Forest Enterprise Scotland
Managing the National Forest Estate

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

# North Clydesdale Forests

# Land Management Plan

## Scottish Lowlands Forest District

Approval date: ***

Plan Reference No: ****

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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CSM 6 Appendix 1b

**FOREST ENTERPRISE - Application for Land Management Plan Approvals in Scotland**

## Forest Enterprise - Property

| | |
|---|---|
| Forest District: | Scottish Lowlands |
| Woodland or property name: | North Clydesdale Forests (Heathland/Woodmuir/Kingshill/West Forth/The Mosses |
| Nearest town, village or locality: | Forth |
| OS Grid reference: | NS 965 566; NS 965 588; NS 873 539; NS 939 531; NS 971 480 |
| Local Authority district/unitary Authority: | South Lanarkshire, North Lanarkshire & West Lothian |

### Areas for approval

| | Conifer | Broadleaf |
|---|---|---|
| Clear felling | 344 | - |
| Selective felling | | |
| Restocking* *Woodend Moss Deforestation approved in previous plan* | 266 | 57 |
| New planting (complete appendix 4) | 9.3 | 13 |

1. I apply for Land Management Plan approval*/~~amendment approval*~~ for the property described above and in the enclosed Land Management 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 02/10/2015

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

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

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

7. I undertake to obtain any permission(s) necessary for the implementation of the approved Plan.

Signed …… Signed……
Forest District Manager Conservator

District …Scottish Lowlands……..… Conservancy……Central……

Date …… **Date of Approval**……

*delete as appropriate **Date approval ends**……

CSM 6 Appendix 4

**FOREST ENTERPRISE - Application for Approval of Woodland Creation**

## 1. Forest Enterprise – Property

| | |
|---|---|
| Forest District: | Scottish Lowlands Forest District |
| Woodland or property name: | North Clydesdale Forests (West Forth) |
| Nearest town, village or locality: | Forth |
| OS Grid reference: | NS 939 531 |
| Local Authority district/unitary Authority: | South Lanarkshire |

## 2. Proposed areas to nearest tenth of a hectare

| | |
|---|---|
| New Planting | 22.3 |
| Natural Colonisation | - |
| Open Ground | - |
| Total | 22.3 |

## 3. Special areas and protected land

| Designation | Area Name or Number | Comments |
|---|---|---|
| n/a | n/a | n/a |

## 4. Proposal details of woodland creation

| Area Name or number | Gross Area (Ha) | P Year | Spp | Area (Ha) | Open Ground (Ha) | Comments |
|---|---|---|---|---|---|---|
| Lowland mixed deciduous woodland | 9.4 | 2020 | SY, CAR, ASP, POK | 9.4 | - | |
| Conifer | 9.3 | 2020 | SS | 9.3 | - | |
| Low growing woody shrub | 1.9 | 2020 | HAZ, WEM, ROW, HAW | 1.9 | - | |
| Native wet woodland | 1.7 | 2020 | GWL, PBI, CAR | 1.7 | - | |

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

Signed …… Signed……
Forest District Manager Conservator

District …… Conservancy…….

Date …… **Approval Date**…….

**Date approval ends** ……..

# Environmental Impact Assessment Determination Enquiry Form

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

| **Section 1 Proposed work** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Please put a cross in the box to indicate the type of work you are proposing to carry out. Give the area in hectares and where appropriate the percentage of conifers and broadleaves. | | | | | | | |
| Proposed work | cross | Area in hectares | % Conifer | % broadleaves | Proposed work | cross | Area in ha |
| Afforestation | X | 22.3 | 42 | 58 | Forest roads | x | 0.5 |
| Deforestation | | | | | Forest quarry | | |
| Location and District | | | North Clydesdale Forests (West Forth); Forth, South Lanarkshire – Scottish Lowlands Forest District | | | | |

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

| **Section 2 Property details** | |
|---|---|
| Property Name | North Clydesdale Forests (West Forth) |
| Grid Reference (e.g. AB 123/789 | NS 939 531 |
| Local Authority | South Lanarkshire |
| Nearest Town | Forth |

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

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

| **Section 5 your agent or woodland manager's details** | | | | | |
|---|---|---|---|---|---|
| Title | Mr | Initials | R | Surname | Clamp |
| Organisation | Forestry Commission Scotland – Scottish Lowlands Forest District | | | | |
| Address | Five Sisters House | | | | |
| Five Sisters Business Park | | | | | |
| West Calder | | | Postcode | EH55 8PN | |
| Tel No | 0300 067 6725 | | Mobile | 07801 213 304 | |
| Fax | - | | e-mail | robert.clamp@forestry.gsi.gov.uk | |
| Is this the address for correspondence? | | yes | X | No | |

| **Section 6 Applicant's details** | | | | | |
|---|---|---|---|---|---|
| Title | Mr | Initials | S | Surname | Towers |
| Organisation | Forestry Commission Scotland – Scottish Lowlands Forest District | | | | |
| Address | Five Sisters House | | | | |
| Five Sisters Business Park | | | | | |
| West Calder | | | Postcode | EH55 8PN | |
| Tel No | 0300 067 6765 | | Mobile | 07867 353 108 | |
| Fax | - | | e-mail | stewart.towers@forestry.gsi.gov.uk | |
| Is this the address for correspondence? | | yes | X | No | |

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

# Contents



## Version History

| Version | Date | Comments |
|---|---|---|
| 1.0 | 02/08/2017 | Initial Draft |
| 1.1 | 14/09/2017 | Minor changes after district staff feedback |
| 1.2 | 03/11/2018 | Update to 3.5 & 5.5 from WoSAS comment |

# Summary of proposals

The **'North Clydesdale Forests'** comprise the forest blocks of **Heathland**, **Woodmuir**, **Kingshill**, **West Forth** & **The Mosses**. With the exception of West Forth these blocks have served as significant productive forests within Scottish Lowlands Forest District, producing large volumes of standard quality timber. The intention is to maintain this function whilst continuing to diversify the structural and biological diversity of the blocks. Recent tree health concerns over various pines and larch species have necessitated a revaluation of further planned species diversification for these blocks supporting the continued judicious use of Sitka Spruce both as a pure crop and in mixture with Lodgepole pine.

The proportion of native broadleaves within the forest will be increased and the move, initiated in previous plans, to create semi natural Forest Habitat Networks along the riparian corridors continues. Improvement to forest edges along roadside corridors will also continue to progress as part of this plan.

The primary objectives for the plan areas are to continue the sustainable production of timber, enhance native woodland habitat networks and to develop and maintain high quality access and recreation infrastructure.

## Woodland changes

| **Species Breakdown** | **2017** | **2027** | **2037** |
|---|---|---|---|
| Primary species: Sitka spruce | 47% | 37% | 36% |
| Secondary species: other conifers | 15% | 13% | 12% |
| Broadleaves | 6% | 8% | 9% |
| Open, Successional, Felled, Other | 32% | 42% | 43% |
| | | | |
| Total Plan Area: **2,205 Ha** | | | |

## Key Proposals

| **Planned Operations** | **2017-2027** |
|---|---|
| Felling | 344 Ha |
| Thinning | 31 Ha |
| Restock | 284 Ha |
| Woodland Creation | 22.3 Ha |
| Habitat Restoration | 45 Ha |
| Road Construction | 788 m |

# 1.0 Introduction

## 1.1 Setting & Context

The 'North Clydesdale Forests' comprise the forest blocks of Heathland, Woodmuir, Kingshill, West Forth & The Mosses. The majority of the forests are situated within South Lanarkshire local authority area however approx. 64 Ha of Kingshill lies within North Lanarkshire and Woodmuir is situated in West Lothian.

- Heathland (1178 Ha) lies both east and west of the A706 just north of the village of Forth.
- Woodmuir (366 Ha) lies north and south of the A704 and abuts Heathland to the south.
- Kingshill (360 Ha) lies south of the village of Allanton off the A71.
- West Forth (95 Ha) lies to the east and west of the A706 south of Forth.
- The Mosses (206 Ha) are located north of the village of Carnwath off the B7016.

The forests lie within the upland setting of the central plateau and primarily function to produce large volumes of cellulose from typical commercial conifer species.

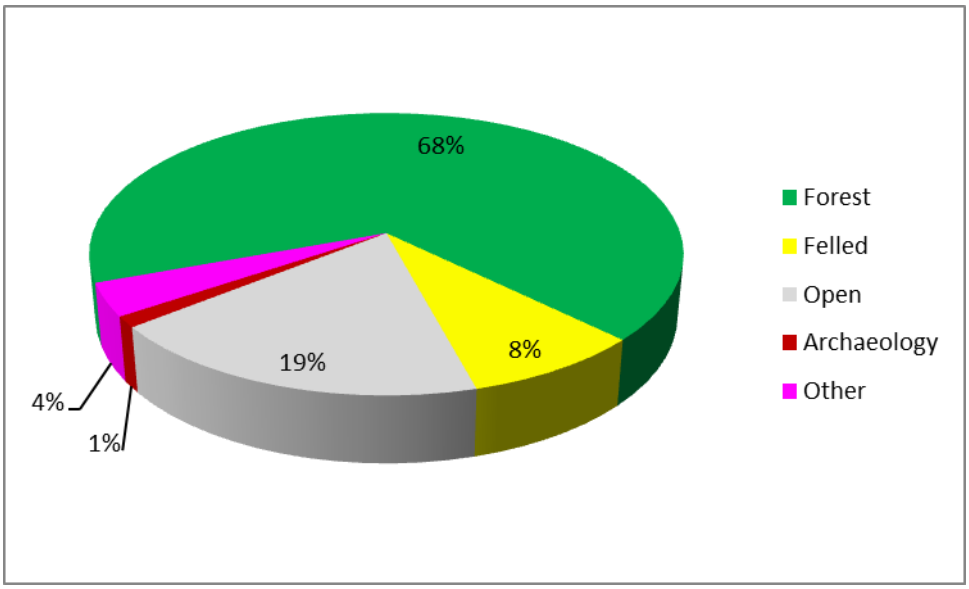
See **Map 1 Location** & **Map 2 Context**

The current land matrix is as follows:

Table 1 – Current Forest Blocks land usage

| | **Area (Ha)** | | | | |
|---|---|---|---|---|---|
| **Land use\Site** | **Heathland** | **Woodmuir** | **Kingshill** | **West Forth** | **The Mosses** |
| Forest | 810 | 271 | 273 | 47 | 93 |
| Felled | 141 | | | | 48 |
| Open | 145 | 85 | 74 | 43 | 63 |
| Archaeology | 27 | 1 | | | |
| Other | 55 | 9 | 13 | 5 | 2 |

Figure 1 – North Clydesdale Forests Current Land Usage




## 1.2 Site Histories

**Heathland**

The forest we see today at Heathland is comprised of various former agricultural or opencast mine holdings purchased between 1968 and 2014 with the majority of the area planted with commercial conifer during the 1970's and 1980's. Since the early 2000's patch clear-fells have been carried out beginning a process of forest restructuring and diversification which is still on-going. There was further expansion of the forest in the early 2000's after restoration of the former opencast coal area at Mountainblaw around the millennia using sewage filter cake. This process was mirrored to the south-east at Horberry where FES originally leased and created woodland on behalf of the opencast mining operators later acquiring the site outright in 2014. This plan will replace the previous Forest Design Plan (FC Ref: 032/04/06) which has had extended approval from 9th March 2015 and will now incorporate Horberry which was not included within the current plan.

**Woodmuir**

Woodmuir was acquired for the NFE in 1959 and first planted in the 1960's and subsequently almost entirely all harvested and restocked through the 1990's and early 2000's. During the 1990's a significant area of ground, generally stretching through the middle of the site south of the A704, began to be opencast mined for coal. The operators subsequently went bankrupt, leaving the site unrestored. In 2004 a partnership between FEC & Digit utilised sewage filter cake to restore this area after filling and reshaping. The restored area was then planted with a range of conifer and broadleaf species with the opportunity also taken to create permanent

access routes and a large wildlife pond. This plan will replace the previous Forest Design Plan (FC Ref: 035713002) which has 10 year approval until 13th May 2019.

**Kingshill**
Kingshill was purchased in 1961 and the forest established through the 1960's & 70's. The process of harvesting and restocking the forest to restructure and diversify began in the late 1990's into the 2000's and continues today. In 2005 nine turbines were constructed within the forest which form part of the wider Blacklaw wind farm. This plan will replace the previous Forest Design Plan (FC Ref: 032/03/03) which has had extended approval from 17th December 2013.

**West Forth**
West Forth became part of the NFE in 1994 with the forest predominantly established in 1995. In 2004, the Coal Authority were granted a 25 year lease in order to implement a scheme to remove iron and other pollutants from water coming out of the former deep coal mines via a burn within the site and into the Mouse Water was created. This comprises a settlement lagoon and reed bed system resulting in clean water reaching the river. The scheme achieved an Environmental Commendation for Civil Engineering from the Saltire Society in 2006. This plan will replace the previous Forest Design Plan (FC Ref: 032/08/06) which has 10 year approval until 24th February 2018.

**The Mosses**
The Mosses were purchased in 1956 with the Blackgate Moss forest established in the mid 1950's although after a fire destroyed part of it some was replanted in the 1980's. The forest at Carnwath Moss was established over the late 1960's and early 1970's and the forest at Woodend Moss was established in 1970. In 2015 most of Carnwath Moss was harvested or mulched in order to restore the lowland raised bog the forest was planted on. About half of Blackgate Moss was also harvested in the same period although this will be restocked with native wet woodland species. Woodend Moss is also due to be cleared for bog restoration in the next few years. This plan will replace the previous Forest Design Plan (FC Ref: 032/08/14) which has 10 year approval until 26th March 2018.

# 2.0 Analysis of previous plans

Table 2 – Progress on previous LMP objectives

| Site | Objective | Proposed management actions | Progress to date<br>1 - Little/No progress<br>2 – Some progress<br>3 – Progress as per LMP |
|---|---|---|---|
| **Heathland** | To enhance the value of the area to wildlife by increasing age and species diversity and developing a Forest Habitat Network (FHN) based on the watercourse corridors. | Felling and restocking will be timed to ensure that a variety of age classes is dispersed throughout the area<br>Creation of robust wind firm boundaries at the replanting stage will enable further restructuring initiatives to be taken in subsequent rotations | 3 |
| | To improve the recreation value of the forest and preserve features of archaeological interest. | Seek funding to remove trees from around the built remains, to provide interpretation and improve access | 3 |
| | To improve the external and internal views of the forest. | | 3 |
| | To protect water quality and the physical integrity of streams. | Native broadleaf trees and shrubs will be concentrated along the principal watercourses as a FHN, providing linkages also to some of the unplanted open ground surrounding the forest. | 2 |
| | | | |
| **Woodmuir** | Maintain and increase conifer productivity using improved planting stock where possible. | In the plan period an average of 1500 tonnes/annum will be produced. | 3 |
| | Continue reducing landscape impact by redesign of edge planting. | Continue restructuring of forest. | 3 |

| | | | |
|---|---|---|---|
| | Maintain clean access points at existing car parks and trails. | - | 3 |
| | Provide links to places of interest as resources permit. | We hope to work with communities at Breich and Forth to encourage greater activity, with potential for a link between Woodmuir and Heathland to the south. | 2 |
| | Protect newly designated Ancient monument and other historic features. | Any work required is agreed with Historic Environment Scotland in a management plan reviewed every 5 years. This plan includes annual recorded inspections. Tree planting will be kept back at least 20m from other historic features. | 3 |
| | Continue development of diverse forest structure for long distance views and improvements along transport corridors. | Continue restructuring of forest. | 3 |
| | Continue improvements along main watercourses and around wildlife ponds created at opencast restoration. | Felling and restocking of coupe 22 will make a significant addition to the FHN. In coupes 11 & 27 clear spruce regen and enrich with more broadleaves. | 2 |
| | | | |
| **Kingshill** | Sustainable timber production | - | 3 |
| | Conservation of heritage and focusing of resources on LBAP priorities | Restocking designed to protected the archaeological remains around Bentyhillocks | 3 |
| | Increase the area of broadleaves | Along the valley of the Auchter Water there is a significant increase in broadleaf planting. There are some areas with significant natural regeneration of | 2 |

| | | | |
|---|---|---|---|
| | | broadleaves, which it is expected will spread further into the productive forest, as well as along the watercourse area. | |
| | Age diversification | Larger coupes will been subdivided at restocking to allow further restructuring in the next rotation. Short-rotation forestry on areas out with the 'footprint' of the turbine requires felling of crops >13.5m top height within ~200m of each turbine. | 3 |
| | Increase in linked accesses to surrounding ground | Connections to adjacent forest and other areas outside the forest will be built as part of the windfarm construction. Providing and signing links in longer distance routes will be actively considered in partnership with all interested parties | 2 |
| | | | |
| **West Forth** | To enhance the benefits for wildlife by managing the open space to diversify vegetation | The wildflower meadow, established in 2006, continues to be managed by mowing and removal of cut vegetation. | 3 |
| | To improve the recreation value of the forest | Existing surfaced tracks will be maintained and funding sought to upgrade others if demand supports this need. | 3 |
| | To maintain a supply of timber for the Scottish wood-using industry | Thinning may be an option in the forest, despite some difficulties with access across rides and wayleaves | 3 |
| | To protect water quality and the physical integrity of streams | - | 3 |
| | To improve the external and internal views of the forest | - | 3 |
| | | | |

| | | | |
|---|---|---|---|
| **The Mosses** | In the ten years covered by this Plan, there is no work proposed which would require Approval. | | 3 - Since the inception of this plan FES's Strategy for Lowland Raised Bogs and Intermediate Bogs has been published and we successfully amended the FDP to allow us to fell all of Carnwath and Woodend Mosses for bog restoration as well as part of Blackgate Moss to transition to native wet woodland. The Carnwath & Blackgate operations took place in 2015 with Woodend due in the next few years. |

# 3.0 Background information

## 3.1 Physical site factors

### 3.1.1 Soils & landform

Heathland, Woodmuir, Kingshill & West Forth sit on predominantly alkaline limestone associated bedrock formations which also featured coal seams at Heathland, Woodmuir and West Forth accounting for their previous mining histories. The Mosses lie predominantly over basic volcanic rock. The superficial geology has been influenced by glaciation with deposits of till spread across most of the sites. Peat is also widespread found in large areas of Heathland, Woodmuir, Kingshill and The Mosses. The underlying geology and landform have produced generally poor soils which therefore limit the number of species suited to grow well across these sites. The areas of peat are generally characterised by a matrix of poor unflushed raised and blanket bogs as well as areas of flushed basin and blanket bog. The till deposits are generally characterised by peaty and typical surface-water gleys. Better quality brown earths are scarce as are areas of man-made and skeletal soils. In some cases, along various watercourses, valley complex soils have also developed. In areas where surface mining previously occurred (Heathland and Woodmuir) these were restored using sewage cake, with varying

degrees of success with some areas, particularly in Heathland, being mainly compacted rock spoil. Generally, across the sites, the soils are wet and poor in nutrients. Elevation rises from approximately 194m above sea level (asl) at Kingshill to ~ 360m asl at Heathland.

See **Map 3a - Soils**

### 3.1.2 Current climate & exposure

The climate across the sites ranges from 'Warm' and 'Moist' to 'Cool' and 'Wet' with the vast majority of the forest lying at the latter end of that spectrum.

See **Map 3b - Climate**

Detailed Aspect Method Scoring (DAMS) is a measure of windiness of a site using the angle to the horizon in the eight compass points, weighted towards the prevailing wind direction. Scores range from 0-24: The higher the score the greater the exposure, with scores below 13 regarded as sheltered and above 22 as too high for commercial forestry. DAMS on the site range from moderately exposed 15 – severely exposed 19, with scores generally increasing with elevation. The majority of the plan area is a highly exposed 17.

The predominant climate and exposure across the forest also limit the choice of species suited to the conditions. Cumulatively the soils, climate and exposure limit the choice of tree species suitable for continued productive conifer crops.

### 3.1.3 Future climate

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

### 3.1.4 Hydrology

Various small burns run though or adjacent to the sites feeding larger systems such as the Rivers Clyde and Almond. Table 3 below lists the various watercourses found at each site.

Table 3 – Watercourses

| Heathland | Woodmuir | Kingshill | West Forth | The Mosses |
|---|---|---|---|---|
| Mouse Water (Dippool Water to Clyde) | Woodmuir Burn | Auchter Water | Mouse Water (Dippool Water to Clyde) | Dippool Water |
| Mosshat Burn (Dippool Water to Clyde) | Longford Burn | Garrion Burn | Abbey Burn | |
| Wormlaw Burn | Paddy's River | | | |
| Punce Linn (Harwood Water to Forth) | | | | |

In addition to the watercourses the disused waterbody of Lambcatch Reservoir is located within Heathland forest however it is not within the National Forest Estate ownership but rather is owned by the local authority.

Further to the watercourses and waterbodies the sites are collectively situated on the 'Lanark', 'Stirling & Falkirk' and 'Clydesdale' bedrock and localised sand and gravel aquifers which also have associated Groundwater Drinking Water Directives. Heathland, Kingshill, West Forth also influence the 'Lower Clyde including Mouse Water and Auchter Water' Sensitive Areas River Urban waste water Treatment Directive. The hydrology also collectively impact on the River Clyde and River Almond Salmonid Waters Fresh Water Fish Directive.

## 3.2 The existing forest

### 3.2.1 Species, age structure & yield class

Table 4 below shows the species make-up of the individual forests with Figure X further illustrating the collective species composition of the North Clydesdale Forests. Both the table and figure show that the forests are predominantly conifer (~91%) of which Sitka spruce constitutes ~74%.

See **Map 3c - Existing Forest Stock**

Table 4 – Current Forest Blocks Species by Area

| | Site - Area (Ha) | | | | |
|---|---|---|---|---|---|
| **Species\Site** | **Heathland** | **Woodmuir** | **Kingshill** | **West Forth** | **The Mosses** |
| Sitka spruce | 574 | 166 | 201 | 28 | 42 |
| Norway spruce | 15 | 18 | 8 | | |
| Larches | 108 | 24 | 23 | 3 | |
| Lodgepole pine | 43 | 16 | 6 | | 39 |
| Scots pine | 12 | 16 | 16 | 0 | 1 |
| Other conifers | 3 | 0 | 1 | | |
| Broadleaves | 56 | 32 | 18 | 16 | 11 |

Figure 2 – Current North Clydesdale Forests Species Composition

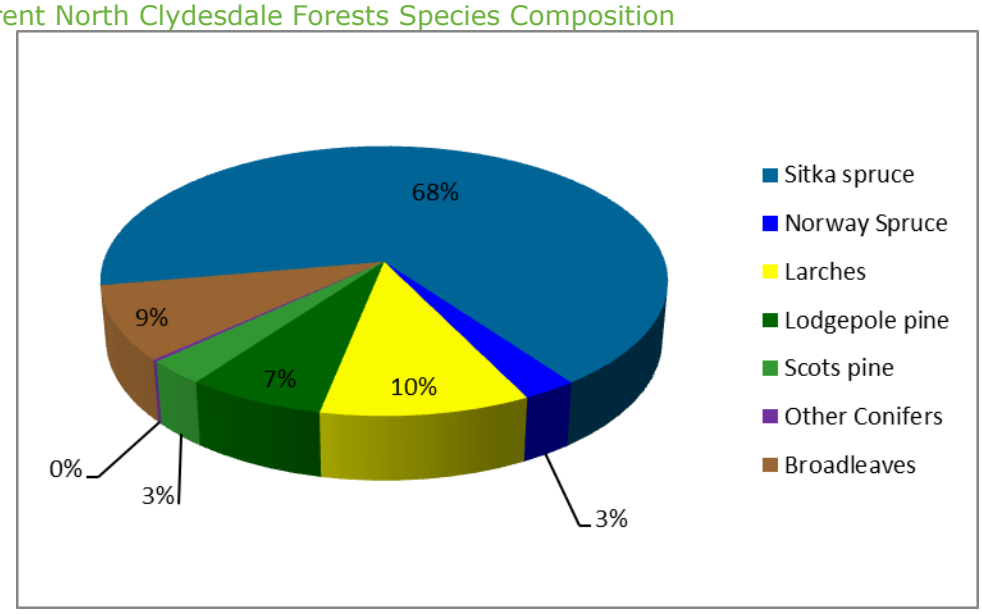



Figure 3a below illustrates that the general picture across the forests collectively is much of the forest is predominantly made up of mature crops which should rightly be felled during the life of this plan. This is no surprise given the relatively even aged nature of the forests, generally planted during the 1970's and 1980's, and presents a challenge to diversify the age structure and thus avoiding creating a similar problem at the end of the next rotation. Figures 3b-3f further illustrate how the structures vary in each individual forest and also highlight in the establishment columns some of the restructuring work that has already occurred.

Figure 3a – Current North Clydesdale Forests Age Structure

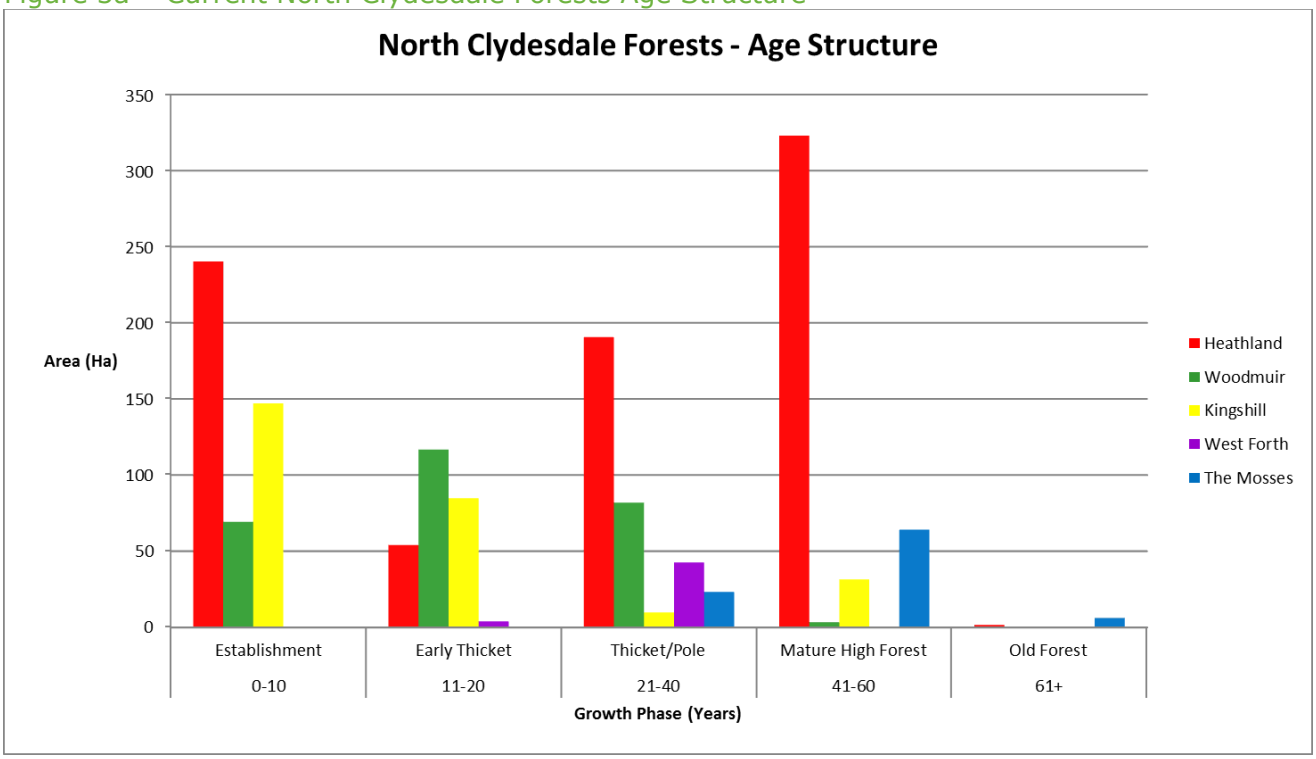



Figure 3b – Current Heathland Age Structure

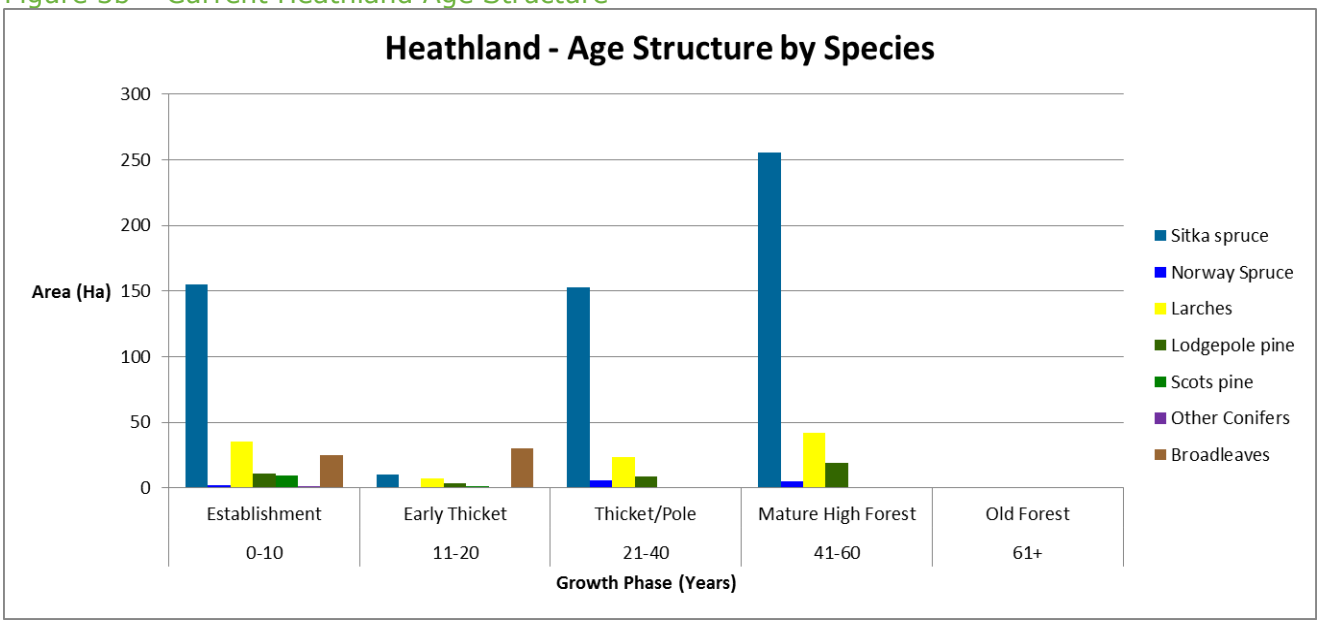


Figure 3c – Current Woodmuir Age Structure

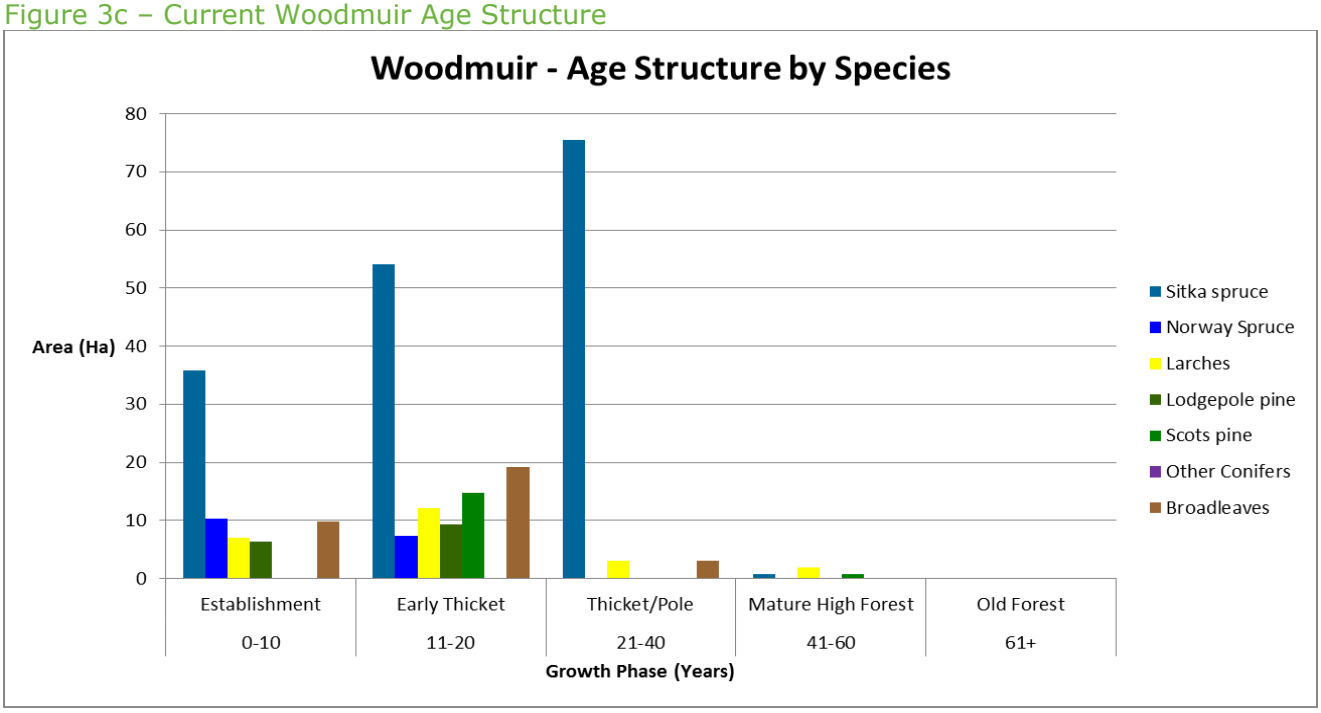



Figure 3d – Current Kingshill Age Structure

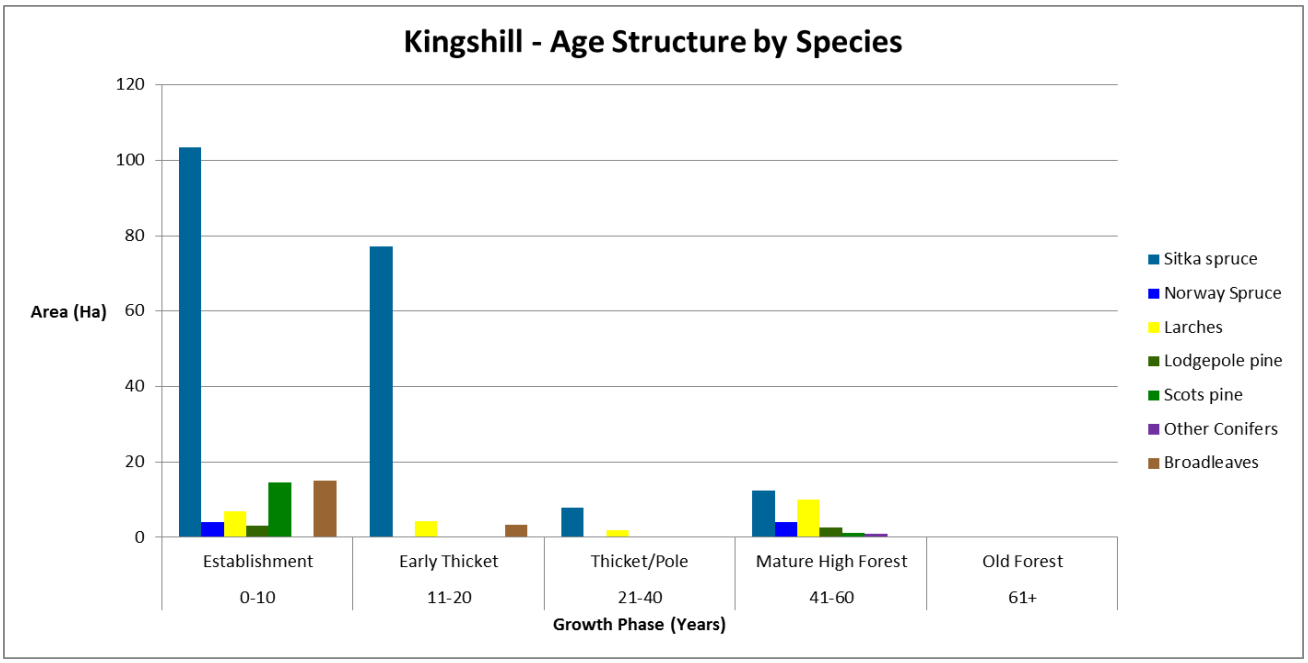


Figure 3e – Current West Forth Age Structure

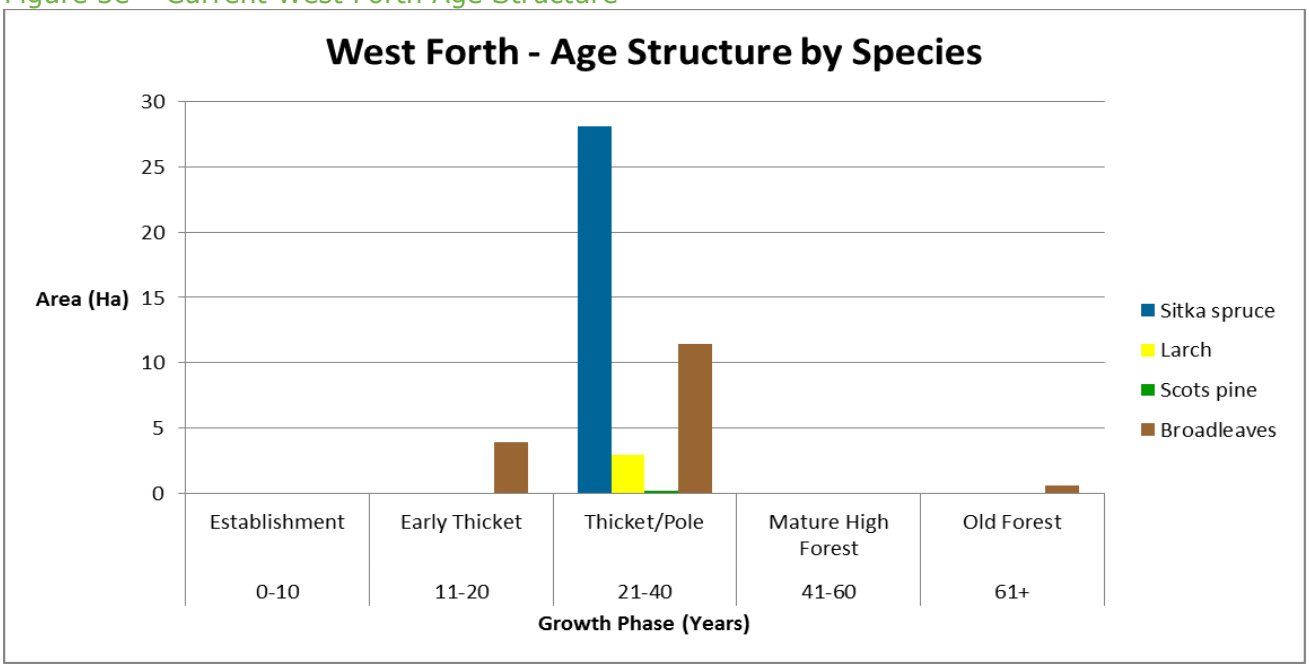
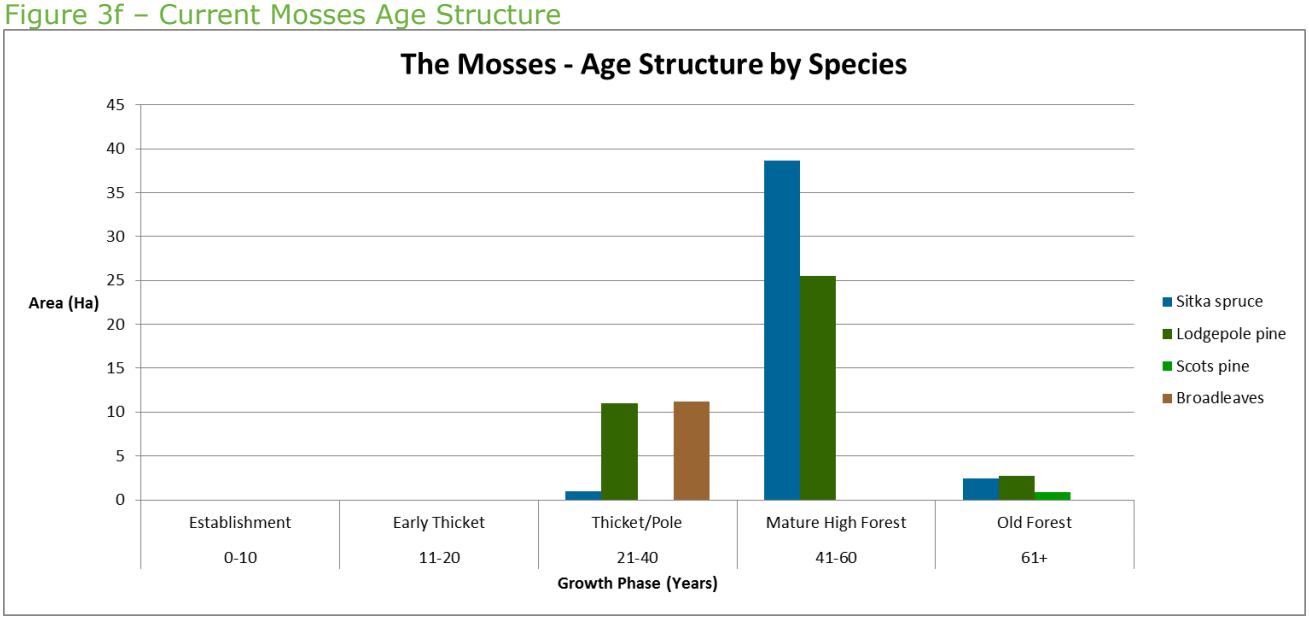



Figure 3f – Current Mosses Age Structure




Yield classes for Sitka spruce range from 6 – 24 across the sites with the majority of the crops being around YC 14. Much of the first rotation crop will have benefitted from fertilizer application and therefore with fertilizer application no longer generally practiced we can expect a general reduction in yield class of the 2nd rotation crops by 2-4 grades. We can mitigate against this reduction somewhat by

the use of improved stock and the use of nurse crops such as Alaskan Lodgepole pine.

### 3.2.2 Renewable energy - Wind

Kingshill has 9 wind turbines within its area which form part of a wider turbine network which makes up the Blacklaw Windfarm. As part of the lease agreement with the developer, Scottish Power Renewables (formerly CRE Energy), the district has an obligation to maintain the trees within an agreed area under a short rotation forestry regime, felling trees before they reach an average height of 12m for wind flow.

### 3.2.3 Operational access

Currently each of the forest blocks is served by one or more forest roads. The current network has generally been adequate however further enhancements will be required to access certain areas needing felled in the next 10 years.

### 3.2.4 Low Impact Silviculture Systems (LISS) potential

With the generally highly exposed nature of the sites along with the poor, wet soils the sites are not deemed as suitable for LISS.

### 3.2.5 Pathogens

#### 3.2.5.1 Dothistroma Needle Blight (DNB)

DNB (also known as Red Band Needle Blight because of the colourful symptoms it shows on pine) causes premature needle defoliation, resulting in loss of yield and, in severe cases, tree death. Recent surveys have shown outbreaks of DNB across Scottish Lowlands Forest District and within Heathland it is present on both mature and thicket stage crops with the latter also true at Woodmuir.

#### 3.2.5.2 *Pytophthora ramorum* (*P. ramorum*)

*P. ramorum* is a fungus-like pathogen of plants that is causing extensive damage and mortality to trees and other plants in parts of the United Kingdom. Larch in particularly is extremely vulnerable, and high infection and mortality levels are currently causing significant issues in Galloway Forest District. Several isolated instances of *P. ramorum* have been detected within Scottish Lowlands Forest District forest blocks at the time of writing, although these were isolated trees rather than large-scale infections. Despite the forests described in this plan falling within Risk Zone 3, deemed the zone of lowest risk, one of the district infections was discovered in Heathland Forest and resulted in a Statutory Plant Health Notice

to remove all other larch within both the affected stand as well as a 250m buffer surrounding the affected stand.

#### 3.2.5.3 Chalara fraxinea (Ash dieback)

Ash dieback is a serious disease of ash trees caused by a fungus, resulting in leaf loss, crown dieback and, potentially, tree death. The young ash stands established around the turn of the century have been confirmed as infected with Chalara. No cases of Chalara have been confirmed at any of the plan sites however ash is present as a component in various areas and therefore the potential for infection is there.

## 3.3 Landscape & Land use

### 3.3.1 Landscape character

The sites are situated within four landscape character areas described in the 1998 'The Lothians', and 1999 'Glasgow and Clyde Valley' Landscape Character Assessments, key elements of which are reproduced below:

Table 5 – Landscape character assessment

| | **Glasgow & Clyde Valley LCA** | | | **The Lothians LCA** |
|---|---|---|---|---|
| Landscape Type | Plateau Moorlands | Plateau Farmland | Rolling Farmland | Upland Fringes |
| Key characteristics and features | • Distinctive upland character created by the combination of elevation, exposure, smooth plateau landform, moorland vegetation and predominant lack of modern development<br>• These areas share a sense of apparent naturalness and remoteness which contrasts with the farmed and settled lowlands. | • Extensive, gently undulating landform<br>• Dominance of pastoral farming but with some mosses surviving<br>• Limited and declining tree cover<br>• Visually prominent settlements and activities such as mineral working<br>• The rural character of the Plateau Farmland has suffered as tree cover has declined and the visual influence of settlement, transport infrastructure and mineral workings has increased. | • Distinctive undulating landform created by fluvio-glacial action.<br>• Dominance of pastoral farming, varying in productivity according to elevation and exposure.<br>• Importance of woodland in structuring the landscape and providing shelter for agriculture and rural settlement. | • Along the northern margins of the upland areas lies a fringe of transitional landscapes. These are differentiated from the true uplands by a more productive range of land cover types including improved grassland, together with arable land, particularly in the east, and coniferous woodland, particularly in the west. |
| Relevant landscape guidelines | • Encourage the management of existing coniferous plantations in the plateau Moorlands with the aim of developing more natural shapes and achieving more varied age and species composition.<br>• Discourage significant expansion of existing conifer plantations in order that the balance between planted and unplanted land remains broadly constant.<br>• Where new planting does occur, encourage designs which reflect and articulate local variations in topography and avoid the obscuring of local features such as burns, gullies, walls or archaeological sites.<br>• Encourage forest developments to retain broad open space corridors which respect areas of historic occupation and cultivation where these occur.<br>• Encourage the regeneration or expansion of broadleaf woodland and scrub along burnsides and in gullies creating a closer integration of | • Bring existing field boundary trees and farm woodlands into positive management with the objective of prolonging the life of existing specimens and bringing forward replacement in the longer term<br>• Consider the scope for additional woodland planting around settlements, along transport corridors and on the periphery of other visually prominent land uses and activities with the objective of reducing these features' impact on the wider landscape.<br>• | • In the area near Carstairs, the aim should be to conserve and allow the regeneration of semi-natural stands of birch and Scots pine; there may be opportunities to encourage the growth of new woodlands on unwooded hillocks or in the form of woodland belts linking existing woods<br>• Commercial plantations should be designed carefully to ensure that they do not undermine or obscure the small scale nature of local topography; where this type of forestry does occur, the aim should be to encourage planting patterns which retain a significant proportion of open land which make use of organic shapes and outlines and which avoid geometric edges and boundaries. | • Increase woodland cover in accordance with Central Scotland Forest Strategy targets, through sensitivity designed and located planting, and keeping visual balance between openness and enclosure under regular review;<br>• Reinforce robustness and integrity of distinctive field boundary features: treelines, hedgerows and shelterbelts;<br>• Alleviate visual impact of existing large-scale coniferous plantations through restructuring;<br>• Conserve diversity of open habitats on less productive ground including wetland and heather moorland;<br>• Proposed new road route (Fastlink) will require very careful siting and design in sensitive, open landscape. |

| | | | | |
|---|---|---|---|---|
| | lowland woodland and the moorland landscape.<br>• Support new woodland planting where appropriate to provide screening around land uses such as mineral extraction and along the principle transport corridors. | | | |

### 3.3.2 Visibility

Due to the topography of the land the forests are generally only viewed at the small to medium scale, either from transport corridors or nearby settlements. Views along transport corridors are generally fleeting; however, where the forests line public roads for a significant distance, these views can be more sustained. Some redesign has previously occurred along forest edges/public road borders, moving away from darker coniferous species and their tunnel effect toward a more varied and diverse edge. Such edges generally combine diffuse broadleaved shrubs and trees with judicious open space. Even so, certain roadside edges would still benefit from further restructuring.

### 3.3.3 Neighbouring land use

The surrounding land use predominantly consists of a matrix of upland plateau moor/farm land. Within this is the prominent settlement of Forth, various mineral workings, peat cutting areas, Black Law & Leven Seat windfarms as well as other neighbouring commercial forestry blocks. The most notable forest blocks include: 'Longford & Sandys Wood' located to the east of Woodmuir with 'Pate's Hill West' to the east again of that and 'Muldron Forest' which lies between the west of Heathland and north-east of Kingshill.

## 3.4 Biodiversity & Environment

### 3.4.1 Priority Habitat Types

PHT's are protected under the UK Biodiversity Action Plan, and FES policy is to protect, enhance and expand these habitats where appropriate. There are a broad range of open space and woodland types within the plan area, a number of which are present across the sites. The most significant UK and Local Biodiversity Action Plan habitats include **Blanket Bog**, widespread at Heathland and also found at The Mosses although significantly mostly found under productive conifer plantation; **Lowland Raised Bog**, prevalent at The Mosses; **Wet Woodland** and **Fen**, also found at The Mosses; **Reedbeds**, found at Holmesdyke, West Forth and **Rivers and Burns** such as The Mousewater, Wormlaw Burn, Mosshat Burn, Punce Linn and other minor watercourses at Heathland.

The process of restoring Carnwath Moss Lowland Raised Bog has already begun with the removal of the trees at Carnwath in 2015 both by conventional harvesting machinery and tree mulching.

### 3.4.2 Ancient Woodland

Wilsontown Glen at Heathland has remnants of existing Ancient Semi-Natural Woodland, which are well preserved and contain Aspen. Woodmuir also had a belt of ancient woodland through the central portion of the forest north of the A704 which at some point was felled and planted with non-native trees i.e. it's a Plantation on Ancient Woodland Site (PAWS) of Scots pine and mixed broadleaves which is now in the process of being restored.

### 3.4.3 Important Species

A variety of important species have been observed across the various sites and recorded in our Conservation layer with various sites used by some also recorded. Examples of significant species include:

Long Eared Owl, Northern Goshawk, Merlin, Eurasian Sparrowhawk, Eurasian Jackdaw, Pine Marten, European Water Vole, European Otter, Smooth & Palmate Newts, Common Lizard, Small pearl-bordered fritillary and Common blue butterflies.

### 3.4.4 Wildlife (Deer Management)

The North Clydesdale Forests have healthy populations of Roe deer which are maintained by the culling of, around 170 each year across the sites by way of a deer management contract.

### 3.4.5 Non Native Invasive Species

Woodmuir has seen the intrusion of **Himalayan balsam** (*Impatiens glandulifera*) most likely due to the fly-tipping of gardening/landscaping residue. This species is a threat to native flora and habitats as it is aggressive and forms dense stands that exclude other plants. If left unchecked Himalayan balsam could pose a risk of colonising substantial areas to the detriment of native flora and fauna.

Woodmuir & Kingshill both support **Grey squirrel** (*Sciurus carolinensis*) which in high numbers are extremely destructive in woodlands, stripping bark from the main stem and branches of trees over late spring and summer. Oak, Scots pine and Norway spruce are species within these sites which are particularly vulnerable to stem breakage caused by bark stripping.

**American Mink** (*Neovison vison)* have previously been observed at Heathland. Initially the population developed from animals escaping from fur farms, and throughout the second half of the twentieth century it spread through most of

mainland UK. There is substantial evidence that mink have detrimental impacts on native fauna including nesting inland waterfowl and aquatic mammals especially water voles. Mink may also account for a large proportion of salmonid mortality in some river systems.

## 3.5 Heritage

FES maintains extensive archaeological records for the NFE within our heritage database. Important historic environment features are surveyed, recorded, mapped and monitored by SLFD to ensure and demonstrate Forestry Commission Scotland compliance with the UK Forestry Standard. This ensures that undiscovered historic environment features are mapped and recorded prior to forestry management operations and ensures the continued comprehensive protection of the known archaeological resource. In the case of this plan area, whilst not identifying what each feature is, the **Key Features Opportunities and Constraints Maps (4a (i-v))** show the various heritage feature locations within each block. There are a high number of features within the plan area most of which are unscheduled and generally already afforested. The sub-sections below provide further detail of those features which have been the focus of any intervention during the previous plan period.

### 3.5.1 Scheduled Monuments

**Heathland** – The Wilsontown Ironworks Scheduled Monument has an annual inspection as part of the district's Scheduled Monument Management Plan agreed with Historic Environment Scotland.

**Woodmuir** – The district have removed trees from the Woodmuir Coke Ovens Scheduled Monument when it was scheduled and continue to inspect annually and manage the vegetation.

**The Mosses** – in 2014/15 the district cleared the trees from within the impact zone and beyond of the Couthally Castle Ruin Scheduled Monument.

### 3.5.2 Non-scheduled Archaeology

**Heathland** – The district have used historic aerial photography to capture and record several bell bit features which are out-with the scheduled monument area. The district has upgraded part of the Bye Law Hill Tramway feature. The Thirlstane stone cairn feature was the subject of the 'Dig It' archaeological project in 2015 to 'excavate, record, investigate and restore' the feature. A War Memorial is managed by a local community group who have created a seated area with planter.

**Kingshill** – For the second rotation of the forest the district have left the former Bentyhillocks farm steading unplanted with the feature surveyed and recorded in 2015.

**West Forth** – The district worked with the Coal Authority to preserve as part of the reed-bed scheme the 18th Century underground stone outflow feature 'Holmesyke level'

## 3.6 Community & Recreation

**Heathland**

The main recreational focus for Heathland is the Wilsontown Ironworks scheduled monument and Wilsontown Glen which both fall within 1 km of Forth and therefore qualify them as Woodlands In and Around Towns (WIAT). Recreation facilities here consist of a car park, a network of surfaced and unsurfaced way-marked trails and interpretation focused on the industrial heritage and biodiversity of the sites. Visitor counters have been installed, and visitor numbers are estimated at between 12,000 and 15,000 per year. Recreation here is mainly focused on dog walking or visiting the scheduled monument.

Regular maintenance work on the site consists of mowing the grass paths and surfaced path edges, maintaining the interpretation and way-markers, and carrying out repairs on the car park. Facilities and trees are inspected following OGB42 guidelines.

The Horberry area of Heathland is currently under a permission allowing a local community group (WATIF – Woolford, Auchengray, Tarbrax Improvement Foundation) to carry out minor access improvements to increase community use of this area of the site.

The remainder of Heathland has little CVS involvement, apart from the regular clearing of fly-tipping at forest road entrances, and maintenance of barriers.

**Woodmuir**

The only recreation provision at Woodmuir is a car park off the A704. Informal access is taken from here along the forest roads, and also into the south block from the forest road entrances. Visitor numbers are low.

The forest road entrances attract frequent fly-tipping. Recent work to clear the entrances of vegetation to improve sightlines and visibility from the road has been successful in reducing the frequency of fly-tipping incidents.

**West Forth**

This WIAT woodland attracts an estimated 4000 visitors per year. There are a number of way-marked trails throughout the site. Access is generally taken from Forth. Recreation here mainly takes the form of dog walking. There is also a small lay-by allowing access from an unclassified road at the east side of the site next to the settlement lagoon and reed bed system.

Recent work at West Forth has included the upgrading of a footpath loop (Rab's Path) with regular maintenance including the regular mowing of footpaths. Education work has and continues to be carried out with local schools, making use of the forest where possible.

**Kingshill & The Mosses**

There is no recreation provision at these sites, although a number of designated core paths run through Kingshill. Both sites are targets for fly-tipping and low-level anti-social behaviour.

# 4.0 Analysis & Concept

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

See **Maps 4a (i-v) Key Feature Opportunities & Constraints**

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

See **Maps 4b (i-v) Initial Design Concept**

# 5.0 Management Proposals

## 5.1 Forest Stand Management

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

Patch clear-felling remains the most appropriate silvicultural system for the majority of the forests and it is the intention to move toward generally smaller coupe sizes in future in order to facilitate the further restructuring of the blocks and allow for more structurally and biologically diverse forests as well as imparting greater flexibility for future management options.

See **Maps 5a (i-v) Management**

### 5.1.1 Clear felling

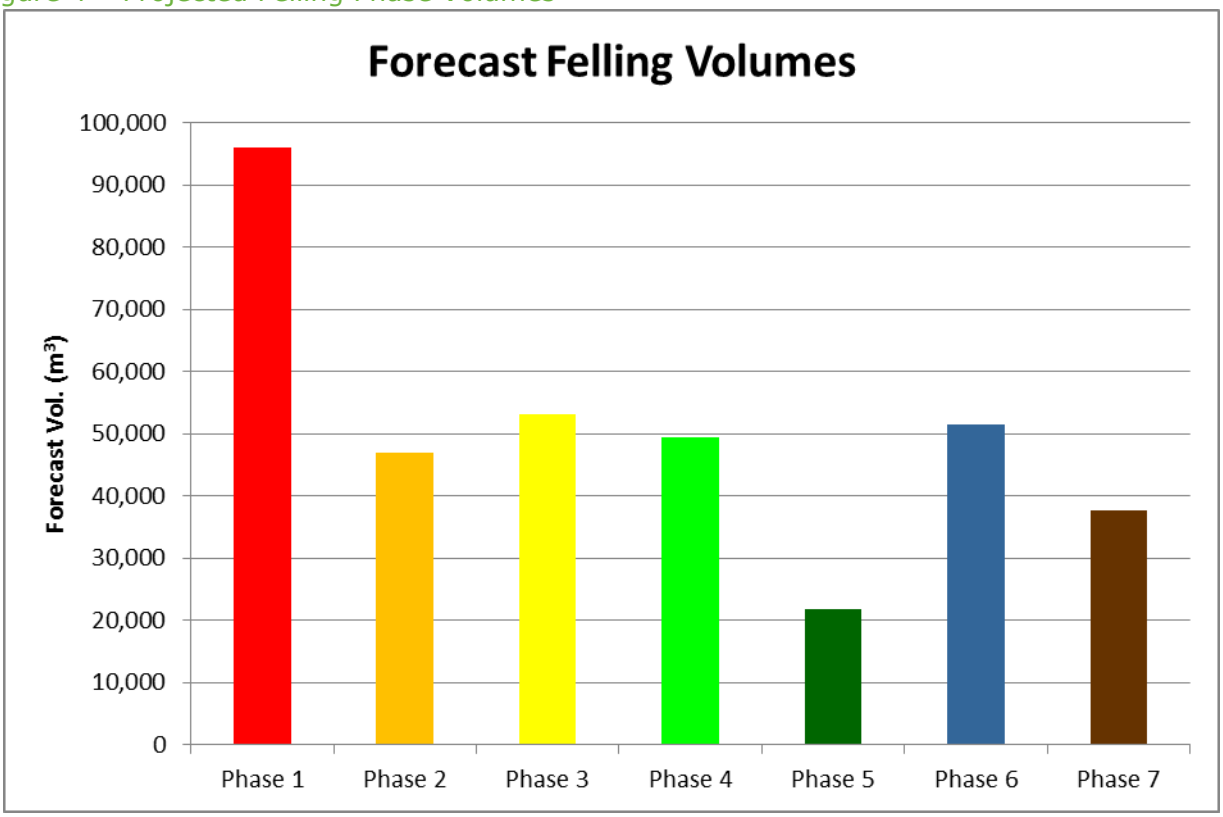
Patch clear felling will continue be the most appropriate management approach for the majority of the forests which are predominantly productive conifer. While generally coupe fell years are based on the optimal rotation lengths to reach Maximum Mean Annual Increment various coupes are proposed for both early felling; such as the areas of Short Rotation Forestry around wind turbines, and others for retention; enhancing biological and structural diversity. It should also be noted that another important consideration was smoothing the current general peak in harvestable timber volume which was inevitable from these even aged forests; this has to be considered both at the block and district level.

During the 10 years of the plan period, a total of 344 ha, with a projected volume of 143,085 $m^3$, are designated for clear felling (see **Table 6** & **Figure 4** below).

Table 6 – Projected Felling Phase Volumes by Block

| Felling Phase | Heathland Est Vol ($m^3$) | Woodmuir Est Vol ($m^3$) | Kingshill Est Vol ($m^3$) | West Forth Est Vol ($m^3$) | The Mosses Est Vol ($m^3$) | Overall Volume ($m^3$) |
|---|---|---|---|---|---|---|
| **1** (2018-2022) | 84,452 | | 9,316 | | 2,260 | 96,028 |
| **2** (2023-2027) | 45,320 | | 1,738 | | | 47,058 |
| **3** (2028-2032) | 34,598 | | 9,665 | | 8,831 | 53,095 |
| **4** (2033-2037) | 15,756 | 4,991 | 14,277 | 14,342 | | 49,366 |
| **5** (2038-2042) | | 13,071 | 8,640 | | | 21,712 |
| **6** (2043-2047) | 12,768 | 30,999 | 7,696 | | | 51,463 |
| **7** (2048-2052) | 8,076 | 17,477 | 12,087 | | | 37,640 |

Figure 4 – Projected Felling Phase Volumes




### 5.1.2 Thinning

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

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

SLFD policy is not to thin crops on areas with a DAMS score greater that 15; In the case of the North Clydesdale Forest blocks, as described in section 3.1.2, most of the forests are 'highly exposed' which means thinning operations would likely significantly increase the risk of windthrow. Not only this but as the soils are predominantly wet and soft, thinning operations would likely lead to significant ground damage and therefore thinning should not be prescribed in these blocks for future rotations; having said that there was a first thinning intervention carried out in the 20 year old conifer crops at West Forth in 2015 and the crop remains stable and undamaged by wind. We envisage further thinning of these crops on a 5 year cycle until they are felled; this is expected to produce around 1000m$^3$ of timber at each intervention. A decision on whether or not to thin future rotations at West Forth will be made in future plans.

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

### 5.1.3 Low Impact Silvicultural Systems (LISS)

As mentioned in the previous section these sites are not best suited for thinning as the intended benefits of enhanced crop stability, increased tree volume and improved regenerative potential would be negated by the risks to the crop from windthrow and therefore not conducive for management through Alternative to Clearfell methods such as LISS or Continuous Cover Forestry (CCF). However for the small areas of broadleaves e.g. West Forth it may be beneficial to lightly thin some crops for aesthetic benefit as well as to improve individual tree stability rather than promoting any other silvicultural benefit.

### 5.1.4 Minimum Intervention and Natural Reserves

For various areas of the forests biodiversity will be the primary objective and we are prepared to commit such areas of land to minimum intervention management or leave as natural reserves. Natural reserves include existing mature mixed woodland whilst Minimum Intervention areas tend to be mixed broadleaves and areas of conifer forest, originally intended for commercial purposes, either planted on areas of deep peat or on poorly restored ground which has led to very poor or checked growth. In appropriate areas similar crops have been identified for removal in order to restore the underlying bog habitat however several areas unsuitable for restoration will be managed as peat edge woodland habitat. This minimum intervention classification need not apply in perpetuity and should future economics allow, these areas may be reviewed and revaluated for alternative management in future plans.

### 5.1.5 Operational Access

During the life of this plan operations are only proposed in Heathland, Kingshill, and The Mosses. For the areas affected generally the current road network will be adequate however there will need to be ~ 250m of new road created at Kingshill to access coupe 20 and two spur roads totalling ~540m off the existing road network at Heathland to access coupe 45.

## 5.2 Future species and habitats

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

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

### 5.2.1 Proposed Restock Species

While it is important to recognise the challenges posed to forestry in the future from predicted climate change and the increasingly diverse range of pests and diseases afflicting a range of tree species; the soils, climate and topography of the sites within this particular plan area limit opportunity to significantly diversify the species make-up of the forests.

For the most part this plan proposes continued use of Sitka spruce as the predominant productive conifer species with increased use of Lodgepole pine as a nursing mixture. This plan does however propose to improve the habitat network links chiefly through the development of semi-natural woodland along the riparian corridors, most notably along the Mouse Water and Wormlaw Burn at Heathland. These forest habitat networks will be comprised of a matrix of native broadleaves and open space. Further use of mixed broadleaved planting with open space will be employed where forest edges follow public road corridors.

Despite the species limitations faced, this plan continues to build on work of previous plans to diversify the forests' age structure. This is achieved, where appropriate, by reducing the size of existing coupes and, when restocking, designing in more wind firm edges to increase the stability of neighbouring coupes and therefore allow for a greater range of options for future management decisions.

See **Maps 5b (i-v) – Future Species & Habitats**

Table 7 – Proposed Restock Species

| Species | Gross area (ha) | % | Net area (ha) |
|---|---|---|---|
| Sitka spruce | 179 | 8% | 156 |
| Lodgepole pine/other conifer | 87 | 4% | 76 |
| W4 Birch Woodland associated species | 57 | 3% | 40 |
| W9 Upland mixed broadleaved woodland associated species | - | | - |

### 5.2.2 Woodland Creation

This plan proposes some small scale new planting at West Forth on selected areas of currently open space amongst areas of existing woodland. This additional woodland area will provide an improved woodland experience for visitors, bringing the woodland closer to the path network, with the additional benefit of enhancing visual, structural and biological diversity.

#### 5.2.2.1 Planting prescriptions

The proposed woodland will be made up of distinct woodland categories:

- Lowland mixed deciduous woodland
- Conifer
- Native wet woodland
- Low growing woody shrub

The indicative species, areas, densities and spacing for each category are listed in Table 7 below (also see **Map 5b iii – West Forth Future Species and Habitats**).

Table 8 – West Forth Woodland Creation Figures

| Woodland Category | Indicative Species | Density (Stems/Ha) | Spacing (m) | Area (Ha) |
|---|---|---|---|---|
| Lowland mixed deciduous woodland | Sycamore, Common alder, Aspen, Pedunculate oak, Wild cherry | 3000 | 1.8 x 1.8 | 9.4 |
| Conifer | Sitka spruce | 2500 | 2.0 x 2.0 | 9.3 |
| Low growing woody shrub | Hazel, Wych elm, Elder, Rowan, Hawthorn, Blackthorn, Dog rose, Guelder rose | 1100 | 3.0 x 3.0 | 1.9 |
| Native wet woodland | Goat Willow, Grey Willow, Downy birch, Common alder | 1100 | 3.0 x 3.0 | 1.7 |

#### 5.2.2.2 Ground preparation

Deep forestry ploughing will not be permitted as a method of ground preparation to avoid sediment run-off and erosion. Shallow agricultural ploughing should not be used on slopes over 9%. Site sensitive ground preparation methods such as hand screefing and continuous mounding on slopes over 9%, will be adopted.

With regards drainage, appropriate methods will be employed in accordance with the most recent edition of the Forests & Water Guidelines in areas of commercial crop and no drainage methods will be employed in areas of native wet woodland as these species depend on moist or waterlogged soils.

#### 5.2.2.3 Crop protection

It is likely that the proposed areas of new broadleaved planting will be largely protected using tree guards with the new conifer planting left unguarded and reliant on the existing onsite deer management.

# 5.3 Prescriptions

## 5.3.1 Productive Conifers

The primary function of these forests is generally to produce high volumes of softwood timber of relatively standard quality, predominantly providing for the small roundwood and woodfuel market rather than the saw-log market.

As such and as per the SLFD restocking strategy a reduced management input will generally be employed; meaning:

- lower cost or alternative ground prep methods
- restocking at average initial density of 2,700 stems/ha to achieve a final density of between 2,250 and 2,500 stems/ha with an emphasis on achieving overall stocking
- top-up spraying may be employed based on evidence from the Hylobius Management Support System.
- a restricted SDA process to ensure that the objectives that are set for the site are being met and to inform any future management

Sitka spruce will continue to form the primary component of the productive conifer as it is well suited to the site with generally higher yield classes. Sitka will be planted pure where the soils are better but on the poorer deep peat areas it will be planted in intimate mixture with Lodgepole pine where the pine will act as a nurse.

Although Scots pine and larch were planted in various areas previously, due to the threat posed by (respectively) DNB and *P. ramorum* detailed in section 3.2.5, there will be no further restocking carried out using these species.

## 5.3.2 Semi-natural woodland

Various areas of the sites are potentially suitable to support Native woodland types (as classified in *FC Bulletin 112 Creating New Native Woodlands*), the woodland types, locations and species are listed in Table 9 below:

Table 9 – Native Woodland Types

| Woodland Type | Location | Species |
|---|---|---|
| W4 (Birch woodland) | Poorest ground, typically around bogs and also along riparian corridors. | Downy birch, Goat willow, Common alder |
| W9 (Upland mixed broadleaved woodland) | On more fertile soils. | A wide range of broadleaved species including Oak, Birch, Rowan, Alder, Aspen, Gean, Holly, Hazel and shrubs. |

Riparian areas will generally be lower density W4 woodland incorporating around 30% of open space. Elsewhere, a more diverse range of native woodland types may be planted according to local conditions. It may also be expected that a conifer component will develop in these areas through natural regeneration; this can be accepted however should be managed to ensure it remains a minor component.

### 5.3.3 Mixed woodland

Along transport corridors and along visible forest edges a diffuse matrix of non-productive low density broadleaves and open space will be developed. Given its tolerance of exposure and roadside conditions Sycamore may feature in this matrix on areas of mineral soil. If a conifer component develops in these areas through natural regeneration; this can be accepted however it should be managed to ensure it remains a minor component. The district landscape architect will provide a more detailed planting design for roadside restocking to coincide with the work plan process.

In terms of management input the areas intended as semi-natural and mixed woodland along with designed open space will be managed as per the SLFD restocking strategy using minimal intervention with no/limited ground preparation. Restocking will be at low densities according to site objectives with no SDA process and with low future management input.

### 5.3.4 Open ground

Our management of open ground for biodiversity will include the surveying and monitoring of natural tree regeneration at the recently deforested Carnwath Moss LRB and any necessary scrub cutting required. At Woodend Moss we will remove any trees not already felled by standard methods to restore the underlying LRB as per the previous approved LMP. We will also continue to annually mow the wild flower meadow area at West Forth. Other areas of ground managed as open for heritage conservation are detailed in section 5.5.

### 5.3.5 Remediation of restored former opencast coal mines

Some areas of Heathland which were formerly open cast coal mines and were restored in the past have not been successful in creating a medium suitable for commercial tree growth. Such areas may be revisited in future, depending on discussions with potential restoration partners, with a view to doing some further remedial restoration to improve the soil condition in order to successfully establish viable commercial crops. Depending on timescales this may require future amendments of this plan in order to allow coupes containing failing crops to be felled early to allow for this soils remediation.

### 5.3.6 Water

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

## 5.4 Biodiversity & Environment

### 5.4.1 Habitat Management

The various woodland and open priority habitats as well as the species they support will continue to be conserved and developed as per the management detailed in the previous section.

### 5.4.2 Ancient Woodland

#### 5.4.2.1 PAWS

A PAWS survey to monitor the condition of the ancient semi natural woodland at Wilsontown Glen will be carried out

Scrub cutting at Woodmuir PAWS area to remove Sitka spruce regeneration and in addition encouraging Aspen suckering in order to further establish this native broadleaf species.

#### 5.4.2.2 Deadwood

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

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

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

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

Table 10 – Assessed Deadwood Ecological Potential (DEP)

| Assessed DEP | Area (ha) | Future Volume Estimate ($m^3$/ha) | Total Future Volume ($m^3$) |
|---|---|---|---|
| High | 170 | 72 | 12,240 |
| Medium | 164 | 63 | 10,332 |
| Low | 1866 | 57 | 106,362 |

Total future potential is thus estimated at **59** $m^3$/ha.

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

- Retain small groups of live trees and/or single large trees to develop into deadwood, identify these from trees lacking commercial value or areas with bryophytes.
- Leave one very large fallen stem if possible on each site (>20cm dbh).

### 5.4.3 Important Species

The variety of species listed in section 3.4.3 demonstrates that forest of predominantly commercial conifer species can provide valuable habitat for a wide range of important flora and fauna. The management detailed in section 5.1 is expected to further enhance opportunities for various species e.g. restoring LRB's; providing more structurally diverse forests; retaining areas of relatively open poor growth forest; and increasing the area of riparian woodland.

### 5.4.4 Wildlife (Deer Management)

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

- To enable restocking to take place without the need for deer fencing and to achieve a stocking density of 2500 stems per hectare at year five in accordance with OGB 4.
- The District aim for damage allowance is to keep leader damage levels below 10% on all commercial plantations.

- Ensure all Biological resources on the National Forest Estate remain in favourable condition (as per SNH guidelines).
- To maintain a sustainable deer population.

### 5.4.5 Non Native Invasive Species

**Himalayan balsam** (*Impatiens glandulifera*) - An eradication programme is in place within affected sites across the district in accordance with the District Invasive Non-Native Species Plan 2014-2019. This will continue with a foliar spraying regime at Woodmuir to eradicate the balsam.

**Grey squirrel** (*Sciurus carolinensis*) - As Woodmuir is not within a Red squirrel (*Sciurus vulgaris*) stronghold they are not deemed a threat to this species here and therefore this is not a driver for controlling them. Furthermore the tree species with the potential to be affected by grey squirrel form only a minor component of the forest so likewise this also is not a driver to introduce Grey squirrel control.

**American mink** (*Neovison vison*) – Despite the potential threat to water vole at Heathland their population seems to be thriving. It is suspected that suitable riparian habitat where wet fen like conditions provide various small dry refuges for the water vole protect them from the mink. This plan will see the enhancement of such riparian areas along the main watercourses which in turn should benefit water vole. To effectively control mink in the area would require collaboration with neighbouring landowners and partners under a targeted local project which at present has not been established. FES remains open to any future discussions with appropriate partners to tackle this issue.

## 5.5 Heritage

The forest design illustrated in the **Future Species and Habitats Maps (5b (i-v))** considered the various heritage features, many currently hidden under trees such as historic tramways, and our future management intends to gradually reveal many of these more and more going forward providing enhanced context to them and also improving our ability to access and manage these features in the future.

Appropriate buffers have been applied by our Environment & Heritage Forester to all the different features across the sites which are recorded within our heritage database. This is done in accordance with the guidance provided in the Forests and Historic Environment guidelines (2011), the FCS policy document: Scotland's Woodlands and the Historic Environment (2008) and the supporting FES Historic Environment Planning Guidelines. Features generally have buffers ranging from 5-10 metres depending on their nature but these can be wider or even have no buffer. Such constraints are identified and surveyed by Forest District staff prior to

any work being undertaken in order to ensure that upstanding historic environment features can be marked and avoided. For operations, work prescriptions protect relevant historic environment features apportioning appropriate buffers clear from ground disturbing operations and planting. Opportunities to enhance the setting of important sites are considered on a case-by-case basis.

The following sub-sections provide further detail as to some features which will see specific management or work on them during the life of this plan.

### 5.5.1 Scheduled Monuments

**Heathland**

The district will continue to manage and promote the **Wilsontown Ironworks** Scheduled Monument in accordance with the Historic Environment Scotland-approved Management Plan including scrub cutting, rose bay willow herb treatment and using sheep to manage the vegetation. In addition to this we will also collate new information as it is revealed and give two talks to heritage groups each year.

**Woodmuir**

SLFD will continue to control vegetation on the **Woodmuir Coke Ovens** Scheduled Monument in accordance with the Historic Environment Scotland-approved Management Plan.

**The Mosses**

The fence protecting the **Couthally Castle** scheduled monument (which is just off NFE ground) will be re-aligned to the NFE boundary.

### 5.5.2 Non-scheduled Archaeology

**Heathland**

The district have been in communication with the Coal Authority who are keen to make safe the 'Climpy mine and tramway' feature however care needs to be taken that the feature is not damaged in the process.

There is also the potential to carry out some masonry repair work to the 'Store Brig' at Wilsontown

**Woodmuir**

A heritage volunteer has offered to produce a survey of the 'Rashiehill Muir' former steading which will hopefully provide added context to the feature and further inform our future management of it.

## 5.6 Community & Recreation

FES district staff will continue to liaise with local communities to promote and encourage use of the sites and Community Rangers will continue to seek opportunities to develop new and forge existing links with schools, community and user groups to increase awareness and enjoyment of the sites. FES will continue to maintain and, where appropriate, improve trails and paths particularly at Wilsontown and West Forth.

## 5.7 Critical Success Factors

The success of this plan will be based on whether the objectives set out in the Management Plan Brief (see Appendix IV) are achieved. The table which forms Appendix V details how each objective will be appraised, where and when each objective will be monitored; by who and where it will be recorded. This will enable an evaluation of success as part of the mid and end of plan reviews.