Larch and small-seeded broadleaves including Birch, Willow, Rowan, Alder and Aspen	Squirrel friendly species have been used but wood is isolated and too small to support a breeding population.	Yes

3.0 Background information

3.1 Physical site factors

Refer to Map 2: Key Features.

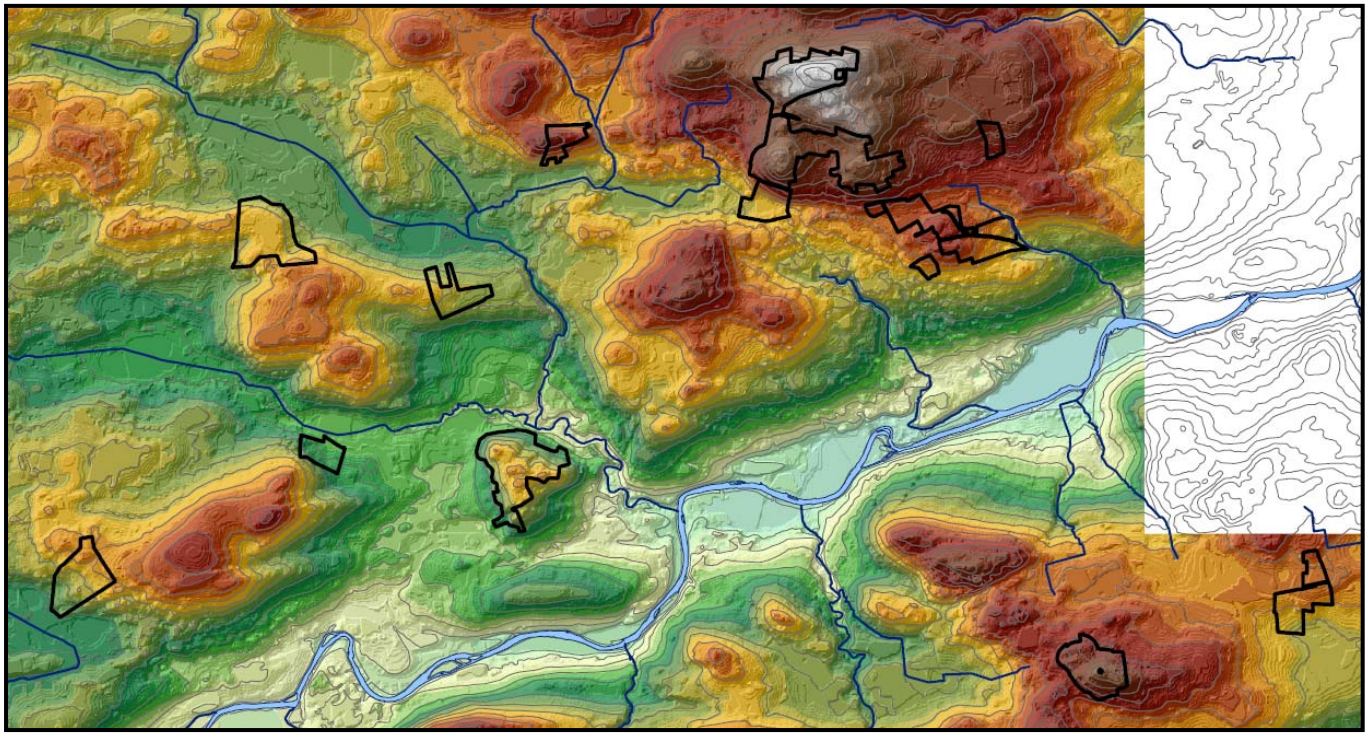
3.1.1 Geology, soils and landform

Geology - According to the British Geological Survey (Geological Map of the UK), the land management plan area is underlain by either Felsic rock (an igneous rock that is relatively rich elements that form feldspar and quartsz) or Psammite, Semipelite and Pelite (which are all sandstones of dirrering textures from course to fine). These are overlain by drift geology of Till or Glacial sand and Gravel in most blocks with an area of peat in Duff's Hill. See the map below for details.

All the bedrock and drift geology combinations lead to the creation of soils with a medium level on nitrogen availability.

Soils – There is a wide range of soil conditions across the plan area ranging from lowland sphagnum bog to scree. The majority of the soils are podzols or in a podzolic phase. These are normally free draining with relatively good conditions for rooting. They are however often strongly acidic with low nutrient levels. In fact 96% of the soils have a poor to very poor nutrient regime. Some wetter sites with bogs provide more nutrients; brown earths are also present in places but often in a podzolic phase. This information along the climate details will be used to help inform the choice of planting species.

Topography - The elevation of the land management plan area runs from about sea level along the river Dee valley to approximately 200 meters at the top of Kingshill in Countesswells. Most of the blocks are situated on the higher ground above the river valleys. See map below.

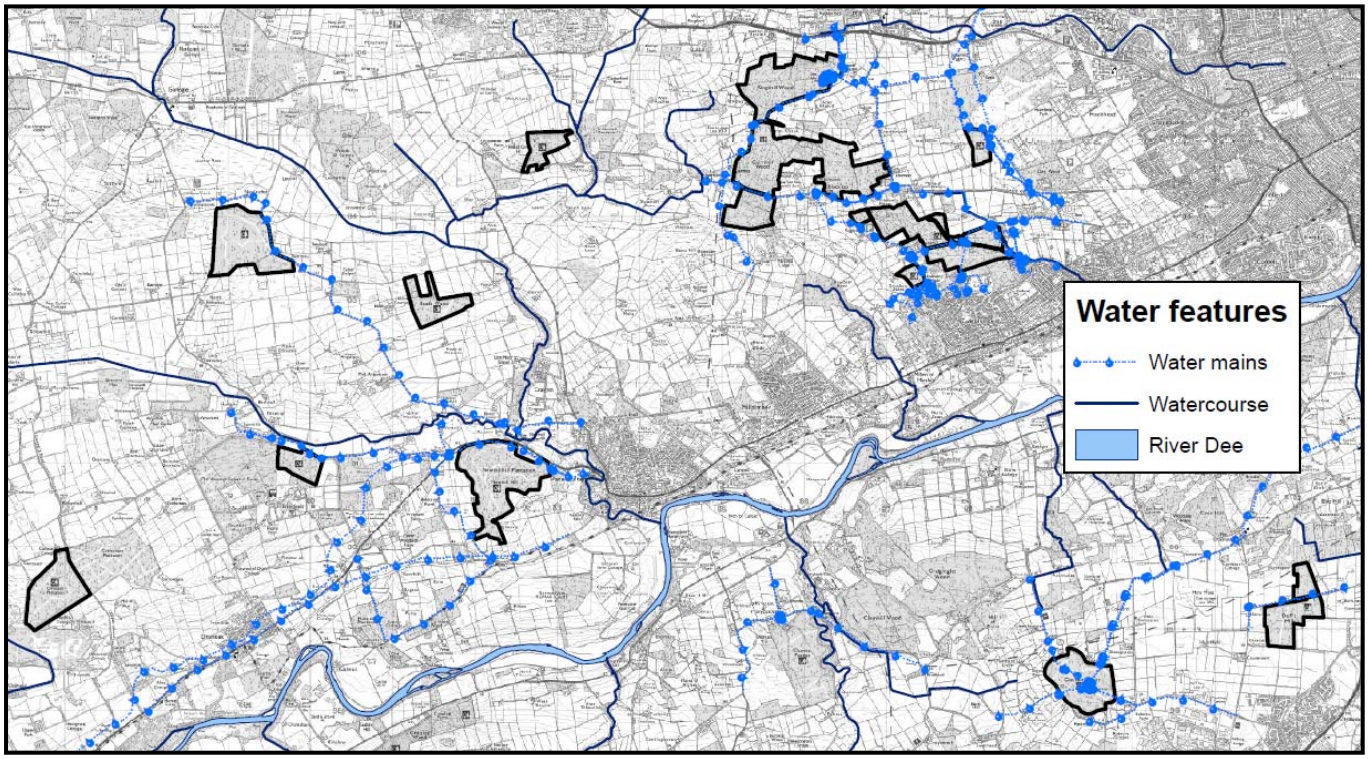


3.1.2 Water

Within Clochandighter are public water mains running from man-made reservoirs.

There are few water features in the Peterculter Woods. A small burn runs through Newmillhill Wood, which feeds the Gormack Burn.

There are also few water features and watercourses within the Countesswells woods. The Cults Burn runs down the eastern edge of the Foggieton block at Sunnyside. There is an extensive network of drains throughout the wood and these in most occasions drain to burns.

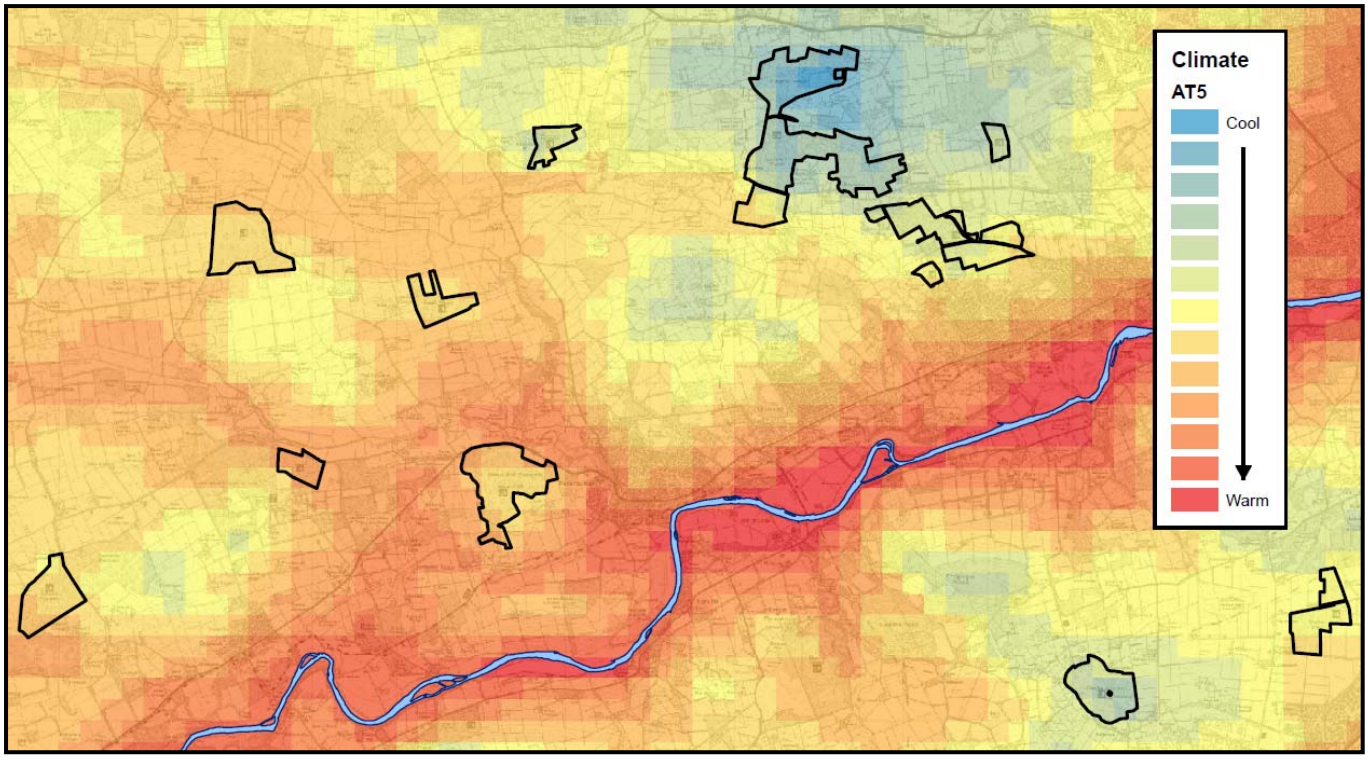

Water features
Water mains
Watercourse
River Dee

3.1.3 Climate

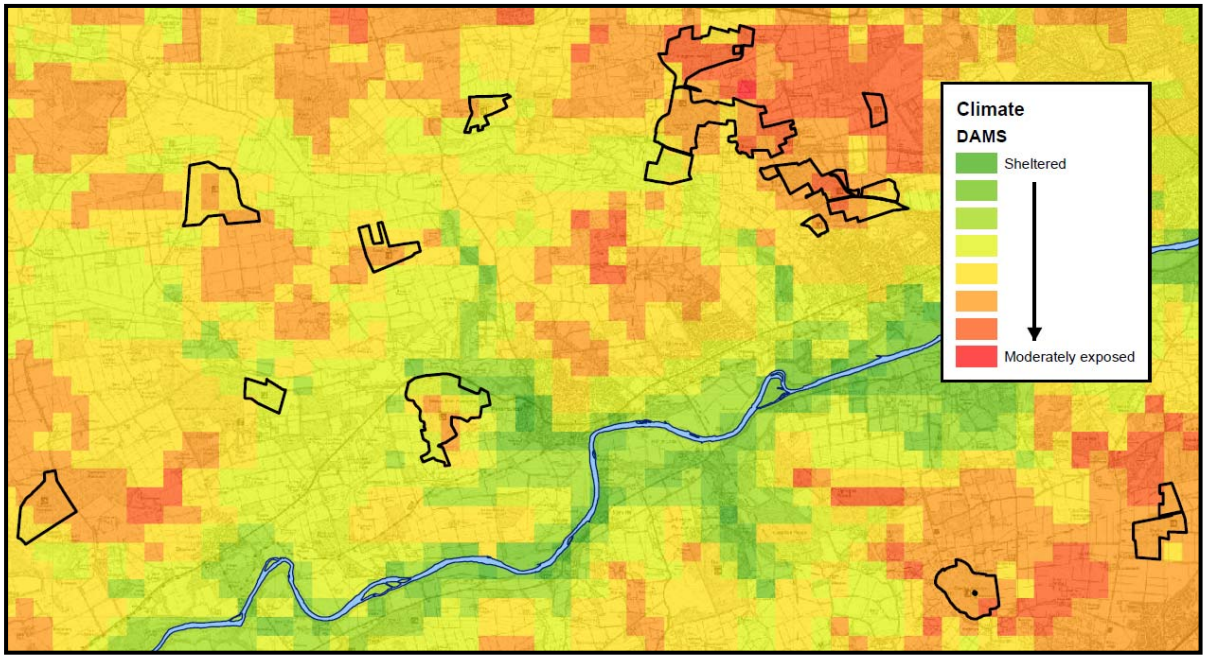
The climate data for the design plan area is obtained from the Ecological Site Classification system (ESC).

The results of interrogating this system gave the following.

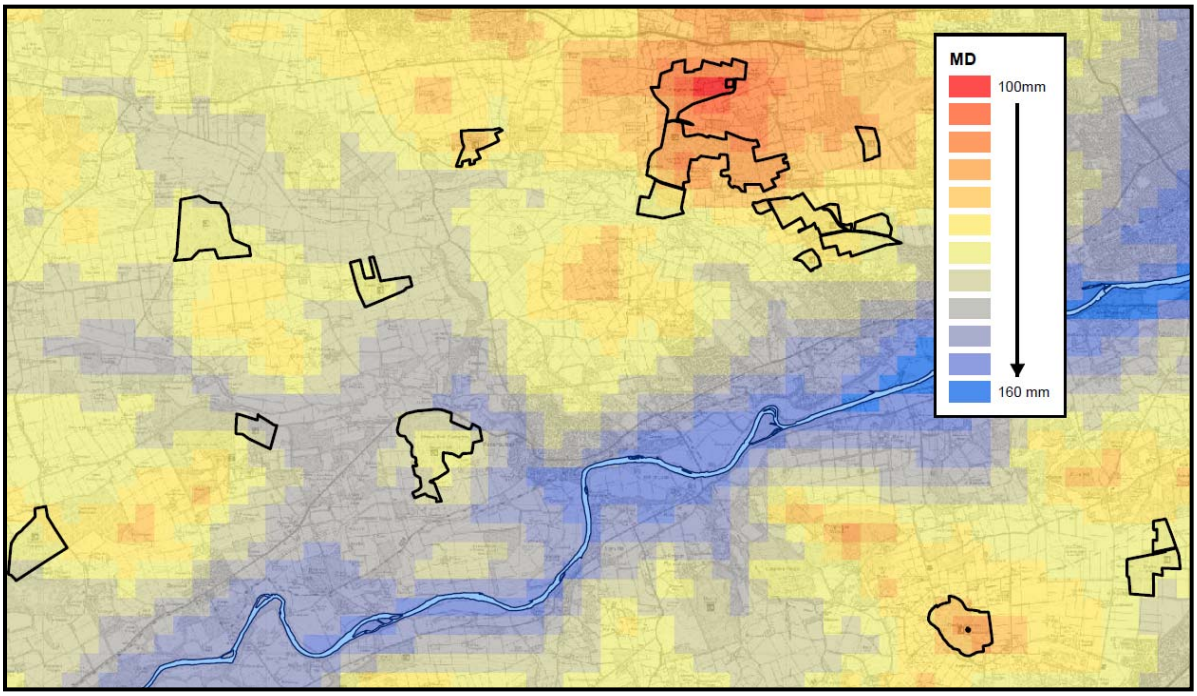
AT5	DAMS	MD
1062 - 1271	8 - 13	103-145
Cool - Warm	Sheltered – moderately exposed	Moist



AT5 is the accumulated total of the day-degrees above the growth threshold temperature of 5º, which provides a convenient measure of summer warmth. The results for AT5 place these blocks in the "cool" and "warm" zones.



DAMS is the Detailed Aspect Method of Scoring. This represents the amount of physically damaging wind that forest stands experience in the year. The value here is between 8 and 13.



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). The value here is between 103mm and 145mm which places all the blocks in the "moist" zone.

These results will be used to help assist in the choice of tree species for restocking in this LMP. Each tree species has tolerances for these and other factors and they will 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.

3.2 Biodiversity and environmental designations

There are two SSSI's adjacent to the woodland blocks. (See aerial photograph in section 3.4.3 below).

The first SSSI is Old Wood of Drum which is an ancient wood. This area has a documented history dating back to the 13th century, and is one of the largest of oak woods in Aberdeenshire. The wood is dominated by oaks, mainly pedunculate oak (Quercus robur), and downy birch (Betula pubescens) with some Scots pine (Pinus sylvestris). A variety of other trees and shrubs are found including rowan (Sorbus aucuparia), wych elm (Ulmus glabra), gean (Prunus avium), holly (Ilex aquifolium) and hazel (Corylus avellana).

The second SSSI is Loch of Park. This is one of the best examples of reedbeds and willow/alder woods in Scotland. It supports extensive willow alder woodland and swamp/fen/reed vegetation. The drier ground contains the largest basin alderwood in Aberdeenshire, together with alder-sallow carr and tall herb fen. The basin is of local importance for breeding birds, particularly for wildfowl and waders.

Other biodiversity issue that will have an impact on the management of these blocks includes the presence of red squirrels. These are one of the six key species identified in the FCS Biodiversity Action Plan. 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 the planning forest operations to minimise damage to red squirrel dreys and populations, including survey work to locate dreys prior to felling operations and the planning of the forest structure and composition to specifically suit red squirrels. Additionally the diversity of habitat that this work will eventually create will be a benefit for many other species.

There are red kites nesting in some of the woods and there are regular sightings of goshawk and peregrines.

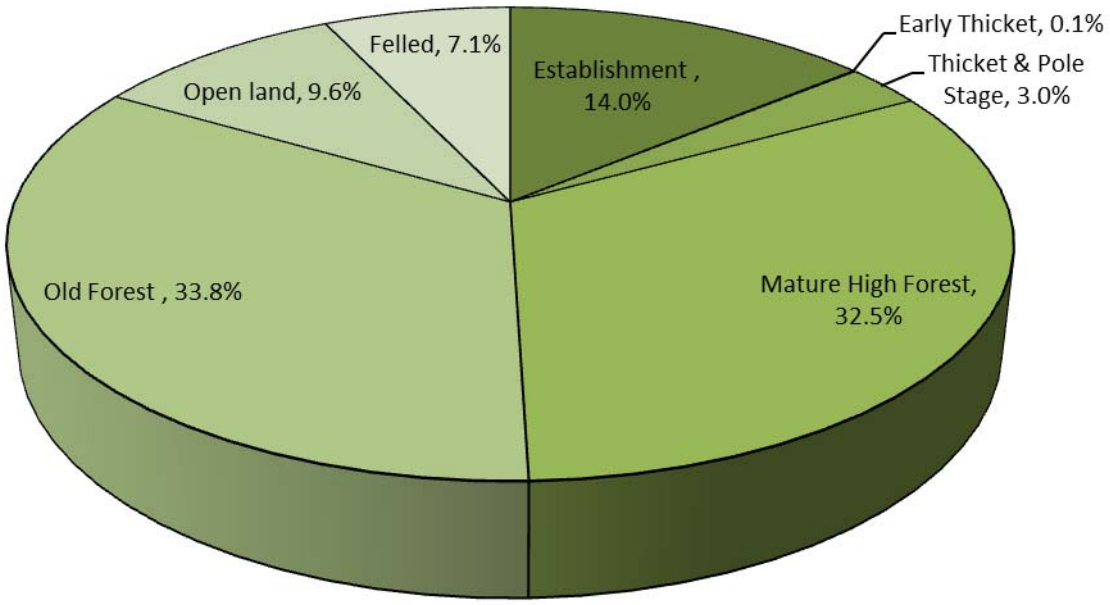
3.3 The existing forest

3.3.1 Age structure, species and yield class

Age Structure

Ages of trees (years)	Successional Stage	Area (ha)	%
0 -10	Establishment	76.6	14.0
11 – 20	Early Thicket	0.4	0.1
21 – 40	Thicket & Pole Stage	16.2	3.0
41 – 60	Mature High Forest	177.4	32.5
61+	Old Forest	184.8	33.8
	Open land	52.3	9.6
	Felled	38.9	7.1

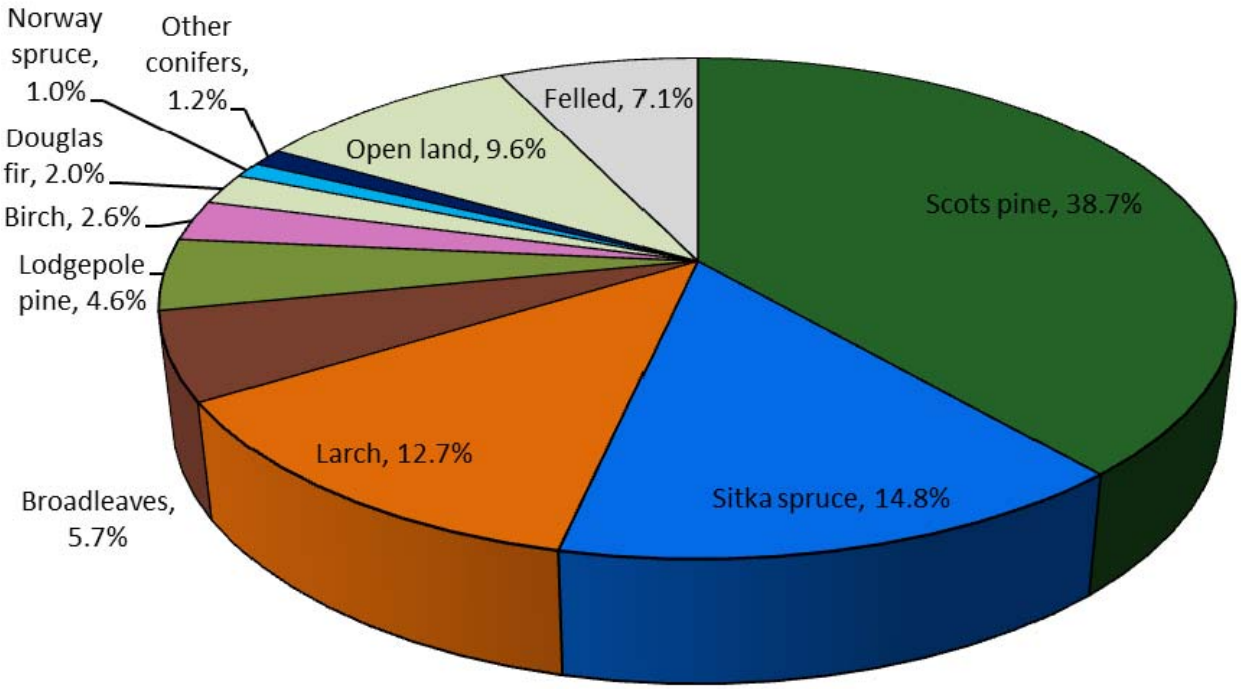
The age structure of the woods is heavily weighted to mature and old forest. This is partly due to the areas of old beech wood and also the mature pine which typically has a normal rotation of 70 -75 years.

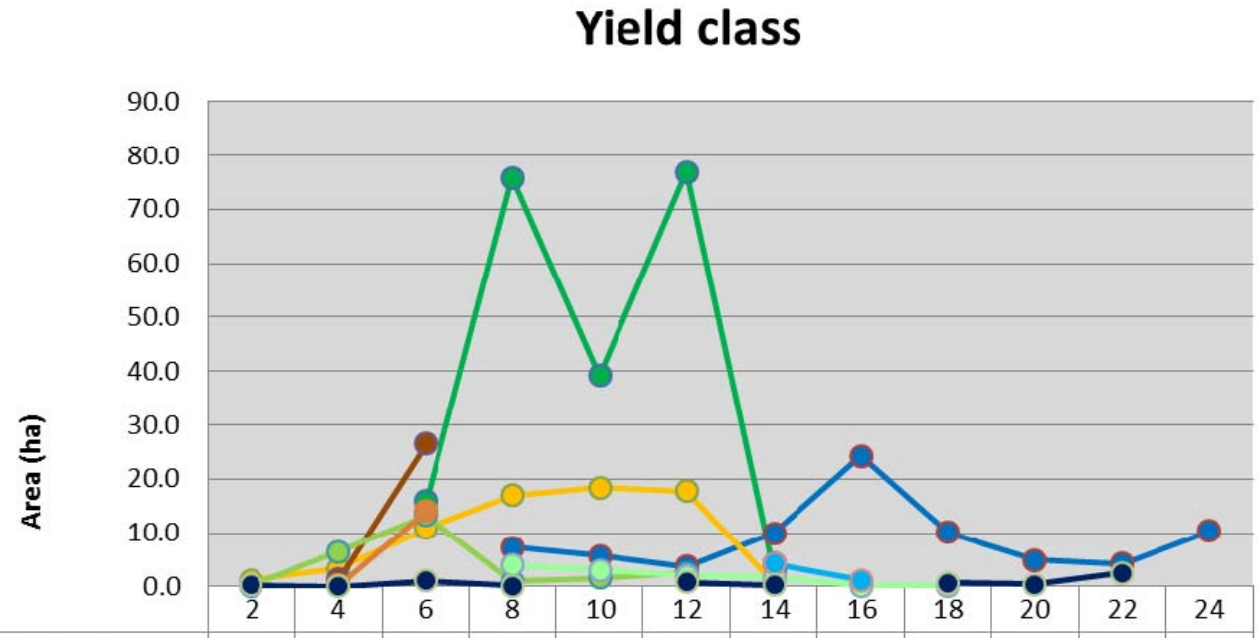


Species

Species	Area (ha)	%
Scots pine	210.7	38.7
Sitka spruce	80.6	14.8
Larch	69.4	12.7
Broadleaves	30.9	5.7
Lodgepole pine	25.1	4.6
Birch	14.4	2.6
Douglas fir	11.1	2.0
Norway spruce	5.4	1.0
Other conifers	6.3	1.2
Open	52.3	9.6
Felled	38.9	7.1

Sitka and Scots pine currently account for just over half the woodland area.





	2	4	6	8	10	12	14	16	18	20	22	24
Scots pine			15.9	75.9	39.2	76.8	2.9					
Sitka spruce				7.3	5.7	3.8	9.9	24.2	10.1	5.0	4.3	10.3
Larch	1.2	3.4	10.9	17.0	18.4	17.7	0.8					
Broadleaves		1.3	26.5				4.5					
Lodgepole pine	0.2	6.5	13.3	1.0	1.6	2.6						
Birch		0.4	14.1									
Douglas fir				4.0	3.1	2.1	1.7	0.1	0.2			
Norway spruce							4.2	1.2				
Other conifer	0.3	0.0	1.0	0.2		0.8	0.3		0.7	0.4	2.6	

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3.3.2 Access

Nearly all the woods front onto public roads and none are far from an A or B class road. They nearly all have suitable loading areas and internal roads and tracks. Very little work is needed to improve access for harvesting operations.

3.3.3 LISS potential

In the existing plan approx 63% of the area is designated for management under Low Impact Silvicultural Systems (LISS).

These management systems are defined as: '… silvicultural systems whereby the forest canopy is maintained at one or more levels without clear felling.'

LISS prescriptions mean that no area larger than 2 ha may be felled at any one time.

The potential for LISS is based on the wind hazard class of the crop, the soil nutrient regime, the suitability of the species to the site and the history of thinning of the site. Currently the issue that is limiting the success of LISS within these blocks is the recruitment of natural regeneration. This could be due to a number of reasons including:

- The current ground vegetation is too dense for natural regeneration;
- The browsing pressure from mammals is too high;
- The existing crop is not old enough to produce sufficient viable seeds;
- The light levels under the crop are not sufficient to allow natural regeneration to develop.

During the planning process all coupes will be assessed for their suitability for continuing to be managed under LISS. Those assessed as unsuitable will be returned to management by clearfell while any coupe not currently designated but thought to have a good potential will be changed to LISS management.

3.3.4 Current and potential markets

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

Material	End product	Percentage
Short roundwood	Chip board, Orientated strand board (OSB), Paper	45
Short log	Pallets & slats	30
Log	Construction	24

The majority (95%) of this production is sold into markets in the north east of Scotland, with little travelling more than 50 miles to the processing facility. There is a high percentage of short Roundwood as quite a few of the blocks are young so there will be significant volumes of small diameter material in first

thinnings. However there are some areas of mature pine and spruce in Countesswells and Kingshill which will produce good log material.

It is expected that some of the pine and larch crops might reach a size and quality that they are suitable to go to niche markets in the future, but there will not be large quantity of this type of material.

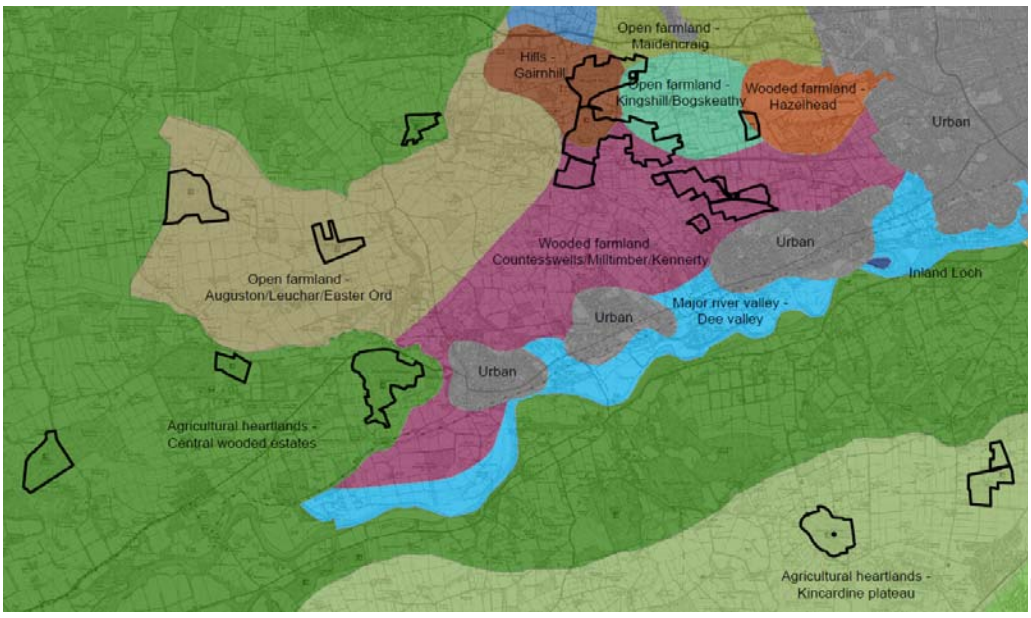
3.4 Landscape and land use

3.4.1 Landscape Character and Value

The visual amenity of the Aberdeen Woods is important as many of the blocks are prominent features in the local landscape.

Scottish Natural Heritage, in partnership with local authorities and other agencies, has carried out a national programme of Landscape Character Assessment (LCA). This programme aims to improve knowledge and understanding of the contribution that landscape makes to the natural heritage of Scotland. It considers the likely pressures and opportunities for change in the landscape, assesses the sensitivity of the landscape to change and includes guidelines indicating how landscape character may be conserved, enhanced or restructured. These assessments are considered during the preparation of all land management plans.

The Aberdeen Woods design plan area is covered by Scottish Natural Heritage LCA No102, South and Central Aberdeenshire and LCA No80, Aberdeen. The map below shows the area each of the woodlands falls into.



Agricultural heartlands – Central wooded estates

The topography of this area varies from broad sweeping valleys and hills to pockets of more confined, small-scale relief. The landscape pattern is one of large open arable fields in some areas with small fields of pasture enclosed by drystone dykes in others. Dense woodlands are a consistent feature.

The aim for this area is to manage broadleaf woodland to conserve a mix of species and resist conifer domination. Conifer plantations enhance the woodland structure but stark geometric shapes can conflict with the more natural shapes of the broadleaf woodland. The planting of broadleaf edges will better reflect the existing broadleaf woods and create a more natural character.

Newmill hill is located in the central wooded estates area of the agricultural heartlands.

Agricultural heartlands – Kincardine plateau

The gentle rolling relief of this area descends gradually from the moors to coastal cliff giving a transition from upland to an intensive agricultural character. Its sloping relief gives many long distance views while the sea has a strong influence on the character of the area.

The transition from upland to coastal edge results in a diverse land cover and a complex landscape pattern that lacks a unified and coherent pattern.

Duffs Hill on the Kincardine plateau of the agricultural heartlands.

Open farmland – Anguston / Leuchar / Easter Ord

This area has a gently undulating topography. There are long distance views north-westwards to Bennachie. The land use is predominantly agriculture, with more pasture than arable. There are few significant boundary or shelterbelt trees, but coniferous plantations are present particularly in the east. Much of the woodland is straight edged, but as this corresponds to the adjacent field boundaries it does not appear incongruous.

View across the open farmland towards Leuchar Moss.

Wooded farmland – Countesswells / Milltimber / Kennerty

The topography of this area is diverse and undulating. It is visually enclosed by rising land or woodland. The landuse is predominantly agricultural, with a mixture of arable and grazing. There is a good deal of woodland present throughout the area. This occurs as coniferous plantations, mixed woodland, clumps, shelterbelts and boundary trees. This contributes significantly to the variety of this landscape.

One of the guidelines for this area is that woodland management should maintain the distinctive variety of woodland in both terms of size and shape.

View across the wooded farmland towards the Dee valley.

Hills – Gairnhill

This area consists of a low, gently rounded hill that is the southern outlier of a ring of high ground to the west of Aberdeen. The lower slopes are generally in agricultural use with the upper slopes devoted to coniferous plantations. The woodland forms a strong contrast with the lower pastoral farmland.

One of the issues raised as having potential to cause landscape change is the management and felling of mature trees which could have a considerable visual impact, but if replanting is carried out this should only be temporary and may increase the diversity of the forest.

Open farmland – Kingshill / Bogskeathy

This area has a raised, gently sloping plateau containing a very shallow basin. The primary landuse is agriculture, a large proportion of which is given over to horse grazing and recreational riding. Paths and bridleways extend into adjoining woodland areas. There are several large-scale coniferous plantations adjoining the area but there are few trees actually within it.

Wooded farmland – Hazelhead

The landform of this area is very gently undulating – almost flat. It is the vegetation pattern that dominates the character of the area, with open areas contained within the surrounding woodland.

Agriculture has a minor role in this landscape. Woodland is the dominant land use which has both scenic and recreational value and is a fundamental resource of the area.

3.4.2 Visibility

Many of the woods are prominent in the landscape either because of their location on higher ground or because they are close to public roads.

Leuchar Moss on higher ground viewed from the B979.

Countesswells wood viewed from the west along the Countesswells Road.

3.4.3 Neighbouring land use

The land uses surrounding most of the blocks is a mixture of open farmland, unimproved marshland and forestry. The main A90 trunk road is close to Duffs Hill and there are also small industrial estates beside Duffs Hill and Clochandighter. Houses and gardens back directly onto many of the woods.

Baads, Newmillhill and Leuchar Moss Woods are surrounded on all sides by a mixture of arable farmland and grazing land. A mixture of conifer plantation, deciduous woodland (Loch of Park SSSI) and farmland bound Collonach. Drum Wood is adjacent to the Old Wood of Drum SSSI (Native Oakwood) and Drum

Castle and Garden which includes policy woodlands and mixed conifer plantations, with the remainder being farmland.

The land uses surrounding the Peterculter Woods are a mixture of arable farmland, grazing land and woodland (coniferous plantation and semi-natural woodland). Collonach is neighboured by the Loch of Park SSSI, which has one of the largest Alder woodlands and reed beds in the region. These two woodlands are therefore sensitive to change, where forest operations could impact on the site conditions of the SSSIs.

The southern block of Foggieton backs onto Cults with houses and gardens up the woodland edge. Hazelhead nestles between the golf course and open farmland.

There is a small parcel of land within Kingshill Wood that is owned by Scottish Water. This land comprises a reservoir from which water mains run out through the wood. Wayleaves are required to protect the pipelines.

The plan aims to improve the transition from farmland to conifer plantation, complement the objectives of neighbouring landowners and take into account the shelter and protective quality that these woods have.

Areas of existing semi-natural habitat are fragmented. Opportunities exist to increase broadleaved and wet woodland to create transition zones and links between, for example, the coniferous woods and the townships south of the Foggieton block and the birch woodland to the south of Rotten O' Gairn.

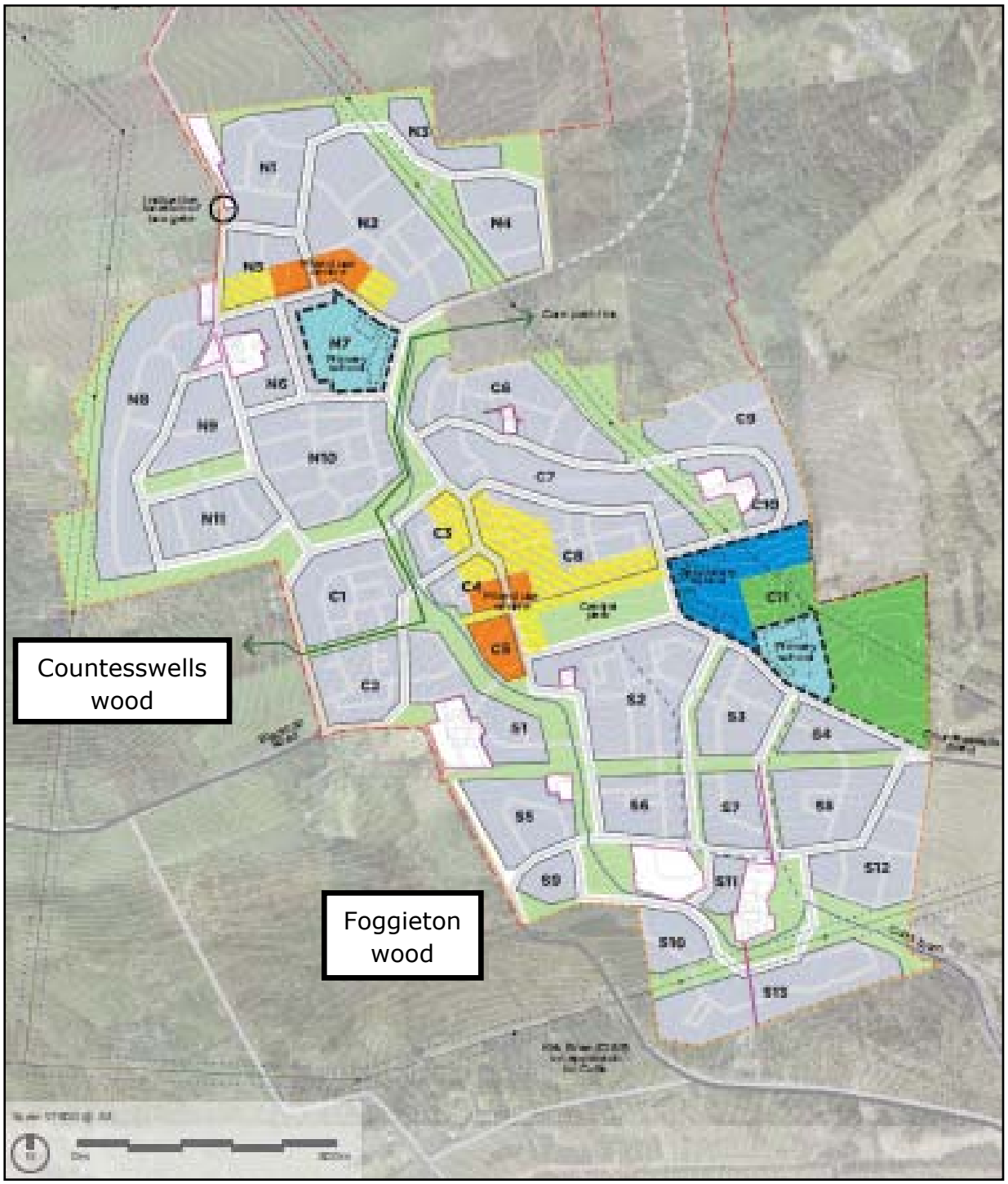
There are many locations where mature conifers planted close to the woodland boundary throw deep shade onto farmland to the north.

In October 2014 a planning permission in principal was considered by Aberdeen City Council for an extensive development at Countesswells. The planning application is for "a residential led mixed use development comprising of;

- 3000 houses;
- a town and neighbourhood centre (including commercial, retail and leisure uses);
- approximately 10 hectares of employment land;
- community facilities;
- open space;
- landscaping; and
- supporting infrastructure including access."

This development is located adjacent to Countesswells and Foggieton woods (see map below). The number of houses proposed (3000) and the direct access connection into Countesswells woods means this development has the potential to have a huge impact on the number of visitors to the woodlands. This increase in visitors may have an effect on how forestry operations can be safely undertaken and also the need for additional infrastructure to accommodate the numbers involved.

However at this stage of the planning process there is no guarantee that the development will take place in the form proposed or even happen at all. Therefore this information has simply been noted but the proposed management of the woodlands involved has not been changed. As the development plans progress and they are finalised we may require amendments to this plan to address the issues and opportunities created.



3.

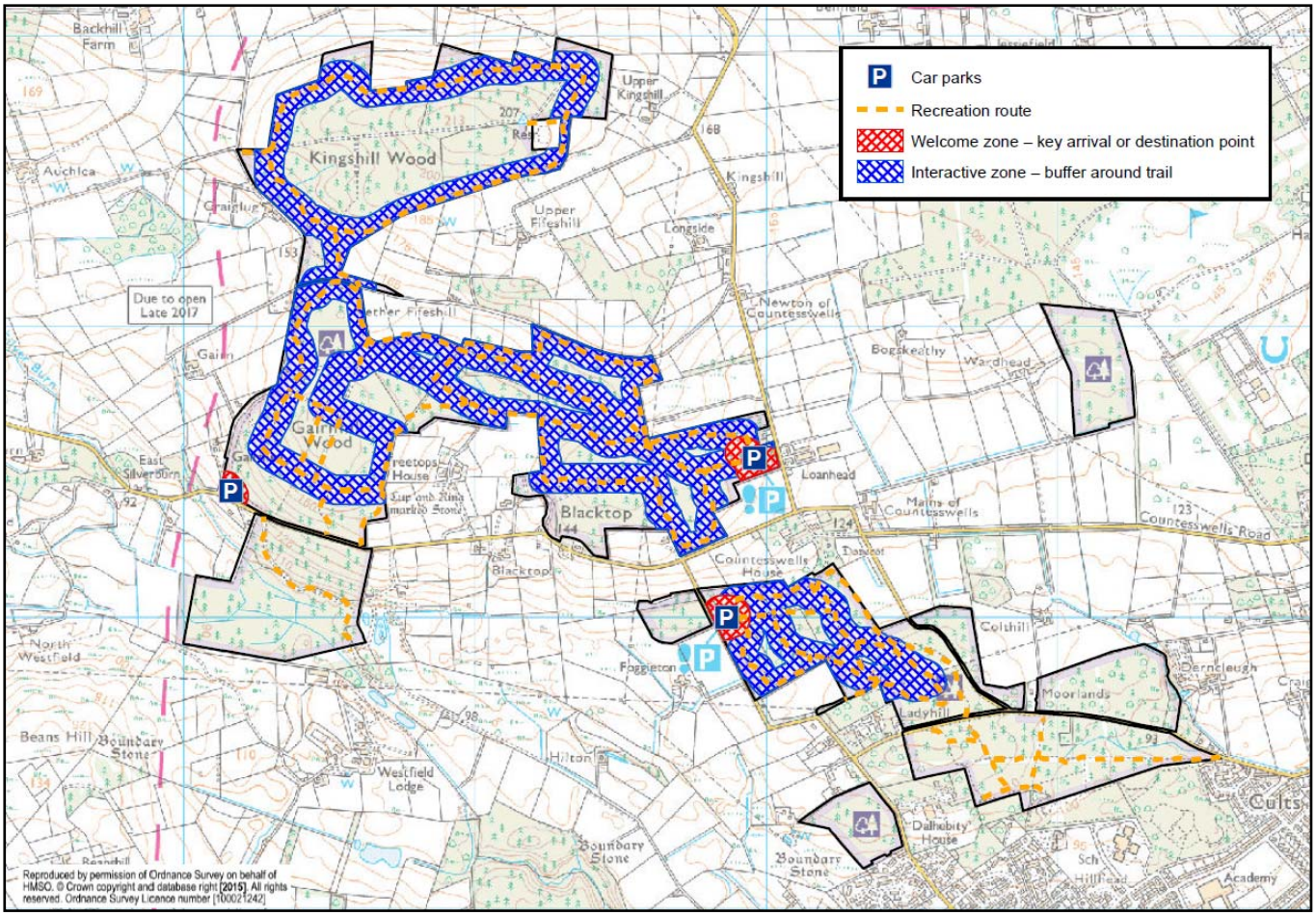
3.5 Social factors

3.5.1 Recreation

Public access provision is mainly focussed on the Countesswells wood. This is close to a large local population and the woods are large enough to accommodate an extensive network of paths and car-parks. Many of the paths are way-marked and some interpretation is provided.

Local walkers and horse riders frequently use a formal and informal network of paths, incorporating the forest roads, in Oldman Wood and Countesswells. Recreation provision and maintenance is of high priority in Countesswells Wood given its proximity to Aberdeen. There are currently footpaths provided from the Rotten O' Gairn, Foggieton and Countesswells car parks and these are all heavily used. On average approximately 67,000 cars visit the car parks each year and this relates to approximately 110,000 people per year. The Countesswells car-park is the most heavily used Forestry Commission car-park in Scotland.

The other main users of Countesswells Woods are horse riders. There are approximately five stable yards in the immediate vicinity. Use of the horse trails is heavy and this combined with poor drainage and lack of light reaching some tracks means that some of these tracks are very boggy.



The visitor experience of the forest depends on the intimacy of the landscape and the stage of their journey. Therefore the forest is split between three zones that are frequented by visitors. These are:

- **Welcome zone** – the “arrival” point and associated access, parking and immediate backdrop. The “high impact” zone and our shop window.

- **Interactive zone** – a 50m buffer either side of a designated facility or well-used informal route. What the visitors directly experience whilst using our facilities.

3.5.2 Community

There is a strong public use of the forests from Aberdeen and the surrounding towns. Despite this heavy public usage there is currently no expressed desire to become involved in the planning and management of the woodlands. Countesswells is the only block adjacent to a town or settlement where the local community has a sense of 'ownership'.

3.5.3 Heritage

There are two Scheduled Monuments in the plan area, both are in Leuchar Moss.

The first is Easterhill hut circles which comprises of the remains of seven hut circles and a field system likely to be Late Bronze Age or Iron Age in date. The field system includes rig-and-furrow, cairns, stony banks and at least one lynchet.

The second is Benthoull croft cairn which is a monument measuring 11.5m in diameter and 1m in height above the modern ground surface. It has a depression in the top which, it is surmised, is the result of antiquarian excavation. It is thought to be a burial cairn which come in many different shapes and sizes and usually date from the Bronze Age (c. 2,300 BC – 800 BC).

In addition there are 21 other features of heritage value within the woods that are not scheduled. A check of both internal records and the SMR has been undertaken to establish the location of these features. The details of these will be included in the work plan that is drawn up for every operation carried out within the plan area.

Drum wood is within the Drum Castle and Garden Designed Landscape, which defines the 'landscaped park' of Drum Castle. This is an impressive 18th century landscape setting for the category A-listed Drum Castle, containing an oak wood dating back to the 1500s.

Care will be taken to preserve all archaeological features identified on site and the Forests and Historic Environment Guidelines will be followed at all times.

3.6 Pathogens and diseases

3.6.1 Hylobius

Hylobius can cause extensive feeding damage to young trees used to restock clearfell sites but damage is often highly variable. Previously it has not been possible to predict damage and so insecticides have been routinely used to protect the trees to try to safeguard the young crop. However on clearfells where Hylobius numbers are low this treatment may be unnecessary and conversely when numbers are very high the treatment may be unable to protect the trees. Both of these situations result in losses in valuable resources.

3.6.2 Dothistroma needle blight (DNB)

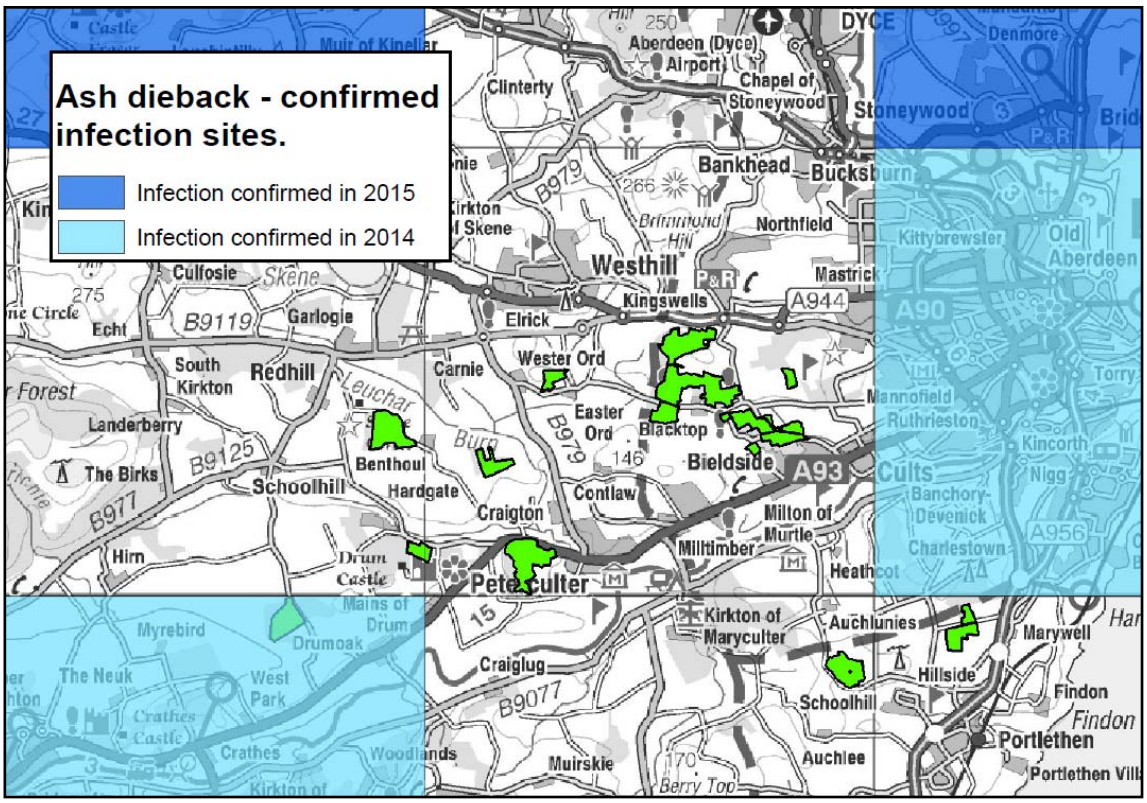
Dothistroma needle blight is a fungal pathogen affecting the woods within Moray & Aberdeenshire forest district. It is present within Aberdeen woods but at a low level currently.

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

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

3.6.3 Hymenoscyphus fraxineus (previously Chalara fraxinea)

Ash dieback is an aggressive fungal disease and is caused by Hymenoscyphus fraxineus (previously Chalara fraxinea). The disease causes leaf loss and crown dieback in affected trees, and usually leads to tree death. Ash trees suffering with the infection have been found widely across Europe since trees believed to have been infected with this newly identified pathogen were reported dying in large numbers in Poland in 1992. These have included forest trees, trees in urban areas such as parks and gardens, and also young trees in nurseries. The map below shows the confirmed infection sites based on the OS 10km grid squares and is based on information obtained of 1 Feb 2016.



3.6.4 Phytophthora ramorum

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

Although European and hybrid larch are also susceptible to P. ramorum, current evidence indicates that the impact of the disease is greatest on Japanese larch

which can die within one to two seasons, with consequential economic, environmental and amenity impacts. The disease on larch showed a significant expansion in 2013 with a core area of some 5-6000 ha of larch within South West Scotland showing extensive signs of infection. Further, smaller and more sporadic infections have also been identified along the western seaboard of Scotland principally in the Argyll and Cowal areas. There have also been four isolated outbreaks in the north east of Scotland but none within the Aberdeen woods plan area to date. The total infected area within Scotland is estimated to be now in excess of 6,500 ha.

3.7 Statutory requirements and key external policies

This Land Management Plan has been drafted to ensure that planning and operations functions comply with the following legislation and policies:

Biodiversity
- Conservation (Natural Habitats) Amendment (Scotland) Regulations 2007
- Nature Conservation (Scotland) Act 2004
- Wildlife and Natural Environment (Scotland) Act 2011
- Land Reform (Scotland) Act 2003
- The Water Environment and Water Services (Scotland) Act 2003
- Water Environment (Controlled Activities)(Scotland) Regulations 2011
- UK Woodland Assurance Standard 2008
- UK Forestry Standard 2011 – Forests and biodiversity, Forests and water
- Deer (Scotland) Act 1996

Climate Change
- The United Nations Framework Convention on Climate Change
- The Kyoto Protocol
- EC Directive 2003/87/EC
- Climate Change (Scotland) Act 2009
- UK Forestry Standard 2011 – Forests and climate change

Historic Environment
- Ancient Monuments and Archaeological Areas Act 1979
- Planning (Listed Buildings and Conservation Areas)(Scotland) Act 1997
- Treasure Trove Scotland
- UNESCO World Heritage Convention
- European Convention on the Protection of the Archaeological Heritage Valetta 1992
- UK Forestry Standard 2011 – Forests and historic environment

Forests & People
- Control of Substances Hazardous to Health Regulations 2002
- Employers Liability (Compulsory Insurance) Act 1969
- Equality Act 2010
- Gangmasters (Licensing) Act 2004
- Health and Safety at Work Act 1974
- Management of Health and Safety at Work Regulations 1999
- Occupiers' Liability (Scotland) Act 1960

- Provision and Use of Work Equipment Regulations 1998
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995
- The Highways Act 1980
- UK Forestry Standard 2011 – Forests and people, Forests and landscape

Soils

- Control of Pesticides Regulations 1986
- The Waste Management Licensing Regulations 1994
- European Soil Charter
- UK Forestry Standard 2011 – Forests and soil

4.0 Analysis and Concept

Refer to Map 4: Analysis and concept.

Issue	Analysis	Concept
Timber production	The forest produces a sustainable supply of quality timber from thinning, clearfelling and LISS operations.	Restock felled areas with species appropriate to the site conditions and that will continue to produce a sustainable supply of timber in the future. Unless other objectives are of a higher importance for a site.
Community engagement	Local communities are the main users of the forest though they show little interest in having a high level of involvement in the planning process.	Continue current level of involvement with the various user communities to maintain their interest in the area. Include both statutory and non-statutory consultees during the planning process.
Recreation	Existing facilities serves a wide range of users.	Maintain the provision at its current level and standard and improve facilities as resources allow.
Species & habitats	There is good potential to improve biodiversity value to benefit priority species such as red squirrel.	Develop permanent habitat networks of biodiversity value. Consider the needs of priority species while designing and managing the forest and comply with appropriate regulations and action plans.

5.0 Forest Design Plan Proposals

5.1 Management

Refer to Map 5: Management.

5.1.1 Thinning

Wherever possible the district will continue to maximise the area managed through thinning. The FES 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;
- The area is out with the thinning window;
- The basal area of the crop does not meet the required level;
- Thinning is unlikely to improve poorly stocked or poor quality crops.

Within Aberdeen woods, in addition to the conifer crops, suitable stands of broadleaves will be thinned. Broadleaf areas will be managed with the objective of being productive. Productivity for these areas could range from the production of quality timber through to fuel wood.

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

The blocks are split into thinning coupes, which will be worked on a 5 year cycle (this may vary in Continuous Cover areas, see detailed prescriptions). See Map 6 – Thinning.

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

5.1.2 Clearfell

The main silvicultural system employed in British forestry is 'patch' clear-felling followed by restocking by planting or, occasionally, natural regeneration. There will be areas of woodland in the plan area stocked with fast growing conifers on soils which are not considered suitable for LISS. In order that the timber in these areas are harvested before the onset of windblow clearfell will remain the appropriate silvicultural system.

Although clear-felling can appear to have a negative impact on landscape and habitat it is still an important management system. To a degree it mimics the natural disturbances caused by natural processes such as fire or windblow in a forest. It 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 replanting also creates transient open habitat that is exploited by several species such as voles, deer and raptors.

This will continue to the main silvicultural system employed in Aberdeen Woods. The scale of clearfells will be in keeping with the scale and topography of the local landscape.

Some of the area currently identified as LISS will be converted back to clearfell in the next rotation as species more appropriate to the site conditions are planted at restocking.

5.1.3 Low Impact Silvicultural Systems (LISS)

Refer to Map 8: LISS coupes.

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

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

In the existing plan just over 353ha were selected for LISS management. While reviewing these coupes many factors were taken into consideration:

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

Following the consideration of the above factors the total area of LISS in this plan has been decreased to 204ha. The main reason for this is that LISS management is not the best system to use to meet the primary objective set for the coupe. See Map 8 LISS coupes for the locations of the LISS areas.

The preferred restocking method is by natural regeneration. The limiting factor to a wider adoption of LISS across the plan area is the stability of the existing crops in the face of potential windblow. The crops have not been thinned with LISS objectives in mind and any attempt to convert them at this late stage in their rotation is unlikely to be successful as there is insufficient time to create a stable crop of large crowned trees to provide a reliable source of seed. Additionally many of the sites have a dense ground vegetation layer that makes natural regeneration less likely to be successful. Therefore any attempt to use LISS is unlikely to produce a fully stocked, fairly regularly spaced, next rotation of trees. Therefore this is not the most appropriate management system in the areas where the production of a quality timber crop is the primary objective.

The areas retained in LISS management include areas around the main recreation facilities as these will benefit most from the positive aspects of LISS management. That is, less visual disturbance and the creation of a more diverse species and age structure. The reduction of the overall LISS area allows resources to be concentrated on the areas where they are going to have the greatest impact. For instance if restocking by natural regeneration is not successful then replanting can be undertaken at a scale that can be successfully managed with the resources available.

All areas identified for restocking by natural regeneration have been recorded and programmed for inspect on a five yearly basis. At each inspection and assessment will be made to establish if the natural regeneration is or is likely to

achieve the objectives for the site. If it is decided that the objectives are not being met then replanting with an appropriate species will be undertaken. If natural regeneration is occurring but not yet at the required density then the option to review the site in a further five years may be taken. If after two such inspections, that is ten years following felling, it is felt appropriate to wait a further period for natural regeneration then a discussion and agreement will be reached with the Conservancy woodland officer.

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

A prescription for each of the LISS coupes has been prepared and is included in Appendix 3 with additional general information on LISS management in Appendix 4.

5.2 Future habitats and species

Refer to Map 7: Future habitats and management.

5.2.1 Restocking

The choice of restock species in this plan has been guided by the ESC results for this climatic area and soil types. This has in fact limited the species choice in some areas due to the "very poor' soil types with low fertility. However in areas where more choice is available efforts have been made to select as wide a range of species as possible to create a diverse woodland rather than a more limited species mix, with potentially more susceptibility to pathogens such as DNB.

One aim of restocking will be to create diverse habitat networks within the forest by linking riparian zones and existing broadleaf areas with additional broadleaf planting and open space. The aims of these networks is to:

- break up the conifer blocks;
- bring structural, species and visual diversity;
- protect watercourses from operations on the adjacent land;
- improve the biodiversity value of the forest by creating natural corridors for species migration;
- enrich the water ecosystem with falling leaf litter.

The establishment and management of these areas will involve:

- maintaining and protecting existing broadleaf areas both beside watercourses and within the wider forest during felling operations;
- maintaining a mixture of native broadleaves and open space (up to 80% open space);
- removing conifer regeneration when it exceeds 20%;
- maintaining deadwood.

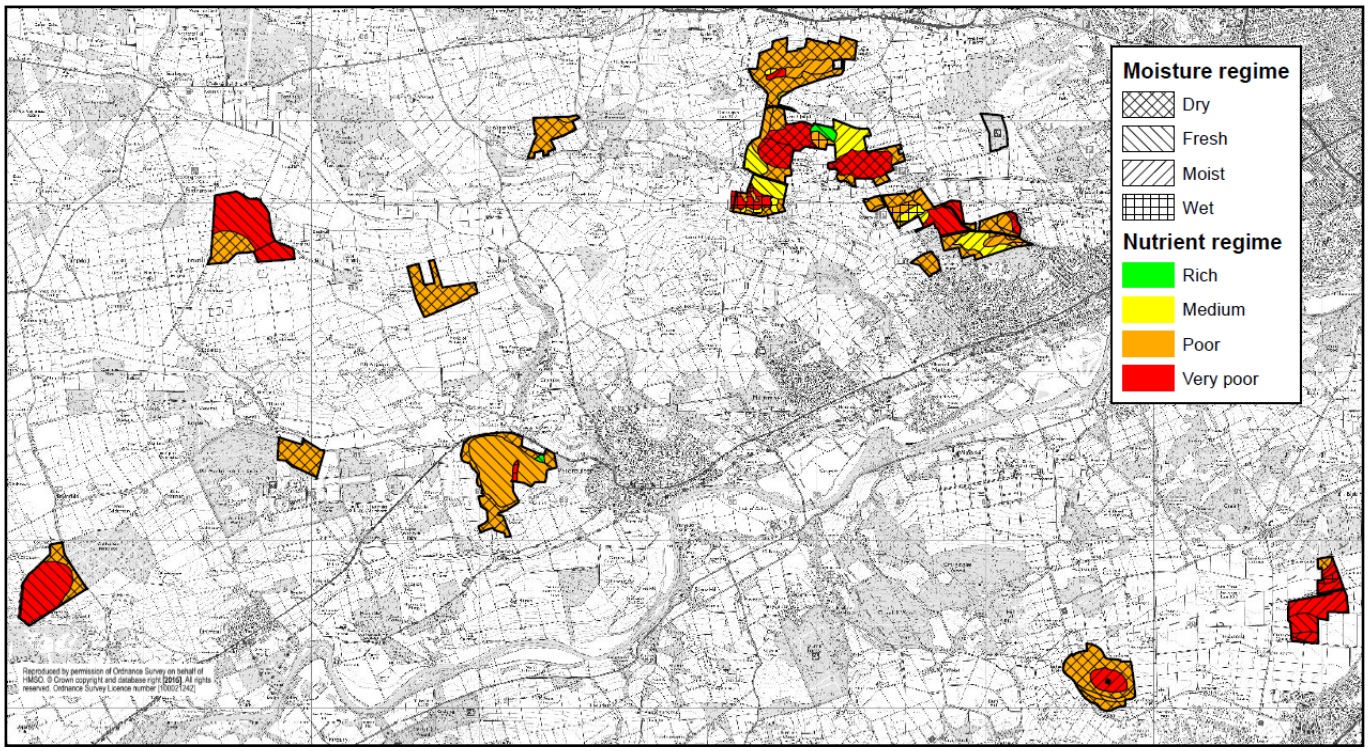
Where appropriate and the site conditions allow, broadleaves will be planted and managed to be productive. Growing broadleaves as a commercial crop requires a long term commitment. Higher establishment costs are inevitable. However the approach will be introduced into Aberdeen woods not only for the economic benefits (high demand for hardwoods) but also due to the environmental advantages (wood fuel, alternative for replacing conifers struggling with diseases, support for unique fauna and flora species).

Areas suitable for growing productive broadleaves have been identified within the forest. See map 7 – future habitats and species.

To be successful the general prescription will be:

- undertake the appropriate ground preparation;
- choose good quality planting material of the best available provenance;
- select the appropriate planting density;
- undertake appropriate weed control;
- undertake appropriate protection from mammals such as voles, rabbits and deer.
- provide the necessary attention in the early stages of stand development to increase the value of the final crop. Operations to be considered will include respacing, early thinning and pruning.

The species choice for restocking is directed by the ESC decision support system. Due to the soil nutrient regime being "poor" or "very poor" in many of the blocks (see map below) the choice of species is more limited if the objective of producing a quality timber crop is to be achieved.



Areas of broadleaved woodland have potential to become commercially productive woodland provided the site and access is appropriate. If resources

allow, commercial management operations, including the coppicing of birch and other appropriate broadleaves for fuelwood, thinning and high pruning of broadleaves to create potential future niche market products may be carried out. Therefore restocking will be undertaken to achieve a spacing that will allow this management to be undertaken.

Management of Open Land & Non Commercial Areas

Areas not suitable for commercial management include broadleaved woodland that is not able to be managed productively along with open habitats. These areas will require monitoring to ensure they deliver the required objectives. Non-desirable species, such as non-native conifer regeneration, will be removed if it threatens to prevent the objective of the area being met.

Areas designated as permanent open space have been chosen to aid public access; to help diversify the woodland edges; to enhance riparian areas and complement areas of broadleaves; to protect archaeological features or where there are other biodiversity benefits.

Experience so far shows that much open ground will become dominated by gorse, bracken or broom. It is prohibitively expensive to fight against this natural process so it is accepted that 'open ground' means an absence of trees rather than an area with only short ground vegetation.

Regular harvesting will create a network of transitional open space between the felling and establishment operations. These will provide suitable habitat for several species. Bare land though will not be counted towards the open ground requirement.

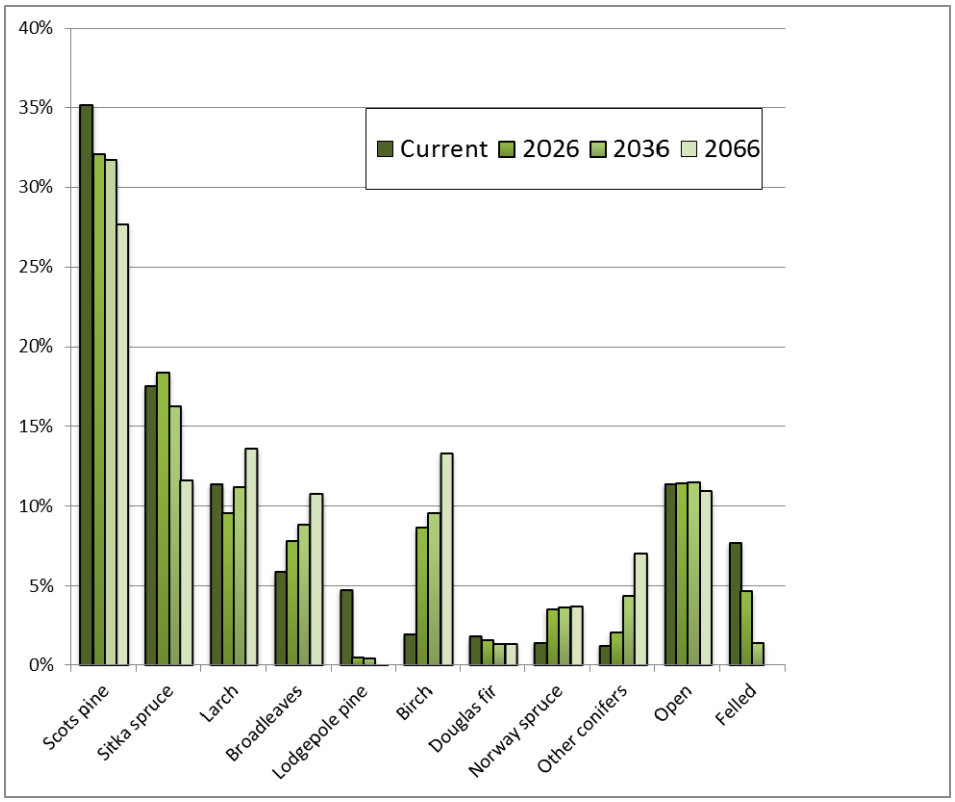
Easterhill hut circle SM requires monitoring of the condition of the monument and ensure the removal of all intrusive scrub vegetation and regeneration. If required, clearance will occur at least once every five years. All scrub vegetation and naturally regenerating trees on and around the upstanding structures will be cut off at ground level using appropriate hand or power tools and removed. Where necessary the cut roots of invasive vegetation will be poisoned with an appropriate herbicide.

Around Benthoull croft cairn any forestry operations will be planned and organised to avoid any damage to the monument. Any regeneration occurring on or within 10m of the scheduled area will be removed. All tree-felling and timber extraction operations in the vicinity will be carefully planned to ensure that

damage to the monument is avoided and best working practice is exercised at all times. If required, clearance will occur at least once every five years. All scrub vegetation and naturally regenerating trees on and around the upstanding structures will be cut off at ground level using appropriate hand or power tools and removed. Any burrowing animal infestation will be monitored and appropriate remedial action undertaken.

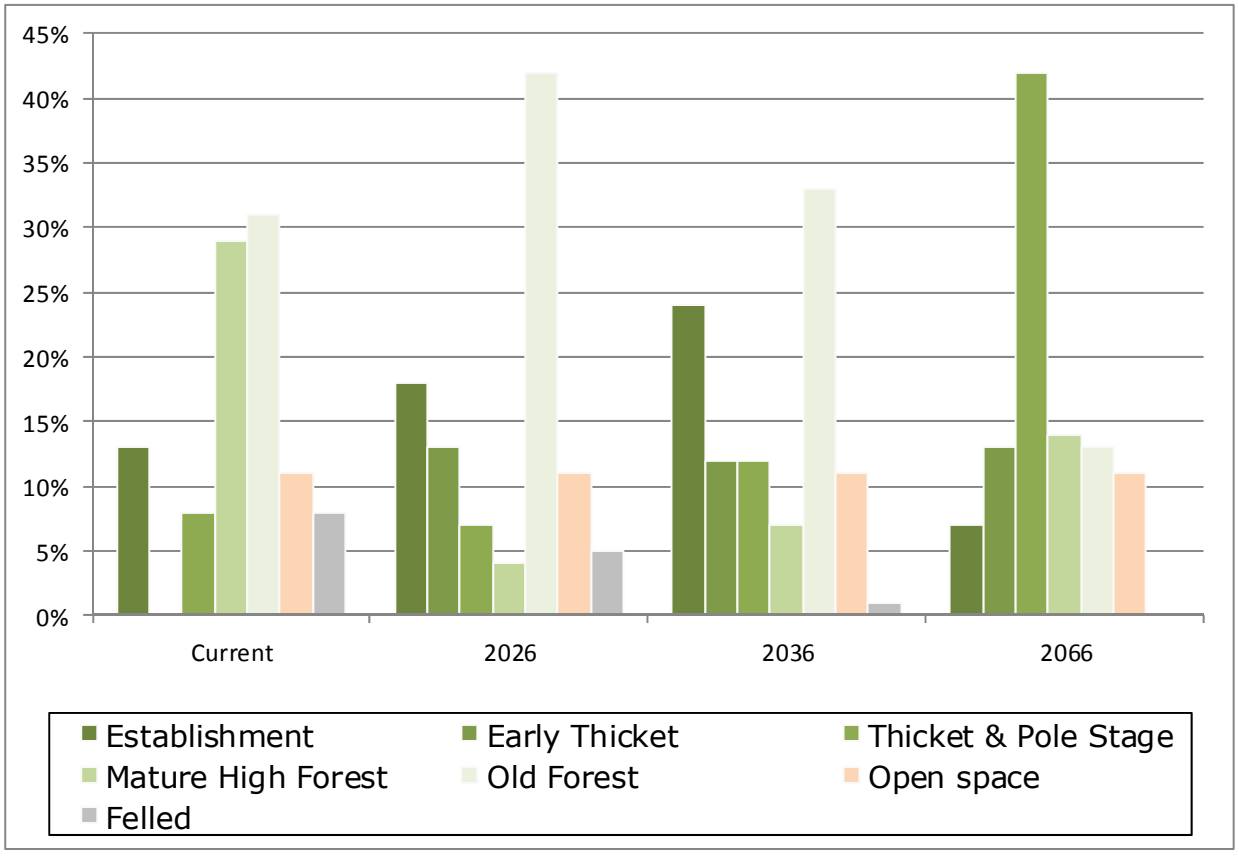
5.3 Species Tables

Species	Current distribution 2016	Projected distribution 2026	Projected distribution 2036	Projected distribution 2066
Scots pine	35%	32%	32%	28%
Sitka spruce	18%	18%	16%	12%
Larch	11%	10%	11%	14%
Broadleaves	6%	8%	9%	11%
Lodgepole pine	5%	0%	0%	0%
Birch	2%	9%	10%	13%
Douglas fir	2%	2%	1%	1%
Norway spruce	1%	3%	4%	4%
Other conifers	1%	2%	4%	7%
Open	11%	11%	11%	11%
Felled	8%	5%	1%	0%



5.4 Age Structure

Age of Trees (years)	Successional Stage	Current distribution	Projected distribution 2026	Projected distribution 2036	Projected distribution 2066
0 -10	Establishment	13%	18%	24%	7%
11 – 20	Early Thicket	0%	13%	12%	13%
21 – 40	Thicket & Pole Stage	8%	7%	12%	42%
41 – 60	Mature High Forest	29%	4%	7%	14%
61+	Old Forest	31%	42%	33%	13%
	Open space	11%	11%	11%	11%
	Felled	8%	5%	1%	0%



5.5 Deer Management

Wild deer are managed in accordance with the 2014 Deer Management on the National Forest Estate, current practice and future directions document.

The strategy takes recognition of the fact that Wild deer are an asset, an integral part of Scotland's biodiversity and provide healthy food and recreational opportunities. The challenge of managing wild deer originates in a need to balance the environmental, economic and deer welfare objectives of the Scottish nation with the objectives of private landowners for forestry, agriculture, sporting and other forms of land use.

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

It is therefore FCS deer policy to:

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

All deer management will be carried out in accordance with Operational Guidance Booklet 5 – Deer management.

The cull for Aberdeen woods is undertaken by a contractor. It is for roe deer only and the number of deer culled is currently stable. In 2008/09 52 deer were culled, in 2014/15 the cull was 43 and in 2015/16 it was 47. Taking the cull in this area is very difficult due to the very high recreation pressure. This means that only the very early morning is available for safe culling. Additionally night shooting does not take place in these blocks due to the proximity of settlements and individual residences.

The current cull level is sufficient to allow natural regeneration to become established to meet the objectives for the LISS areas of the plan. Given the very high recreation

pressures the prescription for the majority of the LISS areas is simply to maintain a woodland cover that allows the use of the woods for recreation to continue. There is no requirement to achieve a prescribed mix of species of natural regeneration which allows a higher deer population to be accepted than would be appropriate in other locations where the objective is to grow quality timber.

5.6 Access

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

5.7 Pathogens

Hylobius weevil 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 clearfells where *Hylobius* numbers are low this treatment may be unnecessary and conversely when numbers are very high the treatment may be unable to protect the trees. Both of these situations result in losses in valuable resources.

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

In common with the majority of Forest Enterprise Scotland estate, most restocking in the design plan area has traditionally taken place within two years of sites being clearfelled. However, many seedlings were badly damaged or killed by the Large Pine Weevil, *Hylobius abiatis.* This species lays its eggs in deadwood/stumps on clearfell sites and the emerging adults feed on the bark of young trees, often with devastating effect on newly planted conifer crops.

Due to the expected high level of Hylobius and the adopted policy for environmental management to "reduce the use of Insecticides where feasible" restocking is planned to take place at the end of year 4. Restocking may take place before then if monitoring, using the Forest Research Hylobius Management Support System, shows that it is safe to do so.

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 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 the infected crop will allow us to prioritise the harvesting of such areas.
The following scale and categorisation has been developed by Forest Research.

Needle retention (years)	Defoliation (%)	Mortality %		
		<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

This has led to the following action plan for dealing with Dothistroma Needle Blight 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 land management plan will be required as specified in the tolerance table for felling such areas;
- reassess badly affected blocks and consider if a full review of the land management plan is required;
- planting programs will need to be amended to include replacement species suitable for the site.

Specific measures within this plan area to reduce the impact of DNB include heavy thinning and the removal of Lodgepole Pine (which is particularly vulnerable). Even with these measures the volume production of pine stands may be uneconomic, although these actions may maintain a pine element for amenity purposes. The costs associated with these measures include lower volume production, lower timber quality and higher costs.

5.8 Critical Success Factors

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

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

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

- Maintain or expand the population of red squirrels in woods that are free of grey squirrels.

- Control of deer populations to allow natural regeneration within LISS areas.

Appendix 1 – Consultation record

Consultee	Date contacted	Date response received	Issue raised	Forest District Response
Aberdeenshire council – Infrastructure services	20/06/2013 by email			
Aberdeen City council – Enterprise, planning & infrastructure	20/06/2013 by email	05/07/2013	See copy of response below.	
Aberdeenshire archaeology service	20/06/2013 by email	21/06/2013	Details of archaeological sites provided.	Details provided cross checked with GIS heritage layer.
SNH	20/06/2013 by email			
SEPA	20/06/2013 by email			
RSPB	20/06/2013 by email			
Crathes, Drumoak & Durris community council	20/06/2013 by email			
Westhill & Elrick community council	20/06/2013 by email			
Culter community council	20/06/2013 by email	08/07/2013	See copy of response below.	
North Kincardine community council	20/06/2013 by email			
Craigbuckler & Seafield community council	20/06/2013 by email			
Cults, Bieldside & Milltimber community council	20/06/2013 by email			

Aberdeen City Council – response to initial consultation.

The proposed Aberdeen woods sites are a part of the Aberdeen Green Space Network (GSN). Aberdeen Green Space Network is a strategic network connecting various habitats and species, urban and rural green spaces to each other and the communities around them. It offers a wide range of social, health economic and environmental benefits.
Aberdeen's Green Space Network is identified in the Local Development Plan (Policy NE1) explains how the green space network will be protected and enhanced through the planning process. The basic purpose of GSN is to protect, promote and enhance designated natural heritage sites, connectivity between habitats, open spaces and opportunities for physical activity and access to the outdoors. It also takes into account climate change adaptation opportunities and flood risk or alleviation, the distribution of existing open spaces and their relationship with communities, development opportunities, health and deprivation information and transport issues.

Kingshill
The Kingshill wood forms site 37 of the Green Space Network. The site is classified as a Core category supporting native pine and other coniferous woodlands, priority habitat. There are water bodies recorded in the area and the surrounding area. Towards the Peterculter Burn the area has been identified as at risk of flooding. SNH ancient and semi-natural woodlands are recorded on the site which increases the importance of the site.

There are paths mainly within woodland area, and there is demand for links to north. High level of use by pedestrians, cyclists and horse riders. AWPR passes to western edge of site. Localised flooding is recorded in the past. Any future management of the site should consider these interest and the likely risks of flooding.

Countesswells
The Countesswells Woods lies towards the south of the GSN site no. 41 and forms core category. The major habitat types are mixed pine, broadleaved and scrub woodlands, and locally important habitat. The site has a good biodiversity value supporting various species and habitats. SNH ancient and semi-natural woodlands are recorded on the site.

The site is very popular for horse riding, walking, running and cycling. Water bodies are also recorded in the area. There are opportunities to enhance paths and signage. There was a path link created in 2010 by Aberdeen Greenspace

linking to Hazlehead. The AWPR passes to western edge of site. The eastern edge of the site is an Opportunity Site (OP) 58 proposed for development of 3000 houses under the Aberdeen Local Development Plan 2012.

The southern part of the Aberdeen woods out with the boundary is marked as site No 36 on the GSN as a Core category provide linkages to the River Dee and Coutesswells. This site has a variety of habitats comprising of upland birch, other broadleaved and wet woodland, scrub woodland, a small area of upland oak woodland, mixed woodland, pine woodland, rush pasture, acid grassland, heath, bracken and neutral grassland. A small area of standing water with other coniferous woodland (priority habitat) is also recorded on the site. The site is very well used by the public for walking due to its good network of footpaths and convenient parking. Main recreational area is Foggieton, with many paths used for walking, running, cycling and horse riding. Small water bodies are recorded in the area and are considered as an important part of the habitat.

In the open space audit the site scores very high in terms of its biodiversity value and supports a variety of habitats. The part of the site is birch woodland with some areas of broadleaved woodland, bracken and old stone quarries. There large areas of neutral grassland with scattered trees and scrub, broadleaved woodland surrounding the site. UKBAP Priority Species and Scottish Biodiversity List Species such as Red Squirrel, Small Pearl-bordered Fritillary and BAP Local Priority Species Wych elm and Locally important species, Sessile Oak are recorded on the site.

The site also supports UKBAP Habitat of Rush pasture, Upland and Lowland birch woodland and Local BAP Habitat of other broadleaved woodland along with a range of habitats and species. Scottish Natural Heritage (SNH) ancient and semi-natural woodlands are also recorded on the site.

There are opportunities to improve path and core paths (CP) particularly Core Path CP55 and improved linkages to CP 41 (Countesswells).

The Northern part of the Aberdeen Woods is categorised as core GSN comprising of mixed pine, broadleaved and scrub woodlands, locally important habitat. Site is popular for horse riding, walking, running and cycling. The site has a good biodiversity value supporting various species and habitats including SNH ancient and semi-natural woodlands. The AWPR passes to western edge of site. There are opportunities to enhance paths and improve signage.

The Aberdeen Wood Forest Design Plan should consider these interests and works proposed for the future management and maintenance of the site should give a due attention to its existing use.

The south of the Aberdeen woods forms part of the site 53 of the GSN. It provides linkages to various habitats and a part of the site performs core functions. The major habitats types are grasslands, bracken, broad leaved and wet woodlands, standing open waters, alluvial forests with *alnus glutinosa* and *fraxinus excelsi*.

There are some water bodies recorded in the area as well. The site is very popular for recreational purposes and links with core path to west of GSN site, and path across site linking Milltimber with Westfield to North. Some informal access within Den of Murtle. SNH ancient and semi-natural woodlands are recoded in the area.

The site is a priority habitat supporting habitats recorded under the UK BAP such as standing water, birch and wet woodlands and locally important habitat of scrub, broadleaved and pine woodlands. Locally important species of Pedunculate and Sessile oak, Common twayblade , Badgers along with Local BAP species of Wych Elm are recorded in the area.

Opportunity Site (OP) OP62 Oldfold identified in the Aberdeen Local Development Plan lies to the south of the site.

A local farmer created path link from Milltimber north towards Westfield. There is a demand for path linking Milltimber and Bieldside (Core Paths Plan AP10) (safe route to school) There is a demand from development to upgrade link between Milltimber and Blacktop via Westfield. There are opportunities to improve access links into Murtle Den Local Nature Conservation Site.

Adjacent to OP62 Oldfold, requiring various path upgrades and new connections. The site could benefit from AWPR offset mitigation measures.

Foggieton Woods

Foggieton Woods forms a Core part of the Aberdeen Green Space Network site no 35 and lies towards the south east of the Aberdeen Woods. This site has a variety of habitats comprising upland birch woodland, other broadleaved woodland, wet woodland, scrub woodland, a small area of upland oak woodland, mixed woodland, pine woodland, rush pasture, acid grassland, heath, bracken, neutral grassland, Coniferous woodland, dwarf scrub heath grasslands, broadleaved woodlands, neutral grasslands and priority habitats. The site

provides recreational facilities for walking, cycling, and horse riding. SNH ancient and semi-natural woodlands are recorded in the area. There is a small area of standing water body.

The site is a priority habitat supporting UK BAP priority species such as Red Squirrel and locally BAP priority species of Wych Elm and Sessile Oak. Species and habitats listed under the Scottish biodiversity list and UK BAP habitat such as Rush Pastures and
Local BAP habitat of scrub woodland are recorded on the site. Major wildlife species recorded are common lizard and Small Pearl-bordered Fritillary.

The Aberdeen Woods sites has also been audited for its quality as a part of the open space audit and a quality scored has been assigned to each site on a set quality criteria. The part of the site scores low in quality due to limited access facilities and its limited value in terms of community use. In order to improve the quality the site it would require more access facilities so that the nearby communities can benefit from it.

The design plan should consider these interests for any future management and maintenance. There are opportunities to create a new off the road direct path link between Foggieton and Countesswells beside Countesswells House along line of aspirational path shown on Core Paths Plan.

The isolated patch of Aberdeen woods towards the south of the Foggiton forms part of the GSN site no. 54 providing linkage and connecting various habitats and species. A part of the site is Open Semi-Natural area and support major habitats types are Purple moor grass and rush pastures, broad leaved woodlands, standing open water and canal. There are some water bodies recorded in the area forming an important part of the habitat.
The site supports locally important species of Pedunculate oak and habitats of other broadleaved woodland (Local BAP). SNH ancient and semi-natural woodlands also recorded in the area.

There are some projects carried out by Aberdeen Greenspace. There are opportunities to provide paths linking Milltimber and Bieldside. The Aberdeen Western Peripheral Route (AWPR) will affect the site.

Hazlehead
The Hazlehead Park forms Core part of the GSN site no. 33 and provides a variety of habitats and recreational facilities including Golf Course and a public park. The Aberdeen woods site lies to the west of the Hazlehead Park and pat of the site is Farmland.

The major habitats types are predominantly a mixture of woodland, other coniferous woodland, lowland birch woodland and other broadleaved woodland, pine woodland with areas of bracken, scrub woodland, neutral and improved grassland. Lowland Birch and broadleaved woodland, grasslands and locally important habitats.

Golf course, playing fields, picnic areas provides informal recreation linking various paths. There are good network of footpaths running through the site. The site supports UK Priority Species listed under Scottish Biodiversity List. Important Species recorded are Brown Pipistrelle, Bandit Pipistrelle and Song Thrush including BAP Local Priority species of Wych Elm and UK BAP Habitat of open standing water and Local BAP Habitat of Scrub woodland.

The Aberdeen Woods sites has also been audited for its quality as apart of the open space audit and a quality scored has been assigned to each site on a set quality criteria. The part of the site scores low in quality due to the limited access facilities and connection with other transport modes its limited value in terms of community use due to lack of facilities such as benches, diversity of use for different age types. In order to improve the quality of the site it would require more facilities so that the nearby communities can use it for the benefit it provides for well being.

There are opportunities for path improvement works on the site. Aberdeen City Council is working in partnership with the Greenspace Scotland to look at the future management of the Hazlehead Park under the climate change seniors and adapting to the climate change challenges. The park is being considered as the first climate change park in Scotland.

The Aberdeen Woods Forest Design Plan should consider all these interests and the future management of the woods should consider these concerns. The Aberdeen woods Forest Design plan should also take into account the results of the Aberdeen Open Space Audit and the Strategy and associated actions. There are a lot of opportunities for partnership working and improving the area or the benefits it provides to the environment and the communities.

Comments relate to outdoor access, recreational access and active travel only.

Integration with neighbouring development for recreational access and promoting active travel and adapting for increased demand:

With reference to our adopted Local Development Plan (2012), I think that the access provision for following woodlands should be considered in relation to increasing demands from the following developments -

* Kingshill (assuming a safe road crossing is created between Kingshill and Kingswells): OP40 West Hatton and Homefarm, Kingswells; OP41 Kingswells C; OP42 Kingswells D and West Huxterstone; and OP58 Countesswells.
* Countesswells: OP58 Countesswells
* Hazlehead (increased use through connectivity but not bordering): OP58 Countesswells; OP52 Hazledene; OP57 Pinewood
* Foggieton: OP58 Countesswells; OP51 Friarsfield

In particular, opportunities should be identified to consider likely desire lines into the woods along boundaries with developments so that access can be managed through suitably designed access points where appropriate and deterring any informal access entry locations which could have negative impacts on species and habitats of conservation concern by deflecting access users to less damaging entrance points. This should be done with active two way engagement with Council access staff who can support communication with planners and developers to ensure that connections are made in right places at the right times.

Relationship with core path plan:
Scottish Government have asked for core paths to be incorporated into Local Development Plans. Therefore we are currently reviewing our adopted core paths plan as part of the preparation of our next Local Development Plan. It has become apparent that several of the core paths designated in the 2009 Core Paths Plan on FCS land are not maintained tracks. There should be early engagement to ensure that core path routes in our reviewed Core Paths Plan are consistent with how you intend to manage the sites to minimise the potential for conflict between land management operations and core path use and to help ensure that the paths/tracks will be of a maintained standard.

Aspirational core path 10:
There is a strong local desire for a path that links the north Milltimber to the north of Bieldside and to link onwards to Cult Academy. This is because alternatives for walking or cycling are unattractive and involve lengthy detours. The line of AP10 in the maps is just indicative of the destinations and will vary as detailed consultation and design takes place. The Forest Design Plan could consider the potential for incorporating or providing some supporting wider path infrastructure in the Foggieton area around Bieldside.

CULTER COMMUNITY COUNCIL

Forestry Commission Scotland
Moray & Aberdeenshire Forest District
Portsoy Road
Huntly
Aberdeenshire
AB54 4 SJ
FAO: Planning Forester, Mark Reve

8th July 2013

Dear Mark,

Review of Aberdeen Wood Plan

You recently wrote to my colleague Philippa Mathew, Chairperson of Culter Community Council regarding **Review of Aberdeen Wood Plan** enclosing a location map. This matter was discussed at our recent planning meeting and I was asked to deal directly with you as the responsible person for such matters.

Thank you for seeking the input of Culter Community Council (CCC) which has strong interest in and commitment to natural environment and amenities. We fully support an economically viable, sustainable, quality timber resource but it is the creative measures for health and wellbeing, coherent landscape design and the environmental and ecological improvement of the land managed that are the main focus of engagement with you.
At this stage we will keep our input at a high level, further detail could be provided as follow-up should this be advantageous.

The attached highlights provide our initial input. We are in contact with adjacent communities and interest groups and contribute to the Aberdeeb City Planning Group of the Community Councils Forum. We interface with and support of the Maryculter Woodland Trust currently engaged in negotiations to acquire part of Maryculter Wood.

With best regards,
David

David Wakefield
Deputy Chair Culter Community Council
Planning Officer Roads, Paths & Natural Environment
95 North Deeside Road
Peterculter, AB140QL

Tel: 01224 733273; Cell: 0784 325 8732; Email: djwwcl@btconnect.com

REVIEW OF ABERDEEN WOOD PLAN – INPUT OF CULTER COMMUNITY COUNCIL

1. CCC are familiar with all woodlands marked on the map provided. David Wakefield personally has intimate knowledge of these woodlands through daily walking and observation of flora and fauna.

2. **Economic, sustainable, viable timber resource: ISSUES**

a. Recovery & use of brashings, offcuts, fallen timber etc. for biomass fuel
b. Reduction of losses due to wind damage following thinning
c. Damage to watercourses and drainage by forestry operations (contractors)
d. Reinstatement of footpaths and parking following timber extraction
e. Licensed access for unrecovered felled timber for use as fuel

3. **Creative Measures for Health & Wellbeing: SUGGESTIONS**

a. Segregated, designated woodland for ‘mountain bikers’
b. Reinstatement of safe walking routes following timber operations
c. Woodland observatory shelters for wildlife
d. Notification/ woodland closure during stalking and pest control by shooting

4. **Coherent Landscape Design: SUGGESTIONS**

a. Clear fell & dispose of small isolated woodlands for natural regeneration
b. Address wind damage by fallen timber removal and use promptly
c. Native broadleaf husbandry to screen conifers on all boundaries
d. 10m minimum margin to all public roads to reduce deer collision risk

5. **Environmental & Ecological Improvement: SUGGESTIONS**

a. Foster and support local forestry recreational user groups
b. Encourage and assist local acquisition and husbandry of ‘pocket’ woodland
c. In association with local Councils & user groups train & support voluntary rangers
d. Design and deliver local forestry educational/ recreational programs

e. Support and actively engage in invasive species eradication + husbandry/ reintroduction of native species
f. Reintroduce and foster commercial native hardwood long term renewable based woodlands
g. Promote and foster hedges and wind-break tree cultivation + tree culture for biomass fuelled energy production (willow etc.)
h. Actively & agressively promote renewable wood and paper products as replacements for plastics i.e. supermaket packaging and bags.

Culter Community Council
July 2013

DJW

Appendix 2 – Tolerance table

	Adjustment to felling coupe boundaries	Timing of restocking	Change to species	Windthrow response	Changes to roadlines	Designed open space
FC Approval not normally required	0.5 ha or 5% of coupe – whichever is less.	Up to four planting seasons after felling.		Up to 0.5 ha in areas of high sensitivity. Up to 2 ha in areas of low sensitivity.		Location of temporary open space e.g. deer glades if still within overall open space of design.
Approval by exchange of letters and map	0.5ha to 2ha or 10% of coupe whichever less.		Change within species group e.g. conifers, broadleaves.	0.5 ha to 2 ha in areas of high sensitivity. 2ha to 5ha in areas of low sensitivity.	Additional felling of trees not agreed in plan Departures of >60m in either direction from centre line of road.	Increased of 0.5ha to 2ha or 10% whichever is less
Approval by formal plan amendment	2ha or 10% of coupe.	Over four planting seasons after felling.	Change from specified native species. Change between species groups.	>2 ha in areas of high sensitivity. >5 ha in areas of low sensitivity.	As above depending on sensitivity.	More than 2ha or 10%. Any reduction in open space in sensitive areas. Colonisation of agreed open space

Appendix 3 – LISS prescriptions

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

Coupe ref. (See map 8 – 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
1	Uniform shelterwood 15.5ha	Timber production. Use natural regeneration for restocking	Simple structure. SP 35%, Larch 35%, MB 30%	Age – 60years. Trans period – 150 years. Return time – 10 years.	None – low light level. Grass & moss	Deer, windblow	Crown thinning.
2	Uniform shelterwood 14.7ha	Timber production. Use natural regeneration for restocking	Simple structure. SP 35%, Larch 35%, MB 30%	Age – 60years. Trans period – 150 years. Return time – 10 years.	None – low light level. Grass & moss	Deer	Crown thinning.
3	Group selection 10.5ha	Diversify age and species structure to compliment Drum wood SSSI.	Complex structure. BI 80%, MB 20%	Age – 10 years. Trans period – 100 years. Return time – 10 years.	None – too young. (April 2016)	None at current time. (April 2016)	First thin at or before 12m top height.
4	Uniform shelterwood 22.7ha	Timber production. Use natural regeneration for restocking	Simple structure. SP 35%, Larch 35%, MB 30%	Age – 60years. Trans period – 150 years. Return time – 10 years.	None – low light level. Grass & moss	Deer, windblow	Crown thinning.
5	Single tree selection 5.0ha	Diversify age and species structure as backdrop to heritage feature (Belskavie tower)	Complex structure. MB 100%	Age – 10 years. Trans period – 100 years. Return time – 10 years.	None – too young. (April 2016)	None at current time. (April 2016)	First thin at or before 12m top height.

6	Group selection 32.9ha	Diversify age and species structure as backdrop to recreation facility. Timber production.	Complex structure. SS 40%, MB 40%, MC 20%	Age – 50 to 90 years. Trans period – 100 years. Return time – 10 years.	Little regen – low light level. SS & MB in areas where sufficient light. Grass & moss	Deer, windblow	Matrix thin with 6ha of group felling (felling to target older crops, groups to be up to 1ha).
7	Group selection 43.5ha	Diversify age and species structure as backdrop to recreation facility. Timber production.	Complex structure. SP 30%, MB 50%, MC 20%	Age – 40 to 70 years. Trans period – 100 years. Return time – 10 years.	Little regen – low light level. MB & MC in areas where sufficient light. Grass & moss	Deer, windblow	Matrix thin with 7ha of group felling (felling to target older crops, groups to be up to 1ha).
8	Group selection 13.5ha	Diversify age and species structure as backdrop to recreation facility. Timber production.	Complex structure. SP 20%, MB 60%, MC 20%	Age – 60 to 85 years. Trans period – 100 years. Return time – 10 years.	Very little regen – low light level. Moss	Deer, windblow	Matrix thin with 3ha of group felling (felling to target older crops, groups to be up to 1ha).
9	Single tree selection 4.8ha	Diversify age and species structure as backdrop to main recreation car park.	Complex structure. BE 80%, MB 20%	Age – 145 years. Trans period – 200 years. Return time – 10 years.	None – low light level. Moss	Deer	Fell equivalent of 1ha.
10	Single tree selection 8.0ha	Diversify age and species structure as backdrop to recreation car park.	Complex structure. BE 80%, MB 20%	Age – 145 years. Trans period – 200 years. Return time – 10 years.	None – low light level. Moss	Deer	Fell equivalent of 1.5ha.

11	Group selection 29.8ha	Diversify age and species structure as backdrop to recreation facility. Timber production.	Complex structure. MB 50%, MC 50%	Age – 55 years. Trans period – 100 years. Return time – 10 years.	Very little regen– low light level. Some MB where sufficient light. Grass	Deer	Matrix thin with 6ha of group felling (felling to target older crops, groups to be up to 1ha).
12	Single tree selection 3.0ha	Diversify age and species structure.	Complex structure. MB 100%	Age – 10 years. Trans period – 100 years. Return time – 10 years.	None – too young. (April 2016)	None at current time. (April 2016)	First thin at or before 12m top height.

Appendix 4 – LISS management

LISS is an approach to forest management in which the forest canopy is maintained at one or more levels without clearfelling.

The word 'approach' is important because:
• we are not following a system;
• there are no standard prescriptions; and
• flexibility is important – to take advantage of opportunities as they arise.

Any preconceived ideas about systems of managing forests can act as a 'straight jacket' to thinking about CCF.

Stands that have been regularly thinned are more likely to be successful with CCF. Crown thinning will be undertaken when transforming stands to CCF rather than low or intermediate types, as used in plantations. The basis of crown thinning is to remove competition from around selected trees (Frame trees), even if the trees to be removed are as big. Using crown thinning usually increases the average tree size, so there is potential for more income.

There are two main types of structure:
• Simple – in which there will be one or two canopy layers of trees
• Complex – where there are three or more canopy layers of trees

1. Transformation of a young (<40 yrs) stand to a simple structure

The objective is to achieve reasonably even regeneration of the desired species and then remove the canopy in a number of thinnings.

- Early crown thinning will be heavier (10-20%) than management table intensity and aim to develop 100 equally distributed 'frame' trees per hectare.
- 'Frame' trees are well-formed dominant trees with good crowns at reasonably even spacing.
- When the trees begin to cone (see table 1 below) stands will be thinned to the basal areas shown in table 2 to develop good conditions for regeneration to establish.
- If/when natural regeneration occurs it will be more variable than on a planted site, giving more variability in age, density and species.
- Canopy removal will aim to maintain a leader-to-lateral ratio of >1 in the regeneration (see figure 1), generally this will be achieved using the basal areas in table 2.
- The final removal of the overstorey may not involve all the trees depending on management objectives and windthrow considerations (green tree retention).
- If natural regeneration is only partially successful in terms of number and species mix planting will be undertaken. Planting will be concentrated so the location of trees is known and

they can be maintained. This will be by using a minimum of 16 trees in distinct group with the trees planted at 1.5 m x 1.5 m to form robust groups.

- If natural regeneration has been completely unsuccessful and CCF is still seen as appropriate planting will be undertaken to form the new canopy layer.
- Before planting the stand will be thinned to the basal areas for 'seedling growth' in the table 2.
- The felling and extraction of the canopy trees will be considered when deciding where to plant.
- Planting will be at 2500 trees per hectare in a well-defined pattern so they can be found for subsequent maintenance. 'Blanks' will be left when the planting position is close (<1 m) to canopy trees. This should ensure restocking compliance with OGB 4, as the area under the canopy is not part of the net area.
- Attention will be paid to site preparation, vegetation management, plant quality and reducing the impact of mammals to make sure of successful establishment. In general opportunities for site cultivation will be constrained by the overstorey.
- If the established crop is between the ages of 20 and 40 years, a transformation period of up to 50 years is expected.

Table 1. Species seed production details.

Species	Age of first good seed crop	Age of max seed production	Interval between good seed crops (yrs)
Sitka spruce	25-35	40+	3-5
Scots pine	15-20	60+	2-3
Douglas fir	30-35	50+	4-6
European larch*	25-30	40+	3-5
Japanese larch*	15-20	40+	3-5
Hybrid larch*	15-20	40+	3-5
Western hemlock	25-30	40+	2-3
Corsican pine	25-30	60+	3-5
Lodgepole pine	15-20	30+	2-3
Norway spruce	30-40	50+	**
Noble fir	30-40	40+	2-4
Grand fir	35-45	40+	3-5

Table 2. Basal area guidance for natural regeneration

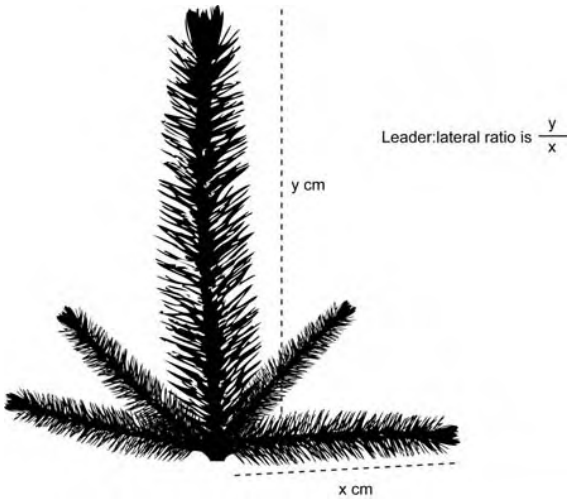
Species/ group	Shade tolerance of seedlings	BA (m2 ha-1) Establishment*	BA (m2 ha-1) Seedling growth**
Larches	Intolerant	20-25***	15-20
Pines	Intolerant	25-30***	20-25
Sitka spruce	Intermediate	30-35	25-30
Douglas fir	Intermediate	35-40	30-35
Norway spruce	Tolerant	40-45	35-40
Western hemlock	Tolerant	40-45	35-40

* On moderate to fertile sites where vegetation regrowth will be faster and more severe the BA for establishment will be increased.

** Seedlings and saplings are growing well under a canopy when the ratio of the length of the leader to the length of laterals in the upper whorl is ≥1, as shown in figure 1.

*** Stands of larch and pine at these basal areas will usually have well-developed ground vegetation layer and control or cultivation will be needed to start regeneration.

Figure 1. Leader-to-lateral ratio.



2. Transformation of a young (<40yrs) stand to a complex structure

The objective is to create a wider dbh range than under a simple system by:
- retaining small trees; and
- encouraging fast growth of selected frame trees

- The pattern of regeneration will be different to a simple structure, and will be arranged in groups that only cover up to 20% of the area at any one time.
- Up to 50 'Frame' trees will be selected per hectare and these will be crown thinned so as to keep as many small trees as possible.
- 'Frame' trees are stable, well-formed dominant trees. They may need to be present on the site for a long time; spacing should be 'clumpy' and not regular. Stable trees will have a larger diameter for a given height.
- The stand will be thinned to a residual basal area of about 18-25 m2 per ha for larches and pines, and 25-35 m2 per ha for spruces and Douglas fir. The choice within this range will depend upon the site and the balance between the overstorey and any regeneration. If there is little or no regeneration a higher value will be chosen to provide suitable conditions for seedlings to establish. If there is enough regeneration, which needs to be released, then a lower value will be favoured. The aim at each thinning is to remove enough trees to achieve the chosen residual basal area.
- If there is too much regeneration thinning will be concentrated on releasing the best regeneration and attempting to hold it back in other areas.
- Planting in complex structures will be considered to increase chances of success.
- Trees will be planted in canopy gaps of 0.1 ha minimum size.
- Trees will be planted in half the area of the gap in the centre.
- Close spacing (1.5 m x 1.5 m) will be used to make the groups robust. For example, when planting a canopy gap of 0.1 ha 200 trees will be planted at 1.5 m spacing on half the area in the middle of the gap. Close spacing will ensure rapid canopy closure and planting only half the area ensures minimal competition from the canopy trees, allowing opportunities for natural regeneration and increasing operational access.

3. Transformation in older (>40yrs) stands

Transformation of stands older than 40 years may be possible, especially on wind-firm sites, but the opportunity to steer the development of the young stand in thinning has been lost.

The main implications of this are:

- for simple systems there will be reduced opportunities for developing the crowns of 'Frame' trees and the window for natural regeneration is reduced. Therefore more 'frame' trees will be retained and a longer regeneration period used.
- in complex systems the main risks are that 'Frame' trees will become too large to be marketable, and the stand will still be quite uniform when windthrow starts. The aim is to establish groups of regenerating seedlings under an irregular overstorey while older trees are progressively felled.