Scottish Lowlands Forest District

Renfrewshire Woods

Land Management Plan

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:	Renfrewshire Woods (Boden Boo / Johnstone Woods / Windyhill / Howwood & Knockmountain
Nearest town, village or locality:	Erskine / Johnstone / Howwood & Kilmacolm
OS Grid reference(s):	NS 459 719 / NS 431 616 / NS 435 615 / NS 402 600 / NS 358 713
Local Authority district/unitary Authority:	Renfrewshire Council & Inverclyde Council

Areas for approval

	Conifer	Broadleaf
Clear felling	4.3	
Selective felling		
Restocking	0.9	3.4
New planting (complete appendix 4)		12.0

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 06/02/2015

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 Scotland……

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:	Renfrewshire Woods (Boden Boo/Johnstone Woods/Windyhill/Howwood & Knockmountain
Nearest town, village or locality:	Erskine / Johnstone / Howwood & Kilmacolm
OS Grid reference:	NS 459 719 / NS 431 616 / NS 435 615 / NS 402 600 / NS 358 713
Local Authority district/unitary Authority:	Renfrewshire Council & Inverclyde Council

2. Proposed areas to nearest tenth of a hectare

	Boden Boo	Knockmountain	All
New Planting	0.1	11.9	12.0
Natural Colonisation			
Open Ground			
Total	0.1	11.9	12.0

3. Special areas and protected land

Designation	Area Name or Number	Comments
SSSI	Dargavel Burn	Located partially within Knockmountain

4. Proposal details of woodland creation

Area Name or number	Gross Area (Ha)	P Year	Spp	Area (Ha)	Open Ground (Ha)	Comments
Boden Boo	0.1	2019/20	ROW 50%, ELM 30% HOL 20%	0.1	0	
Knockmountain						
1	5.7	2019/20	DGR* 40%, GDR‡ 30% PSP 30%	5.1	0.6	*Dog rose ‡Guelder rose
2	1.4	2019/20	GWL 40%, CAR 30% PBI 30%	1.0	0.4	
3	3.5	2019/20	CAR 30%, POK 30% ROW 20%, HAZ 20%	2.5	1.0	
4	1.3	2019/20	CAR 30%, POK 30% ROW 20%, HAZ 20%	1.2	0.1	

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

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

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

Date …… **Approval Date**……..

Date approval ends……

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

Section 1 Proposed work							
Please put a cross in the box to indicate the type of work you are proposing to carry out. Give the area in hectares and where appropriate the percentage of conifers and broadleaves.							
Proposed work	cross	Area in hectares	% Conifer	% broadleaves	Proposed work	cross	Area in ha
Afforestation	X	12.0	-	100	Forest roads	X	0.4
Deforestation					Forest quarry		
Location and District			Boden Boo & Knockmountain, 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	Renfrewshire Woods (Boden Boo & Knockmountain)
Grid Reference (e.g. AB 123/789	NS 459 719 & NS 366 714
Local Authority	Renfrewshire
Nearest Town	Erskine & Kilmacolm

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)	8.4
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

d. The Broads	N/A
e. World Heritage Site	N/A
f. Scheduled Ancient Monument (SAM)	N/A
g. an area designated as National Scenic Area	N/A
h. Area of Outstanding Natural Beauty (AONB)	N/A
i. "Natura 2000" site - *(European network of special areas of conservation and special protection areas under the Wild Birds Directive)*	N/A

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Version History

Version	Date	Comments
1.0	30/08/2016	Initial draft
1.1	28/09/2016	Amended after internal district comments
1.2	07/02/2017	Update header and footer

Summary of Proposals

Following the acquisition of six sites across the Renfrewshire area between 2006 and 2012 this plan combines those various sites under one plan by revising the existing plans for **Knockmountain**, **Windyhill** & **Howwood** (*which includes the adjoining* ***Tor Bracken***) and adding new plans covering **Boden Boo**, and **Johnstone Woods**.

Together the sites cover approximately 320 hectares of which approx. half is given over to woodland with the other half open. The woodlands are predominantly broadleaved which make up approx. 80% of the cover with the remaining 20% conifers. Of the afforested area just over half of this has been planted within the last decade. This plan maintains woodland coverage with some small scale, end-of-rotation/wind-risk, shelter-belt felling balanced by restock/additional new planting which will enhance views, landscape and biodiversity potential. This plan also maintains the existing species diversity across the sites and aims to develop the relatively young crops to allow future age restructuring using low impact silvicultural systems as an alternative to clearfelling.

Being located in and around the communities of Erskine, Johnstone, Howwood and Kilmacolm the sites already serve or have the potential to better serve the respective communities that surround them; as such this plan has been carefully designed to make the most of existing and future opportunities to improve access and recreation, enhancing their attraction to those communities and beyond.

Introduction:

Renfrewshire Woods Land Management Plan details the management tasks and proposals to be applied at Boden Boo, Johnstone Woods, Windyhill, Howwood and Knockmountain woodlands for the 10 year approval period of the plan and beyond.

After 5 years the plan will be subject to review.

Located almost entirely within the Renfrewshire Local Authority area (approx. 32 Ha of Knockmountain falls within Inverclyde) (**see map 1 – Renfrewshire Woods Location**) and all being entirely or partially within 1 kilometre of settlements with populations greater than 2000 people, these sites qualify for the Woodlands In And Around Towns (WIAT) programme which aims to improve the quality of life in towns and cities and as such will be designed and managed accordingly. This plan delivers on various objectives specific to the individual sites, influenced by the district strategic priorities which are guided by the “Key Aspirations” of the Scottish Forest Strategy (see **Appendix IV - Management Plan Brief**).

Forestry Commission Scotland
Coimisean na Coillteararachd Alba

Renfrewshire Woods Section A: Boden Boo

A1.1 Setting and context

Boden Boo is in Renfrewshire on the south bank of the River Clyde to the north-west of Erskine in the shadow of the Erskine Bridge. The National grid reference for the centre of the wood is NS 459719. To the north the site is bordered by the River Clyde and to the west, under the bridge, is Erskine Golf Course. The east of the site is demarked by a stone wall with a small business park with surrounding woodland further east across the road. To the south lies the town of Erskine. The site covers an area of approx. 22.5 hectares.

The current land use matrix is as follows:

Table A1 Current land usage

Land use	Area (ha)	%age
Existing Broadleaved Mixed Woodland	15.4	68
Unplantable or bare	4.2	19
Open	2.9	13
Total	**22.5**	**100%**

See **Maps A1 –Location & A2 - Context**

A1.2 History of the site

Boden Boo was part of the former Erskine Park Estate, originally owned by the Earl of Mar, then acquired by Lord Blantyre in 1703. In 1828 the 11th Lord Blantyre landscaped the estate grounds and the 'Boden Boo Plantation' first appears on the 1863 Ordnance Survey Map. In 1900 the Blantyre line became extinct and the estate was broken up with Renfrewshire Council eventually becoming the landowner before it was purchased for the National Forest Estate (NFE) by Forest Enterprise Scotland (FES) on the 30th March 2012.

Boden Boo is one of fourteen woodlands across Glasgow and the Clyde Valley which together form the Commonwealth Woods; a legacy of the 2014 Commonwealth Games, linking up with the 54 countries of the Commonwealth through teaching and learning in Glasgow schools and through the wise management of our woods and forests. The scheme encourages people to engage with their local woodland spaces and enjoy outdoor recreation and experience woods in new ways.

A2.0 Analysis of previous plan

There was no previous plan for this wood.

A3.0 Background information

A3.1 Physical site factors

A3.1.1 Geology, soils and landform

The underlying geology of the site is predominantly volcanic in origin however there is also an area of sedimentary rocks. This bedrock is overlain by natural superficial raised marine deposits which has resulted in brown earth soil [FC code 1] on the on and around the higher ground and brown type surface water gley [FC code 7b] on some of the lower more poorly draining areas (see **Map A3a – Soils**)

Soil Moisture Regime provides an indication of the moisture and oxygen availability in the soil, both of which are essential for root growth. According to the Ecological Site Classification Decision Support System (ESC- DSS), Boden Boo's soil moisture regime ranges from Fresh to Very Moist, implying periods of waterlogging in areas, which may in turn influence root depth.
Soil Nutrient Regime is a measure of both the availability of soil nutrients for plant growth, and the acidity of the soil (which impacts on the solubility and hence availability for uptake of most nutrients). Boden Boo's soil is of Medium nutrient status, which is suited to a wide range of tree species.

A3.1.2 Climate

Boden Boo falls within the Warm, Moist Climatic zone with Accumulated Temperature (day-degrees above 5 °C, a measure of growing season length) varying between 1431 and 1475 (1200 representing the dividing point between Cool & Warm).

A3.1.3 Exposure (DAMS)

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 scores 12-13** (<13 = sheltered, 13-15 = moderately exposed), with scores generally increasing with elevation (see **Map A3b - Climate**).

A3.1.4 Hydrology

There are no watercourses running within the site and despite the woodlands location just south of the River Clyde it does not drain into the river.

A3.2 The existing woodland

A3.2.1 Age structure, species and yield class

Age Structure

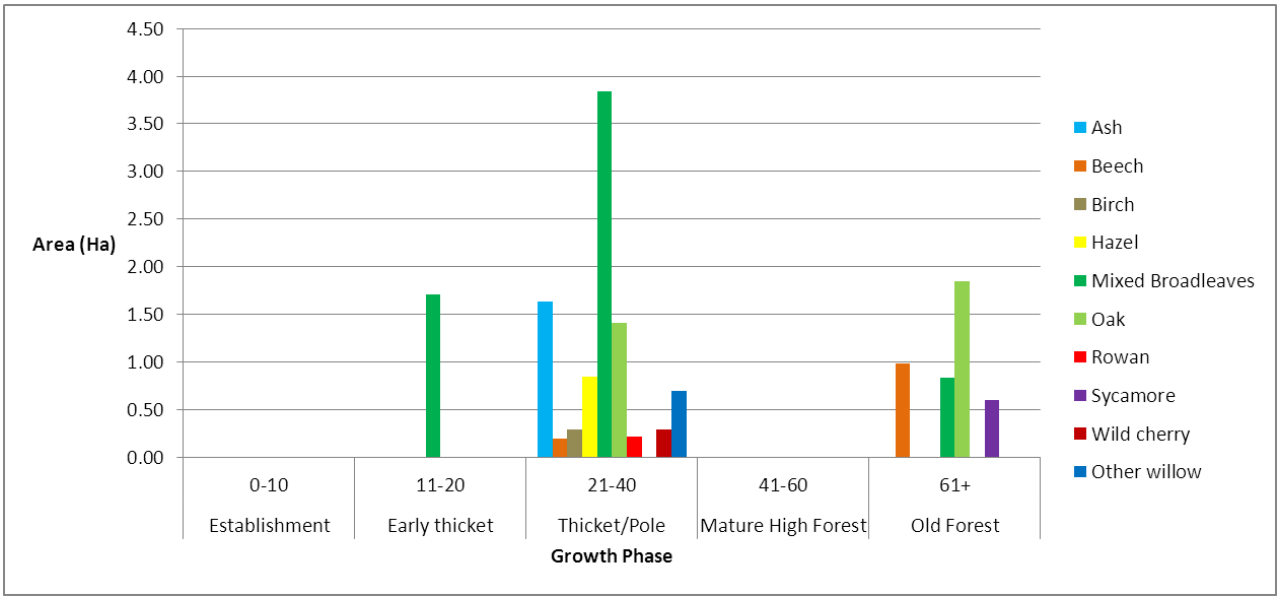
From **Table A2** below it is clear that the majority of the woodland (~60%) is made up of thicket & pole stage woodland predominantly planted in 1993. There is also the remaining established old woodland which is probably a remnant of when Boden Boo fell within the former Erskine Park.

Table A2 Age Structure

Age of Trees (years)	Successional Stage	Area (ha)	%
0-10	Establishment	0	0
11-20	Early Thicket	1.71	11
21-40	Thicket & Pole Stage	9.43	61
41-60	Mature High Forest	0	0
61+	Old Forest	4.27	28

Figure **A1** below further categorises the woodland age structure by species.

Figure A1 Age Structure Breakdown



Species Structure

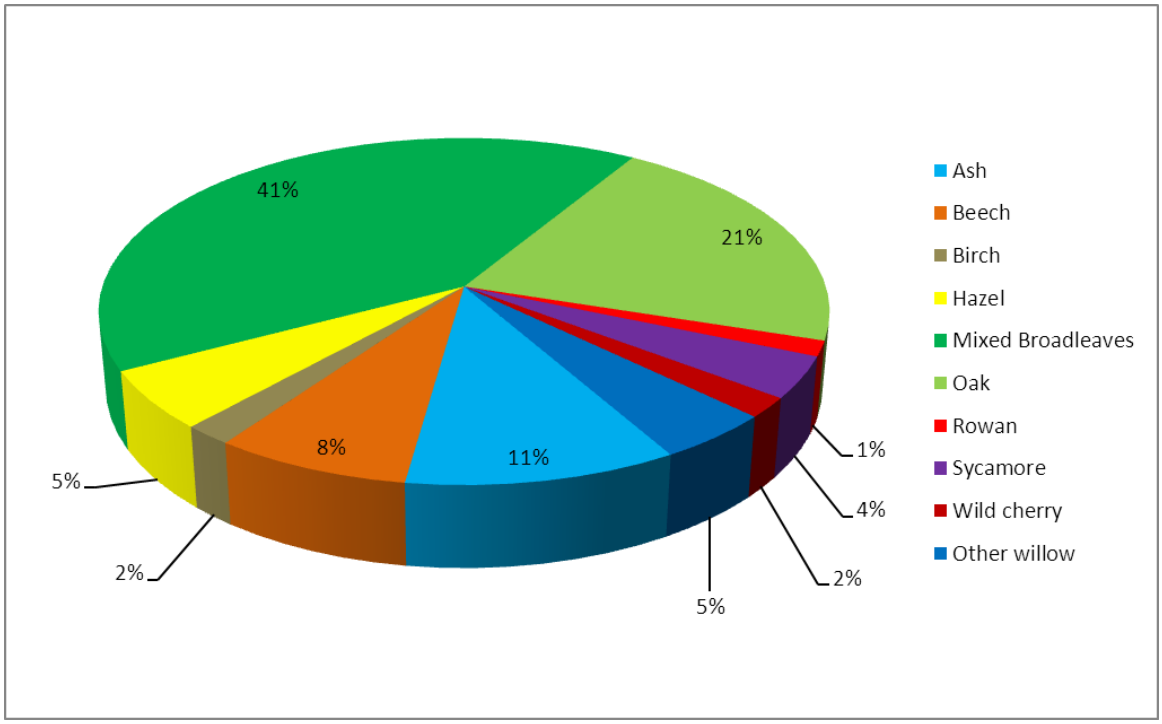
Boden Boo is a broadleaved wood comprised of various species which can be seen from **Table A3** and **Figure A2** below (see also **Map 3c – Current Stock**).

Native Woodland - Of the broadleaved area, the vast majority (approx. 16.3 ha), has been identified as native woodland by The Native Woodland Survey of Scotland (NWSS); carried out between 2006 and 2013 (see **Map A3d – NWSS**).

Table A3 Species Structure

Species	Area (ha)	%
Ash	1.63	11
Beech	1.18	8
Birch	0.29	2
Hazel	0.85	5
Mixed Broadleaves	6.39	41
Oak	3.26	21
Rowan	0.22	1
Sycamore	0.60	4
Wild Cherry	0.29	2
Other Willow	0.70	5

Figure A2 - Current Species Structure Breakdown



Yield Class

Yield classes across the site range from 2-6 with the vast majority of those (88%) within the higher range of YC4 & 6.

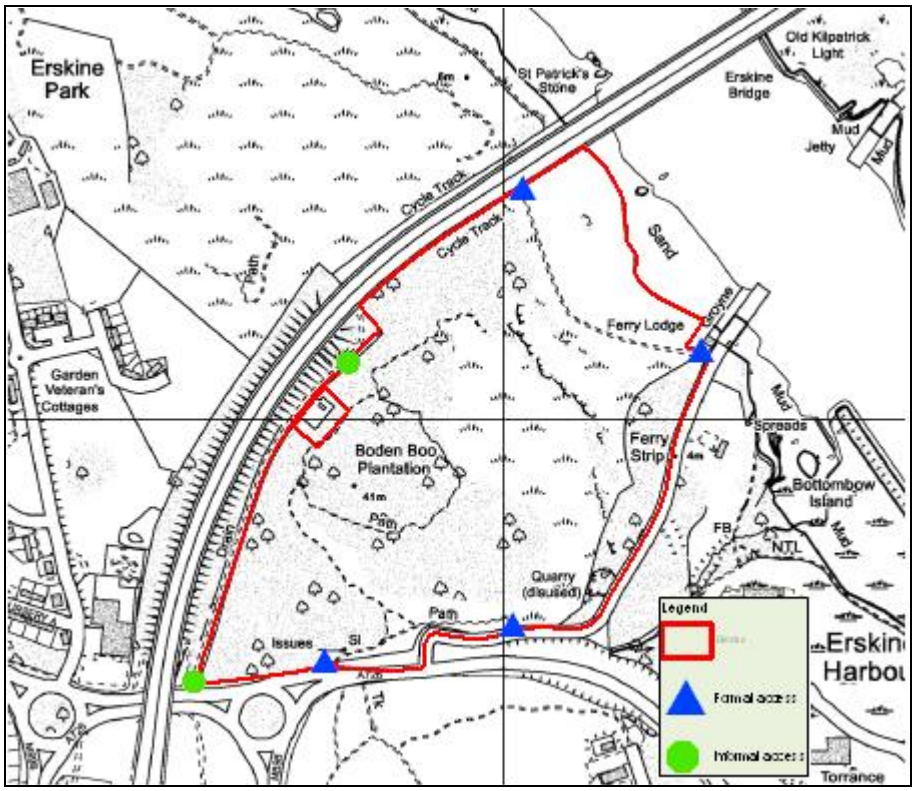
A3.2.2 Ancient Woodland

7.5 Ha of the site has been identified as Long Established Woodland of Plantation Origin (LEPO). This woodland has been interpreted as plantation from maps of 1860 and continuously wooded since. Many such sites have developed semi-natural characteristics, especially the oldest ones, which may be as rich as Ancient Woodland (see **Map 3e – Ancient Woodland Map**).

A3.2.3 Access

There are 4 formal access points to the site with a further 2 informal ways of entering the site. The site has two car parking areas suitable for approx. 14 and 3 cars respectively. The larger main parking area is located to the north east of the site next to the former Erskine Ferry Toll Lodge with the smaller lay-by parking bay located to south east along Ferry Road. The woodland has a network of approx. 2.6 km of formal footpaths which facilitate access through the site and also a few circular walks within the wood. The main path through the wood is also part of the wider local core path network.

Figure A3 – Access points



A3.2.4 LISS potential

This site is suited to low impact systems as it is a stable site with restricted access to large harvesting machinery. The nature of the crop is also suited to LISS having a varied age and species structure.

A3.2.5 Current and potential markets

Thinnings from the crop of mixed broadleaves could provide for the firewood market as well as for more niche local hardwood sawmillers although access for timber transportation may present challenges.

A3.2.6 Pathogens

A3.2.6.1 *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. At present there is no known infection within Boden Boo however as ash forms a significant portion of the mixed broadleaves in the wood and is regenerating well if Chalara was to hit it would have a significant impact.

A3.3 Landscape and land use

A3.3.1 Landscape character and value

Boden Boo sits within a fairly diverse and irregular landscape due the nature of its urban setting characterised by a complex matrix of roads, bridges, residential housing as well as business and retail parks. The woodlands are generally perceived on the small scale due to the surrounding topography obscuring views of the site within their wider context.

In terms of SNH's Landscape Character Assessment, the site sits between 2 character types; Raised Beach and Rugged Upland Farmlands (see **Figure A4** below). Relevant extracts from the Glasgow and Clyde Valley Landscape Character Assessment are shown below in **Figures A5 & A6**:

Figure A4 – Land Character Type Areas

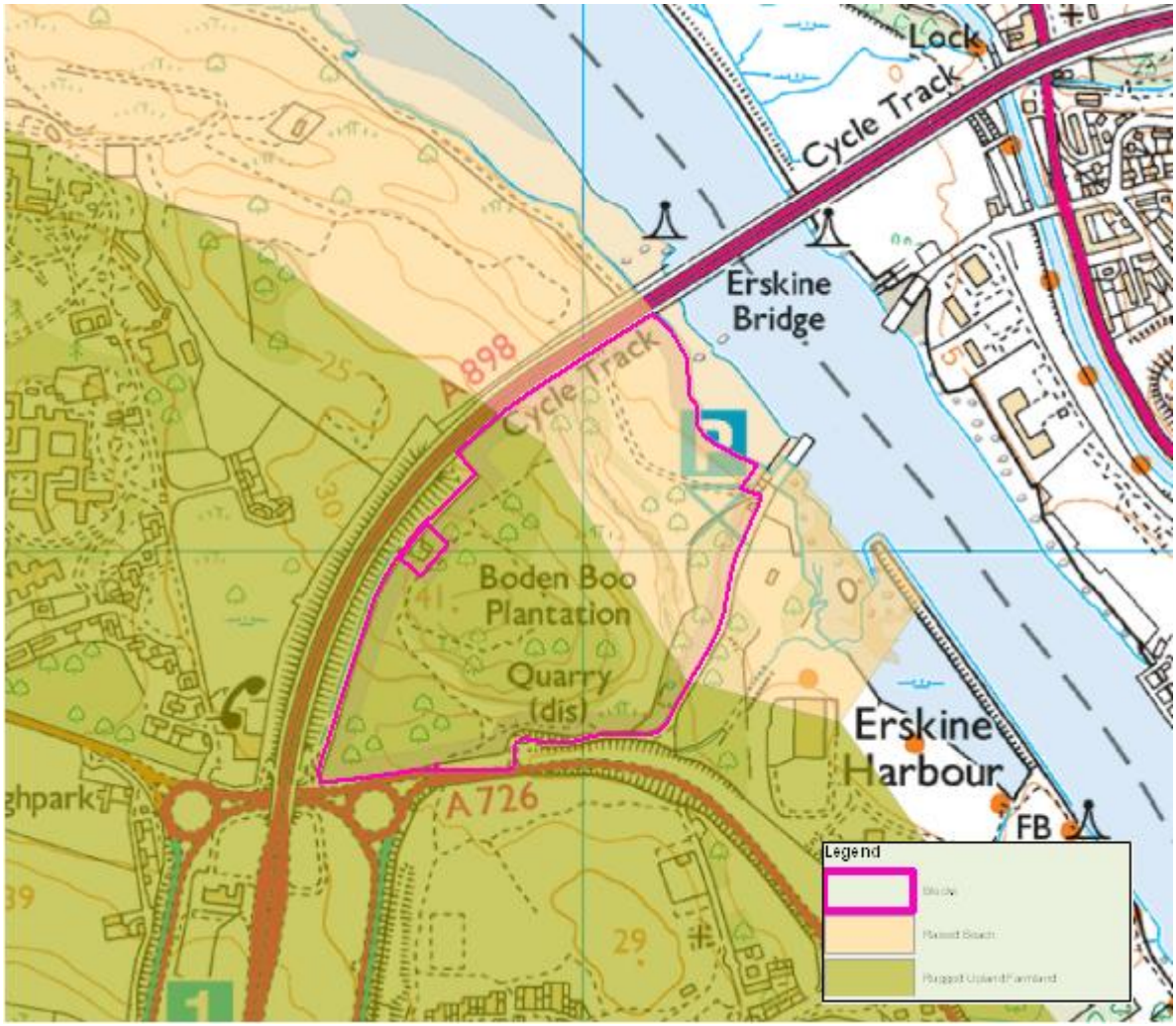


Figure A5 Raised Beach Land Character Type

RAISED BEACH - KEY LANDSCAPE ISSUES

5.1.8 Key landscape issues affecting this landscape type include:

.....

- *the importance of remaining areas of broadleaf woodland on the former cliffline*
- *the importance of historic components of the landscape, particularly the policies and estate woodlands associated with historic houses and estates*
- *recreational importance of the raised beach, and views from it across the inner Firth of Clyde*
- *longer term effects which may be associated with climate change, including the management of flood risk.*

MANAGING LANDSCAPE CHANGE

Key characteristics

5.1.9 The key characteristics, features and qualities of this landscape type are:

- *steep scarp, representing the former cliffline, and narrow platform, representing the former beach, with estuarine mudflats along the inner part of the Firth of Clyde*
- *`hanging' broadleaf woodland on many of the steeper slopes*

.....

- *prominent area with extensive views*

Landscape planning and management should aim to conserve and enhance the distinctive landform features of the Raised Beach landscape type and the patterns of land cover, settlement and land use which result. Changes that weaken these patterns, or which would introduce conflicting elements into the landscape, should be resisted.

Trees and woodland: sensitivities and forces for change

5.1.10 The former cliffline woodlands of semi-natural and policy origin are an important nature conservation resource, provide a backcloth for lower level developments and frame views along the estuary. These are mostly in private ownership and are subject to no, or minimal, management; consequently, under-grazing. Dutch elm disease and the lack of regeneration or restocking with appropriate species, is a threat to their continued existence. Certain urban fringe community woodland projects are providing local benefits but are limited in scale. The raised beach landscape would also be sensitive to the encroachment of forestry over the scarp or hill ridge unless this could be integrated with existing hanging woodlands.

Trees and woodland: planning and management guidelines

5.1.11 Woodland makes a critical contribution to the character of this landscape, articulating and emphasising the contrast between the steep scarp and the more gently sloping areas above and below. Management should therefore aim to:

- *encourage the conservation, and where appropriate, the active management, of existing broadleaf woodland; there may be opportunities to increase the extent of existing woodlands;*

.....

Figure A6 Rugged Upland Farmlands Land Character Type

RUGGED UPLAND FARMS - KEY LANDSCAPE ISSUES

5.6.7 Key issues affecting this landscape type include:

- *the importance of encouraging the continued maintenance and management of hedges, field boundary trees and characteristic woodland clumps*
- *the visual and landscape impacts associated with urban related infrastructure, particularly tall structures such as pylons and communications masts*
- *changes in landscape character resulting from non-agricultural land uses such as golf courses*

MANAGING LANDSCAPE CHANGE

Key characteristics

5.6.8 The key characteristics, features and qualities of this landscape type are:

.....

- *tree cover often emphasising landform, for example concentrated on bluffs and outcrops*

Planning and management should aim to conserve the distinctive character of the Rugged Upland Farmland by resisting developments such as pylons and masts, which would weaken its rural character, and by securing the positive management of features such as field boundaries and woodlands.

Trees and woodland: sensitivities and forces for change

5.6.9 Woodland provides an important structural landscape element. As noted above, stands of beech and pine emphasise many of the rugged hillocks, contrasting with intervening pastures. The landscape would be very sensitive to the loss of these woodlands, either through direct loss, or, more likely, through under-management and neglect. Equally, an increase in woodland cover to include the currently un-wooded area would change perceptions of the landscape. There may, however, be opportunities for additional, small scale woodlands, which conform to existing patterns and which would reinforce the character of the landscape.

Trees and woodland: planning and management guidelines

5.6.10 Guidelines for the Rugged Upland Farmland include:

- *the emphasis in this landscape type should be placed upon securing the appropriate management of existing small woodlands, particularly where they emphasise the natural topography and thereby contribute to landscape character*
- *this landscape type has the potential to accommodate some additional woodland planting provided that this is of a relatively small scale, is correctly sited (particularly in relation to hillocks and outcrops) and reflects local patterns of species, particularly the occurrence of Scots pine in higher areas and beech in lower areas*

.....

A3.3.2 Visibility

Due to the local topography the site is viewed predominantly on the small scale that is to say from relatively close vantage points which don't allude to the wider context of the site. The main views to be had of the site are glimpsed views of the tops of the trees from the A898 and views of the woodland edge from the A726. Slightly wider views are available from the river and from its northern shore but these are relatively obscure vantage points.

A3.3.3 Neighbouring land use

The surrounding land use whilst generally considered urban has relatively few developments with the A898 and a golf course to the west, a business park to the east set amongst woodland, the River Clyde to the north and to the south, across the A726 road, playing fields and open park land before becoming residential housing.

A3.2.4 Utilities

Map A3f shows the utility matrix found throughout the site.

A3.4 Biodiversity

In partnership with East Renfrewshire and Inverclyde, Renfrewshire Council have developed a Local Biodiversity Action Plan (LBAP) which has within it three specific areas which influence management at Boden Boo; Woodlands, Coastal and Urban Habitats. Derived from these areas are priority habitats and species in need of conservation and the outlines methods the LBAP Group intend to pursue in order to achieve this goal. The priority habitats and species relevant to Boden Boo are listed below.

A3.4.1 Priority Habitat & Important Species

Drawing on the LBAP, two broad UK habitats are identified as being relevant to Boden Boo; **Broadleaved and Mixed Woodland** and **Unimproved Grassland**. Within these broad definitions specific priority woodland and grassland habitats are specified.

Amongst the two broader habitats the UK priority habitats which are relevant to Boden Boo are the 18.3 Ha of Lowland mixed deciduous woodland and 1.4 Ha of Neutral grassland as identified by the NWSS (see **Map A3g – NWSS Dominant Habitat**).

Whilst the LBAP identifies several species associated with the priority habitats mentioned above, none of these species have been seen or documented within the wood. The species most likely to be found within the site are:

- Otter (*Lutra lutra*)
- Common Pipistrelle Bat (*Pipistrellus pipistrellus*)
- Soprano Pipistrelle Bat (*Pipistrellus pygmaeus*)

Two rare hoverflies have been recorded at Boden Boo: *Brachyopa insensilis* & *Brachypalpoides lentus.* Both species are closely associated with sap runs and rot holes on mature deciduous trees, where their larvae develop. They were recorded at a single sap run on a broken beech (Brachyopa insensilis is a

Scottish Biodiversity List species and both are rare flies in a Scottish context – both recordings were 'first' records for Renfrewshire.

A3.4.2 Designations

Renfrewshire Council has identified a number of Local Nature Conservation Sites (*formerly Sites of Importance for Nature Conservation (SINC)*) from a habitat survey of Renfrewshire, and Boden Boo is one of these. Boden Boo represents a composite site with a variety of habitat types that include broadleaved woodland, parkland (scattered trees), scrub (dense and scattered), neutral grassland, marshy grassland, tall ruderals and an area of standing water. The site contains a large number of flowering plants and faunal interest includes Fox, and butterflies (Purple Hairstreak, Small Copper, Small Heath and Meadow Brown).

Boden Boo is also adjacent to the Inner Clyde Estuary: Site of Scientific Interest SSSI (designated in 1999); Special Protection Area (SPA) and RAMSAR (both designated in 2000) for the estuary's wildfowl and wading birds, particularly its internationally important wintering population of Common Redshank (*Tringa tetanus*).

A3.4.3 Invasive Non-Native Species

The wood is inhabited by **Grey squirrels** (*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 and Sycamore are species within the wood which are particularly vulnerable to stem breakage caused by bark stripping.

A3.5 Heritage

An archaeological survey of the site was carried out in 2013 by AOC Archaeology Group and little of archaeological significance was recorded. Only two features were recorded, the first being a metalled track-way leading from the disused quarry in the SE of the site and the second being a revetted ditch, possibly a ha-ha, close to a well, marked on the OS first edition map. The well itself cannot be seen and may have been in-filled or covered.

A3.6 Community & Recreation

A3.6.1 Community

With its slightly detached location the woodland isn't immediately accessed by the surrounding residential population. Many local residents may have to walk several hundred yards and negotiate busy A class roads to access the site. There is also access to the site off the Clyde Walkway. Many visitors to the site get there by car and use the car parking areas. There are five primaries and one secondary school within 1 mile of the site. Since taking over the management of the site the forest district has run events such as a Dog user

event, summer family events, diversity events such as 'Eid in the Woods' and an annual Halloween event that attracts over 300 participants. Engagement is an important element of the yearly Halloween event with a partnership with Linwood Area of Dance Drama and Songs (LADDS) who have twice had their children performing as part of the Halloween trail. The district has worked with Renfrewshire Council who now run regular Forest Schools in Boden Boo. The district has also worked with Crisis Counselling to carry out a Branching Out programme in Boden Boo. The forest district has also gained the help of a volunteer warden who helps maintain the woodland.

A3.6.2 Recreation

People counters installed at the entrances suggest an estimated 93,000 visitors to the wood each year. A significant proportion of these visitors to the site come to exercise their dogs and do so in the open park area by the river, many also venture into the wood but by no means all of them.

Since taking over the management of the site the forest district has been involved in a number of projects to improve the visitor experience. As such and as part of the terms of purchasing the site, the large historic boundary wall that runs the length of the site beside the Old Ferry Slip road was repaired, re-appointed and the vegetation was removed from it in 2011.

A 2km path network was created in early 2012. The reason for the provision of this path network was to increase the use of the wider site and in particular the woodland element. Before Forest Enterprise Scotland took the site on the woodland was under used with most visitors accessing the Northern open area of the site and the beach on the River Clyde, the new path network has encouraged more people to access the woodland year round and has increased the diversity of user groups.

In 2013 the Lay-by entrance to the site was upgraded with new wall and bespoke metalwork feature. Although this entrance was secondary to the main entrance it was in a state of disrepair and was bringing the quality of the site down.

In 2014 the main car park entrance was upgraded with marked parking bays, improved access feature wall with bespoke metalwork installation. The existing council bins were replaced with wooden ones and were installed at additional bin locations were serviced under the Erskine Bridge and at the lay-by entrance. The additional bins were installed as a response to demand from site users.

In 2015 a number of seats were installed in Boden Boo including the creation of two picnic areas. The seating was placed to improve access for people who could walk the paths, to allow places for visitors to experience quiet reflection

and peace/ enjoy views and to provide opportunities for social interaction. As part of this operation two old and damaged council picnic benches were removed.

In 2016 the Boden Boo Maintenance Plan was created. This was the first plan of this type to be used in Scottish Lowlands Forest District and has been designed for both staff and contractors to easily understand what is required to ensure the site is maintained to a high standard.

In addition to these improvements a new website for the site was produced in 2014 and in 2015 an orientation panel was installed as part of a seating feature. The seating feature added a focal point for people to gather and to draw them away from the car park into the site. The orientation panel and a sister panel at the lay-by entrance were installed to encourage more people to explore the woodland. Both maps on the orientation panels were orientated to the site visitors' view and styled to be easy to read and provide confidence without the need for way markers.

A4.0 Analysis and Concept

Using survey work and research, a broad range of factors were acknowledged and considered to recognise the site's key features (see **Map A4a**) which, informed by the objectives set out in the management plan brief (see **Appendix IV**) were used to identify the opportunities and constraints (see **Map A4b**) which exist within the management plan area and from there develop an initial concept (see **Table A4 Analysis and Initial Concept Development** below). This initial concept was then distilled further to produce a concept map (see **Map A4c – Boden Boo Concept Map**) which summarises the main aspirations and intentions for the management plan. This management concept formed the main basis for the public consultation held in September 2015.

Table A4 Analysis and Initial Concept Development

Strategic Priority	Opportunity	Constraint	Concept Development
Accessible	Increase availability of car parking spaces to facilitate potential increase in visitors to the wood.	Lack of suitable area within FC ownership.	Explore the potential to expand the parking area on the opposite site of the road from the existing parking area.
	Improve River Clyde experience for the visitor by bringing them closer to the water.		Formalise the existing desire line which runs along the river bank to allow visitors to enjoy a walk closer to the water and to tie in with the core paths running along the Clyde out with FE ownership.
	Make more use of the existing open space for activities and events.	Available space and parking facilities limits size of events.	Maintain the open area by the River Clyde, enjoyed by visitors for activities such as picnics, dog walking etc.
	Standardise path surfacing material and improve path convergences to facilitate transition through the wood.		Improve path convergence node where varying surfaces meet at awkward angles.
	Improve sections of path to allow for improved access for all abilities and experience of the wood.		Upgrade existing path to cater for all abilities to the view point.
Cared for	Improve River Clyde experience for the visitor by bringing them closer to the water.		Maintain the north east edge of the site to ensure the condition of the neighbouring SSSI/SPA & RAMSAR site.
	Improve onsite furniture replacing with new/more natural alternative.	Wooden benches may be more susceptible to fire and graffiti is less easily removed/covered.	Improve site benches replacing current metal benches with wooden ones.
	Improve onsite furniture replacing with new/more natural alternative.	Wooden benches may be more susceptible to fire and graffiti is less easily removed/covered.	Relocate existing deteriorating picnic benches by the waterfront with new benches to the north west of the site.

Healthy	Work with the existing varied mixed broadleaf species within the wood and patterns of regeneration to facilitate the healthy growth of the wood. Use small scale CCF/LISS thinning, re-spacing and pruning creating gaps for further regeneration, the space for thicket stage crops to develop with decent form.		Implement Low Impact Silvicultural Systems approach to manage woodland, maintaining continual woodland cover using site appropriate vehicles & machinery.
Healthy	Improve aesthetic within the wood with appropriate silviculture.		As above
Productive	Create suitable access to facilitate forest machinery movement and timber extraction.	Potential disagreement from Gas company.	Explore potential access agreement along western edge road with gas company allowing district to upgrade the entrance and form a spur into the wood to allow timber access, stacking & turning.
Treasured	Make better use of area of constraint to improve visual appearance and experience for the visitor as well as the biodiversity value of this area.	Safe working heights underneath power line	Create wildflower meadow within western edge utility wayleave. Power, gas & water lines run through here limiting potential for this area which is presently dense with bramble, rosebay willowherb etc.
	Improve visual appearance and experience for the visitor as well as the biodiversity value of this area.		Create wildflower meadow to make better use of ground left open for views much of which is currently covered in rosebay willowherb.

	Improve visual appearance and experience for the visitor as well as the biodiversity value of this area.		Create a wildflower meadow across from walled pedestrian entrance to provide variety and colour to the open strip which is presently dominated by rosebay willowherb
	Improve visual appearance and experience for the visitor as well as the biodiversity value of this area.		Plant small groups of native mixed broadleaves maintaining views over to the Kilpatrick Hills, Bridge & River Clyde.
	Enhance visitor attraction to the wood by providing interactive art and play features for children.	Busier woods can be off putting to those who prefer a more solitary peaceful experience.	Create a natural play trail loop around the top of the hill, encouraging more children/families into the wood.
	Enhance visitor attraction to the wood by providing interactive art and play features for children.	Busier woods can be off putting to those who prefer a more solitary peaceful experience.	Add creative art elements into the wood e.g. 'Boo the spider' and/or 'doors to nowhere'
	Improve visitor experience on exiting/entering the wood and demarcation of FES management area boundary.	Potential disagreement from Erskine Bridge management company.	Explore the possibility of creating an art mural on the Bridge stanchion as one enters the site from the Clyde walkway from the north west. Possible local community competition for best design?

A5.0 Management Proposals

The proposals detailed below describe the rational and methodologies to be employed in order to achieve the objectives set out in **Appendix IV**. Much of what is proposed for Boden Boo will be dependent on various factors such as the availability of suitable funding, consultation with neighbours/community etc. Such proposals constitute possible future projects for FES to be delivered in partnership/agreement with others. **Appendix II – Management Table & Map A5d - General Management & Potential Projects** highlight which aspects of the management of the site fall under our 'general management functions' and which might constitute a 'potential future project'.

A5.1 Woodland Management

The proposals for this site have been produced based on sound silvicultural and environmental principles and follow the requirements, guidelines and recommendations set out within the UK Forestry Standard, the UK Woodland Assurance Scheme, FC Bulletin 124 Ecological Site Classification for Forestry and FC Bulletin 62 Silviculture of Broadleaved Woodland, FC Bulletin 115 Alternative Silvicultural Systems and the current FC edition of Forest and Water Guidelines.

As the woodland functions primarily to provide general amenity and biodiversity value and is of mixed species; it is the intention to manage the woodland sensitively to those aspects. That being said managing the woodland with a view to developing its value as a timber crop need not conflict with the overriding aspiration for the site in providing community benefit.

With this in mind the intention for the woods is to balance appropriate management of the various visitor zones throughout the sites whilst creating the conditions which will encourage the healthy growth and regeneration of a mix of species and strata in perpetuity. Achieving this balance will require coordination of both the Forest Management (FM) team and the CRT team. The FM team will concentrate on silvicultural thinnings primarily within the passive and interactive management zones whilst CRT will focus on aesthetic interventions to improve the visual appreciation of the sites for the visitor by way of light thinning, crown lifting and coppicing within the welcome and interactive management zones. The remainder of this subsection outline both the short term aims of the thinning proposals and the longer term silvicultural aims (see **Maps A5a – Management** & **A5c - Visitor Zoning** & **Appendix II – Management Table**).

Long-Term Silvicultural Aims

To encourage and promote the growth, regeneration and spread of existing broadleaved species throughout the wood along with other site suitable broadleaved species aiming to achieve a woodland diverse in species, structure, character, texture and biodiversity. Natural regeneration and/or native broadleaf enrichment will be utilised and managed to promote good growth and form with clean boles with a view to producing timber suitable for a wider range of niche markets such as those for butts and beams rather than solely for the firewood market.

A5.1.1 Silviculture

Given that Boden Boo is a small urban wood with approximately 30% of the crop old forest trees which have suffered from past neglect; and is in close proximity to airborne pollution from a major trunk road it may be fragile to being opened up too much in future. Despite this possible fragility the alternative which is to clearfell and re-stock is not considered appropriate due to the site's size, its importance in the conservation of species and habitats associated with mature planted trees and its inestimable amenity value to the local community.

As indicated previously the woodland functions primarily to provide general amenity and biodiversity value and is of mixed species; it is the intention to manage the woodland sensitively of this aspect. There are however significant levels of ash and sycamore natural regeneration (NR) across parts of the site, it seems sensible to utilise this natural development and managing this with a view to developing its value as a timber crop which need not conflict with the overriding aspiration for the site in providing community benefit.

In order to encourage natural regeneration to develop into marketable timber whilst also developing a diverse wood the regeneration onsite will be utilised to create an irregular structure using the Low Impact Silvicultural System of single tree selection, removing single or small groups of trees to provide suitable gaps in the canopy to encourage regeneration. This form of management will help provide a range of habitats for wildlife as well as texture and visual diversity for visitors.

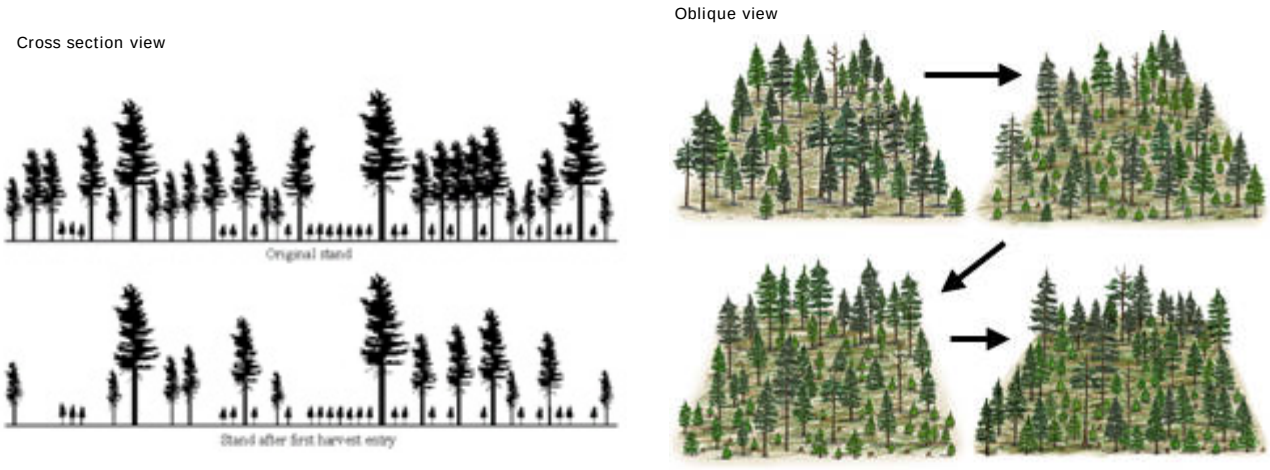
The selection system, like a shelterwood system, will involve creating gaps in the canopy to encourage the regeneration on along with tending and re-spacing to eventually enable the identification of final crop trees of selected species for retention by way of crown thinnings of the stand every 7-10 years which will encourage long-term stand stability, improve stand health, enhance ground conditions for regeneration and in turn yield small volumes of timber and other forest products. In the surrounding matrix out-with any created gaps intermediate thinnings will allow the surrounding trees to gradually develop before they too eventually are removed to form a new gap.

As the site sustains several older specimens there are various trees which require on-going monitoring of their potential risk to public safety. When individual trees become unsafe they will be removed.

Single Tree Selection System

This system of silviculture will be practical for the size of Boden Boo and which is made up of a variety of broadleaved species both in intimate and blocky mixture. This system will generally involve selecting the stems of various species by way of form and vigour and crown thinning accordingly. As and when sufficient levels of natural regeneration is observed then gaps in the canopy will be made by removing single or small groups of trees to promote this NR. Where insufficient levels of NR is found enrichment planting of site suitable broadleaved species will be used to achieve the same goal. (see Figure A7 – Illustrations of the Single Tree Selection system).

Figure A7 – Illustrations of the Single Tree Selection system



In order to complement the approaches of the silvicultural systems proposed the thinning regime(s) applied will aim to achieve the following general intention: To identify future seed trees of desired climax species and remove competing secondary species whilst creating the space to encourage the ideal light and seedbed conditions to promote NR or enrichment of a healthy & vigorous understory of desired species. Thinning interventions will be careful not to overly destabilise stands, however due varying levels of previous management this remains a potential risk. If windthrow should occur, creating natural canopy gaps, these should be inspected to determine if desirable NR is likely and if not, appropriate species should be planted in these gaps.

All thinning decisions will be guided the Operational Guidance Booklet (OGB) 9 – Managing Thinning and the current SLFD Thinning Plan. CCF decisions will be guided by OGB 7 – Managing Continuous Cover Forests.

A5.2 Future habitats and species

A5.2.1 Woodland Creation

Table A5 – New Planting below & **Map A5b – Future Habitats & Species** show a very small area of the site that is proposed for woodland expansion. It is currently open ground with rose bay willow herb growing and the ground would be better used for woodland in order to frame views and diversify the species within the wood further.

Table A5 – New planting

Woodland type	**Species**	**Area** (ha)	**Spacing** (m)	**Density** (Stems/Ha)
Unproductive MB	ROW 50%; ELM 30%; HOL 20%	0.1	3.0 x 3.0	1100

A5.2.2 Woodland habitat

The management system detailed previously as well as the prescriptions in the following section outline how the current crop will eventually be replaced using NR and/or enrichment to maintain or improve the condition of the priority woodland habitats of **Lowland mixed deciduous woodland**.

Table A6 below outlines an indicative silvicultural management timetable appropriate for managing a crop similar to that of Boden Boo however as the majority of the crop is between thicket and pole age and hasn't had the benefit of the other initial stages of management this table should be referred to accordingly.

Table A6 Indicative Silvicultural Management Timetable to Manage Natural Regeneration

Stage	**H_{100} [m]***	**Interventions**
Establishment		Utilise the Natural Regeneration (NR) from the existing mixed stand (predominantly Ash (AH) and Sycamore (SYC) NR). Employ a continuous CCF group shelterwood system creating a suitable number of gaps ~30m wide as a patchwork over time leading to an irregular structure. The gaps will allow more light to the forest floor allowing the NR to get away. In creating the gaps stump back trees such as Willow (XW) and Hazel (HAZ) so it will coppice back which will assist in drawing up the NR as well as functioning in bole cleaning and controlling light levels in the future.

Young stand	<2	Establishment of access lines if necessary. Differentiation and species selection are mainly regulated through interventions in the overstorey (light level management). Clear up felling damage to allow quick restocking. Shaping the leaders if necessary.
Thicket stage	2 - 6	Keep stand dense to promote self-pruning and differentiation. Selective thinnings in the overstorey continues and provides rising light levels. Continued clearing of felling damage and formative pruning if required.
	6 – 9	First quality assessment. Self-pruning continues due to the high stand density. Only wolf trees and trees with felling damage are to be removed.
Pole stage	9 – 16	Closed canopy of young crop is to be maintained. Select up to 200 Final Crop (FC) tree candidates/ha and assess their competition status. Dominant individuals need no assistance, but co-dominant FC tree candidates may be supported by removal of 1-3 competitors. This intervention should only improve the competition situation for FC tree candidates, but not interrupt the self-pruning and differentiation processes.
Small timber stage	16 – 18	Establish extraction line network. When dominant trees have reached the desired length of branch-free bole (7-10m for AH), ~70-140 FC trees/ha are permanently selected and marked (in order to achieve between 40-60cm target dbh). The first and second thinning aim to release FC trees to encourage fast diameter growth. Release FC trees completely, removing competitors as well as smaller trees which may cause mechanical damage (whips). Groups of FC trees are not possible with AH.
Timber stage	>20	Interventions focus on FC trees, which must be kept free from crown competition. The envisaged understorey of (Sycamore (SY)/HAZ/XW/Beech (BE)) based on the current species mix is to be maintained in order to control ground vegetation and prevent epicormic growth, however secondary species trees (e.g. SY or BE) advancing into

		FC tree crown area must be removed.
Final harvesting and regeneration	>30	Target diameter harvesting usually creates favourable conditions for NR. Established NR needs to be assessed regarding its density, species composition and area cover. Continuation of the group shelterwood system. Planting and beating up with 3,000 - 5,000 plants/ha (pro rata) if NR fails or is insufficient.

**** H100 represents the mean height of the 100 trees with the largest DBH within one hectare.***

A5.2.2 Open Land

The management of the parkland with scattered trees by the River Clyde will continue to be managed around a regime of timed cuts. On the area of open neutral grassland in the heart of the site we will continue to maintain the vast majority of this area using a regime of timed cuts, however where appropriate we will look to plant a small number of broadleaved trees in order to better frame certain views and to supress the Rose-bay willowherb. We will also explore the possibility of creating a wildflower meadow area here as well as within the wayleave to the west of the site.

A5.2.3 Water

Operations on the site will adhere to the guidance in the latest version of the Forest and Water Guidelines.

A5.3 Biodiversity

A5.3.1 Priority Habitat Types & Important Species

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

A5.3.2 Designations

The management of the woodland and open areas detailed previously will ensure the continued conservation of the Boden Boo SINC and the neighbouring SSSI, SAC & RAMSAR designations.

A5.3.3 Invasive Non-Native Species

Grey squirrel (*Sciurus carolinensis*) – As Boden Boo 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 woodland is not being managed primarily as a commercial plantation so likewise this also is not a driver to introduce Grey squirrel control.

A5.3.4 Deadwood habitat

It is the aim to utilise natural processes 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.

It is the district policy to contribute around 20m^3/ha of deadwood averaged across the whole woodland area in each forest block. This aspiration is dependent on the site type and long term objectives. At Boden Boo the deadwood potential has been estimated as medium and as such the following SLFD policy approach should be adopted:

- Retain veterans, standing & fallen dead stems and some stumps.
- Harvest windblow only when it is economic or required to make the site safe.
- Leave stems of no commercial value to die through shading.
- Leave one very large fallen stem if possible on each site (>20cm dbh)

This approach should be weighed against the health and safety implications in regard to priority visitor zoning areas detailed within the FC Practice Guide Managing Deadwood in Forests & Woodlands and appropriate steps should be taken to balance the approach above with public safety.

A5.3.5 Wildlife Management

Boden Boo supports only the occasional Roe deer and due to the size and nature of this small woodland the population is not likely to increase substantially. Physical protection of any future new planting or enrichment would be most suitable as culling on this site is not an appropriate method.

A5.4 Heritage

There are no significant heritage features requiring specific management however if any should be found then appropriate measures will be employed as per the Forests and the Historic Environment guidance.

A5.5 Community & Recreation

FES district staff will continue to liaise with the local community to promote and encourage use of the wood 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 wood (see **Map A5d - General Management & Potential Projects**).

A5.5.1 Community

The forest district will continue to run a regular event programme and aim to have a minimum of one event at Boden Boo per year. We will also continue to encourage groups to run their own activities such as Community Events, Branching Out and Forest School programmes under the FES permission system.

A5.5.2 Recreation

Looking to the future for Boden Boo, in 2017 a new picnic area will be installed on the Clyde side to be in full sun for most of the day, this has come from requests from site users. There is the potential to create a new path and viewing platform on the Clyde side to allow wheel chair users to better access the river and be able to have a circular route. There is also the potential to explore a new section of path and limited parking to allow wheel chair access to the top loop of the woodland. We will look to explore the potential to increase the parking provision outside of the current land holding. This may be able to be undertaken in partnership with 'Crisis Counselling (a mental health charity)', one of our neighbours who are looking to develop their offer. Our current CRT strategy has identified Boden Boo as suitable for the provision on some low key play provision; this would be done in consultation with site users and the local community. Boden Boo will be included in the 'Woodlands of Renfrewshire' leaflet to be produced 2016-18 and Boden Boo may have its own leaflet produced 2017-19. If a partnership is developed with Crisis Counselling and a new car park is provided there may be the potential to work on the production of a joint orientation to link their site to Boden Boo.

A5.6 Access

A5.6.1 Visitor

As described in the section above there is the potential to create a new path and viewing platform on the Clyde side to allow wheel chair users to better access the river and be able to have a circular route. There is also the potential to explore a new section of path and limited parking to allow wheel chair access to the top loop of the woodland. We will explore the potential to increase the parking provision outside of the current land holding. This may be able to be undertaken in partnership with 'Crisis Counselling (a mental health charity)', one of our neighbours who are looking to develop their offer.

A5.6.2 Management

In terms of management access it would be advantageous to establish an access to the wood which doesn't conflict with the amenity accesses currently used by visitor at the main car park to the north-east or the parking bay to the south. The best opportunity to establish this would be to agree an access arrangement to use the Renfrewshire Council owned utility access road to the south-west. During the life of this plan we will explore this opportunity with

the council as well as the possibility to make improvements to this access for forestry purposes (see **Appendix II**).

A5.7 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.

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Renfrewshire Woods
Section B:
Johnstone Woods

B1.1 Setting and context

The Johnstone Woods are made up of Rannoch Wood (or Castlehill Wood) to the north and Bluebell Wood (or Auchenlodment Wood) to the east. Bluebell Wood is also referred to as Craigston Woods on OS Maps, but this name doesn't seem to be used locally. The woodland covers approximately 31.3 hectares and is located on the southern edge of Johnstone and provides a valuable resource for the local community, both in terms of informal recreation and landscape amenity. The urban area of Johnstone Castle, one of Paisley's Partnership's Priority Areas, borders the woodland on three sides. Including other areas of Johnstone which adjoin the woodland, there is a residential population of 15,000 living in the immediate vicinity of the woodland. The woods for the most part are unfenced and open to public access. They are well used by local residents.

Table B1 Current land usage

Land use	Area (ha)	%age
Existing Broadleaved Mixed Woodland	28.16	90
Existing Conifer Mixed Woodland	0.89	3
Open space	2.20	7
Total	**31.25**	**100%**

See Maps B1 - Location & B2 - Context

B1.2 History of the site

The site is a long-established woodland which was originally managed as a policy woodland around the former Johnstone Castle, owned by the Houstons of Milliken from the late 18th century until the mid-1950's. Although the castle and policies were considered particularly picturesque, the continued growth of the town of Johnstone reduced their size and the estate had largely disappeared by the start of the 20th century. Much of the castle was demolished in 1950, and most of the remainder of the grounds was purchased by the local authority for housing in 1956. Due to the housing development the woodland shrunk from its initial size and was managed by Renfrewshire Council until it was purchased for the National Forest Estate (NFE) by Forest Enterprise Scotland (FES) on 30th March 2012. Since this time Scottish Lowlands Forest District (SLFD) has made various improvements to the site but this plan will be the first management plan created for the site by FES.

B2.0 Analysis of previous plan

There was no previous plan for these woods

B3.0 Background information

B3.1 Physical site factors

B3.1.1 Geology, soils and landform

The underlying geology of the site is sedimentary overlain in parts by igneous intrusions. This bedrock is overlain by natural superficial deposits of till which has resulted in brown type surface water gley soil [FC code 7b] for most of the site (see **Map B3a – Soils**)

Soil Moisture Regime provides an indication of the moisture and oxygen availability in the soil, both of which are essential for root growth. According to the Ecological Site Classification Decision Support System (ESC- DSS), The Johnstone Wood's soil moisture regime ranges from Moist to Very Moist, implying periods of waterlogging in areas, which may in turn influence root depth.

Soil Nutrient Regime is a measure of both the availability of soil nutrients for plant growth, and the acidity of the soil (which impacts on the solubility and hence availability for uptake of most nutrients). The site is of Medium nutrient status, which is suited to a wide range of tree species.

B3.1.2 Climate

Drumchapel Woods fall within the Warm, Moist climatic zone with Accumulated Temperature (day-degrees above 5 °C, a measure of growing season length) varying between 1337 and 1381 (1200 representing the dividing point between Cool & Warm).

B3.1.3 Exposure (DAMS)

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 scores from a sheltered 12 to a moderately exposed 13** (13-15 = moderately exposed, 16-17 = highly exposed), with scores generally increasing with elevation (see **Map B3c – Climate**).

B3.1.4 Hydrology

Craigbog Burn flows northward through Bluebell Wood from Rannoch Road toward Johnstone. A series of drain issues are located elsewhere in Bluebell Wood notably at the base of the beech dominated north western slope which form part of the south eastern boundary to Bluebell Wood and flowing north-west toward Auchenlodment Primary School through the centre of Bluebell Wood. The burn drains into the Black Cart Water although much of the former

course of the burn has been buried under the Johnstone Castle housing development.

B3.2 The existing woodland

B3.2.1 Age structure, species and yield class

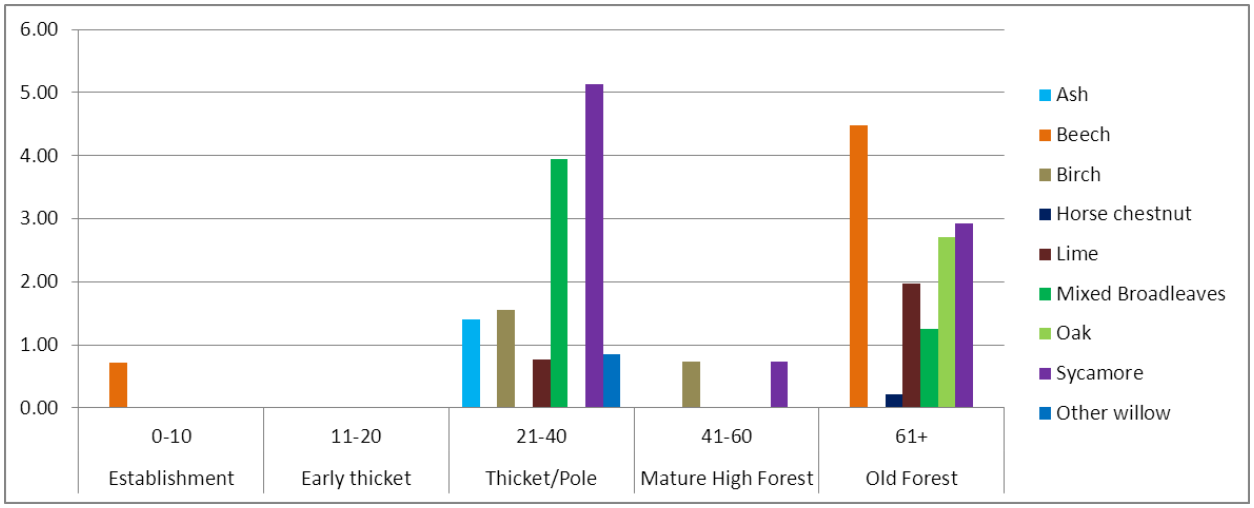
Age Structure

The age structure of the woodland in diverse with a generally over-mature non-native and young thicket-pole native age structure profile. There is extensive natural regeneration of Ash, Beech and Sycamore in different areas.

Table B2 Age Structure

Age of Trees (years)	Successional Stage	Area (ha)	%
0-10	Establishment	0	0
11-20	Early Thicket	18.2	55
21-40	Thicket & Pole Stage	1.5	5
41-60	Mature High Forest	0	0
61+	Old Forest	12.9	40

Figure B1 Age Structure Breakdown by Species



Species Structure

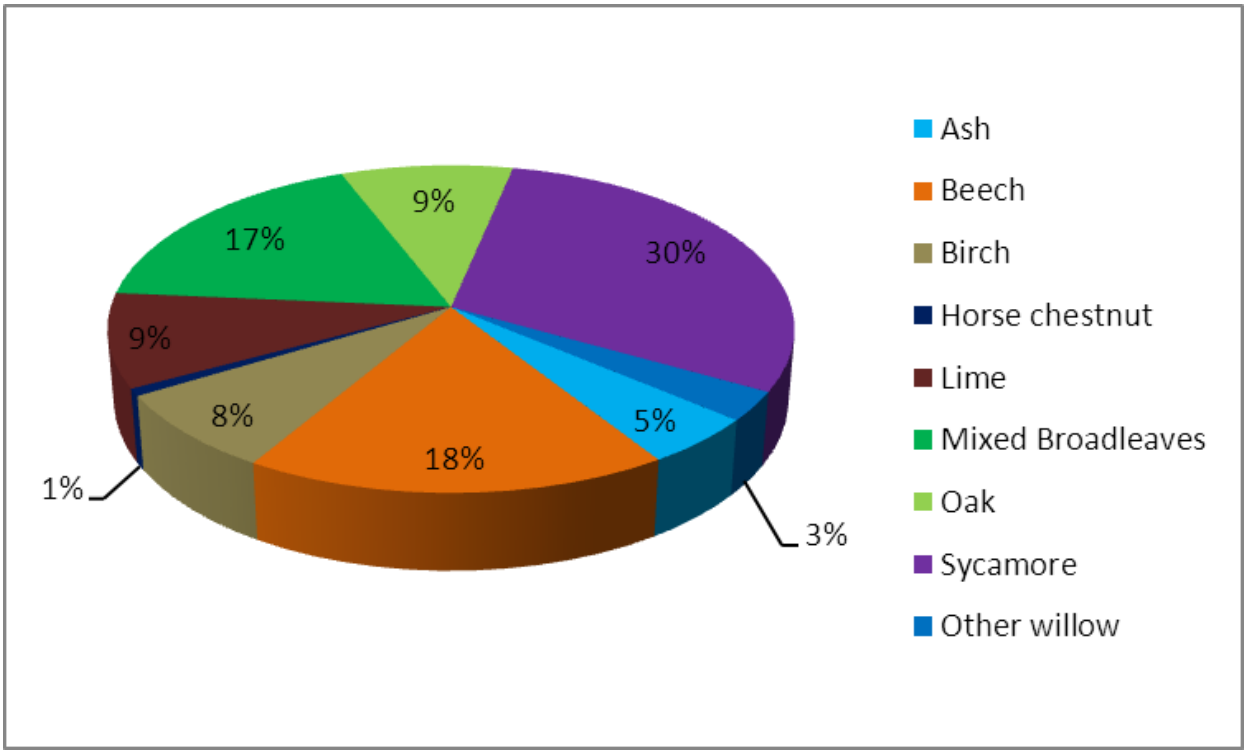
Figure B2 - Current Species Structure Breakdown and **Map B3c – Current Stock** helps one understand the proportions of the various species throughout the wood but further detail on the significance of these species and their spread is provided below. The woodland is broadleaved the majority of which are Sycamore, Beech and other mixed broadleaves as seen in table B3. The aim of this plan is to maintain a varied diversity of species within the woods.

Native Woodland - Of the broadleaved area, around half (approx. 15.5 ha), has been identified as native woodland by The Native Woodland Survey of Scotland (NWSS) carried out between 2006 and 2013 (see **Map B3d – NWSS**).

Table B3 Current Species Structure

Species	Area (ha)	%
Ash	1.41	5
Beech	5.19	18
Birch	2.29	8
Horse chestnut	0.21	1
Lime	2.73	9
Mixed Broadleaves	5.19	17
Oak	2.71	8
Sycamore	8.78	30
Other Willow	0.85	3

Figure B2 Current Species Structure Breakdown



Yield Class

Yield classes across the site range from 2-10 with the majority of those within the higher range of YC 8 & 10.

B3.2.2 Ancient Woodland

The majority of the site (approx. 26 Ha) has been identified as of Long Established Plantation Origin (LEPO) (see **Map B3e – Ancient Woodland Map**).

B3.2.3 Access

Being relatively small woodlands on the edge of a residential housing area these woods are primarily accessed via a network of footpaths from several entrances to each wood for recreational use. The footpath network is in a fair condition and offers accessibility to a wide range of abilities although there are some steeper areas within each of the woods and sections that are pretty badly deteriorated and this has caused uneven and slightly challenging terrain. A new transfer point was created into Rannoch Wood in 2015 off of Rannoch Road to facilitate future management however there is no such forestry access in Bluebell Wood. There are however several surrounding areas of disused land which could potentially provide short-medium term access opportunities. Access for forestry operations will be restricted to small machinery or horse and stacking availability will be limited. The main paths through the woods are also part of the wider local core path network.

B3.2.4 LISS potential

This site is suited to low impact systems as it is a stable site with restricted access to large harvesting machinery. The nature of the crop is also suited to LISS having a varied age and species structure.

B3.2.5 Current and potential markets

Thinnings from the mixed crop could provide for the firewood market as well as for more niche local hardwood saw millers although access for forest machinery for extraction and timber transportation may present challenges.

B3.2.6 Pathogens

B3.2.6.1 *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.

Ash accounts for ~5% of the tree cover in the woods where, as yet, *Chalara* infection has not been detected however there is substantial ash regeneration becoming prevalent so continued monitoring for the disease is likely to become more important.

B3.2.6.2 *Armillaria* (Honey Fungus)

We previously had an outbreak of Honey Fungus in the Chestnut along Rannoch Road in Bluebell Woods.

B3.3 Landscape and land use

B3.3.1 Landscape character and value

The Johnstone Woods sit within a fairly diverse and irregular landscape due the nature of its urban setting characterised by a complex matrix of roads,

residential housing schools and shops. The woodlands are generally perceived on the small scale due to the surrounding topography obscuring views of the site within their wider context.

In terms of SNH's Landscape Character Assessment, the majority of the site is categorised as Rugged Upland Farmlands with an urban fringe. Relevant extracts from the Glasgow and Clyde Valley Landscape Character Assessment are shown below in Figure B3:

Figure B3 Rugged Upland Farmlands Land Character Type

RUGGED UPLAND FARMS - KEY LANDSCAPE ISSUES

5.6.7 Key issues affecting this landscape type include:

- *the importance of encouraging the continued maintenance and management of hedges, field boundary trees and characteristic woodland clumps*
- *the visual and landscape impacts associated with urban related infrastructure, particularly tall structures such as pylons and communications masts*
- *changes in landscape character resulting from non-agricultural land uses such as golf courses*

MANAGING LANDSCAPE CHANGE

Key characteristics

5.6.8 The key characteristics, features and qualities of this landscape type are:

.....

- *tree cover often emphasising landform, for example concentrated on bluffs and outcrops*

Planning and management should aim to conserve the distinctive character of the Rugged Upland Farmland by resisting developments such as pylons and masts, which would weaken its rural character, and by securing the positive management of features such as field boundaries and woodlands.

Trees and woodland: sensitivities and forces for change

5.6.9 Woodland provides an important structural landscape element. As noted above, stands of beech and pine emphasise many of the rugged hillocks, contrasting with intervening pastures. The landscape would be very sensitive to the loss of these woodlands, either through direct loss, or, more likely, through under-management and neglect. Equally, an increase in woodland cover to include the currently un-wooded area would change perceptions of the landscape. There may, however, be opportunities for additional, small scale woodlands, which conform to existing patterns and which would reinforce the character of the landscape.

Trees and woodland: planning and management guidelines

5.6.10 Guidelines for the Rugged Upland Farmland include:

- *the emphasis in this landscape type should be placed upon securing the appropriate management of existing small woodlands, particularly where they emphasise the natural topography and thereby contribute to landscape character*
- *this landscape type has the potential to accommodate some additional woodland planting provided that this is of a relatively small scale, is correctly sited (particularly in relation to hillocks and outcrops) and reflects local patterns of species, particularly the occurrence of Scots pine in higher areas and beech in lower areas*

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B3.3.2 Visibility

The Johnstone Woods are not visible other than from their immediate surrounds due to the topography and views being obscured by urban features.

B3.3.3 Neighbouring land use

Generally speaking the land use to the north is urban residential including schools, shops and other amenities and to the south the land use is rural with another FES Woodland (Windyhill) just across the public road to the south as well as surrounding farmland. There is also active quarry on Rannoch Road across from the woods.

B3.3.4 Utilities

Map B3f shows the extent of the various utility infrastructures detailed throughout the site.

B3.4 Biodiversity

B3.4.1 Priority Habitat Types & Important Species

Drawing on the LBAP, the only UK habitat identified as being relevant to the Johnstone Woods is Broadleaved and Mixed Woodland.

Within this broad habitat type is 15.5 Ha of Lowland mixed deciduous woodland as identified by the NWSS (**see Map B3g – NWSS Dominant Habitat**).

Whilst the LBAP identifies several species associated with the priority habitat mentioned above, none of these species have been seen or documented within the wood. The most likely species to be found within the site are:

- Common Pipistrelle Bat (Pipistrellus pipistrellus)
- Soprano Pipistrelle Bat (Pipistrellus pygmaeus)

A bat survey commissioned in 2011 and carried out by Wild Surveys Ltd., however, didn't find any signs of bats within the site although there are suitable roosting areas for them (the local Community and Environment Ranger has detected Pipistrelle Bats but has not established whether common or soprano during his surveys). During this survey no nesting birds were observed.

B3.4.2 Designations

The Johnstone Woods don't have any national, regional or local designations but do lie within a Tree Preservation Order Area.

B3.4.3 Invasive Non-Native Species

As a remnant of its former estate policy heritage the woodland contains ***Rhododendron ponticum*** which would have been planted as an ornamental when originally planted however has since had unintended consequences. This species is an aggressive coloniser that reduces the biodiversity value of a site; it obstructs the regeneration of woodlands and once established is difficult and costly to eradicate. As bushes mature and occupation of an invaded site increases, physical access can be reduced by the sheer density and size of the plants present, and the cost of some management operations can increase if the bushes require treatment first. Mature bushes also act as a prolific seed source for invasion of adjacent areas, and are a continued source of new plant material into areas successfully cleared.

With its proximity to residential areas and some incidents of the fly-tipping of gardening/landscaping residue a small area of woodland has seen the advance of **Japanese knotweed** (*Fallopia japonica*) and **Himalayan balsam** (*Impatiens glandulifera*). These species are a threat to native flora and habitats as they are aggressive and form dense stands that exclude other plants. If these species were left unchecked they could pose a risk of colonising substantial areas to the detriment of native flora and fauna.

The wood is inhabited by **Grey squirrels** (*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 and Sycamore are species within the wood which are particularly vulnerable to stem breakage caused by bark stripping.

B3.5 Heritage

AOC Archaeology Group was commissioned to undertake an archaeological survey in 2013 and the resulting report revealed that there was little of archaeological significance within the site. Nothing relating to the presence of Johnstone Castle was recorded, and there was no sign of any surviving prehistoric archaeology. Three sites, all relating to modern activity, were recorded, including steps leading to St Aidan's Roman Catholic Church and two short lengths of ruinous modern field walling.

B3.6 Community & Recreation

B3.6.1 Community

In 2012 a partnership was formed with 'Phoenix Futures' a Drug and Alcohol rehabilitation charity. This partnership has phoenix Futures' clients who are working on their 'Recovery Through Nature' programme working in the woodlands regularly undertaking estate maintenance tasks. The partnership continues today FES have provided a container for the group to keep tools in

which is situated with agreement in the grounds of Auchenlodment Primary School. In 2014 as celebratory partnership event was held with the unveiling of a Phoenix sculpture.

There have been a number of Community Events held in the woodlands by FES including summer family events and a Tree Dressing event with a night time route with effect lighting. The Tree dressing event involved a lot of pre-event engagement with different user groups including local schools and community groups. The district has developed a good working relationship with Auchenlodment Primary School and this partnership continues. The district is also working with the Renfrewshire Walking Network occasionally leading a walk that uses Bluebell and Rannoch Wood.

B3.6.2 Recreation

In 2012 a Visitor Experience Plan was created that included Windyhill as well as Bluebell and Rannoch Wood. This identified various areas for improvement within the Johnstone Woods and recommended various priorities and actions many of which have been implemented. In addition to the district's work within the wood we also created a new website to promote the site in 2014.

B4.0 Analysis and Concept

Using survey work and research, a broad range of factors were acknowledged and considered to recognise the site's key features which, informed by the objectives set out in the management plan brief (see **Appendix IV**) were used to identify the opportunities and constraints which exist within the management plan area and from there develop an initial concept (see **Table B4 Analysis and Initial Concept Development** below). This initial concept was then distilled further to produce concept maps (see **Maps B4 - Johnstone Woods Concept**) which summarise the main aspirations and intentions for the management plan. This management concept formed the main basis for the public consultations held in September 2015.

Table B4 Analysis and Initial Concept Development

Strategic Priority	Opportunity	Constraint	Concept Development
Accessible (Rannoch)	Opportunity to improve the path network to divert routes away from less ideal access point at corner of Tower Rd & Willow Dr to preferred areas.	Potential for continued use of corner access, impact on the woodland by creating new paths	Create a new section of path linking the entrances on Elm Dr & Tower Rd to the east through the hollow creating an attractive circular walk within Rannoch Wood and reducing footfall via the corner of the housing.
	Improve aesthetic by removing wire mesh fencing behind Willow Dr. residential housing and removal of fly-tipped refuse.	Potential safety and property concerns of housing residents	Clean up this area and explore removing the wire fence and managing this area as part of the wider woodland.
	Improve Tower Rd entrance point, making it more accessible and attractive	Potential for an increase to the current path length as well as significant re-landscaping and new planting.	Improve this entrance providing a more visually attractive, welcoming, accessible and significant point of entry to the wood.
	Remove potentially hazardous old steps feature	Steps may be of historic significance for retention.	Reduce the potential risk posed by remnant steps by creating an earthen bank against them.
	Alternatively change the route of the path along Beith Rd to bring it further into the wood, enhancing the woodland experience and providing buffer from traffic and noise from road.	Increase to existing path network will impact woodland coverage, People may continue to use existing path in preference.	Retain current path route but make necessary improvements to benefit the visitor experience.
(Bluebell)	Remove unsightly metal wire fence off Maple Dr presenting a barrier to access and a potential hazard.	Decreased definition of woodland boundary, potential for increase fly-tipping	Explore removing unsightly fencing.

	Remove/replace unsightly palisade fencing between Larch Plc./Chestnut Plc. and the wood potentially creating a new access	Potential disagreement from Larch Pl & Chestnut Pl residents. Potential safety concern.	Explore removing unsightly fencing and new access into the wood.
	Replace unsightly palisade fencing around drainage weirs with less obtrusive alternative	Potential safety concerns	Investigate potential to replace unsightly palisade fencing with an less obtrusive alternative.
	Develop desire line off existing formal path between Bluebell to Windyhill. Desire line leads along Craigbog ridge through non FE woodland joining back with existing path taking in potential views north.	Potential impact of increasing path network. Increased anti-social use of this area. Increased safety concerns from increased usage along high ridge.	Investigate potential to improve informal paths expanding the network to take in more of both FE and non-FE woodland and views of the wider environment.
	Chance to tie in management of area out-with FE ownership along the ridge, banking and drainage ditch.	Potential conflict of interest/objective from owner	Examine in collaboration with neighbours and partners possibilities for synchronised management of contiguous non-FE woodland
	Improve/upgrade sections of path to prevent muddy areas in future and make safe potentially hazardous steps, footbridges etc.		Maintain formal path network for the benefit of visitors to the wood.

	Tidy up blown trees across paths, re-space dense regeneration, clear back overgrown ground vegetation.		Improve the visitor experience by clearing access obstacles and improving views through the wood by way of managing dense ground vegetation such as brambles and re-spacing of dense natural tree regeneration.
Cared for (Rannoch)	Manage the pooled wet hollow either as a feature potentially with boardwalk, rushes etc. or look to improve drainage	Uncertain potential of this area	Provide definition to this wet hollow using appropriate species choice and infrastructure to improve the visual aesthetic and biodiversity potential of this area.
	Enhance high point of the wood by improving views north and removing Rhododendron secluding the area encouraging antisocial use	Removing all the mature beech which are interrupting views may affect seed source for regeneration below.	Improve views out from and into this area by way of thinning and removal of invasives promoting the area as a view point or natural play and reducing its draw for antisocial use.
(Bluebell)	Improve existing formal entrances by tidying up litter, graffiti, overgrown ground vegetation, unsightly fencing, walls etc. along with improved signage.		Liaise with local community to explore options to improve existing entrances providing an improved visitor experience.
	Create defined management strip between the woodland and housing that bounds onto it. Within the strip manage out dangerous trees that could impact on private property and replace with low growing species with added benefit of providing residential screening.	Strip could be open to potential encroachment of residential garden areas.	Systematically remove any large trees which may pose a potential hazard to neighbouring properties. Where woodland bounds with residential property plant low growing species which are either low growing or can be managed as coppice to replace lost screening function and prevent these areas filling up with weeds due to lack

			of competition. Having a planted strip will also reduce residential encroachment and fly tipping.
	Eradicate fly-tipping issue in wood off of Auchenlodment Rd.	Trouble spot off road is access to mobile mast so obstacles to parking would impact of this access.	Area has been tidied up and fenced off with an information banner displayed explaining the work carried out and suggesting where potential fly-tippers can legally dispose of their waste locally.
Good value (Rannoch)	Chance to tie in management of area out-with FE ownership next to play park	Potential conflict of interest/objective from owner	Explore options to synchronise management of this section of non FES woodland with wider FES managed wood.
(Bluebell)	Investigate the potential to manage the former housing area on Maple Dr to allow for further woodland expansion and improved access options to the site for residents and forestry operations.	Potential disagreement from community, council, housing association etc.	Discuss with neighbours and local authority the potential to provide additional planted greenspace in order to integrate the woodland into the wider community.
	Alternatively investigate the potential to utilise the quarry entrance area for timber stacking and haulage.	Potential lack of agreement from quarry owners.	Explore seeking agreements from neighbours on utilising non-FES managed areas for machine access and timber transfer.
	Opportunity to tie in management of area out-with FE ownership in grass park area off Spruce Ave to provide an improved visitor woodland experience.	This land may be earmarked for alternative use.	Explore with local community & neighbours preferences for the land-use of the grassed area off Spruce Ave.

	Potential to seek permission to use the grass areas near the school on Elm Dr for timber stacking and haulage pick up.	Potential objection to this function from local authority and/or residents.	Explore seeking agreements from neighbours and local authority on utilising non-FES managed areas for machine access and timber transfer.
Healthy (Rannoch)	Work with the existing varied mixed broadleaf species within the wood and patterns of regeneration to facilitate the healthy growth of the wood. Use small scale CCF/LISS thinning, re-spacing and pruning creating gaps for further regeneration, the space for thicket stage crops to develop with decent form.		Employ Low Impact Silvicultural Systems to manage the woodland on a continuous cover basis promoting and enhancing where necessary existing natural regeneration in order to maintain a diverse mix of species and ages throughout the wood.
	Improve aesthetic within the wood with appropriate silviculture.		As above
(Bluebell)	Work with the existing varied species within the wood and patterns of regeneration to facilitate the healthy growth of the wood. Use small scale CCF/LISS thinning, re-spacing and pruning creating gaps for further regeneration, the space for thicket stage crops to develop with decent form.		Employ Low Impact Silvicultural Systems to manage the woodland on a continuous cover basis promoting and enhancing where necessary existing natural regeneration in order to maintain a diverse mix of species and ages throughout the wood.
	Improve aesthetic within the wood using appropriate silviculture.		As above
Productive (Rannoch)	Improve visual aesthetic and biodiversity value by planting the open area with extra trees.	Potential conflict of biodiversity aims. Potential establishment difficulties from browsing, protection, vandalism etc.	Plant a small number of individual trees to provide a more visually pleasing welcome zone to this access point.

	Improve existing access across from Burns Dr to allow for timber transport access and stacking		Create timber transfer point to be re-used during future thinning interventions which will be encouraged to green over between operations.
(Bluebell)	Improve access into the wood by developing the existing access in off Rannoch Rd. to make it suitable for forestry traffic.	Potential disapproval from the users of the wood, potential impact on the wood.	Explore options for potential creation of a transfer point for machine access and timber extraction.
	Investigate the potential to manage the former housing area on Holly Pl. to perhaps for further woodland expansion and/or improved access options to the site for residents and forestry operations.	This land may be earmarked for alternative use.	Discuss with neighbours and local authority the potential to provide additional planted greenspace in order to integrate the woodland into the wider community. Explore seeking agreements from neighbours and local authority on utilising non-FES managed areas for machine access and timber transfer.
	Chance to tie in management of area out-with FE ownership in "old sheep park" to provide an improved visitor experience.	This land may be earmarked for alternative use.	Explore options to synchronise management of the 'old sheep park' which is contiguous with the woodland if the community identify this as an aspiration.
Treasured (Rannoch)	Improve visual appearance along path beside Beith Rd by removing/replacing dilapidated iron railings, restore damaged section of stone wall, improve signage etc.	Challenge to define the best area to cross Beith Rd to access the wood, potential safety concern if railings removed.	Improve visitor experience along Beith Rd - Upgrade damaged sections of wall and safety railings and remove obsolete fencing. Also thin and prune trees to improve views into wood.

(Bluebell)	Install additional signage to promote FE management of the woods, define access points and facilitate personal positioning within the wood	Potential for signage to be vandalised	Improve signposting throughout the wood. Replace current signage with FC branded signs and put in more signs at well used entrances and key nodes.
	Chance to improve and make safe the boundary between the wood and the football park.		Explore options with the football ground owners and the local authority to improve this unattractive and potentially hazardous boundary.
	Formalise or extend certain well used desire lines and improve their associated entrance points to promote access to the woods, FE management presence and improve the appearance of the wood.		Improve informal access points in order to promote more local community use of the wood.
	Better definition of boundary between wood and school by way of a hedge would screen off views into the playground, provide a buffer against noise and enhance biodiversity.		Explore creating a new hedgerow between wood and school. Potential to be a joint project with school to inform kids of benefits of hedgerows.

B5.0 Management Proposals

The proposals detailed below describe the rational and methodologies to be employed in order to achieve the objectives set out in **Appendix IV**. Much of what is proposed for the Johnstone Woods will be dependent on various factors such as the availability of suitable funding, consultation with neighbours/community etc. Such proposals constitute possible future projects for FES to be delivered in partnership/agreement with others. **Appendix II – Management Table** & **Map B5e - General Management & Potential Projects** highlight which aspects of the management of the site fall under our 'general management functions' and which might constitute a 'potential future project'.

B5.1 Woodland Management

The proposals for this site have been produced based on sound silvicultural and environmental principles and follow the requirements, guidelines and recommendations set out within the UK Forestry Standard, the UK Woodland Assurance Scheme, FC Bulletin 124 Ecological Site Classification for Forestry and FC Bulletin 62 Silviculture of Broadleaved Woodland, FC Bulletin 115 Alternative Silvicultural Systems and the current FC edition of Forest and Water Guidelines.

As the woodland functions primarily to provide general amenity and biodiversity value and is of mixed species; it is the intention to manage the woodland sensitively to those aspects. That being said managing the woodland with a view to developing its value as a timber crop need not conflict with the overriding aspiration for the site in providing community benefit.

With this in mind the intention for the woods is to balance appropriate management of the various visitor zones throughout the sites whilst creating the conditions which will encourage the healthy growth and regeneration of a mix of species and strata in perpetuity. Achieving this balance will require coordination of both the Forest Management (FM) team and the CRT team. The FM team will concentrate on silvicultural thinnings primarily within the passive and interactive management zones whilst CRT will focus on aesthetic interventions to improve the visual appreciation of the sites for the visitor by way of light thinning, crown lifting and coppicing within the welcome and interactive management zones (see **Maps B5a - Management** & **B5d – Visitor Zoning**). The remainder of this subsection outline both the short term aims of the thinning proposals and the longer term silvicultural aims.

Long-Term Silvicultural Aims

To encourage and promote the growth, regeneration and spread of existing broadleaved species throughout the wood along with other site suitable broadleaved species aiming to achieve a woodland diverse in species, structure, character, texture and biodiversity. Natural regeneration and/or native broadleaf enrichment will be utilised and managed to promote good growth and form with clean boles with a view to producing timber suitable for a wider range of niche markets such as those for butts and beams rather than solely for the firewood market.

B5.1.1 Silviculture

Given that the Johnstone Woods are small urban woods with approximately 40% of the crop old forest trees which have suffered from past neglect it may be fragile to being opened up too much in future. Despite this possible fragility the alternative which is to clearfell and re-stock is not considered appropriate due to the site's size, its importance in the conservation of species and habitats associated with mature planted trees and its inestimable amenity value to the local community.

As indicated previously the woodland functions primarily to provide general amenity and biodiversity value and is of mixed species; it is the intention to manage the woodland sensitively of this aspect. There are however significant levels of ash, beech and sycamore natural regeneration (NR) across parts of the site, it seems sensible to utilise this natural development and managing this with a view to developing its value as a timber crop which need not conflict with the overriding aspiration for the site in providing community benefit.

In order to encourage natural regeneration to develop into marketable timber whilst also developing diverse woods the regeneration onsite will be utilised to create an irregular structure using the Low Impact Silvicultural System of single tree selection, removing single or small groups of trees to provide suitable gaps in the canopy to encourage regeneration. This form of management will help provide a range of habitats for wildlife as well as texture and visual diversity for visitors.

The selection system, like a shelterwood system, will involve creating gaps in the canopy to encourage the regeneration on along with tending and re-spacing to eventually enable the identification of final crop trees of selected species for retention by way of crown thinnings of the stand every 7-10 years which will encourage long-term stand stability, improve stand health, enhance ground conditions for regeneration and in turn yield small volumes of timber and other forest products. In the surrounding matrix out-with any created

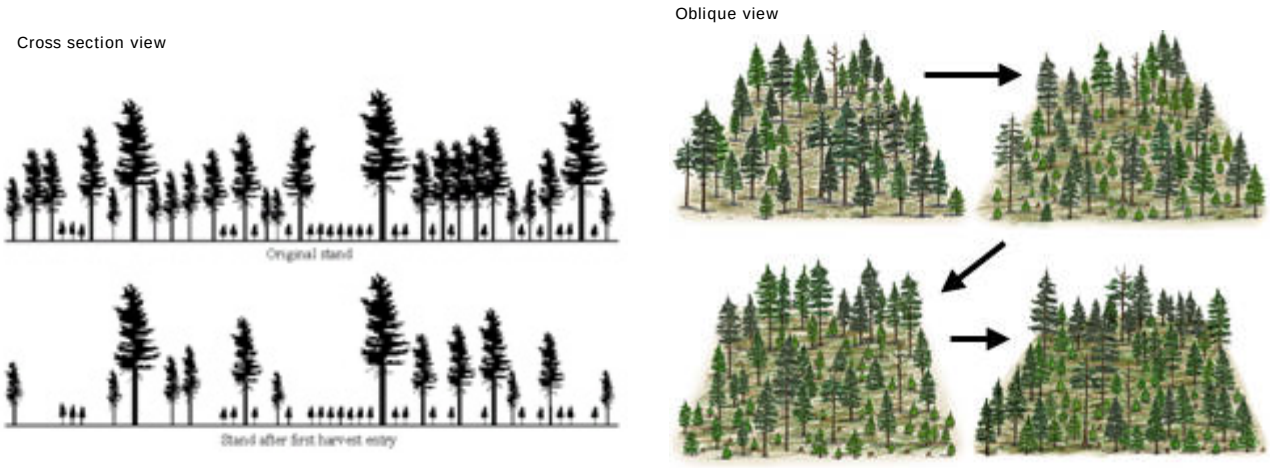
gaps intermediate thinnings will allow the surrounding trees to gradually develop before they too eventually are removed to form a new gap.

As the site sustains several older specimens there are various trees which require on-going monitoring of their potential risk to public safety. When individual trees become unsafe they will be removed.

Single Tree Selection System

This system of silviculture will be practical for the size of the Johnstone Woods which is made up of a variety of broadleaved species both in intimate and blocky mixture. This system will generally involve selecting the stems of various species by way of form and vigour and crown thinning accordingly. As and when sufficient levels of natural regeneration is observed then gaps in the canopy will be made by removing single or small groups of trees to promote this NR. Where insufficient levels of NR is found enrichment planting of site suitable broadleaved species will be used to achieve the same goal. (see Figure B4 – Illustrations of the Single Tree Selection system).

Figure B4 – Illustrations of the Single Tree Selection system



In order to complement the approaches of the silvicultural systems proposed the thinning regime(s) applied will aim to achieve the following general intention: To identify future seed trees of desired climax species and remove competing secondary species whilst creating the space to encourage the ideal light and seedbed conditions to promote NR or enrichment of a healthy & vigorous understory of desired species. Thinning interventions will be careful not to overly destabilise stands, however due varying levels of previous management this remains a potential risk. If windthrow should occur, creating natural canopy gaps, these should be inspected to determine if desirable NR is likely and if not, appropriate species should be planted in these gaps (see **Map B5b – Silviculture**).

B5.1.2 Thinning

In order to complement the approaches of the silvicultural systems proposed the thinning regime(s) applied will aim to achieve the following general intentions:

To identify future seed trees of desired climax species and remove competing secondary species whilst creating the space to encourage the ideal light and seedbed conditions to promote enrichment and NR of a healthy & vigorous understory of desired species. As the site is relatively diverse in species and structure various regimes will be appropriate in various areas; these include selective methods such as crown and low thinning.

Thinning interventions will be careful not to overly destabilise stands however due to previous neglect this remains a potential risk. If windthrow should occur, creating natural canopy gaps, these should be inspected to determine if desirable NR is likely and if not, appropriate species should be planted in these gaps.

All thinning decisions will be guided the Operational Guidance Booklet (OGB) 9 – Managing Thinning and the current SLFD Thinning Plan. LISS decisions will be guided by OGB 7 – Managing Continuous Cover Forests.

B5.2 Future habitats and species

B5.2.1 Woodland habitat

The management system detailed previously as well as the prescriptions in the following section outline how the current crop will eventually be replaced using NR and/or enrichment to maintain or improve the condition of the priority woodland habitats of **Lowland mixed deciduous woodland**.

Table B5 below outlines an indicative silvicultural management timetable appropriate for managing a crop similar to that of the Johnstone Woods however as the majority of the crop is either thicket/pole age or old mature woodland and hasn't had the benefit of the other initial stages of management this table should be referred to accordingly (see **Map B5c – Future Habitat & Species**).

Table B5 Indicative Silvicultural Management Timetable to Manage Natural Regeneration

Stage	**H_{100} [m]***	**Interventions**
Establishment		Utilise the Natural Regeneration (NR) from the existing mixed stand (predominantly

		Sycamore (SYC) and Ash (AH) NR). Employ a continuous CCF group shelterwood system creating a suitable number of gaps ~30m wide as a patchwork over time leading to an irregular structure. The gaps will allow more light to the forest floor allowing the NR to get away. In creating the gaps stump back other trees such as Wych elm (ELM) and Hazel (HAZ) so it will coppice back which will assist in drawing up the NR as well as functioning in bole cleaning and controlling light levels in the future.
Young stand	<2	Establishment of access lines if necessary. Differentiation and species selection are mainly regulated through interventions in the overstorey (light level management). Clear up felling damage to allow quick restocking. Shaping the leaders if necessary.
Thicket stage	2 - 6	Keep stand dense to promote self-pruning and differentiation. Selective thinnings in the overstorey continues and provides rising light levels. Continued clearing of felling damage and formative pruning if required.
	6 – 9	First quality assessment. Self-pruning continues due to the high stand density. Only wolf trees and trees with felling damage are to be removed.
Pole stage	9 – 16	Closed canopy of young crop is to be maintained. Select up to 200 Final Crop (FC) tree candidates/ha and assess their competition status. Dominant individuals need no assistance, but co-dominant FC tree candidates may be supported by removal of 1-3 competitors. This intervention should only improve the competition situation for FC tree candidates, but not interrupt the self-pruning and differentiation processes.
Small timber stage	16 – 18	Establish extraction line network. When dominant trees have reached the desired length of branch-free bole (7-10m for AH), ~70-140 FC trees/ha are permanently selected and marked (in order to achieve between 40-60cm target dbh). The first and second thinning aim to release FC trees to encourage fast diameter growth. Release FC

		trees completely, removing competitors as well as smaller trees which may cause mechanical damage (whips). Groups of FC trees are not possible with AH.
Timber stage	>20	Interventions focus on FC trees, which must be kept free from crown competition. The envisaged understorey of (Sycamore (SY)/HAZ/ELM/Beech (BE)) based on the current species mix is to be maintained in order to control ground vegetation and prevent epicormic growth, however secondary species trees (e.g. SY or BE) advancing into FC tree crown area must be removed.
Final harvesting and regeneration	>30	Target diameter harvesting usually creates favourable conditions for NR. Established NR needs to be assessed regarding its density, species composition and area cover. Continuation of the group shelterwood system. Planting and beating up with 3,000 - 5,000 plants/ha (pro rata) if NR fails or is insufficient.

**** H100 represents the mean height of the 100 trees with the largest DBH within one hectare.***

B5.2.2 Water

Operations on the site will adhere to the guidance in the latest version of the Forest and Water Guidelines e.g. existing drains should be realigned where appropriate to ensure that water is discharged slowly into buffer areas.

B5.3 Biodiversity

B5.3.1 Priority Habitat Types & Important Species

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

B5.3.2 Invasive Non-Native Species

Rhododendron ponticum - An eradication programme of Rhododendron ponticum is in place within affected sites across the district in accordance with the Rhododendron Strategy on the National Forest Estate in Scotland. A programme of control has already been implemented where Rhododendron has been previously been manually cut and had the foliage chemically sprayed. This is being followed up with on-going foliar spraying to remove it from the wood and collaboration with neighbours to tackle bushes in close proximity which if unattended will likely provide the seed to reinvade the site.

Japanese knotweed (*Fallopia japonica*) - An eradication programme of Japanese knotweed is in place within affected sites across the district in accordance with the District Invasive Non-Native Species Plan 2014-2019. Control is initially through stem injection of glyphosate and then a follow up foliar spray or stem inject the next year. The next stage will be to re-cover the affected areas with appropriate species to prevent re-establishment. It is planned to rake and burn the remaining material after the follow up spray and to reseed or plant the ground.

Himalayan balsam *(Impatiens glandulifera)* – Hand pulling of the principal affected area would not be fully effective so foliar chemical spraying of glyphosate will be employed between the months of May – Aug. Any other individual stems scattered elsewhere will be hand pulled and removed from site.

Grey squirrel (*Sciurus carolinensis*) – As the Johnstone Woods are 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 woodland is not being managed primarily as a commercial plantation so likewise this also is not a driver to introduce Grey squirrel control.

B5.3.3 Deadwood

It is the aim to utilise natural processes 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.

It is the district policy to contribute around 20m^3/ha of deadwood averaged across the whole woodland area in each forest block. This aspiration is dependent on the site type and long term objectives. At Johnstone the deadwood potential has been estimated as medium and as such the following SLFD policy approach should be adopted:

- Retain veterans, standing & fallen dead stems and some stumps.
- Harvest windblow only when it is economic or required to make the site safe.
- Leave stems of no commercial value to die through shading.
- Leave one very large fallen stem if possible on each site (>20cm dbh)

This approach should be weighed against the health and safety implications in regard to priority visitor zoning areas detailed within the FC Practice Guide

Managing Deadwood in Forests & Woodlands and appropriate steps should be taken to balance the approach above with public safety.

B5.3.4 Wildlife Management

Roe Deer

Roe deer are present throughout the site but due to its proximity to the residential area and the high proportion of open canopy the deer do not appear to reside within the site. Current levels of broadleaf regeneration is establishing well without much damage and therefore it would be expected that minimal intervention would be required for naturally regenerating seedlings but enrichment planting may need physical protection.

B5.4 Heritage

There are no significant heritage features requiring specific management however if any should be found then appropriate measures will be employed as per the Forests and the Historic Environment guidance.

B5.5 Community & Recreation

In general FES district staff will continue to liaise with the local community to promote and encourage use of the wood 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 wood (see **Map B5e - General Management & Potential Projects**).

B5.5.1 Community

During the life of this plan the forest district will continue to explore opportunities to expand our education work to include a wider range of local Schools and will continue and build on our partnership with Phoenix Futures. The district will look to encourage local people to come forward to be volunteer wardens and encourage groups to run their own activities such as Community Events, Branching Out and Forest School programmes under the FES permission system.

B5.5.2 Recreation

Bluebell and Rannoch Wood will be included in the 'Woodlands of Renfrewshire' leaflet due to be produced Spring 2017. In 2016 the will be a new Visitor Experience Plan produced that will identify the need and placement of new signage and orientation throughout the site. In 2017-19 the signage and orientation plan identified in the Visitor Experience Plan will be implemented.

B5.6 Access

B5.6.1 Visitor

In 2016 the boundary wall along Beith Road will be repaired and in 2017-19 some path repair and potential creation of some new paths will be undertaken after the major thinning operation that is due be undertaken in 2016-17.

B5.6.2 Management

Whilst Rannoch Wood has a recently created transfer point for management access, there is currently no such provision in Bluebell Wood therefore, during the life of this plan, the district will explore opportunities with surrounding neighbours (Renfrewshire Council and Linstone Housing) to access the site via non-FCS ground to manage the site and potentially extract timber.

B5.7 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.

Forestry Commission Scotland
Coimisean na Coillteararachd Alba

Renfrewshire Woods Section C: Windyhill

C1.1 Setting and context

Windyhill is a former farm, situated south-west of Johnstone in Renfrewshire. The approximately 47 hectare site was previously almost entirely given over to a mix of rough, improved and semi-improved grazing with a small areas of riparian and ancient semi-natural woodland. As set out in the previous plan roughly half of the site is now given over to woodland since being newly planted in 2013 (see **Map C1 – Location** & **Map C2 - Context**). The current land-use matrix is shown below in **Table C1 – Current land use**.

Table C1 - Current land use

Land Use	Area (Ha)
Woodland	23.8
Open/Other	23.4

C1.2 History of the site

As mentioned above the site was previously a farm which was used for stock grazing. The site was purchased by Scottish Lowlands Forest District for the National Forest Estate on the 15th October 2008. A Forest Design Plan was produced for the site (FCS Ref: 032/10/03) which was approved on 14th October 2011. This plan set out the management objectives for the site for the subsequent 10 years and beyond which was essentially to expand the woodland area across the site establishing new native woodland. The desired new planting took place in 2013.

C2.0 Analysis of previous plan

C2.1 Aims of previous plan and achievements

In lieu of the approval and implementation of this plan, Windyhill is covered by the previous FES Forest Design Plan which was approved on 14/10/2011 for the period of 10 years ending on 13/10/2021. The aims and achievements of the previous plan are listed in **Table C2 – Previous Plan Progress** below.

Table C2 – Previous Plan Progress

Objective	**Proposed Management Actions**	**Progress to date** **1** – Little/No progress **2** - Some progress **3** – Progress as per FDP
Afforestation within fields currently in permanent pasture.	▪ Establish areas of productive broadleaves, native broadleaves and woody shrubs	3 – New planting occurred in 2013
Develop informal recreational opportunities throughout the site	▪ N/A	3 –Car parking provision has been improved to encourage increased use of the site and the paths and ride desire lines have a mowing regime to keep them functional for the public
Maximise biodiversity of the entire site	▪ Establish areas of productive broadleaves, native broadleaves and woody shrubs	3 – New planting occurred in 2013

C2.2 How previous plan relates to today's objectives

The objectives of the previous plan still relate to today's objectives which can be found within **Appendix IV** this new plan aims to consolidate those aims within an expanded plan including woodlands sharing various attributes such as geography, climate, soils and function.

C3.0 Background information

C3.1 Physical site factors

C3.1.1 Geology Soils and landform

Sedimentary rock with some igneous intrusions, underlie the area which in places are overlain by glacial till and sand/gravel. A mine shaft has been recorded to the north of the site near the boundary of the site.

The main overlying soil types found across the site are as follows:

- Brown earth [FC code 1]
- Improved brown earth [FC code 1c]
- Skeletal brown earth [FC code 1s]
- Brown gley [FC code 7b]
- Peaty gley [FC code 6]

Soil Moisture Regime provides an indication of the moisture and oxygen availability within the soil, both of which are essential for root growth. The majority of the site is wet implying periods when waterlogging occurs within the soil that may potentially impair rooting depth.

Soil Nutrient Regime is a measure of both the availability of soil nutrients for plant growth, and the acidity of the soil (which impacts on the solubility and hence availability for uptake of most nutrients). Most of the forest has soil of Poor to Medium restricting species options for the site.

C3.1.2 Hydrology

The Old Patrick Water flows north to south along the eastern boundary of the site, eventually joining the Black Cart Water and then into the River Clyde.

C3.1.3 Climate

Windyhill is mainly within the **Cool/Wet** climatic zone, with some pockets lying within the **Cool/Moist** zone. The accumulated temperature, (day-degrees above 5.0 C) for much of the site is 1,348.

C3.1.4 Exposure (DAMS)

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 scores for the majority of the site is a **sheltered 12** with only a small portion a **moderately exposed 13** and hence the site is potentially suitable for thinning.

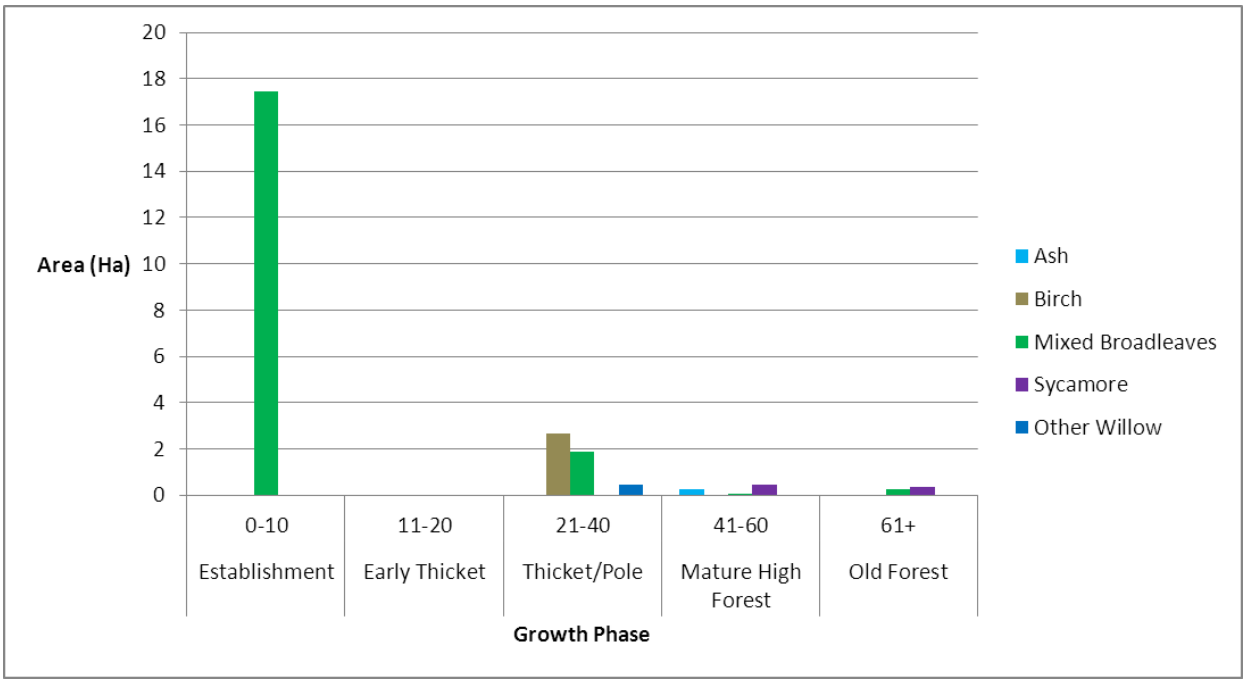
C3.2 The existing woodland

C3.2.1 Age structure, species and yield class

Age Structure

Figures C1 below highlights, the age structure of Windyhill is dominated by the recently planted establishing mixed species broadleaves.

Figure C1 – Current Age Structure Breakdown

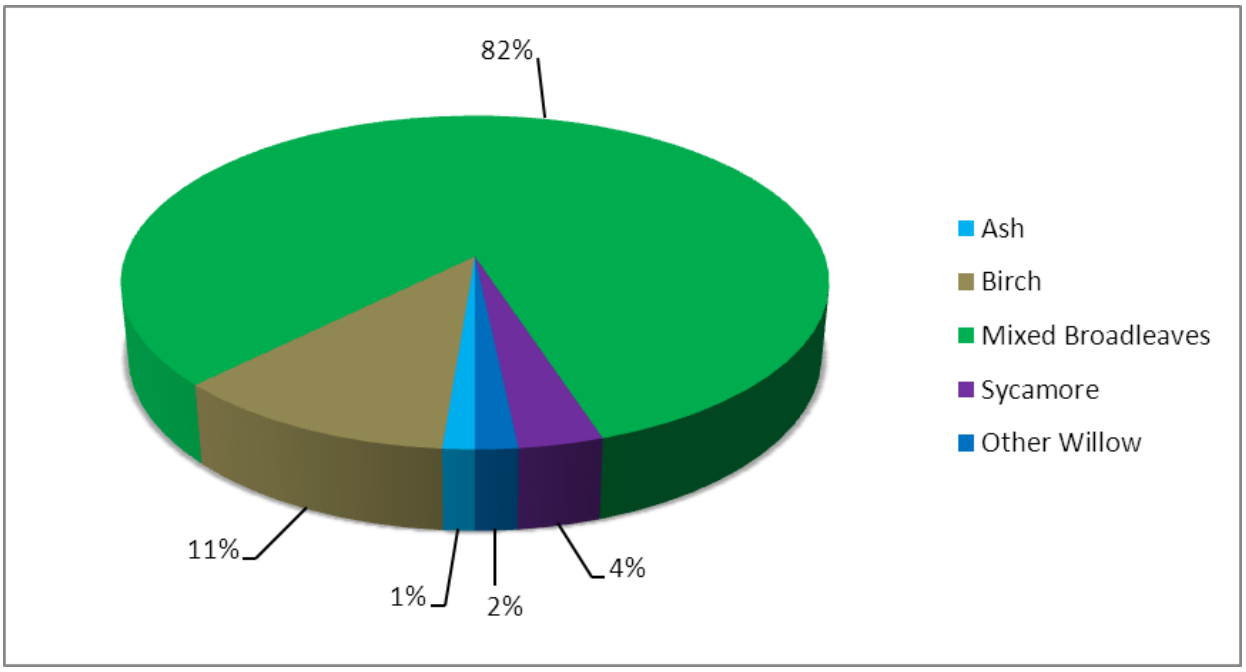


Species Structure

Figure C2 – Current Species Structure Breakdown & **Map C3a – Current Stock** shows the current make-up of the wood and helps one understand the proportions of the various species throughout the wood. The woodland is broadleaved the majority of which are mixed. The aim of this plan is to maintain a varied diversity of species within the woods.

Native Woodland - Of the broadleaved area, approx. 12.2 Ha has been identified as native woodland and approx. 1.6 Ha as nearly native by The Native Woodland Survey of Scotland (NWSS) carried out between 2006 and 2013 (see **Map C3b – NWSS**).

Figure C2 – Current Species Structure Breakdown



Yield Class

Yield classes range from 2 – 8.

C3.2.2 Ancient Woodland

The pre-2013 woodland had an area of approx. 6 Ha identified within it as of Long Established Plantation Origin (LEPO) status and hence is deemed to have been planted at some point around 1750. This was comprised Upland Birchwood and Mixed Broadleaved Woodland (see **Map C3c – Ancient Woodland**).

C3.2.3 Access

Vehicle access is gained to the site via the public road from Johnstone, then the former Windyhill farm steading access onto site. In 2012 a path network with major additional path was created to give visitors multiple route options. In 2013 a feature wall was installed at the main entrance enhancing the welcome zone. Installation of seating in 2015 throughout the site now provides rest points and places to enjoy both the interior and exterior views.

C3.2.4 LISS potential

The mature woodland has the potential to be managed using Low Impact Silvicultural Systems (LISS), during the life of this plan using a single tree selection system. The recent planting will also have the potential to be managed using LISS in the future, the system(s) of management of these area will be determined in future plans.

C3.3 Landscape and land use

The surrounding land mainly comprises of stock farms interspersed with mixed woodland and housing.

C3.3.1 Landscape character and value

Windyhill sits within a generally rural and irregular landscape due to the patchwork of agriculture and woodlands. The woodlands are generally perceived on the small scale due to the surrounding topography obscuring views of the site within their wider context.

In terms of SNH's Landscape Character Assessment, the site is categorised as Rugged Upland Farmland. An extract from the Glasgow and Clyde Valley Landscape Character Assessment are shown below in Figure C3:

Figure C3 Rugged Upland Farmlands Land Character Type

RUGGED UPLAND FARMS - KEY LANDSCAPE ISSUES

5.6.7 Key issues affecting this landscape type include:

- *the importance of encouraging the continued maintenance and management of hedges, field boundary trees and characteristic woodland clumps*
- *the visual and landscape impacts associated with urban related infrastructure, particularly tall structures such as pylons and communications masts*
- *changes in landscape character resulting from non-agricultural land uses such as golf courses*

MANAGING LANDSCAPE CHANGE

Key characteristics

5.6.8 The key characteristics, features and qualities of this landscape type are:

.....

- *tree cover often emphasising landform, for example concentrated on bluffs and outcrops*

Planning and management should aim to conserve the distinctive character of the Rugged Upland Farmland by resisting developments such as pylons and masts, which would weaken its rural character, and by securing the positive management of features such as field boundaries and woodlands.

Trees and woodland: sensitivities and forces for change

5.6.9 Woodland provides an important structural landscape element. As noted above, stands of beech and pine emphasise many of the rugged hillocks, contrasting with intervening pastures. The landscape would be very sensitive to the loss of these woodlands, either through direct loss, or, more likely, through under-management and neglect. Equally, an increase in woodland cover to include the currently un-wooded area would change perceptions of the landscape. There may, however, be opportunities for additional, small scale woodlands, which conform to existing patterns and which would reinforce the character of the landscape.

Trees and woodland: planning and management guidelines

5.6.10 Guidelines for the Rugged Upland Farmland include:

- *the emphasis in this landscape type should be placed upon securing the appropriate management of existing small woodlands, particularly where they emphasise the natural topography and thereby contribute to landscape character*
- *this landscape type has the potential to accommodate some additional woodland planting provided that this is of a relatively small scale, is correctly sited (particularly in relation to hillocks and outcrops) and reflects local patterns of species, particularly the occurrence of Scots pine in higher areas and beech in lower areas*

.....

C3.3.2 Visibility

Much of the site is hidden from general view due to topography. The northern and north-east fields are visible from parts of Foxbar situated to the east and southern areas of Johnstone situated to the north.

C3.3.3 Utilities

Map C3d shows the extent of the various utility infrastructures detailed throughout the site. Two 400kV overhead power lines skirt the southern edge of the site, whilst an 11kV line runs across the northern portion of the site from NE to SW. A Low Voltage line crosses a small section to the west of the site. There is also an underground power line on the western edge of the site. A Scotia Networks gas pipeline crosses east to west across the site near its southern border.

Several water pipelines cross the southern portion of the site as well as several water supply lines running along the outer western edge of the site.

C3.4 Biodiversity

C3.4.1 Priority Habitat Types & Important Species

As part of the preparation of the previous plan a habitat survey report was produced by Ben Averis in 2009. As part of that report site surveys were carried out at various different point through the year. The report revealed several habitats of which those of most botanical interest were: Lowland Fen, Lowland Meadow, Lowland Mixed Deciduous Woodland, River, Upland Birchwood, Wet Woodland, Scrub and Rush Mire. Careful woodland design and the planting operation of 2013 incorporated open space and appropriate buffers to protect the habitats listed. Some uncommon and pollution sensitive mosses *Cryphaea heteromalla* and *Ulota phyllantha* have been found on trees within Windyhill.

C3.4.2 Designations

Windyhill falls within only a small portion of the extensive Bardrain Glen, Sergeantlaw Moss & Gleniffer Braes West Local Nature Conservation Sites (*formerly Site of Importance for Nature Conservation (SINC)*). In this case a northern extension following the course of the Old Patrick Water. The relevant aspects of the site relating to the SINC are the broad valley character below Bardain Glen, with dense scrub on its steeper sides but gentler slopes generally of unimproved grassland, often marshy due to flushing. Also the burn side level areas with short grazed (rush) marsh but also with "tall" herbs, alder and willow, fairly mature open Scots pine plantation with some larch plus sycamore, birch, beech and oak (mainly below). Bracken is abundant, especially in open glades, but ground cover generally acidic, bramble and mosses etc. Small valley with marshy burn course, marked by less bracken, and with scrub (some willow but also planted alder - some grey); local pool feeding flushed grassland; below are distinct *Juncus acutiflorus* areas.

C3.5 Heritage

Rathmell Archaeology Ltd. was commissioned to undertake an archaeological survey in 2009 and the resulting report revealed that there was little of archaeological significance within the site. The survey revealed a total of three archaeological features within the management area.

- The remains of a farm steading first recorded on William Roy's Military Map of 1747-55
- A brick and concrete structure of recent (mid-late twentieth date)
- A heap of field clearance which appeared to be comparatively recent in date

There were potential traces of rig-and-furrow cultivation covering extensive stretches of ground in the western portion of the management area. However, these were extremely poorly preserved, their locations denoted only by variations in vegetation growth with no upstanding remains present, and it was unclear whether this particular pattern reflected earlier cultivation remains or the locations of field drains laid in the post-Improvement period.

C3.6 Community & Recreation

C3.6.1 Community

There is no immediate community other than neighbours at High Craigenfeoch, Wester Craigenfeoch, Craigenfeoch Cottage and Glen Park however the majority of the site is within 1km of Johnstone and can be accessed indirectly along footpaths from Johnstone Woods via land owned by Elderslie Estates. To promote community involvement and a sense of ownership of the site within the local area the forest district has engaged with the local Auchenlodment Primary School and involved them with small areas of community tree planting.

C3.6.2 Recreation

Public usage of Windyhill has been increasing since 2012 which saw improvements to existing paths and new additional paths incorporated to the network giving visitors various route options. Further to developing the path network a feature wall was also installed in 2013 at the main entrance enhancing the welcome zone and more recently in 2015 seating was installed to provide rest points and places to enjoy both the interior and exterior views throughout the site.

The site is mainly used by dog walkers from Johnstone and by people making the site part of a longer route through to the Gleniffer Braes Country Park which has its western edge situated to the south-east. This route is available as part of a series of walking routes produced by Renfrewshire Council and available to download as a PDF on their website.

There has been a history of wild camping on the site at the Brandy Burn and this comes with some littering, fire sites and associated scrub damage from burning/cutting for fire wood.

The seven falls were historically a draw for local people but have since been shielded from view by encroaching vegetation.

In 2014 a new webpage was created to promote the site and encourage more visitors.

C4.0 Analysis and Concept

The implementation of the previous plan's proposals to '*establish new woodland*' and '*develop recreational use of the site*' is delivering the vision set out in the previous concept. As such this plan does not propose any changes in the previous concept.

C5.0 Management Proposals

C5.1 Woodland management

The primary management activity of the existing plan to establish new woodland is well on the way to being delivered with planting completed in 2013. As such the on-going management of the site over the life of this new plan will be minimal and is described in the following sub-sections as well as in **Appendix II – Management Table** & **Map C5a – Management** & **Map C5c Visitor Zoning**.

C5.1.1 Clear-felling

No clear-felling is proposed.

C5.1.2 Thinning

Selective light crown thinning of the birch & willow woodland belt will be carried out within the Forest Plan Period. This will be to develop the better crowns to promote crop stability and health to encourage future regenerative capability.

C5.1.3 Silviculture

The older woodland and more recently planted woodland will be managed using alternative to clearfell (ATC) methods such as CCF/LISS silvicultural system methods which will be detailed further in a future plan when the new planting areas are established and clear silvicultural objectives can be defined.

C5.2 Future habitats and species

There are no known species, of particular note, which require particular monitoring or encouragement. In the medium to long term it is anticipated that the species within the areas of existing woodland, designed open ground, rocky outcrops and wetlands will remain relatively constant (see **Map C5b Future Habitat & Species**).

C5.2.1 Woodland

As the existing woodland is relatively diverse, both in species and structure little management intervention is anticipated in the medium term. The trees condition should be monitored and selective felling (for safety reasons) undertaken as and when required. The bracken within the existing woodland will also be monitored and, if the area of infestation is found to be growing, control measures should be put in place.

C5.2.2 Age structure

Within the plan period the area of existing woodland should remain relatively static in terms of overall structure.
The areas of new native woodland planting are intended as long term retention woodland.

The areas of productive woodland may be, in part, harvested as short rotation forestry, in or around the 20 year mark. This will depend upon demand and market conditions at the time. Beyond this the remaining areas will be managed as an even aged stand, for long term retention.

C5.2.3 Open Land

Little, if any, open ground management will be required within the wetland and rocky outcrop areas. Shrub encroachment will need to be monitored with some control work carried out if quality of open habitat becomes jeopardised.
Cutting of rides associated with access routes would be carried out twice per year.

C5.3 Biodiversity

C5.3.1 Priority Habitat Types & Important Species

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

C5.3.2 Designations

The management of the woodland and open areas detailed previously will ensure the continued conservation of the Bardrain Glen, Sergeantlaw Moss & Gleniffer Braes West SINC.

C5.3.3 Deadwood

It is the aim to utilise natural processes 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.

It is the district policy to contribute around 20m^3/ha of deadwood averaged across the whole woodland area in each forest block. This aspiration is dependent on the site type and long term objectives. At Windyhill the deadwood potential has been estimated as low and as such the following SLFD policy approach should be adopted:

- Retain veterans, standing & fallen dead stems and some stumps.
- Harvest windblow only when it is economic or required to make the site safe.
- Leave stems of no commercial value to die through shading.
- If advised, create deadwood stacks and small retentions of live trees and shrubs, to a minimum of 3% of total stem volume.

This approach should be weighed against the health and safety implications in regard to priority visitor zoning areas detailed within the FC Practice Guide Managing Deadwood in Forests & Woodlands and appropriate steps should be taken to balance the approach above with public safety.

C5.3.4 Wildlife Management

This fenced site has quite a lot of deer pressure from the neighbouring woodland/farmland. Not long after being fenced and planted deer broke into the exclosure and caused considerable damage (20-30% leader browsing damage). With the site completely deer fenced no further physical protection is required but effective deer culling should continue on site.

C5.4 Heritage

No further significant management operations are planned during the life of this plan and therefore there no heritage features will be unnecessarily damaged. Any future operations would be conducted in accordance with the UK Forestry Standard Guidelines on Forests and the Historic Environment.

C5.5 Community & Recreation

C5.5.1 Community

Looking forward, Windyhill will be promoted as an area suitable for hosting group educational activities such as Forest School and Branching Out and our Communities team will continue to engage with various groups to encourage greater use of the site.

C5.5.2 Recreation

The site has the potential to warrant improved formal car parking. Likewise with improved parking there would also be the potential to provide ‘All Ability’ trails. We will continue to monitor visitor numbers and visitor feedback and explore these options. Should more formal car parking be provided then the site will be heavily promoted to the Johnstone/Elderslie area.

Further improvement to the visitor experience will be made with the creation of a signage plan identifying the best locations for way marking, finger posts and orientation panels. As part of the signage plan an Interpretation panel will also be installed.

Windyhill will be included in the forthcoming 'Woodlands of Renfrewshire' leaflet due to be produced in 2016-18 and may actually be afforded its own leaflet.

Should visitor numbers increase to 50,000+/year an element of simple 'nature play' may be provided to encourage greater use of the site by families.

C5.6 Access

C5.6.1 Visitor

As mentioned in the previous section there is potential to provide formal car parking and to provide an ‘All Ability’ trail should a formal car park be created. Both these options will be explored during the life of this plan. A signage plan will be produced with the potential for way marking, finger posts and orientation panels.

C5.6.2 Management

It is likely that the establishing woodland will require formal operational access to harvest the future crop and extract the trees for timber haulage. Future plans will determine the most appropriate location(s) for forestry access and the required route(s).

C5.7 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.

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Renfrewshire Woods Section D: Howwood

D1.1 Setting and context

Howwood (and Tor Bracken) is located on the southern edge of the town of Howwood, roughly 3.5km south west of Windyhill. The two parts of the site are adjacent to one another and are now managed as one unit with a combined area of 25.2ha. Approximately 66% of the site is now given over to woodland since being newly planted in 2015. The current land-use matrix is shown below in **Table D1**.

Table D1 - Current land use

Land Use	Area (ha)
Woodland	16.60
Open Space	8.55
Open Water	0.05
TOTAL	25.20

See Maps D1 - Location & **D2 - Context**

D1.2 History of site

FES purchased Howwood from an investment firm on 29/11/2010. The site was previously a Greenfield site used for agricultural grazing. On 30/11/2012 FES acquired the neighbouring land at Tor Bracken (formerly the grounds of Tor Bracken House) which was assimilated into Howwood to make one site. Management proposals for Howwood were incorporated into the previous Windyhill FDP. Since then the majority of the site has been recently planted with predominantly native broadleaves. A substantial length of path has also previously been upgraded.

D2.0 Analysis of previous plan

D2.1 Aims of previous plan and achievements

In lieu of the approval and implementation of this plan, Howwood is covered by an amendment to the Windyhill FDP approved on 14/10/2011 which was for the period of 10 years ending on 13/10/2021. The aims and achievements of the previous plan are listed in the following table.

Table D2 – Previous Plan Progress

Objective	**Proposed Management Actions**	**Progress to date** **1** – Little/No progress **2** - Some progress **3** – Progress as per FDP
Maximise plantable ground and suitability of tree species	• Plant site suited species	3 – Planting in 2015 was of species suited to the site
	• Use native tree species	3 – Native species were planted
	• Suitable pest management to ensure success of planting and regeneration	3 – The establishing trees are protected using tree tubes, spirals as well as being stalked by a local contractor under the management of the district wildlife team.
Preserve important landscape and historic features	• Preserve the most important views within the site and enhance where possible	3 – Views have been retained and should be enhanced with framing
	• Protect known historic features	3 – Known features have been noted and captured on our Heritage Module of Forester GIS.
Increase biodiversity value	• Develop options for expansion of native woodland	3 – Increased woodland cover will expand the habitat network and should increase biodiversity

D2.2 How previous plan relates to today's objectives

The objectives of the previous plan still relate to today's objectives which can be found within **Appendix IV** this new plan aims to consolidate those aims within an expanded plan including woodlands sharing various attributes such as geography, climate, soils and function.

D3.0 Background Description

D3.1 Physical site factors

D3.1.1 Geology Soils and landform

The site has an underlying geology of a mosaic of sedimentary rock with volcanic formations and superficial deposits of Devonian till. This indicates underlying hard rock with shallow soils and areas of gleyed moisture-retaining soils in more level sections of the site.

The Soil Survey of Scotland indicates that the soils formed from drifts derived from basaltic rocks, with brown forest soils and brown rankers with non-calcareous gleys throughout the site with some humus-iron podzols in the central and eastern areas.

Soil types within the site have been confirmed by digging soil pits across the site. The main soil types on the site were brown earths and gleys. In the east of the site there is an area of disturbed ground with poor rooting conditions due to a stony compacted layer. Shallow soils predominate across the elevated ridge in the south of the site.

The site is north facing and occupies the lower slopes of the southern side of the valley above the floodplain of the Black Cart Water, below Broadfield Hill. The majority of the site is moderately or steeply sloping, with occasional rocky outcrops. In the east the site has a more level, gently undulating form. In the south is an elevated ridge below Skiff Wood, which occupies the upper slopes of Broadfield Hill. There are three minor gullies dissecting the northern edge of the site, each with a broadly north to south orientation.

D3.1.2 Hydrology

A small un-named burn flows near to the western edge of the site to join the Black Cart Water. The Skiff Burn runs close to the southern and eastern edges of the site, feeding the small ponds formed by Skiff Dam and Mid Dam.

The majority of the ground drains to the northwest, with a narrow strip of land draining south or west towards the Skiff Burn.

There is a small wetland with a recently created seasonal pond located in the south west of the site.

D3.1.3 Climate

The site is within the Cool Wet climatic zone. The accumulated temperature, (day-degrees above 5.0 C) for the whole site is 1,200- 1,475. Across the whole of the site and the surrounding ground, the Soil Moisture Regime is Moist, while the Soil Nutrient Regime is Medium. Local variations in geology, soil type, slope aspect and drainage create varied conditions.

D3.2 The existing woodland

D3.2.1 Age structure, species and yield class

Age Structure

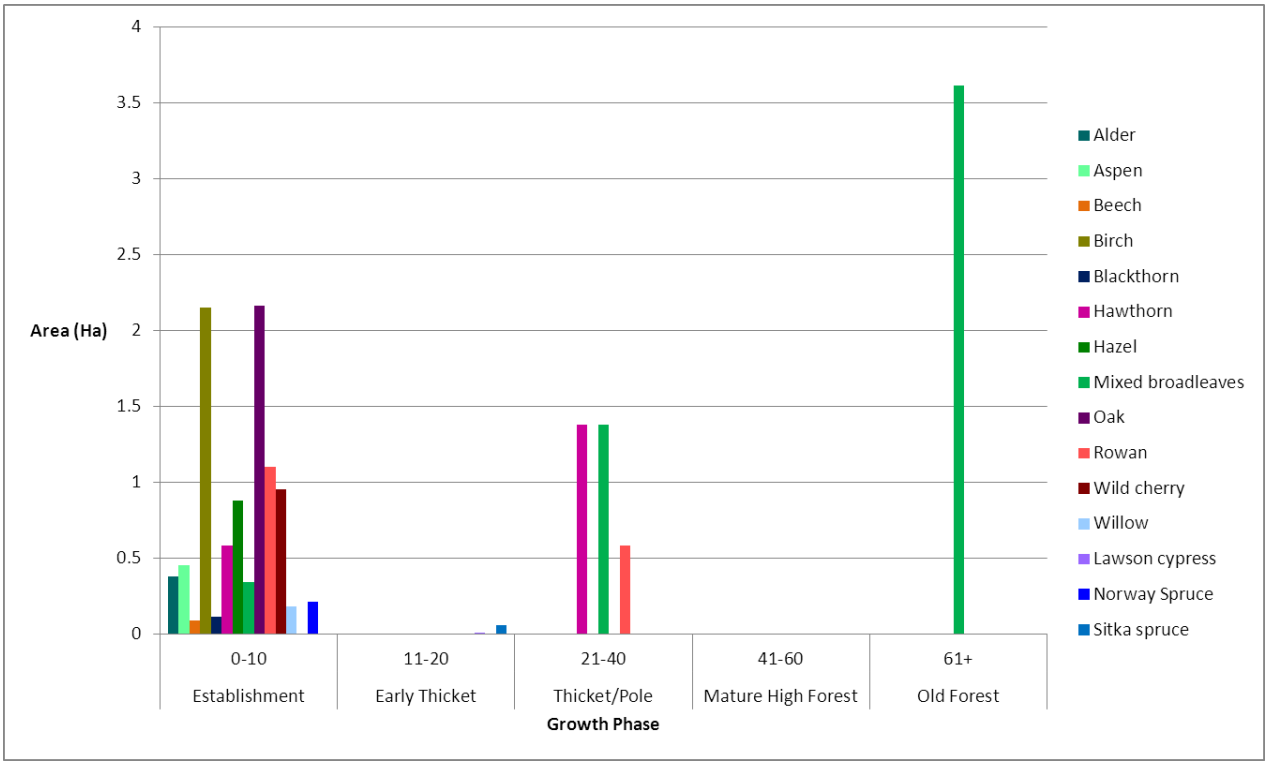
From **Table D2** below it is clear that the majority of the woodland (~71%) is made up of the establishing woodland planted predominantly in 2015. There is

also the established old mixed broadleaved woodland. **Figure D1** illustrates the age structure further by species.

Table D2 - Age Structure

Age of Trees (years)	Successional Stage	Area (ha)	%
0-10	Establishment	9.6	58
11-20	Early Thicket	0.1	0
21-40	Thicket & Pole Stage	3.3	20
41-60	Mature High Forest	-	-
61+	Old Forest	3.6	22

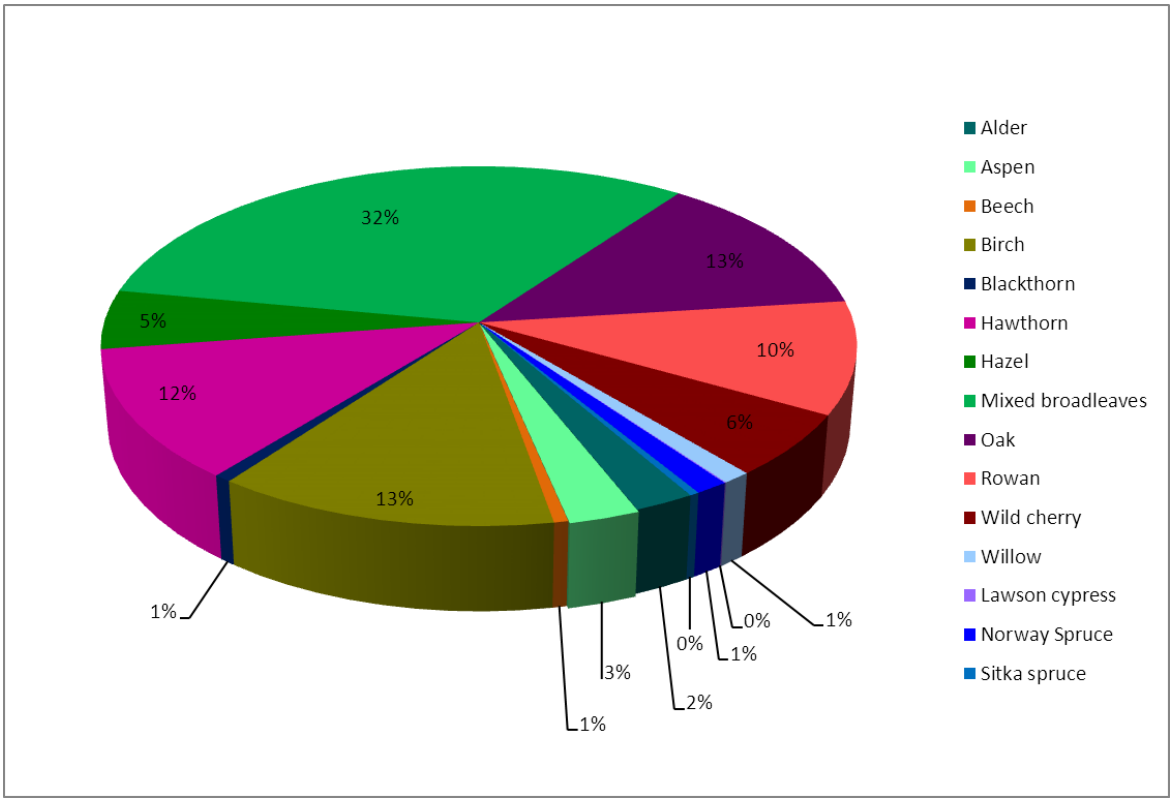
Figure D1 - Age Structure Breakdown



Species Structure - Howwood is mixed woodland consisting predominantly of broadleaves. **Figure D2** below illustrates the current species breakdown of the site (see **Map D3a – Current Stock**).

Native Woodland - Approx. 12.2 Ha (~48%) of the site has been identified as native woodland by The Native Woodland Survey of Scotland (NWSS); carried out between 2006 and 2013 (**see Map D3b – NWSS**).

Figure D2 - Current Species Structure Breakdown



The old woodland cover is dominated by large groups of even-aged, mature hawthorn, with little species or structural diversity.

The old woodland on the slope at the northern edge of the site includes hawthorn with semi-mature ash, sycamore, rowan, alder, aspen and hazel, together with occasional mature oaks.

Mature and over-mature oaks are scattered in the north western part of the site with a few present on the northern slope. These oaks suggest more extensive woodland cover on the site in the past.

Now the oaks are in decline and failing to regenerate, while regeneration of ash and holly is present with occasional frequency. Elsewhere, small scale regeneration of ash, sycamore, hawthorn and holly is present with occasional frequency near existing trees, mainly on the northern edge of the site.

Other species present in small numbers include young hazel, aspen and blackthorn.

In the south eastern part of the site there are irregularly spaced groups of coniferous trees dominated by Sitka spruce with a minor larch component. These trees are at an early-mature stage and appear to be growing well.

There is also a narrow belt of Leyland cypress which define a now obsolete field boundary. These small coniferous groups provide a partial screen for the garden of neighbouring residential property, but contrast starkly with the majority of the existing woodland which is broadleaved in character.

D3.2.2 Ancient Woodland

A small area in the north west of the site is classed as Ancient Woodland of Semi-Natural Origin and beyond the site boundary to the south, lie Skiff Wood and Corsehead Wood which are both recorded as being of Long-Established Plantation Origin (LEPO), (see **Map D3c - Ancient Woodland**).

D3.2.2 Access

Access to and through the site is restricted by poor linkage to public roads and by the site's steep topography. Access for pedestrians to the main area of the site is by a surfaced path with a looped route providing panoramic views to the north and northeast.

The site has the following access points:-

1. The main site entrance is off Hill Road on the northern site boundary. A management and pedestrian gate provide access to a 2m wide surfaced path leading up the slope to the more level ground in the centre of the site. The path is suitable for use by light machinery.

2. In the north western corner of the site a pedestrian gate provides access to the site from the B776.

3. A management gate provides an access point to the western side of Skiff Wood near to its main track, although there is no formal path or track to create a link, machinery could (subject to permission) use this route.

4. A pedestrian gate in the south western corner of the site links to farm land to the south west of Howwood.

5. An old track (with a solid base) leads from the surfaced path in the centre of the site westwards to a management gate in the western boundary. This may provide a potential access point for machinery, dependant on permission being obtained.

Hill Road provides a pedestrian link to the local Core Path network to the north, while an existing track in Skiff Wood (also a Core Path) runs close to the southern tip of the site, making a pedestrian link possible.

D3.2.3 LISS potential

Howwood would be suited to future management under LISS due to the difficult nature of access for future timber extraction and its small scale.

D3.3 Landscape and land use

Howwood occupies an elevated position above Howwood itself. The hillside can be seen from local roads and a railway to the north and from the southern edge of the village.

Currently the existing woodland components of the site visually link with other small-scale woodland around its perimeter.

Skiff Wood is a medium scale, largely coniferous woodland located on the hillside above Howwood and Tor Bracken. The property boundary with Howwood and Tor Bracken is marked by mature, mixed broadleaves around the Skiff Burn.

To the northwest the site abuts the edge of Howwood with open farmland to the north east. Along the north western boundary is a strip of broadleaved woodland with a small area of young broadleaved woodland. To the east is private housing set in large grounds around the ponds formed by Spring Dam, Mid Dam and Skiff Dam.

Historically parts of the site have been used for low intensity grazing, although it is evidently some time since the site was actively farmed.

D3.3.1 Landscape character and value

Howwood sits within a generally rural and irregular landscape due the patchwork of agriculture and woodlands. The woodlands are generally perceived on the small to medium scale due to the surrounding topography obscuring views of the site within their wider context.

In terms of SNH's Landscape Character Assessment, the vast majority of the site is categorised as Rugged Upland Farmland. An extract from the Glasgow and Clyde Valley Landscape Character Assessment are shown below in **Figure D3**:

Figure D3 Rugged Upland Farmlands Land Character Type

RUGGED UPLAND FARMS - KEY LANDSCAPE ISSUES

5.6.7 Key issues affecting this landscape type include:

- *the importance of encouraging the continued maintenance and management of hedges, field boundary trees and characteristic woodland clumps*
- *the visual and landscape impacts associated with urban related infrastructure, particularly tall structures such as pylons and communications masts*
- *changes in landscape character resulting from non-agricultural land uses such as golf courses*

MANAGING LANDSCAPE CHANGE

Key characteristics

5.6.8 The key characteristics, features and qualities of this landscape type are:

.....

- *tree cover often emphasising landform, for example concentrated on bluffs and outcrops*

Planning and management should aim to conserve the distinctive character of the Rugged Upland Farmland by resisting developments such as pylons and masts, which would weaken its rural character, and by securing the positive management of features such as field boundaries and woodlands.

Trees and woodland: sensitivities and forces for change

5.6.9 Woodland provides an important structural landscape element. As noted above, stands of beech and pine emphasise many of the rugged hillocks, contrasting with intervening pastures. The landscape would be very sensitive to the loss of these woodlands, either through direct loss, or, more likely, through under-management and neglect. Equally, an increase in woodland cover to include the currently un-wooded area would change perceptions of the landscape. There may, however, be opportunities for additional, small scale woodlands, which conform to existing patterns and which would reinforce the character of the landscape.

Trees and woodland: planning and management guidelines

5.6.10 Guidelines for the Rugged Upland Farmland include:

- *the emphasis in this landscape type should be placed upon securing the appropriate management of existing small woodlands, particularly where they emphasise the natural topography and thereby contribute to landscape character*
- *this landscape type has the potential to accommodate some additional woodland planting provided that this is of a relatively small scale, is correctly sited (particularly in relation to hillocks and outcrops) and reflects local patterns of species, particularly the occurrence of Scots pine in higher areas and beech in lower areas*

.....

D3.3.2 Visibility

The northern edge of the site is visible from the public road and residential properties at Hillfoot Drive and Carsewood Avenue in Howwood. This view is restricted due to the steep topography at the northern edge of the site. A small number of properties have views of the eastern edge of the site, filtered by existing garden and boundary trees.

More extensive but less intimate views of the site are available from the northern edge of the village and local roads to the north. From these view-points the site forms part of the larger hillside, and where its sporadic tree cover blends with the existing trees in the surrounding area.

D3.4 Biodiversity

D3.4.1 Priority Habitat Types & Important Species

D3.4.1.1 Priority Habitat

In preparing the previous amendment to add Howwood to the Windhyhill FDP a NVC habitat survey was carried out on the Howwood section of the property in August 2012 by Dr Alison Strange and a separate NVC survey for the Tor Bracken area completed in March 2014 by Peak Ecology, along with a survey of both areas for protected species.

The Howwood habitat survey concluded that much of the site contains communities that are unremarkable. Identified areas of greater vegetation interest were; Acid grassland (U4a), Relic heathland (H12c) which, on the steeper slopes in the northern part of the site, include a small population of Spignel, *Meum athamanticum*, Mire (M27a), Pond and surrounding fen (M23b) and Woodland (W11a).

The lower parts of the site lie within the 'Low Corsehead' Site of Importance for Nature Conservation (SINC).

The Tor Bracken survey described this area as a mixture of open habitats, mainly neutral grassland and bracken with scattered scrub, some conifer planting and some scrubby semi-natural woodland. Three communities are considered to be UK BAP priority habitats.

- Lowland mixed deciduous wood with elements of W7, on the northern slope.
- A line of mixed species mature hedge on the northern boundary.
- A small patch of mire (M23b) on low ground in the north of the site.

The recent planting took into account the information provided by NVC habitat surveys and the small area of heath vegetation was kept free of planting. The area identified as mire habitat had scattered mature tree cover and was partially planted to boost tree cover, this area lay within the area classified as Ancient Woodland of semi-natural origin.

In the past most of the site was regularly grazed, and an area of acid grassland was present on the north eastern slope. With grazing on the site ceased it is expected that this grassland habitat is likely to naturally change.

Part of this grassland lies within the area classified as Ancient Woodland of semi-natural origin, and has been planted to establish additional broadleaved woodland cover.

D3.4.1.2 Important Species

As with the habitat survey in preparing the previous plan a protected species survey was also carried out which concluded that the birds recorded on site represent a typical range of species associated with the habitats present. The survey also discovered a single badger clan with a large main sett, a smaller annex and a further disused sett. Another clan were foraging in the west of the site, although their sett is considered to be off the site, presumably to the west. There were 24 individual trees which had features of high potential to be of interest to roosting bats and a further group of 15 mainly oaks that also had a high bat roost potential. No other protected or priority species were recorded during the walkover survey.

D3.4.2 Designations

Local Nature Conservation Sites (*formerly Site of Importance for Nature Conservation (SINC)*) - The majority of Howwood falls within the **Low Corsehead Brae SINC**. This particular SINC has been designated due to its mix of mature trees, neutral or semi-improved grassland, pockets of heath, bracken, abundant scattered scrub and scrubby woodland.

D3.4.3 Invasive Non-Native Species

With its proximity to residential gardens and because of issues with fly-tipping of garden refuse Howwood has been affected by the influx of the highly invasive exotic plant **Himalayan balsam** (*Impatiens glandulifera*) which is aggressive and forms dense stands that exclude other plants. If this species were left unchecked it could pose a risk of colonising substantial areas to the detriment of native flora and fauna.

D3.5 Heritage

AOC Archaeology Group was commissioned to undertake an archaeological survey in 2013 and the resulting report revealed that there was little of archaeological significance within the site. No sign of remains relating to the Corsehead farmstead were recorded, and the two wells depicted at old OS Maps were not visible. A water tank, constructed between the time of the OS first and second edition maps is located at the western side of the study area, and is now ruinous and partly dismantled. A small round cairn was probably related to field clearance, associated with the farmstead, but a prehistoric origin cannot be ruled out. A small circular drystone cell was also recorded and seems likely to be associated with this post-medieval activity. The function of this structure was not clear but it is possible that it represents the remains of

a kiln. Several ruinous drystone dykes are found within the study area, defining the extents of the Corsehead plantation, which was probably established in the earlier 19th century.

D3.6 Community & Recreation

D3.5.1 Community

The local community use the site for informal recreation due in part to its proximity to the village. The local school are known to make occasional excursions to the site, climbing the path for the elevated views.

Levels of littering and anti-social behaviour are relatively low, and it is apparent that many users value the site. Howwood itself is relatively prosperous; the village's two wards being in the 60-80% and 80-100% highest quintiles in terms of deprivation (SIMD). There are very limited opportunities for off-road access in the Howwood area, and consequently the site can provide a valuable resource for the local community.

The forest district has worked with the Community Council and the Howwood Wildlife and Woodland group to part fund an updated version of a walk leaflet with Howwood Community Woodland being included. In 2016 we worked with Howwood Primary School to undertake some community tree planting.

D3.5.2 Recreation

A surfaced path was built in 2012 providing a well-drained route leading from Howwood up the lower, steeper part of the hill to a simple loop on the higher ground. In 2013 a bespoke bench seat provides seating with a degree of shelter at an elevated view point, which provides expansive views to the north over the Clyde to the Kilpatrick Hills and beyond, and further east, over Paisley and Glasgow. In 2014 four stone seats were installed up the steep first section of trail, these seats provide important rest sites to improve accessibility for people with mobility issues. There is no established access to the Tor Bracken section of the site.

Local residents use the site for informal recreational purposes. Many of the regular users walked the area before the path was built, but it is believed that user numbers have greatly increased due to the creation of a surfaced path. A 'people counter' is in place on the path although no data was available to include in this plan.

The local Core Path network links to the site entrance on the northern boundary with another route leading around and through Skiff Wood to the south. A short stretch of additional path in the southern tip of the site could provide another link into the Core Path system.

In addition to the work on the ground a new website to promote the site was created in 2014.

D4.0 Analysis and Concept

The implementation of the previous plan's proposals to '*increase the area of native woodland while protecting biodiversity interests and promoting informal recreational use of the site'* is delivering the vision set out in the previous concept. As such this plan does not propose any changes in the previous concept.

D5.0 Management Proposals

D5.1 Woodland management

The primary management activity of the previous plan 'to establish new woodland' is on the way to being delivered with planting completed in 2015. As such the on-going management of the site over the life of this new plan will be minimal and is described in the following sub-sections (see **Appendix II – Management Table**, **Maps D5a – Management** & **D5c Visitor Zoning**).

Maintenance

- All fences and gates will be monitored regularly for signs of intrusion and maintained in a sound condition.
- All plants and guards will be maintained in an upright and windfirm position.
- All trees will have a 1m² spot maintained in a substantially weed free condition until they are established. This will be achieved by the applications of systemic and residual herbicide and by hand weeding as necessary.
- Plants will be monitored for signs of disease, nutrient deficiency, and damage, and appropriate action taken as necessary.
- Replacement planting will be undertaken to ensure that the original stocking densities are maintained until year 5.
- The site will be routinely monitored to ensure that the specifications are being achieved, and in order that any unforeseen problems can be identified and dealt with, at an early stage.

D5.1.1 Clear-felling

Small groups of coniferous trees are visually intrusive and will be felled. The majority of the felled area will be re-stocked to broadleaved woodland with a small area left as open ground. If viable, timber will be removed from site, and

brash stacked neatly in habitat piles. If extraction is not viable, all arisings will be cut and stacked neatly on site.

D5.1.2 Thinning

Selected groups of hawthorn scrub covering 20% of the total area of scrub will be coppiced to create structural diversity. The selected groups will have an average size of 20m x 20m.

The coppicing will also provide space and light for enrichment planting, thus allowing the introduction of additional tree species. This will leave other areas to develop as dense thickets. This is considered to be the first step towards creating structural diversity and it is intended that the procedure will be repeated 10 years later.

D5.1.3 Silviculture

The majority of the older woodland as well as the recently planted woodland are suited to either have minimal management intervention or be managed using alternative to clearfell (ATC) methods such as CCF/LISS. Such systems will be determined and detailed in a future plan when the new planting areas are established and clear silvicultural objectives can be defined.

D5.2 Future habitats and species

The site includes a number of mature, and over-mature, oak trees which are beginning to decline. There are no signs of regeneration of the oaks and the previous plan's planting and enrichment proposals were aimed at rejuvenating this element of the woodland cover, boosting the range of native tree species and establishing oaks for the future (see **Map D5b – Future Habitats & Species**).

D5.2.1 Restructuring

A small area (0.32ha) of existing coniferous planting will be felled and replaced by 0.24ha of native broadleaved woodland and 0.08ha of open ground. No other restructuring is planned. Approximately 25m^3 of timber will be generated, but it may not be viable to extract this from site.

D5.2.2 Future management

The recent new planting has increased the woodland cover on the site whilst proposed coppicing hawthorn and enrichment planting will create both structural and species diversity in the areas dominated by scrub.

Future management will focus on maintenance of the new planting and enrichment planting. These young plants will require weed control in their establishment phase, to combat grasses and bracken. Tree shelters will also require maintenance to ensure the trees are protected. Stock fencing will require maintenance ensuring stock are excluded from the site.

Further coppicing of a proportion of the hawthorn may assist the development of some of the enrichment planting, and would also help to create a more varied physical structure. This operation would be appropriate 10 years after the initial coppicing work.

No additional path creation is planned although maintenance of the existing path and associated recreational infrastructure will be on-going.

D5.2.3 Age structure

The proposals aim to regenerate areas of patchy mature and over-mature woodland cover through enrichment planting.

Coppicing groups within the areas of hawthorn scrub will create new growth and facilitate enrichment planting. As a result the age structure of the woodland will include a greater proportion of young trees and this will be a step towards sustaining woodland cover on the site and creating a more balanced woodland overall.

D5.2.4 Management of open land

Open ground will be left to develop naturally. Cutting of access routes and verges will be carried out twice per year. Encroachment of woody vegetation into path corridors and into retained views will be monitored, and cut back if required.

D5.3 Biodiversity

D5.3.1 Priority Habitat Types & Important Species

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

D5.3.2 Designations

The management of the woodland and open areas detailed previously will ensure the continued conservation of the Low Corsehead Brae SINC.

D5.3.3 Deadwood

It is the aim to utilise natural processes 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.

It is the district policy to contribute around 20m^3/ha of deadwood averaged across the whole woodland area in each forest block. This aspiration is dependent on the site type and long term objectives. At Howwood the deadwood potential has been estimated as low and as such the following SLFD policy approach should be adopted:

- Retain veterans, standing & fallen dead stems and some stumps.
- Harvest windblow only when it is economic or required to make the site safe.
- Leave stems of no commercial value to die through shading.
- If advised, create deadwood stacks and small retentions of live trees and shrubs, to a minimum of 3% of total stem volume.

This approach should be weighed against the health and safety implications in regard to priority visitor zoning areas detailed within the FC Practice Guide Managing Deadwood in Forests & Woodlands and appropriate steps should be taken to balance the approach above with public safety.

D5.3.4 Invasive Non-Native Species

Himalayan balsam *(Impatiens glandulifera)* – Hand pulling of the principal affected area would not be fully effective so foliar chemical spraying of glyphosate will be employed between the months of May – Aug. Any other individual stems scattered elsewhere will be hand pulled and removed from site.

D5.3.5 Wildlife Management

As fencing in this location was deemed to present issues for maintenance and deer welfare a careful regime of deer control is in place using an FES contractor. This regime included control prior to planting to decrease the population levels with a lot of deer removed in the first year of culling but it is envisaged that surrounding deer will fill the vacuum due to neighbouring woodlands doing little or no control. Regular culling should keep the population in check allowing young trees to grow within acceptable damage parameters. Rabbits are also found on site in decent numbers and have been considered in the recent new planting with selected sensitive species in the main body of planting, and planting within the existing scrub, protected by individual tree shelters and spiral guards.

D5.4 Heritage

No further significant management operations are planned during the life of this plan and therefore there no heritage features will be unnecessarily damaged. Any future operations would be conducted in accordance with the UK Forestry Standard Guidelines on Forests and the Historic Environment.

D5.5 Community & Recreation

D5.5.1 Community

In the future there is the potential to work with Howwood Primary school, in particular to provide Career Long Professional Learning (CLPL) sessions to encourage teaching staff to see Howwood Community Woodland as an important learning resource.

D5.5.2 Recreation

Howwood will be included in the 'Woodlands of Renfrewshire' leaflet to be produced 2016-18. There is also the potential to install additional seating on the top loop path to provide additional rest points and places to enjoy both the interior and exterior views which will be explored during the life of this plan.

D5.6 Access

D5.6.1 Visitor

There are no plans for any additional paths to be created.

D5.6.2 Management

Due to the steep topography of the site and the limited options for operational access the site will be managed as a non-commercial venture with any resulting produce most likely being left onsite as deadwood.

D5.7 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.

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Renfrewshire Woods Section E: Knockmountain

E1.1 Setting and context

Knockmountain is situated within the Local Authorities of Inverclyde and Renfrewshire, approximately 4 miles south-east of Port Glasgow town centre and less than 1 mile north of Kilmacolm village centre (OS Grid Ref: NS 370 715). It occupies an area of 194.2 ha on what was formerly predominantly agricultural farmland but has in recent years become more of a mix of productive and unproductive woodland and open ground. The land at Knockmountain ranges from 132-191m (above sea level). The site forms a valley giving it both north and south facing aspects (see **Maps E1 - Location & E2 - Context**).

The current land use matrix is as follows:

Table E1 Current land usage

Land use	Area (ha)	%age
Open	96.3	50
Woodland	96.1	49
Buildings	1.2	1
Windblow	0.3	0
Open water	0.2	0
Intruded broadleaves	0.1	0
Total	**194.2**	**100%**

E1.2 History of site

Prior to Forest Enterprise Scotland (FES) purchasing Knockmountain on 31/05/2006 the site was primarily used for agriculture for at least a century. FES acquired the site for the purpose of woodland creation for carbon sequestration and produced a Forest Design Plan (FCS Ref: 032/10/03) which was approved on 5th November 2008. That plan set out the management objectives for the site for the subsequent 10 years and beyond which was essentially to expand the woodland area across the site establishing new commercial conifer as well as productive and unproductive broadleaved woodland. The proposed new planting took place in 2009. All of the productive broadleaf areas had Ash as a major component and when it was discovered that the received nursery stock was confirmed to have been infected by Ash dieback (*Chalara fraxinea)* the infected seedlings were destroyed in 2012 and the areas affected were beaten up in 2013 with alternative site suited species.

E2.0 Analysis of previous plan

E2.1 Aims of previous plan and achievements

In lieu of the approval and implementation of this plan, Knockmountain is covered by the current FDP approved on 05/11/2008 which was for the period of 10 years ending on 04/11/2018. The aims and achievements of the previous plan are listed in the following table.

Table E2 – Previous Plan Progress

Objective	**Proposed Management Actions**	**Progress to date** 1 – Little/No progress 2 - Some progress 3 – Progress as per FDP
Maximise the potential for carbon sequestration by creating a woodland based on sound silvicultural decisions	The plan for Knockmountain has been designed in accordance with sound silvicultural and environmental principles, within the framework outlined by the UK Forestry standard and the UK Woodland Assurance Scheme and following the current edition of the Forest & Water guidelines. Trees will be planted is site suited locations in accordance with ESC and protected appropriately	3
Create a productive woodland capable of producing quality softwood and hardwood timber	Plant productive conifer at 2700 stems/ha Plant productive broadleaves at 4400 stems/ha	3 3
Provide an educational resource for local communities and the farming and forestry sectors	No specific actions proposed	2 - By upgrading the access to Knockmountain and by maintaining and enhancing the Langbank to Kilmacolm Right of Way Forest Enterprise Scotland has opened this diverse habitat up to people as an educational resource for local communities
Enhance recreational opportunities for local people through the provision of public access	No specific actions proposed	2 - As part of the upgrade of the Langbank to Kilmacolm Right of Way a new boardwalk was installed. The boardwalk was upgraded in 2015 with the application of non slip decking strips to allow safe access all year round.

		A small boardwalk was installed crossing the wooded area of the Dargavel Burn SSSI to allow greater access to the woodland giving increased route options for visitors. The boardwalk was upgraded in 2015 with the application of non-slip decking strips to allow safe access all year round. A number of seats were installed along the route of the Langbank to Kilmacolm Right of Way, including a picnic bench at a key viewpoint. These seats not only allow better access for people with mobility issues by providing rest stops but also provide visitors with destinations to stop and enjoy the beauty of the woodland and its surrounding location.
Increase biodiversity value through careful design of open space and tree species choice	Native woodland common to the area will be planted including **W4** (*Betula pubescens – Molinia caerula*), **W23** (*Ulex europeaus – Rubus fructicosus*) scrub, **W3** (*Salix pentandra – Carex rostrata*) and **W11** (*Quercus petrea – Betula pubescens – Oxalis acetosella*).	3
Protect water quality through implementation of Forest and Water Guidelines, careful planning and sensitive planting proposals	To protect the integrity of Dargavel Burn SSSI, recommendations made within 'Knockmountain Hydrology Report' relating to sterile buffers around the SSSI and associated springs will be adhered to. Any natural regeneration within these areas will be managed appropriately. Levels of regeneration, up-to 100 stems/Ha will be tolerated, once beyond this level active management will be carried out.	3

E2.2 How previous plan relates to today's objectives

The objectives of the previous plan still relate to today's objectives which can be found within **Appendix IV** this new plan aims to consolidate those aims

within an expanded plan including woodlands sharing various attributes such as geography, climate, soils and function.

E3.0 Background information

E3.1 Physical site factors

E3.1.1 Neighbouring land use

The site is bounded by a mixture of grassland farmland, mixed conifer/ broadleaved woodland giving the landscape character a well-integrated blend of woodland and farmland. The site is also in close proximity to the town of Port Glasgow and the village of Kilmacolm.

E3.1.2 Geology, Soils and landform

Carboniferous, Basalt and spilite underlie the whole of the site. Throughout there are discrete areas of alluvial deposition, glacial till and peat (the area of peat is found within the SSSI present on site).

The dominant soil type on the site is Basic Brown Earth, within these areas are complex' of basic brown earth, shallow cultivated phase and brown ranker areas. There are also discreet areas of wetter soils, surface water gley and loamy soils. The majority of the ground, including the shallow soils and rankers, had been agriculturally improved by cultivation and the establishment of a Rye grass dominated ley mixture. Surface Compaction was also evident throughout the site (see **Maps E3a – Soils**).

E3.1.3 Climate

The accumulated temperature is in one class, this is '**Warm**' (1200-1522) and the moisture deficit is also in one class, this being '**moist**' (90-120). The AT and MD should not prove to be a limiting factor to the growing of either productive Broadleaves or conifers. Annual rainfall at the site is above average at around 1499mm. The DAMS scores for this site range from 13-17 using the current model, because of the proximity to the sea the effective exposure acting upon these trees may be up to 1.5 units more than modelled. The site exposure will be one of the limiting factors for productive Broadleaves and will affect the form and rotation length of the productive Conifers (*Bill Rayner, FCS*) (see **Map E3b – Climate**).

E3.1.4 Hydrology

The Dargavel Burn runs through this site and forms the Dargavel Burn Valley Mire SSSI of which 8.3Ha lies within the site. The site is adjacent to two reservoirs, Auchindores and Leperstone, both of which are out of use. There are hydrological sensitivities on site associated with SSSI. Site condition

monitoring of the SSSI prior to the planting of the previous plan stated that its favourable condition was maintained due to the high water level on site. Scottish Natural Heritage raised concerns as to whether afforestation of the site would lead to a significant reduction in run-off and therefore have a detrimental effect on the SSSI. In December 2007, FCS commissioned an assessment of the Hydrology at Knockmountain Farm. This aim of this assessment was to provide information and guidance to FCS on afforestation and any mitigating measures that can be taken. The recommendations of the report were applied and adhered to and therefore Scottish Natural Heritage was happy for the afforestation on that basis. Knockmountain Farm supplies water to Bogside and Langside Farms from a fault at the North of the site. No plans for any tree planting within this area were part of the previous plan and we continue to monitor any potential impacts on water supplies with the neighbouring landowner. North Glen and Midglen Farms and Finlaystone Estate are unaffected.

E3.2 The existing woodland

E3.2.1 Age structure, species and yield class

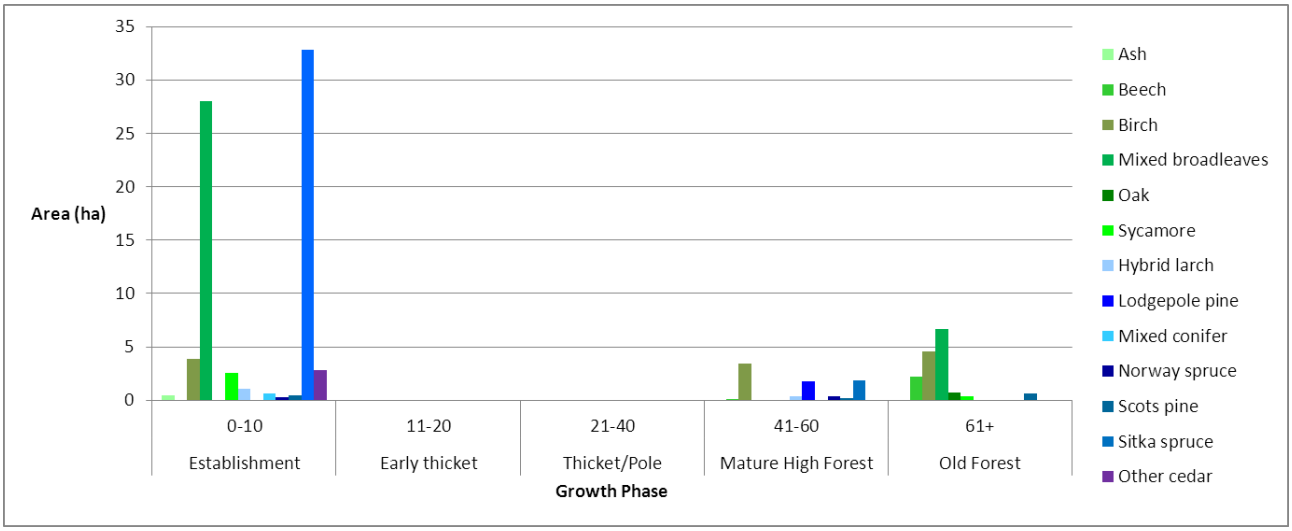
Map E3c – Current Stock illustrates the current sub-compartment stock information found within Knockmountain.

Age Structure - From **Table E2** below it is clear that the majority of the woodland (~73%) is made up of the establishing woodland planted predominantly in 2009. There is also the established mature and old woodland which consist of the conifer shelter belts and the broadleaved areas found in Dargavel Burn and around Knockmountain itself. **Figure E1** illustrates the age structure further by species.

Table E2 Age Structure

Age of Trees (years)	Successional Stage	Area (ha)	%
0-10	Establishment	73.1	76
11-20	Early Thicket	-	-
21-40	Thicket & Pole Stage	-	-
41-60	Mature High Forest	8.2	8
61+	Old Forest	15.2	16

Figure E1 Age Structure Breakdown



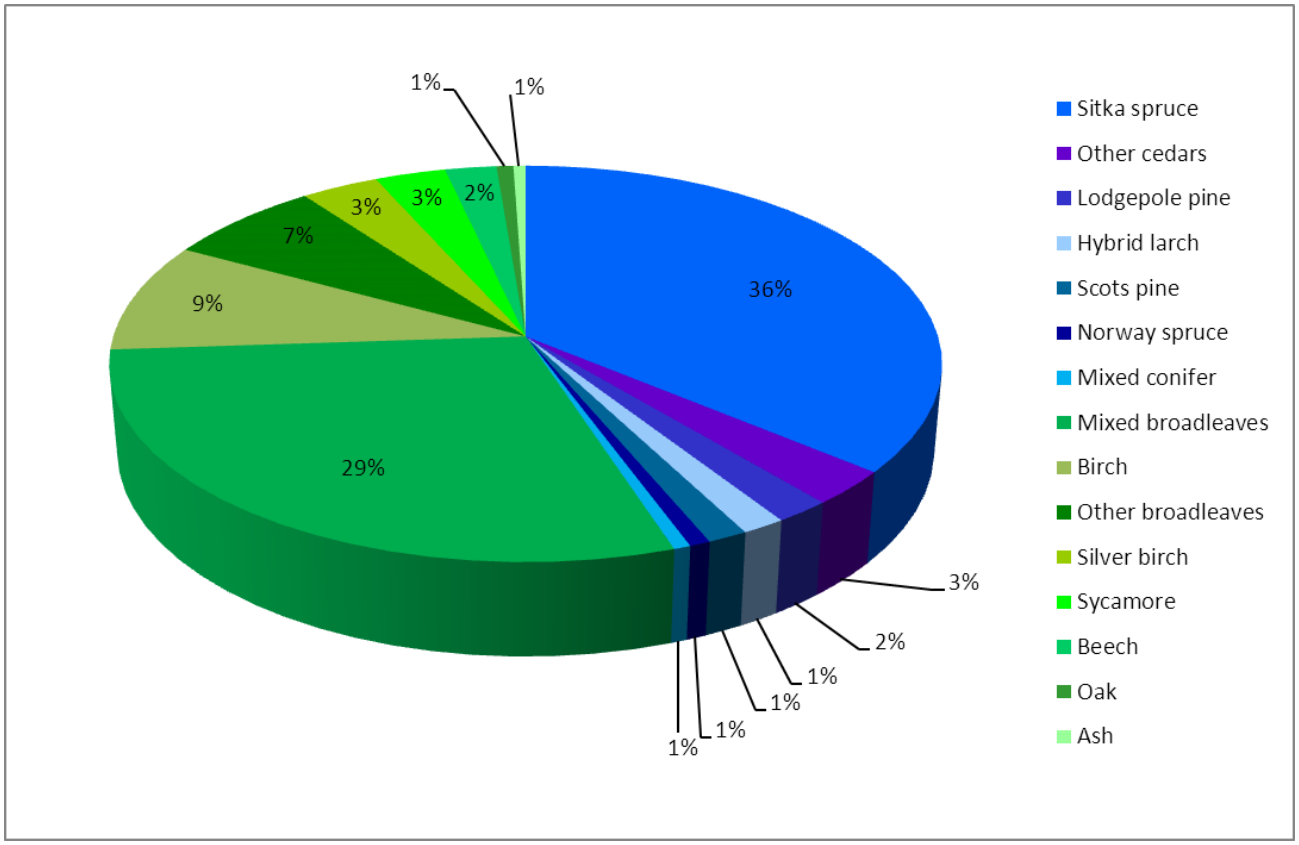
Species Structure - Knockmountain is mixed woodland consisting of a relatively even component of broadleaves and conifer as shown in **Table E3**. **Figure E2** below further illustrates the current species breakdown of the site.

Native Woodland - Of the broadleaved area approx. 19 Ha (~36%) has been identified as native woodland by The Native Woodland Survey of Scotland (NWSS); carried out between 2006 and 2013 and a further 1.3 Ha (~2%) as nearly native (**see Map E3d – NWSS**).

Table E3 Current Woodland Type

Woodland Type	Area (ha)	%
Broadleaves	53.2	55
Conifers	43.3	45
Total	**96.5**	**100**

Figure E2 - Current Species Structure Breakdown



E3.2.2 Ancient Woodland

Approx. 3.5 Ha of the site has been identified as Long Established Woodland of Plantation Origin (LEPO). This woodland has been interpreted as plantation from maps of 1860 and continuously wooded since. Many such sites have developed semi-natural characteristics, especially the oldest ones, which may be as rich as Ancient Woodland (**see Map E3e – Ancient Woodland**).

E3.2.3 Access

The main accesses into the site are via C class roads. This has been and will be adequate for establishment and maintenance purposes and discussions will need to take place in the future with the local authority regarding Timber Haulage routes.

E3.3 Landscape and land use

E3.3.1 Landscape character and value

Knockmountain sits within a rural and irregular landscape due the patchwork of agriculture and woodlands. The site is generally perceived on the small to medium scale due to the topography obscuring much of the site from view

from outwith however views from within the site provide a wider sense of the site.

In terms of SNH's Landscape Character Assessment, the site is categorised as Rugged Upland Farmland. An extract from the Glasgow and Clyde Valley Landscape Character Assessment are shown below in **Figure E3**:

Figure E3 Rugged Upland Farmlands Land Character Type

RUGGED UPLAND FARMS - KEY LANDSCAPE ISSUES

5.6.7 Key issues affecting this landscape type include:

- *the importance of encouraging the continued maintenance and management of hedges, field boundary trees and characteristic woodland clumps*
- *the visual and landscape impacts associated with urban related infrastructure, particularly tall structures such as pylons and communications masts*
- *changes in landscape character resulting from non-agricultural land uses such as golf courses*

MANAGING LANDSCAPE CHANGE

Key characteristics

5.6.8 The key characteristics, features and qualities of this landscape type are:

.....,

- *tree cover often emphasising landform, for example concentrated on bluffs and outcrops*

Planning and management should aim to conserve the distinctive character of the Rugged Upland Farmland by resisting developments such as pylons and masts, which would weaken its rural character, and by securing the positive management of features such as field boundaries and woodlands.

Trees and woodland: sensitivities and forces for change

5.6.9 Woodland provides an important structural landscape element. As noted above, stands of beech and pine emphasise many of the rugged hillocks, contrasting with intervening pastures. The landscape would be very sensitive to the loss of these woodlands, either through direct loss, or, more likely, through under-management and neglect. Equally, an increase in woodland cover to include the currently un-wooded area would change perceptions of the landscape. There may, however, be opportunities for additional, small scale woodlands, which conform to existing patterns and which would reinforce the character of the landscape.

Trees and woodland: planning and management guidelines

5.6.10 Guidelines for the Rugged Upland Farmland include:

- *the emphasis in this landscape type should be placed upon securing the appropriate management of existing small woodlands, particularly where they emphasise the natural topography and thereby contribute to landscape character*
- *this landscape type has the potential to accommodate some additional woodland planting provided that this is of a relatively small scale, is correctly sited (particularly in relation to hillocks and outcrops) and reflects local patterns of species, particularly the occurrence of Scots pine in higher areas and beech in lower areas*

.....

E3.3.2 Visibility

Despite the site covering almost 200 Ha, the site is not particularly visible from surrounding areas. The main areas of visibility from outwith the site are on the small scale from West Glen road near Whinney Hill and from Gallahill Road. There is a viewpoint from within the site located to the North east with spectacular views out to the north-west across the River Clyde out towards the Argyll Hills. This view was protected by judicious species choice and design, planting on lower sections only. From this view point good views south of the site itself can be had at the medium scale.

E3.3.3 Neighbouring land use

The site is predominantly bounded by farmland north, east and west with some private residential housing to the south.

E3.3.4 Utilities

Map E3f - Utilities shows the extent of the various utility infrastructures detailed throughout the site.

E3.4 Biodiversity

E3.4.1 Priority Habitat Types & Important Species

D3.4.1.1 Priority Habitat

In preparing the previous FDP a NVC habitat survey was carried out on the in August 2007 by Biodiversity Solutions. The survey concluded that the site contains areas of the following key habitats: Lowland meadows & upland hay meadows (MG5), Lowland dry acid grasslands (U4), Lowland purple moor grass and rush pastures (M23 & M25) and Wet woodland (W4). A further survey was carried out in 2008 by the then FES Open Habitat Ecologist, Jeff Waddell, and a report produced which included the area of Lowland Fen priority habitat.

D3.4.1.2 Important Species

Most of the plant communities found during the NVC survey were species poor expect for the slightly enriched basin of the Dargavel Burn and the SSSI. Locally rare species identified included Whorled Caraway (*Carum verticillatum)* and Tufted loosestrife *(Lysimachia thyrsiflora)*. A walkover survey prior to the previous plan did not indicate any European Protected Species within the site.

E3.4.2 Designations

Site of Special Scientific Interest (SSSI) - The most significant designation found within the site is '**Dargavel Burn SSSI**' which is one of the best examples of active valley fen in west-central Scotland. The valley fen is a

complex mosaic of communities comprising sedge-dominated mire, wet willow woodland, wet grassland and swamp (and it supports Lesser Tussock Sedge (*Carex diandra)* and Lesser Butterfly Orchid (*Plantanthera bifolia*).

Local Nature Conservation Sites (*formerly Site of Importance for Nature Conservation (SINC)*) – Found predominantly within the site is **Knockmountain & Mire SINC** located around Knockmountain itself. This designation has been assigned to this area by the local authority for its important woodland, grassland and marsh habitat and the support they provide plant species such as Whorled Caraway (*Carum verticillatum)* and Common Wintergreen (*Pyrola minor).* To the south of the site **Whinny Hill SINC** slightly overlaps the site. This designation relates to the site because of the important grassland habitat and the support it provides plant species such as Greater Butterfly Orchid (*Platanthera chlorantha).*

E3.5 Heritage

The National Monument Record for Scotland lists Dargavel Burn, (NMRS No. NS37SE 17), "*ruinous homestead overlooking Dargavel Burn, just SW of plank bridge on the Right of Way from Kilmacolm to Langbank*" located at OS Grid Ref: NS 365 713. There are no plans for any planting or ground disturbance at or near this monument. A desk based archaeological analysis of the site was undertaken by Rebecca Shaw archaeologist in 2008 with a field survey also carried out in 2015 by AOC Archaeology Group. Our Environment Forester has also recorded some heritage features. All features from the various surveys have been recorded in our Heritage GIS Database.

E3.6 Community & Recreation

E3.6.1 Community

The community of Kilmacolm is within walking distance of the site and local primary school groups have visited the site to walk the Right of Way. Some of the communities within Port Glasgow such as Slaemuir, Park Farm and Bardrainney are within relatively close walking distance to the site. A local school uses the site on a fairly regular basis for Duke of Edinburgh and Port Glasgow High started using the site in 2016 for the same purpose. In upgrading the access to Knockmountain and by maintaining and enhancing the Langbank to Kilmacolm Right of Way Forest Enterprise Scotland has opened this diverse habitat up to people as an educational resource for local communities.

Unfortunately there has also been some anti-social behaviour on site, in recent years the former farmhouse and the storehouse used by the for the biomass

business have been raised to the ground. We have also had off road vehicles present on site.

In order to promote the site the local Community Ranger has attended the Kilmacolm Show and various contacts have been established with local regular visitors.

E3.6.2 Recreation

The main demand for recreation on the site comes from walkers and horse riders. There is a Right of Way that runs through the site, this is well used by walkers but horse riders have problems accessing part of it due to the presence of a narrow Boardwalk crossing Dargavel Burn.
As part of the upgrade of the Langbank to Kilmacolm Right of Way a new boardwalk was installed. The boardwalk was upgraded in 2015 with the application of non-slip decking strips to allow safe access all year round.

A small boardwalk was installed crossing the wooded area of the Dargavel Burn SSSI to allow greater access to the woodland giving increased route options for visitors. The boardwalk was upgraded in 2015 with the application of non-slip decking strips to allow safe access all year round.

A number of seats were installed along the route of the Langbank to Kilmacolm Right of Way, including a picnic bench at a key viewpoint. These seats not only allow better access for people with mobility issues by providing rest stops but also provide visitors with destinations to stop and enjoy the beauty of the woodland and its surrounding location.

E4.0 Analysis and Concept

The implementation of the previous plan's proposals to establish '*commercial conifer crop whilst being sensitive to landscape issues and view points*', '*native woodland south of the SSSI*', '*broadleaves for commercial production*' and to '*manage the SSSI as per the agreed management plan with SNH'* is delivering the vision set out in the previous concept. As such this plan does not propose any significant changes to the previous concept other than to bring into management the small area of conifer shelter belts to the north-west as these are succumbing to windthrow and to establish several new small areas of tree cover within the previous planting plan where excessive areas of open space would be better utilised by supplementary planting whilst remaining consistent to the original concept to retain appropriate buffers for the Dargavel Burn SSSI and the utility wayleaves within the site.

E5.0 Management Proposals

E5.1 Woodland management

The proposals for this site have been produced based on sound silvicultural and environmental principles and follow the requirements, guidelines and recommendations set out within the latest versions of the UK Forestry Standard and the UK Woodland Assurance Scheme, FC Bulletin 124 Ecological Site Classification for Forestry and FC Bulletin 62 Silviculture of Broadleaved Woodland, FC Bulletin 115 Alternative Silvicultural Systems and the current FC edition of Forest and Water Guidelines (see **Appendix II – Management Table**, **Maps E5c – Management** & **E5g Visitor Zoning**).

E5.1.1 Woodland Creation

Since the planting and establishment of the areas proposed in the previous FDP the district has generally considered that we were overly conservative in terms of the area we planted and left a surplus of potentially plantable ground as open. Much of what was left unplanted was for good reason such as habitat and hydrology protection however there remains opportunity to expand on the previous new woodland creation taking advantage of open ground within wayleaves and next to paths using low growing species, utilise patches of better soils to the north of the site and plant more of the ground closer to the SSSI hydrological buffers (see **Map E5a – New Planting**). Table E4 below along with Map E5a details the areas of proposed new woodland creation. Tom Nisbett the Hydrologist at Forest Research has confirmed that the areas of new planting will have a negligible effect on the hydrology of Dargavel Burn SSSI with any reduction in run off being less than 1%.

Table E4 – New planting details

Map ref	**Woodland type**	**Species**	**Area** (ha)	**Spacing** (m)	**Density** (Stems/Ha)
1	Low growing shrub	Dog rose 40%; Guelder rose 30%; Blackthorn 30%	5.7	3.0 x 3.0	1100
2	Unproductive MB	GWL 40%; CAR 30%; PBI 30%	1.4	3.0 x 3.0	1100
3	Unproductive MB	CAR 30%; POK 30%; ROW 20%; HAZ 20%	3.5	3.0 x 3.0	1100
4	Unproductive	ROW 30%;	1.3	3.0 x 3.0	1100

	MB	POK 30%; HAW 20%; HAZ 20%			
		Total	**11.9**		

E5.1.2 Clear-felling

It is the intention to manage the productive conifer component of the site on a clearfell system basis however the majority of the conifer on site will not be due for felling until the 2050's. The previous plan looked to retain the small area of mature shelterbelts to provide some shelter in the short term however due to the shallow nature of the soils these areas are beginning to succumb to windthrow and it is therefore the intention to fell these as soon as possible (see **Table E5** below and **Map E5b – Felling**).

Table E5 – Felling details

SubCmpt	Species	Area (ha)	Estimated volume (m^3)
2500i	SS	1.4	571
	LP	1.4	121
	NS	0.4	120
	Windblow LP	0.4	79
2500u	SS	0.4	117
	SP	0.3	33
	Total	**4.3**	**1041**

E5.1.3 Thinning

Due to the shallow nature of the soils across much of the site, the relatively high level of exposure and proximity to the sea it is not the intention to thin the productive conifers as the risk of future windthrow would be too great. The productive broadleaves will be thinned at appropriate intervals to allow the crop to put on volume and increase future stand stability. No thinning is proposed during the life of this plan.

E5.1.4 Silviculture

As previously explained the site is not ideal to be managed using alternative to clearfell (ATC) methods such as LISS and it would not be appropriate to manage the conifer in this way with evidence of ~40 year old stands succumbing to windthrow however, the mature broadleaves in and around the site appear windfirm suggesting that it could be appropriate to manage the recently planted broadleaved component in this way. A decision on whether LISS management will be employed and in what form will be taken in a future plan. With regards to the older broadleaved woodland these areas will have minimal management intervention other than if any trees become dangerous, where they will be felled (see **Map E5d – Silvicultural Systems**).

E5.2 Future habitats and species

In general the current make up and structure of the site will not alter a great deal not only throughout the life of this plan but throughout the rotation lengths of the species found within the wood. The exception to this is the reduction in mature conifer by removing the shelterbelts to be replaced by native broadleaves with an enhancement of the woodland area through further new planting also with native broadleaves (see **Map E5e – Future Habitat & Species**). The various categories of habitat found within the site are described in more detail below.

Productive Conifer Areas – The conifer which is predominantly Sitka spruce (*Picea sitchensis*) but also has a small component of alternative species such as Western red cedar (*Thuja plicata*) and Japanese red cedar (*Cryptomeria japonica*) at the end of their rotations will likely be restocked like for like however it may be suitable to add a component of suitable broadleaves such as Aspen or Alder to diversify the structure going forward.

To replace the proportion of woodland lost in the proposed felling of the conifer shelter belts it is proposed that new compensatory areas are used for the restocking as the soil the shelterbelts were planted on are too shallow and generally unsuitable. The 4.3 Ha lost in the felling will be compensated for over 2 distinct areas productive conifer and unproductive broadleaf. **Table E6** below provides the details of the 0.9 Ha of productive conifer compensatory restocking.

Table E6 – Compensatory Productive Conifer Restock

Map ref	Species	Area (ha)	Spacing (m)	Density (Stems/Ha)
5	SS	0.9	1.9 x 1.9	2700

Productive Broadleaf Areas – The areas planted with sycamore and birch at higher density spacing are being managed to develop trees capable of producing high quality timber. Tending operations have been carried out on the sycamore to encourage single leader forming and reduce forking with further future tending planned. These crops are hoped to be managed under LISS utilising natural regeneration or enrichment planting to maintain a similar future species mix with a more diverse structure.

Unproductive Areas – The species mix of the predominantly native broadleaf areas should remain generally similar with minimal management intervention however where LISS management is appropriate the age structure would be expected to be altered with the creation of gaps to encourage natural

regeneration. The Dargavel Burn SSSI will be managed in accordance with the management plan agreed between FCS and SNH.

As explained previously **Table E7** below provides the details of the 3.4 Ha of unproductive broadleaf compensatory restocking.

Table E7 – Compensatory Unproductive Broadleaf Restock

Map ref	Species	Area (ha)	Spacing (m)	Density (Stems/Ha)
6	GWL 40%; CAR 30%; PBI 30%	2.4	3.0 x 3.0	1100
7	ASP 40%; CAR 30%; POK 30%	0.6	3.0 x 3.0	1100
8	ASP 40% ROW 30%; HAZ 30%	0.4	3.0 x 3.0	1100
	Total	**3.4**		

In addition to the planting of new areas of broadleaf both as new woodland creation and compensatory restocking the district proposes to enrich various suitable canopy gaps within Knockmountain Wood to the north of the site enhance the biodiversity of this area. **Table E8** below provides the details of the broadleaf woodland enrichment.

Table E8 – Broadleaf Woodland Enrichment

Map ref	Species	Area (ha)	Spacing (m)	Density (Stems/Ha)
9	GWL 30%; CAR 30%; PBI 30% POK 10%	5.3	3.0 x 3.0	1100

Low Growing Shrubs - For health and safety reasons, the district didn't plant any trees within 30m of the way-leaves for the power lines on the site however it would be possible to supplement that planting with judiciously located patches of low growing shrubs within 12m of the way-leaves. There are opportunities for further small patches of low growing shrubs to be located elsewhere within the site, species such as guelder rose, dog rose & blackthorn would not grow to significant heights to impact on the way-leaves and would enhance the biodiversity of the site and its visual attractiveness. It remains the case that natural regeneration up to 100 stems/Ha of trees species within the way-leave will be tolerated, once beyond this level active management will be carried out.

Riparian open space - To protect the integrity of Dargavel Burn SSSI, recommendations made within 'Knockmountain Hydrology Report' relating to sterile buffers around the SSSI and associated springs will be adhered to. Any natural regeneration within these areas will be managed appropriately. Levels of regeneration up to 100 stems/Ha will be tolerated, once beyond this level active management will be carried out.

Priority habitat open space – The key habitat areas will remain predominantly unplanted being allowed to develop through natural succession to their ecologically most suitable high community with only small patches of the Lowland purple moor grass and rush pastures habitat to the north of the site around Knockmountain being supplemented with diffuse low density native broadleaves through compensatory restocking and new planting where the soils are less shallow or less wet. Levels of regeneration out with these patches of up to 100 stems/Ha will be tolerated, once beyond this level active management will be carried out.

E5.3 Biodiversity

E5.3.1 Priority Habitat Types & Important Species

There are a number of opportunities to enhance the local biodiversity and the following table summarises these in terms of the Renfrewshire & Inverclyde Local Biodiversity Action Plan.

Table E4 - Opportunities to enhance the local biodiversity

Category	Notable Habitat or Species	Action
LBAP Habitat – Mires	Areas of Mire / Bog on site	• Areas of important mire left open and free from planting
LBAP Habitat – Unimproved Grasslands	Some areas of unimproved / semi-Improved grassland on site	• Areas of important grassland left open and free from planting
LBAP Habitat – Standing Open water	Ponds on site	• Areas of standing water will be protected from any adverse effects of tree planting
LBAP Habitat – Broadleaved & Mixed Woodland	Woodland & scrub on site	• This habitat will be expanded through our proposals for tree planting • LEPO at Knockmountain Wood will be managed and enhanced with enrichment planting.

E5.3.2 Designations

Dargavel Burn SSSI – The district will continue its programme of annual hand clearance of tree regeneration and monkey flower growth on the fen to protect and enhance this area.

The Knockmountain & Mire & Whinny Hill SINC's – The district's continued management and actions such as those listed in the previous sections will protect and enhance these areas.

E5.3.3 Deadwood

It is the aim to utilise natural processes 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.

It is the district policy to contribute around 20m^3/ha of deadwood averaged across the whole woodland area in each forest block. This aspiration is dependent on the site type and long term objectives. At Knockmountain the vast majority of the site's deadwood potential has been estimated as low and as such the following SLFD policy approach should be adopted:

- Retain veterans, standing & fallen dead stems and some stumps.
- Harvest windblow only when it is economic or required to make the site safe.
- Leave stems of no commercial value to die through shading.
- If advised, create deadwood stacks and small retentions of live trees and shrubs, to a minimum of 3% of total stem volume.

This approach should be weighed against the health and safety implications in regard to priority visitor zoning areas detailed within the FC Practice Guide Managing Deadwood in Forests & Woodlands and appropriate steps should be taken to balance the approach above with public safety.

E5.3.4 Wildlife management

Knockmountain had a large perimeter fence erected prior to the 2009 new planting. The fence is often breached due to natural incursions and also poachers. There is however an effective deer control permission syndicate active on site. The deer population is kept at a very low level due to the frequency of visits done by the syndicate. Rabbits are also present on site and controlled accordingly. Any new planting should establish without heavy browsing although rabbit netting may be necessary. Sheep and cattle have also breached sections of the boundary stock fence to the north and south in recent years and this will be considered when looking at future areas of new planting out-with the current perimeter fence.

E5.4 Heritage

The proposed management operations described in sections E5.1 & E5.2 are located away from them most significant heritage features however they, and

any other future operations, will nonetheless be conducted in accordance with the UK Forestry Standard Guidelines on Forests and the Historic Environment.

E5.5 Community & Recreation

The district will continue to maintain and develop relationships with the local community and user groups to promote the site and the organisation. To support this, the district will explore creating a website for the site to promote educational and recreational activities within it.

E5.6 Access

E5.6.1 Visitor

The forest district wishes to provide other access points to the site to allow full access for the horse riders. We have no plans at the moment to provide car parking but we may reassess this situation in the coming years. If a need for car parking becomes apparent we will consult the local authority, as planning permission is likely to be required.

E5.6.2 Management

An extension to the existing forest road will be necessary to provide suitable future access for timber extraction and haulage. Such access would likely only be necessary toward the end of the rotation of the conifers planted in 2009. An extension east from the log yard will be required to reduce long extraction distances across wet ground which would be detrimental to the SSSI and the Right of Way; the proposed road extension would cover a distance of approx. 740m. An upgrade of the recreation path south from the log yard will also be necessary for timber uplift from the felling of the conifer stand to the south and would be beneficial for operational access for thinnings of the broadleaf crops should we want to extract their resultant arisings; the proposed track upgrade would cover a distance of approx. 660m. In the short term, to facilitate the felling of the shelterbelts, the existing forest road may require some upgrading to fill pot holes etc. and may need a small spur added to allow timber traffic more turning options (see **Map E5f – Future Access**).

E5.7 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.