

Kilpatrick Hills Forest Design Plan 2014-2024

Scottish Lowlands Forest District

Kilpatrick Hills

Forest Design Plan

Approval date: ***

Plan Reference No: ****

Plan Approval Date: *****

Plan Expiry Date: *****

Kilpatrick Hills Forest Design Plan 2014-2024

CSM 6 Appendix 1b

FOREST ENTERPRISE - Application for Forest Design Plan Approvals in Scotland

Forest Enterprise - Property

Forest District:	Scottish Lowlands
Woodland or property name:	Kilpatrick Hills
Nearest town, village or locality:	Old Kilpatrick
OS Grid reference:	NS47097748
Local Authority district/unitary Authority:	West & East Dunbartonshire, Stirling

Areas for approval

	Conifer	Broadleaf
Clear felling	1191.2	-
Selective felling	-	-
Restocking	712.0	
New planting (complete appendix 4)	400.7	

1. I apply for Forest Design Plan approval for the property described above and in the enclosed Forest Design Plan.

~~2. * I apply for an opinion under the terms of the Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 for afforestation*/deforestation*/ roads*/ quarries* as detailed in my application.~~

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

8/1/2014

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 permissions necessary for the implementation of the approved Plan.

Signed Signed
Forest District Manager Conservator

District Conservancy

Kilpatrick Hills Forest Design Plan 2014-2024

Date Date of Approval.....

Date approval ends:.....

CSM 6 Appendix 4

FOREST ENTERPRISE - Application for Approval of Woodland Creation

1. Forest Enterprise – Property

Forest District:	Scottish Lowlands
Woodland or property name:	Kilpatrick Hills
Nearest town, village or locality:	Old Kilpatrick
OS Grid reference:	NS47097748
Local Authority district/unitary	West & East Dunbartonshire, Stirling

2. Proposed areas to nearest tenth of a hectare

New Planting	210.3
Natural Colonisation	-
Open Ground	190.4
Total	400.7

3. Special areas and protected land

Designation	Area Name or Number	Comments
SSSI - Biological	Dumbarton Muir – Lily	No planting within 100m buffer
SSSI - Geological	Loch Humphrey Burn	No planting within SSSI
SSSI - Geological	Glenarbuck	No planting within SSSI

4. Proposal details of woodland creation

Area Name or number	Gross Area (Ha)	P Yr	Spp	Area (Ha)	Open Ground (Ha)	Comments
Productive conifers	12.5	2016	SS/LP	10.6	1.9	
Productive conifers	9.4	2016	DF/RSQ/ WRC			
Amenity conifers	1.76	2016	MC	0.2	1.6	Kilpatrick Braes
Productive broadleaves	18.2	2016	OK/ASP/ WCH	15.4	2.7	
Productive broadleaves	3.2	2016	NOM	2.7	0.5	
W4 Native Woodland	49.5	2016	MB	17.4	32.1	
W4/7 Native	156.2	2016	MB	57.2	98.9	

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Woodland						
W4/17 Native Woodland	33.9	2016	MB	22.7	11.2	
W4/19 Native Woodland	4.5	2016	MB	1.8	2.7	
W7 Native Woodland	18.1	2016	MB	12.5	5.7	
W7/11 Native Woodland	12.2	2016	MB	8.5	3.7	
W7/17 Native Woodland	6.7	2016	MB	4.7	2.0	
W9 Native Woodland	12.8	2016	MB	12.0	0.8	
W11 Native Woodland	26.9	2016	MB	23.2	3.7	
W11 + local amenity species	8.7	2016	MB	3.5	5.3	Kilpatrick Braes, including e.g. BE, HBM
W4/7	9.7	2017	MB	3.1	6.6	
W4	2.8	2019	MB	1.1	1.7	
W4	10.6	2020	MB	4.2	6.4	
W4	1.5	2022	MB	0.6	0.9	
W7	0.8	2022	MB	0.6	0.2	
W4	0.8	2023	MB	0.3	0.5	
	400.7			210.3	190.4	

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 Signed
 Forest District Manager Conservator

District Conservancy

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

Date approval ends:.....

Kilpatrick Hills Forest Design Plan 2014-2024

Mr Chris Little
Forestry Commission Scotland
Five Sisters House
Five Sisters Business Park
West Calder
EH55 8PN

28th March 2014

Central Scotland
Conservancy
Bothwell House
Hamilton Business Park
Caird Park
Hamilton
ML3 0QA

Dear Mr Little,

Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 Kilpatrick Hills Forest Enterprise Design Plan

I refer to your application for our Opinion as to whether the work you are proposing within the Kilpatrick Hills Forest Enterprise Design Plan will require our consent.

I can confirm that the work you propose will **not** require our consent.

In reaching this decision the following assumptions have been made:

- The requirements contained within the Guidance about Woodland Creation on Agricultural Land document has been followed, and in line with this guidance you have informed and consulted with those managing neighbouring land and neighbours of your intentions (separately from public consultations).
- No method of ploughing or continuous mounding will be used as a ground preparation technique in areas of sensitive landscape value (principally the Gavinburn and Kilpatrick Braes area).
- The UK Forest and Water Guidelines and Controlled Activities Regulations will be fully complied with and at the operational planning stage you will liaise with SEPA and Scottish Water to produce a pollution control plan with regard to operations being carried out on open ground and in the existing forest.
- All archaeological sites identified in the archaeological surveys will be accommodated in the design through the use of suitable buffers.
- The detailed Forest Enterprise Design plan will meet the requirements of the Scottish Government policy on the control of woodland removal and align with the current Forestry Commission Scotland guidance relating to peatland habitats

This decision is valid for only five years from the date of this letter and shall cease to have effect beyond 28/03/2019. If you propose to carry out any of the work in your application beyond 28/03/2019 or propose any changes to the project details you must inform us beforehand and we will assess again whether you need our consent or not.

Yours sincerely
Tom Hobbs
Operations Manager

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Version History

Version	Date	Comments
1.0		Initial draft
1.1	10/06/2014	Revised following internal review
1.1.1	21/07/2014	Revised following review with Woodland Officer
1.1.2	October 2014	Revised following feedback from Statutory Consultees and Conservancy

Summary of Proposals

Subsequent to the recent acquisition of the central areas of open land within the Kilpatrick Hills, which links the existing FC-owned forest blocks a new Forest Design Plan has been produced to reflect the consolidation of land ownership.

The site comprises approximately 3,500 ha, and is currently split fairly evenly between (primarily conifer) forest and open ground. The design envisages that the overall forested area will increase only slightly, with additional new planting being counterbalanced by the removal of woodland on some areas of blanket bog and upland heath.

Overall species diversity will increase significantly, with the introduction of a broader range of conifers, productive broadleaves and a wide range of native woodland types. This increased biodiversity will benefit the broad range of flora and fauna found across the site.

Recreational usage of the Kilpatrick Hills has increased substantially over the last few years, and the proposals have been carefully designed to accommodate likely continued increases in future.

1.0 Introduction

1.1 Setting and context

The Kilpatrick Hills landholding, located northwest of Glasgow, covers approximately 3,500 ha and chiefly comprises existing forests to the east, north and west, with a large central area of moorland and blanket bog and some small areas of agricultural land on the southern slopes above the Clyde estuary.

The majority of the site sits within West Dunbartonshire Council, although some sections of the eastern edge of the site fall within Stirling Council (approx. 170 ha) and East Dunbartonshire Council (approx. 55 ha).

The current land matrix is as follows:

Table 1.1 - Current land usage

Land Type	Area (ha)	%
Open ground	1,737	49.7
Existing woodland	1,627	46.6
Agriculture	86	2.5
Open water	44	1.3
	3,494	100

See **Map 1 - Location**

1.2 History of the site

The original Forestry Commission holding comprised Auchentorlie forest to the west, Knockupple and Merkins forests to the north and Auchineden forest to the east. The land at Cochno Hill was acquired in 2007, and subsequently the central area, extending from Dumbarton Muir down to the A82 at Gavinburn, was acquired in 2010/11. Most recently, the small plantation block north of Merkins at Wester Cameron was acquired in late 2013.

The majority of the forests were intensively planted over a short period, starting in the north with Merkins (1967-70) and Knockupple (1971), Auchentorlie was planted 1973-4 (with some later filling-in in the early 1980's), and finally Auchineden (1975-79). Wester Cameron was planted by the previous landowner in the late 1980's. The area to the northeast of Greenside reservoir was planted under a WGS grant scheme in 1998, and more recently the southern section of Cochno Hill was planted in 2010.

2.0 Analysis of previous plans

The area described by the plan is covered in part by two previous Forest Design Plans. One plan, covering the four (primarily coniferous) forest blocks of Auchentorlie, Auchineden, Knockupple & Merkins, was approved in May 2006, and expires May 2016. The second plan, covering native woodland creation at Cochno Hill, was approved in March 2009, and will expire in March 2019.

Objective	Proposed Management Actions	Progress to date 1 – Little/No progress 2 - Some progress 3 – Progress as per FDP
Maintain a supply of timber Increase age & species diversity	Programme of felling/restocking to restructure existing even-age stands to a much wider variety of age classes.	1 – Ongoing access issues have delayed start of felling in Merkins, Knockupple & Auchentorlie, although felling in Auchineden has been partially progressed due to better access. As a result little opportunity yet to produce timber at the envisaged volumes or begin diversification of woodland. Creation of native woodland at Cochno Hill has started to diversify age & species range across the site overall.
Protect water quality	Keep new planting and proposed roads suitable distance back from watercourses & reservoirs	2 – Restocked areas in Auchineden adjacent to Auchingree Burn & Kilmannan Reservoir have pulled conifer planting back from water and introduced broadleaved buffer zones.
Develop Forest Habitat Network (FHN)	Encourage development of FHN primarily by planting broadleaves along watercourses and around crags	2 – Minimal felling /restocking to date means there has been little opportunity to develop habitat networks in the main conifer blocks. Planting at Cochno Hill should improve FHN potential up Loch Humphrey burn.
Improve recreation opportunities	Development of forest road infrastructure to provide better access into the forests. Improve amenity value of woodland around lochs/reservoirs.	2 – Some development of paths/roads (especially at the south end of the site) has increased access and helped link Auchentorlie with Kilpatrick Braes.
Improve external & internal	Restructure plantations to	1 – Minimal felling /restocking to date

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views	remove current stark edges. Diversify species to improve visual impact through extensive use of Scots pine, Birch & Larch	has resulted in little opportunity to enhance landscape. Advent of DNB & P. ramorum means that extensive pine/larch planting is not currently feasible. Native woodland planting at Cochno Hill will, over time, help reduce landscape impact of high voltage power lines.
Preserve landscape & historic features	Keep planting back from all identified sites of historic interest.	2 – Planting kept back from range of (unscheduled) sites at Cochno Hill, identified during archaeology survey.
Improve quality of blanket bogs and enhance other priority habitats	Remove intensive grazing from priority open habitats	2 - Removal of intensive grazing from entire central area will allow recovery of bog habitats over time.
Develop improved habitat for protected species (e.g. Black grouse)	Removal of intensive grazing on blanket bog to encourage development of suitable vegetation (e.g. Cotton grass). Development of areas of edge woodland to provide feed/shelter	2 – Planting of new native woodland at Cochno Hill includes areas of edge habitat. Removal of intensive grazing from entire central area will allow recovery of bog habitats over time.

Table 2 – Summary of previously planned operations, 2006-14

Block	Planned felling area (ha)	Actual felling area (ha)	%
Auchineden	179.2	165.9	93
Auchentorlie	75.6	12.6	17
Merkins	251.2	0	0
Total	506	178.5	35.3

3.0 Background information

3.1 Physical site factors

3.1.1 Geology, Soils and Landform

A fault divides the hills into two geologically distinct areas, running roughly NE-SW from the SE corner of Merkins to the SW corner of Knockupple. To the north of the fault line the underlying bedrock is sandstone, primarily overlain with peat and some glacial till. Volcanic basalt dominates south of the fault line, primarily overlain with pockets of glacial till and some areas of peat.

Soils are generally poorer toward the north (primarily bog and surface water gleys), intermediate on the central plateau (surface water gleys and ironpans) and better towards the south (ironpans and brown earths).

Soil Moisture Regime provides an indication of the moisture and oxygen availability within the soil, both of which are essential for root growth. Some Moist areas are present, at both the southern and northern fringes of the site, but the majority of the site is classified as 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). The majority of the site has soil of Poor to Very Poor nutrient status, although the southern edge is generally better, with Medium nutrient status on the lower slopes.

See **Maps 3.1.1 - Soil Groups, 3.1.1 - Peat Depth, 3.1.1 - Soil Moisture Regime and 3.1.1 - Soil Nutrient Regime**

The elevation of the site varies considerably, broadly increasing from 20m above ordnance datum (AOD) at the southern edge to 400m on the top of Duncolm then gradually falling back to 150m at the north tip.

3.1.2 Climate

The majority of the site falls within the Cool Wet climatic zone, with some of the lower lying areas at the northern and southern edges falling within the Warm Wet/Moist zones. The accumulated temperature (day-degrees above 5 °C, an indication of growing season length) varies between 937 and 1455 (1200 representing the dividing point between Cool & Warm). Moisture Deficit (which provides an indication of the dryness of the growing season)

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varies between 38 & 133 (90 representing the dividing point between Wet & Moist).

See **Map 3.1.2 - Climate**

3.1.3 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 scores on the site vary between 10 and 20, with higher scores largely corresponding to increased elevation. The most sheltered areas lie on the east edge of Merkins where the ground runs down to the Carnock Burn, and on the south edge of the site where the slopes run down to the A82.

See **Map 3.1.3 - DAMS**

3.1.4 Hydrology

A series of small burns radiate outward from the central plateau, ultimately joining up with the larger rivers that surround the hills (Endrick Water to the north, Allander Water to the east, River Leven to the west and the Clyde to the south)

Table 3.1.4a – Watercourses

Watercourse	Tributaries	Main Stem
Duntocher Burn	Black Burn Loch Humphrey Burn Jaw Burn	Clyde
Gallangad Burn	Knockupple Burn	Endrick Water
Carnock Burn	Little Saughen Brae Burn Meikle Saughen Brae Burn Burn Crook Glen of the House Burn Rough Burn Carling Burn	Endrick Water (via Blane Water)
Auldmurroch Burn	Auchingree Burn	Allander Water

In addition to a number of natural lochans, several of the burns have been dammed in their upper stages to form reservoirs, broadly located in an arc towards the south of the site.

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Table 3.1.4b – Water bodies

On FC land	Enclosed by FC land	Adjacent to FC land
Loch Humphrey	Greenland Reservoirs #1 & 2	Greenland Reservoir #3
Fyn Loch	Greenside Reservoir	Black Linn Reservoir
Lily Loch	Cochno Loch	Jaw Reservoir
	Kilmannan Reservoir	Black Loch
		Burncrooks Reservoir

3.2 The existing forest

3.2.1 Age structure, species and yield class

Currently, the majority (over 70%) of the existing woodland consists of even aged conifers, with occasional small pockets of broadleaves. The exception is the recent planting at Cochno Hill, which is a primarily broadleaved native woodland.

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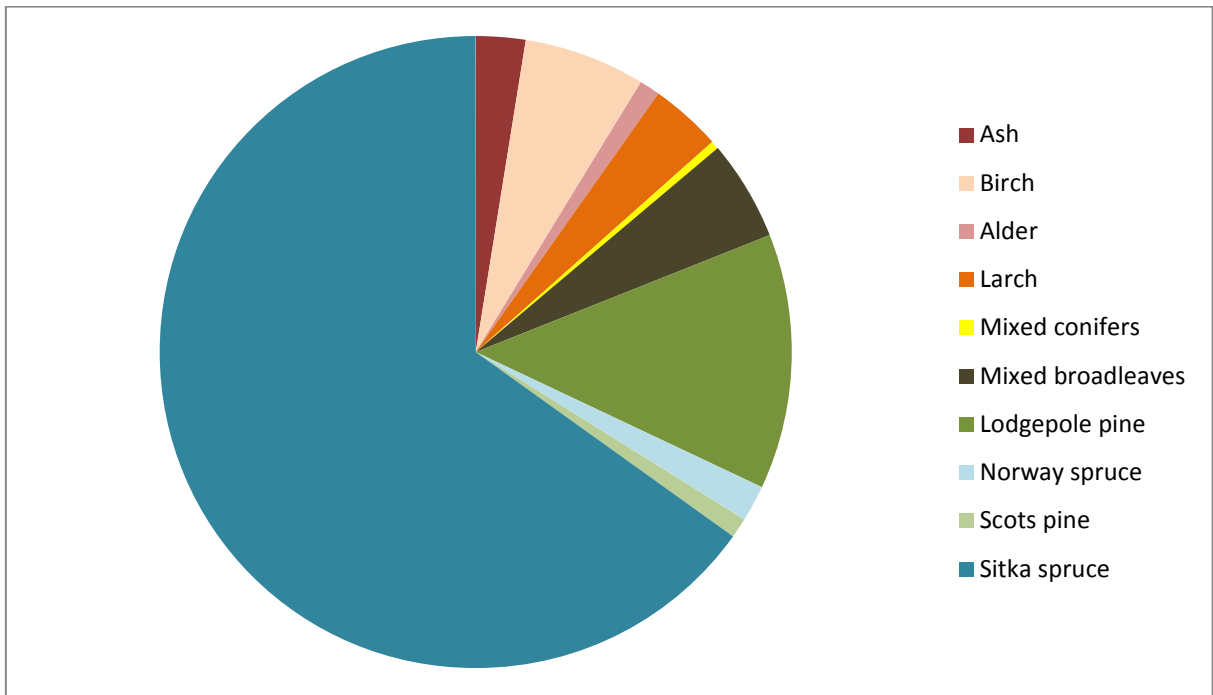
Table 3.2.1 – Current species breakdown

	Area (ha)
Sitka spruce	924.0
Lodgepole pine	191.2
Birch	91.3
Mixed broadleaves	57.6
Ash	37.4
Japanese larch	30.1
Norway spruce	25.2
Alder	15.6
Scots pine	15.0
Hybrid larch	9.2
Oak	8.9
Hazel	8.7
Mixed conifers	3.4
Noble fir	2.4
European larch	2.0
Nothofagus	0.5
Western hemlock	0.3
Grand fir	0.1
Riparian areas	97.5
Windblow ¹	54.1
Unplantable ground	31.9
Felled awaiting restock	20.7
Quarries	0.5
Open	1866.9
	3494.5

¹ Actual windblown area is likely to be higher, as not all areas are fully recorded due to difficulty in accessing areas to fully measure the extent of damage, recent storms etc.

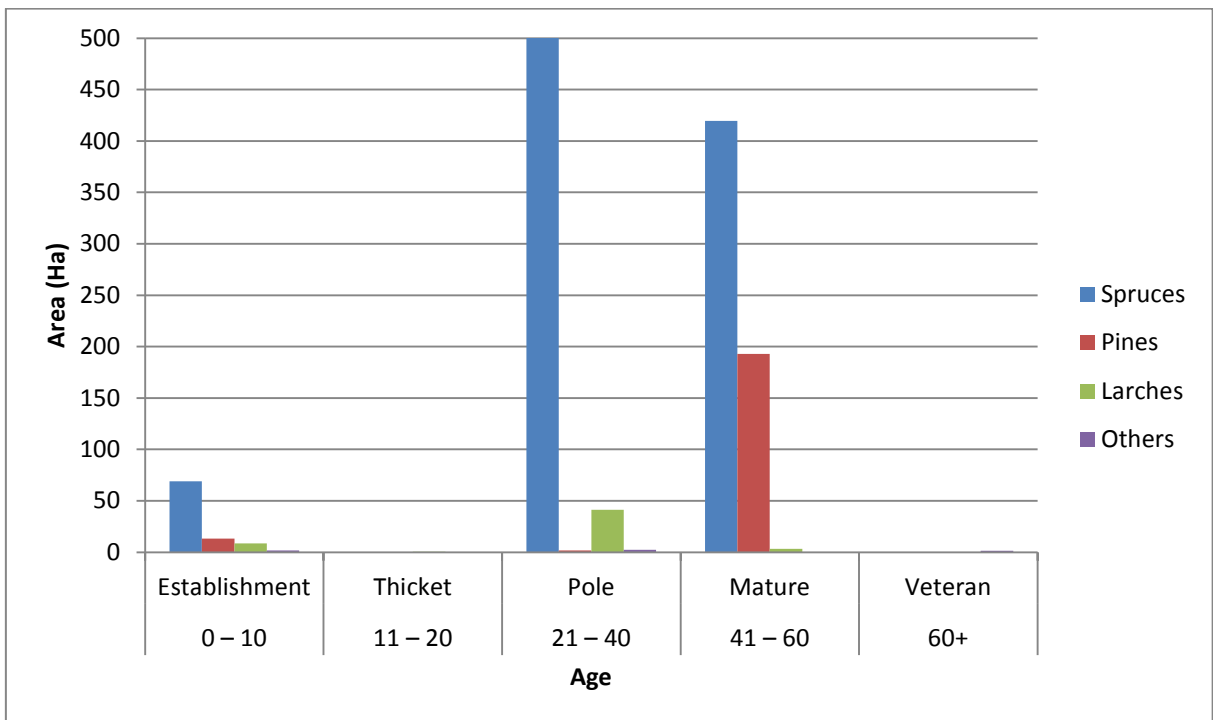
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Figure 3.2.1a – Current species breakdown



Due to the original forest blocks being planted over a short period, there is relatively little age class diversity within the current forest.

Figure 3.2.1b – Current productive crop age structure



Yield Class varies widely across the site due to its sheer scale, with associated variation in soil types, geology, climate, exposure and species. It is also likely that much of the existing conifer crop was fertilised during establishment.

See **Maps 3.2.1a - Species, 3.2.1b - Age and 3.2.1c - Yield Class**

3.2.2 Access

Operational access across the site continues to be an issue. At present only Auchentorlie and Auchineden have access routes suitable for operational machinery, and in both cases the current internal forest road network does not allow full access to the block. Merkins, Cochno Hill and Gavinburn have access suitable for light vehicles only, and there is currently no vehicular access into Knockupple.

Existing FC roads within the Kilpatrick Hills total approx. 17,500m

3.2.3 LISS potential

The potential for Low Impact Silvicultural Systems (LISS) overall is limited due to the advanced age of the existing crop and relatively high wind throw categories. However, there is potential for LISS in the future in some areas, especially at lower elevations - most obviously on the south slopes at Gavinburn. This would take the form of permanent woodland which was worked as a continuous cover forestry system (CCF).

3.2.4 Pathogens

3.2.4.1 Dothistroma Needle Blight (DNB)

DNB also known as Red Band Needle Blight because of the colourful symptoms it shows on pine, causes premature needle defoliation, resulting in loss of yield and, in severe cases, tree death.

Recent surveys have shown outbreaks of DNB across Scottish Lowlands Forest District and within the Kilpatrick Hills infected pine trees have been found in Merkins.

3.2.4.2 *Phytophthora ramorum* (*P. ramorum*)

P. ramorum is a fungus-like pathogen of plants that is causing extensive damage and mortality to trees and other plants in parts of the United Kingdom. Larch in particular is extremely vulnerable, and high infection and mortality levels are currently causing significant issues in Galloway Forest District.

At present no cases of *P. ramorum* have been found within Scottish Lowlands Forest District, although the Kilpatrick Hills falls on the border between Zone 1 (High risk of infection) and Zone 2 (Medium risk of infection) in the FCS Action Plan for Larch in Scotland.

3.2.4.3 *Chalara fraxinea* (Ash Dieback)

Ash dieback is a serious disease of ash trees caused by a fungus, resulting in leaf loss, crown dieback and, potentially, tree death.

Chalara infection of the recently planted ash woodlands on Cochno Hill was confirmed in 2013.

3.3 Landscape and land use

The Kilpatrick Hills are a prominent and distinctive hill range, which provide a broad northern backdrop to Glasgow and its wider conurbations, at a distance appearing as a western outlier to the more extensive Campsie Fells. The Kilpatricks also separate the main metropolis from the more dramatic landscapes of the Loch Lomond and Trossachs National Park.

The hills form the backdrop to the narrowing of the Firth of Clyde east of Dumbarton. At a strategic level they reinforce the threshold between the wider Firth and the River Clyde, and also contribute to the setting of landmark features such as The Clyde, The Antonine Wall, Dumbarton Rock and Castle, the Erskine Bridge and a range of smaller settlements, including the Stirling hill foot settlements along the northern fringe of the hills.

The woodland in the Kilpatricks is relatively extensive, and this contrasts with the less wooded western Campsie Fells.

3.3.1 Landscape character and value

The Kilpatrick Hills rise steeply from the surrounding farmed valleys and the settled coast of the Firth of Clyde. The slopes rise to an elevated, undulating plateau with occasional more pronounced small hills.

The most dramatic landform feature, however, are the steeply tiered and exposed cliff faces of the tilted beds of rock, which form clear visual banding most visible from the south. They also form irregular skylines from a number of viewpoints. These rocky faces also enclose some of the more pronounced gulleys and river valleys.

The steep outer slopes of the hill group are generally farmed along the lower fringes, rising to more open ungrazed upland grassland which extends into the interior. Small lochans and larger reservoirs are scattered across the interior plateau.

On the southern slopes, there are broadleaved woodlands associated with dips and watercourses as well as naturally regenerating woodland along the upper slopes.

Elsewhere, riparian woodland is associated with more pronounced river valleys, while conifer woodlands extend from some of the most visible hilltops into the upland interior.

There is a marked transition from the settled and farmed outer fringe of the hills to the relative openness and perceived naturalness of the interior.

3.3.1.1 Landscape Character Assessment (LCA)

The Kilpatrick Hills form part of the Kilpatrick and Campsie Fells Regional Character Area within the Glasgow & Clyde Valley (LCA) published by Scottish Natural Heritage.

The Kilpatrick Hills are classified as an area of Rugged Moorland Hills, with the most salient extracts reproduced below:

Key Landscape Characteristics

- Distinctive upland character created by the combination of elevation, exposure, rugged landform, moorland vegetation and the predominant lack of modern development;
- These areas share a sense of apparent naturalness and remoteness which contrasts strongly with the farmed and developed lowland areas;
- Presence of archaeological sites on hilltops and sides.

Key Landscape Issues

- Development pressures in some areas around the fringes of the hills;
- Urban fringe issues such as vandalism and dumping in some areas;
- Visual prominence of tall structures including masts and pylons;
- The importance of encouraging the enhancement of existing coniferous plantations and the careful assessment of any proposals for additional planting;
- The need to encourage management of semi-natural woodland on lower slopes and along burn-sides;
- Recreational importance of these hills and the importance of supporting managed access;
- Management of field boundaries and pastures on surrounding slopes.

Trees and woodland: sensitivities and forces for change

This landscape type contains significant areas which have the physical potential for forestry and which may become subject to forest development interests. Should this be the case, then a number of key sensitivities will require to be addressed. Forestry expansion might ultimately prejudice the balance between open and afforested ground.

This may diminish the comparatively wild and undeveloped character of the moorland hills and constrain their amenity value for walking, riding, bird watching, etc. Forestry, if unsympathetically planned, may obscure the rugged topographic features such as basalt scarps and smaller outcrops. Heritage features such as settlement patterns, cairns and estate boundary walls may also be obscured or rendered inaccessible. Any forest developments which extended onto lower slopes from the plateaux would require very careful attention as the scarp slopes are visually prominent.

Trees and woodland: planning and management guidelines

- Encourage the management of existing coniferous plantations on the plateau areas with the aim of achieving a more natural 'fit' with topography, allowing rocky outcrops to be visible and providing more varied age and species composition;
- Expansion of these conifer plantations from the plateau areas onto more prominent hillslopes and scarps should be discouraged strongly;
- Forestry planting proposals should respect the presence of prehistoric and historic settlement and defensive sites in the hills and should retain open ground in these sensitive areas, sufficient to protect the sites and their visual context;
- Geometric conifer plantations and shelterbelts should be discouraged, particularly in prominent hillslope areas;
- There may be opportunities to encourage the regeneration or expansion of broadleaf woodland and scrub along burn-sides and in gullies, creating a closer integration of lowland woodland and the moorland landscape;
- Conservation of areas of scrub marking the transition from lowland to moorland should be encouraged.

3.3.1.2 West Dunbartonshire Local Development Plan

West Dunbartonshire Local Development Plan includes a draft Statement of Importance for Proposed Kilpatrick Hills Local Landscape Area (2013), prepared by W & E Dunbartonshire councils in conjunction with SNH. Dumbarton Muir and the surrounding area already designated by W Dunbartonshire council as an Area of Great Landscape Value (AGLV), and the proposed LLA is a local designation to "protect, enhance & encourage the enjoyment and understanding of locally important landscapes" - locally

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designated areas are intended as a complement to national important National Scenic Areas.

3.3.2 Visibility

The main external views to the site are from south of the Clyde, where the lower slopes at Gavinburn and the slopes below the power lines at Auchentorlie are both relatively prominent in the landscape. The eastern edges of Auchineden are visible on the horizon when viewed from the A809, and the viewpoint at The Whangie offers walkers views south to Auchineden and West to Merkins.

The scale and topography of the site restrict internal views to some extent, but extensive areas of the site can be viewed from the higher viewpoints; primarily at The Slacks, Cochno Hill, Berry Bank and Duncolm.

3.3.3 Neighbouring land use

Agriculture and forestry are the main land uses on the immediately adjacent properties, including Auchineden & Auchineck estates, Merkins farm and the Woodland Trust site at Lang Craigs. There is also a sizeable residential population immediately to the south at Old Kilpatrick, Duntocher & Faifley.

3.4 Biodiversity and environmental designations

3.4.1 SSSI

A number of Sites of Special Scientific Interest (SSSI) are present, and several more are situated immediately adjacent to FC boundaries. All SSSI sites on FC land are covered by SNH-approved management plans.

Table 3.4.1a – SSSI Summary (on FC ground)

Site	Interest	Area (ha)
Dumbarton Muir – Lily Loch	Biological – Raised bog	32.9
Haw Craig – Glenarbuck	Biological – Rocky slopes	2.2
Glenarbuck	Geological – Fossil rich sequence of rock layers	1.3
Loch Humphrey Burn	Geological – Fossilised plants	1.2
		37.8

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Table 3.4.1b – SSSI Summary (adjacent to FC ground)

Site	Interest	Area (ha)
Dumbarton Muir	Biological – Blanket bog	281
Aucheneck	Geological – Glacial landform (terminal moraine)	105.3
Lang Craigs	Biological – Upland habitats (tall herb ledge)	34.1
Haw Craig – Glenarbuck	Biological – Upland mixed ash woodland	16.5

See **Map 3.4.1 - SSSI Locations**

3.4.2 Priority Habitat Types

PHT's are protected under the UK Biodiversity Action Plan and FCS policy is to protect, enhance and expand these habitats where suitable. There are a broad range of open space and woodland types, a number of which are present within the Kilpatrick Hills.

FES carried out a survey of Cochno Hill in 2007/8 and commissioned a contract survey of the habitats at Auchineden and Gavinburn in April 2012 using the National Vegetation Classification (NVC). The majority of the site is open moorland dominated by Blanket bog. The most notable areas of conservation interest are:

- Blanket Bog at Dumbarton Muir.
- The FCS element of the Dumbarton Muir SSSI contains a small Upland Raised Bog adjacent to the Lily Loch, which supports two sedges restricted to mire habitats (bog-sedge *Carex limosa* and the Nationally Scarce tall bog-sedge, *C. magellanica*)
- Upland Mixed Ashwood and Upland Oakwood in the Kilpatrick Braes.

See **Map 3.4.2 - Habitat Types**

3.4.3 Ancient Woodland

Overall, there is very little woodland identified as being of ancient origin, although a number of areas lie immediately adjacent to the site (see **Map 3.4.3 - Ancient Woodland**). The southwest corner of Auchentorlie contains ~8ha of Ancient Semi Natural Woodland, and is part of the wider ancient woodland running up Auchentorlie Glen. The slopes running down to the A82 at Gavinburn also contain a small (~3ha) element of Ancient Woodland, which forms part of a wider expanse at Glenarbuck; and there is an ~17 ha

area of LEPO (Long Established of Plantation Origin) on the Kilpatrick Braes, which comprises the remnants of a much larger mixed plantation (apparent on historic OS maps). Although not formally recorded as such, McKellears Wood on the south edge of Auchentorlie also may well be LEPO, and comprises a remnant oak plantation.

More information on the background history of the native woodland on the Kilpatrick Braes can be found in a study undertaken in 2012 by the FES Native Woodland Ecologist - see **Appendix VI (i) Gavinburn Native Woodland Advisory Report**.

3.4.4 Breeding Birds

In 2012 a Breeding Bird survey was commissioned covering the newly acquired central area in order to obtain baseline information on the existing ornithological interest of the site.

A total of 52 species were recorded on site. Of these, two were Annex 1 (Osprey & Merlin), four were Schedule 1 (Osprey, Merlin, Goshawk & Greenshank), seven were Red listed, 24 were Amber listed, 20 were Green listed and one was a feral or introduced species. Green-listed species accounted for 39% of the total species count whilst Amber and Red-listed species accounted for 47% and 11% of the species count respectively.

Black Grouse lek and breed in the area. FCS monitor this population as part of a national strategy for protecting black grouse.

See **Appendix VI (ii) Gavinburn Breeding Bird Report** for more information.

3.4.5 Protected Species

3.4.5.1 Otter

All water bodies and watercourses within and immediately adjacent to the boundary of the newly acquired central area were surveyed in 2012. Evidence of otters was found at Loch Humphrey, Greenside Reservoir, Kilmannan Reservoir and Burncrooks Reservoir, and it is likely that the Loch Humphrey Burn acts as a transit route to the Forth & Clyde Canal and River Clyde.

3.4.5.2 Water vole

At present water vole are not known to be present on site, and there was no indication of their presence found during the otter survey. Suitable water vole habitat is most likely to occur in the uplands in areas where the

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average gradient is no more than 3% and where extensive, thick deposits of peat are present.

3.4.5.3 Pine marten

Pine marten range across the Kilpatrick Hills and FCS have recorded a breeding site as well as other signs of use within the woodland.

3.4.6 Deer

A deer population assessment undertaken on behalf of FCS in 2013 identified resident populations of Roe deer across the whole of the Kilpatricks and a smaller Red deer population found mainly in the north (Merkins).

Over the last 10 years, an average of 62 Roe and 4 Red have been culled each year, although cull sizes have increased significantly over the last few years, in step with the increased size of landholding, and last year 105 Roe and 9 Red were culled. Damage levels to newly planted crops at Cochno Hill have been largely within FCS objectives, although localised damage has happened due to deer and the regular incursion of sheep from neighbouring properties.

3.5 Heritage

3.5.1 Antonine Wall World Heritage Site

The Antonine Wall (a stone and turf fortification build by the Romans across what is now the central belt of Scotland) is an internationally important monument which forms part of the Frontiers of the Roman Empire World Heritage Site.

Although there are no visible remnants, the course of the Wall crosses the site at the southern edge by the A82, and an associated buffer zone covers the south facing slopes above Old Kilpatrick and Duntocher, stretching up to the ridgeline.

3.5.2 Scheduled Monuments

The Long Cairn at Gallangad Burn (on the western edge of Merkins) is the only SM on site, and is covered by a Historic Scotland-approved management plan. Although situated on neighbouring ground, the Lang Cairn at Gallangad Muir (northwest of Merkins) is close enough to the march fence that its associated buffer zone includes a small area of FC owned land.

3.5.3 Non-scheduled archaeology

A walkover survey and desk based assessment of the newly acquired central area was undertaken in 2012. A follow up report in 2013 tied in this survey with other archaeological surveys undertaken over the wider site to assess the local and regional context of the findings.

Some of the sites recorded in the surveys relate to prehistoric activity and include several hut-circles and house platforms, as well as possible cairns.

Cup and ring marked rocks are an outstanding feature of the prehistoric archaeology of the Kilpatrick Hills.

One unique feature of the area is a very unusual arrangement of land division implemented in the 1850s, known as the March Stones. These are placed across the SE facing slopes of the Slacks and represent an unusual and distinctive feature of nineteenth century land division in the area.

See **Appendix VI (iii) – Gavinburn Archaeological Survey Data Structure Report & Kilpatrick Hills + Cochno Hill North Archaeological Survey** for more information.

3.6 Recreation and Community

As part of the development process for the site, a master planning exercise was undertaken in 2013 highlighting some of the opportunities for recreation, health & wellbeing and economic development – see **Appendix VI (iv) Kilpatrick Hills & Surround Area Strategic Framework**.

3.6.1 Recreation

The area is principally used by those with a local knowledge of the landscape including ramblers and hill walkers from adjacent settlements. Routes tend to take the form of circular loops embarking from road or public transport gateways (primarily along the southern and western periphery) and taking in a part of the ridge overlooking the Clyde, and either one or a number of peaks within the central plateau.

Although yet to be constructed, a section of the long distance John Muir Trail is planned to cross the northeast of the site, entering at Burncrooks reservoir and exiting at the north tip of Merkins.

Mountain bikers have taken to using the areas around Cochno Hill and the Slacks as downhill routes, and lesser numbers make use of cross country routes which cover the open plateau.

The main reservoirs are all fished by local angling clubs.

Horse riders make some use of the site currently, particularly around Cochno Hill and the Slacks.

Some informal camping takes place, particularly in the more accessible areas to the south, and litter and other low level anti-social behaviours can be a problem.

3.6.2 Community

Dumbarton, Duntocher & Old Kilpatrick are the most immediate communities, although the hills are also visible from (and used by) the residents of Alexandria, Bearsden, Milngavie and Drymen, as well as the wider Glasgow population.

4.0 Analysis and Concept

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

Table 4a Opportunities & Constraints

Factor	Constraint	Opportunity	Initial Concept
Climate / Soils/ Elevation	<ul style="list-style-type: none"> Poor quality soils and deep peat across extensive areas of the site, particularly to the north, restricts range of suitable species. Upland elevation of large areas, in combination with estuarine location of site, increases exposure levels and windthrow risk. 	<ul style="list-style-type: none"> Better quality soils across various areas over the site, particularly to the south, increases the range of species suitable for planting. More sheltered areas on the south and north eastern edges of the site offer increased silvicultural options. 	<ul style="list-style-type: none"> Suitable choice of exposure-tolerant and/or slower growing species will reduce the risk of windthrow in the most vulnerable areas of the site. Consider use of nursing mixtures in productive areas Utilise ESC principles and future climate data when considering species suitability.
Disease	<ul style="list-style-type: none"> Site already has DNB-infected pine stands, and is in the high risk zone for developing <i>P. ramorum</i> on larch. <i>C. fraxinea</i> infected Ash at Cochno Hill, and has also been found in nearby woodlands to the south. Extensive birch dieback on WGS plantation north of Cochno Hill 		<ul style="list-style-type: none"> Avoid use of most susceptible species (Scots pine, Larch & Ash), and diversify species planted to mitigate against future risk. Use trees of suitable provenance to mitigate against susceptibility to disease.
Limited species range	<ul style="list-style-type: none"> 70% of existing woodland is Sitka spruce or Lodgepole pine 	<ul style="list-style-type: none"> Increase species diversity to improve adaptability to future pests/diseases and climate 	<ul style="list-style-type: none"> Diversify range of species used to include productive broadleaves, native woodland and alternate conifer species

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		change, and to increase biodiversity, niche timber products and visual amenity	where appropriate.
Restructuring / age diversity	<ul style="list-style-type: none"> Existing plantations have very limited range of age classes, having generally been planted over 2-3 year period. Conifers are generally exceeding critical height, and extensive windblow is already present across the site. 	<ul style="list-style-type: none"> Newly acquired central areas offer opportunity for new woodland creation Ongoing felling & restock programme is starting to diversify age range. 	<ul style="list-style-type: none"> Where possible, incorporate windfirm boundaries into coupe design, diversify age classes to reduce vulnerability and consider use of exposure-tolerant and/or slower growing species in most exposed areas. Consider longer term retention of existing stable stands to broaden age range.
Ride networks	<ul style="list-style-type: none"> Auchentorlie and Auchineden have a limited number of rides, restricting operational access for ongoing management. 	<ul style="list-style-type: none"> Good existing ride network in Merkins, which has benefited from recent clearance of spruce regen. 	<ul style="list-style-type: none"> Incorporate extensive ride network during restocking to allow more effective future management access.
Harvesting access	<ul style="list-style-type: none"> Currently no road access into Merkins or Knockupple. Some areas of existing plantations are difficult to harvest economically (more than 500m from current or planned roads). Difficult access to existing planting on steep ground & crags. 	<ul style="list-style-type: none"> Access into Auchentorlie via Thompson's quarry recently secured, and new road constructed by Scottish Power along main wayleave. Planned roads programme will improve harvesting access for much of the existing plantations. 	<ul style="list-style-type: none"> Adjust timing of felling programme to take account of road construction Keep productive crops off most remote/inaccessible areas.
Browsing	<ul style="list-style-type: none"> New planting at Cochno Hill vulnerable to browsing Localised deer population with potential to become extensive as new planting progresses. Roe widespread while Red are present primarily in the north and east of the block. 	<ul style="list-style-type: none"> Majority of existing woodland sufficiently mature to minimise impact of browsing 	<ul style="list-style-type: none"> Plan ride network and deer glades into design to allow access for deer management, particularly in areas to be stocked with species vulnerable to browsing. Stock proofing existing march fences will significantly reduce potential browsing

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	<ul style="list-style-type: none"> Livestock (sheep & cattle) accessing site in multiple locations 		<p>damage by livestock.</p> <ul style="list-style-type: none"> Take robust approach to initial deer control through focussed effort to reduce background population and help establishment during vulnerable years.
Utilities – OHP, gas, water	<ul style="list-style-type: none"> Utilities require periodic access for maintenance and may require buffer zones for safety. Main overhead power lines have a strong impact on the landscape 	<ul style="list-style-type: none"> Utilise mandatory open space to increase habitat quality. Reduce visual impact through careful planting design 	<ul style="list-style-type: none"> Careful design to allow suitable access, and utilise shrubs and lower growing trees in the vicinity of wayleaves to reduce landscape impact.
Watercourses	<ul style="list-style-type: none"> Potential impact on ease of accessibility of productive areas when harvesting. 	<ul style="list-style-type: none"> Riparian woodland planting in appropriate locations can improve water quality and link disconnected habitats. 	<ul style="list-style-type: none"> Open up watercourses in existing woodland and develop extensive riparian networks across site. Consider potential of suitable unplanted areas for use as deer glades
Lochs & reservoirs	<ul style="list-style-type: none"> Water quality paramount for reservoirs acting as operational water suppliers. Several other water bodies are maintained, although they do not currently supply water. A number of the lochs and reservoirs are fished by angling clubs 		<ul style="list-style-type: none"> Ensure adequate buffer zones are maintained, with appropriate species planted immediately adjacent to these buffers. Comply with all relevant guidelines in UK Forestry Standard – Forests & Water
Designated Areas	<ul style="list-style-type: none"> Several SSSI's are present on site and managed under agreed plans (both biological & geological interest) and several others are immediately adjacent to site. Course of Antonine Wall WHS runs through southernmost edge of the site, and associated buffer zone 	<ul style="list-style-type: none"> Increases biodiversity potential over the site. 	<ul style="list-style-type: none"> Avoid planting in designated areas, and adjust species choice in buffer zones as appropriate. Careful design of planting will help to preserve views out from the course of the Antonine Wall through the use of lower density planting and shrubs. Woodland design on lower slopes will

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	extends up southern slopes of Kilpatrick Braes to the ridge.		need to be sensitive to landscape impact on the buffer zone.
Biodiversity	<ul style="list-style-type: none"> Loss of productive area and deforestation due to open habitat restoration Small areas of designated woodland (ASNW & LEPO) present on southern slopes of Auchentorlie and Gavinburn 	<ul style="list-style-type: none"> Maintain and restore priority open habitats Protect and enhance environment for existing species, including black grouse, osprey, otter, pine marten, cuckoo, yellow meadow ant, large heath butterfly. Preserve and extend ecologically valuable woodland habitats Link habitat development between forest and new planting areas to maximise benefits for both open space and woodland habitats. 	<ul style="list-style-type: none"> Where appropriate incorporate open ground, mature stands, edge habitat etc. into design to preserve and extend range of suitable habitats for protected species. Once felled, manage Knockupple to revert to Blanket bog, linking up open habitat on Dumbarton Muir with adjacent SSSI to the west. Management of priority habitats will be focused on areas where it will provide the most ecological benefits, such as riparian & wet woodland areas, grazing open habitats, blanket bog, natural reserves & long term retentions.
Forest Habitat Networks	<ul style="list-style-type: none"> Existing forest habitat networks are largely confined to external fringes of the site. 	<ul style="list-style-type: none"> Newly acquired central open area provides opportunity to develop extensive forest habitat networks across the site. 	<ul style="list-style-type: none"> Diversify species range in existing blocks to develop networks within existing plantations Link up with woodlands on neighbouring ground. Extend networks across open central area through sensitive new planting.
Archaeology	<ul style="list-style-type: none"> Range of sites of archaeological interest present, potentially limiting planting and operational activity. 	<ul style="list-style-type: none"> Creation of buffers around sites of interest provides opportunity to diversify forest structure and create internal views. Protect and enhance sites whose context is lost under canopy 	<ul style="list-style-type: none"> Protect from operations and where appropriate utilise design to improve setting.
Recreation	<ul style="list-style-type: none"> Little provision within existing 	<ul style="list-style-type: none"> Potential to create a visitor 	<ul style="list-style-type: none"> Exclude existing footpaths from new

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	<p>plantations for recreation opportunities.</p> <ul style="list-style-type: none"> • Multiple high points within the site are popular walker destinations, with viewpoints across large parts of the site. • Existing plantations are often densely planted close up to entrances, reducing appeal of key recreation entrances. • John Muir Trail route through Merkins may restrict potential for commercial restocking along the course of the trail. • Potential for increased visitor numbers to be utilising operational road network. • Some existing recreational users of the Kilpatrick Hills may be unhappy with large amounts of formal recreation features being installed on site. • New routes may increase the disturbance of species such as black grouse and osprey. 	<p>attraction of regional significance</p> <ul style="list-style-type: none"> • Potential to increase economic benefit to the local area • Extensive consultation already undertaken with large numbers of existing & potential users. Response to the potential for increased recreation opportunities has been largely positive. • Network of formal and informal walking and riding (horses & mountain bikes) routes already present on site. 	<p>planting areas.</p> <ul style="list-style-type: none"> • Link internal recreation routes to wider network. • Where appropriate work with operations and the wildlife management team to explore multi user tracks. • Enhance key internal and external views along recreation routes. • Careful design in entrance zones can make key recreation entrances more appealing through varied species choice, retention of older trees etc. • Diversify planting at suitable locations along corridor of John Muir Trail.
Community	<ul style="list-style-type: none"> • Small isolated block south of A82 adjacent to residential areas in Old Kilpatrick • Little previous management means that communities are not used to large scale forest operations. 	<ul style="list-style-type: none"> • Involve local community in design and planting of woodland. • South slopes of Kilpatrick Braes in WIAT area • Educate local communities on the Forest Cycle • Potential to increase economic 	<ul style="list-style-type: none"> • Create community woodland area. Involve local community in planting. • Build links with community and local schools

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		benefit to the local area	
Landscape	<ul style="list-style-type: none"> Existing even aged plantations take little account of landscape features and sit quite starkly in the wider landscape. Southern areas of the site, particularly around the Kilpatrick Braes, are highly visible from wider Glasgow area. 	<ul style="list-style-type: none"> Newly acquired central areas offer opportunity to soften existing internal hard edges. Felling & restocking programme offers opportunity to improve views to and within the forest Central plateau offers a very wild & remote feeling, despite its proximity to significant population centres. 	<ul style="list-style-type: none"> Soften current hard edges through suitable landscape design and species choice, visually improving the fit of the site within the wider area. Create well shaped woodlands which better reflect landform and natural features Retain 'wilderness' feel of central area Careful design on most visible south facing slopes

The main concepts identified above, in conjunction with the objectives highlighted in the original design brief (**Appendix III Brief & Objectives**), were used to develop an initial design concept that categorised the land according to the most appropriate management regimes.

Table 4b – Proposed Management Regimes

Regime	Management Approach
Productive (Core)	<ul style="list-style-type: none"> The main focus is carbon sequestration and economic benefits, and areas will be primarily managed for timber production through clearfelling and restocking. Areas will be principally stocked with either pure Sitka spruce or a self-thinning Sitka/Lodgepole pine mix.
Productive (Mixed)	<ul style="list-style-type: none"> Also managed primarily for timber production, but these areas will contain a more diverse range of species since they generally have better soil or climatic conditions, and may be more sheltered than the core zone. A broader range of other conifers may be used including spruce, pine, fir, cedar and redwood. Mixtures of conifers and broadleaves may be suitable in some areas, and areas of pure broadleaves will also be used where conditions permit. No Ash, Larch or Scots pine will be planted in productive areas due to current disease threats. Whilst patch clearfelling will be used, other Low Impact Silviculture Systems may also be practiced and in less exposed areas there may potentially be opportunities for thinning and management beyond the normal

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	rotation period.
Native (Mixed)	<ul style="list-style-type: none"> • A range of semi-natural woodland types will be planted, based on local ground conditions and climate, whilst also taking • landscape and amenity factors into consideration. • Woodland in these areas will be primarily of NVC types W4, 7, 9, 11 or 17. (No Ash will be planted due to the threat of <i>Chalara fraxinea</i>)
Native (Upland)	<ul style="list-style-type: none"> • The principle aim within these areas is to increase the ecological and landscape diversity within the central Plateau. • Planting in the most exposed areas of the site will be confined to the sheltered valleys and on some of the drier knolls. Woodland in these areas will have a more open character, and will be planted where ground conditions are suitable in clumps at varying densities. • Birch, Alder, Rowan and Willow, in conjunction with upland shrubby species, will constitute the main element, and Juniper may be included (as a replacement for Scots pine) in some areas if suitable.
Native (Transition)	<ul style="list-style-type: none"> • A transition area between the main, more densely planted, stands and the open moorland. In addition to providing ecologically valuable edge woodland, it will also soften the landscape impact of the main forest blocks. • Planting will be at variable density, and will include a range of broadleaved tree and shrub species according to local conditions.
Semi-natural Forest Habitat Network	<ul style="list-style-type: none"> • The principle aim will be to create, enlarge and link areas of current and future conservation value. This will primarily be along riparian corridors, but will also include existing natural reserves and the mature mixed woodlands on the south facing slopes above the Clyde.
Open Ground	<ul style="list-style-type: none"> • Areas of open ground have been designed to meet a wide range of objectives, including: Priority Open Habitat, SSSIs, Scheduled monuments, Preservation of areas of deep peat, Wayleaves for utilities, Buffer zones around water bodies & water courses, and Deer management.

The analysis and design concept, in combination with the proposed management zones, formed the main basis for four public consultation sessions held during Jan 2014.

5.0 Management Proposals

5.1 Forest Stand Management

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

Patch clear-felling remains the most appropriate silvicultural system for the majority of the forested areas. Some of the lower and more sheltered parts will be established/restocked with a view towards managing the crop under Continuous Cover Forestry (CCF) in order to minimise the landscape impact of any future harvesting operations, particularly on the prominent lower slopes at Gavinburn.

The majority of the central plateau will be managed as open ground, where the focus will be on biodiversity and enhancing the existing priority open habitats.

5.1.1 Clear felling

As outlined in Section 2.0 Analysis of previous plans, operational access limitations have severely curtailed the felling operations envisaged in the previous design plan. As a consequence, the opportunities to diversify the age structure by extending the felling rotation of some coupes is greatly restricted, and felling in some areas will be on a more compressed timescale than ideally would be the case.

Where possible the scale of clearfells will be in keeping with the scale and topography of the landscape, with larger coupes located 'further up the hill' and in less visible areas within the site.

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Table 5.1.1a – Felling proposals

Forest Block	Main Considerations	Proposals
Merkins	<ul style="list-style-type: none"> • Extensive windblow present. • Remaining standing crops are approaching or exceeding critical height due to delays in commencing felling operations. • New access road is currently scheduled to be constructed during 2014/15, with an initial 10 year window for timber haulage. 	<p>The majority of the forest will be felled in two phases over the next 10 years².</p> <p>Redesign felling coupe shapes to allow longer felling timescales in future.</p> <p>Areas of deep peat on the western plateau will not be restocked.</p>
Knockupple	<ul style="list-style-type: none"> • Current crop growth is poor, and blanket bog vegetation is still present within the wood. • Dumbarton Muir SSSI blanket bog immediately to west of site. 	<p>Fell and revert to blanket bog.</p> <p>See Appendix VII Bog & Peatland Habitats for further details.</p>
Auchentorlie	<ul style="list-style-type: none"> • Current crops have generally grown well, although extensive windblow has been a problem in some areas, particularly to the west and south of the forest. • Area south of the main overhead powerline is the most visible part of existing forest when viewed from the Clyde area 	<p>Redesign felling coupe shapes/phases to better take account of landscape impact.</p>
Auchineden	<ul style="list-style-type: none"> • Current crop was planted slightly later than the other blocks, and some coupes have already been harvested, resulting in somewhat more scope for extending felling phases and observing adjacency requirements. • Windblow is starting to affect some areas. 	<p>Focus early felling phases on ground north of Auldmurroch Burn.</p> <p>Redesign felling coupe shapes/phases to better take account of landscape impact.</p>

² Whilst every attempt has been made to keep at least five years between felling of adjacent coupes, the scale of felling required means this has not always been possible.

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	<ul style="list-style-type: none"> Felling of stands south of Auldmurroch Burn is largely dependent on construction of new operational access route through neighbouring estate. 	
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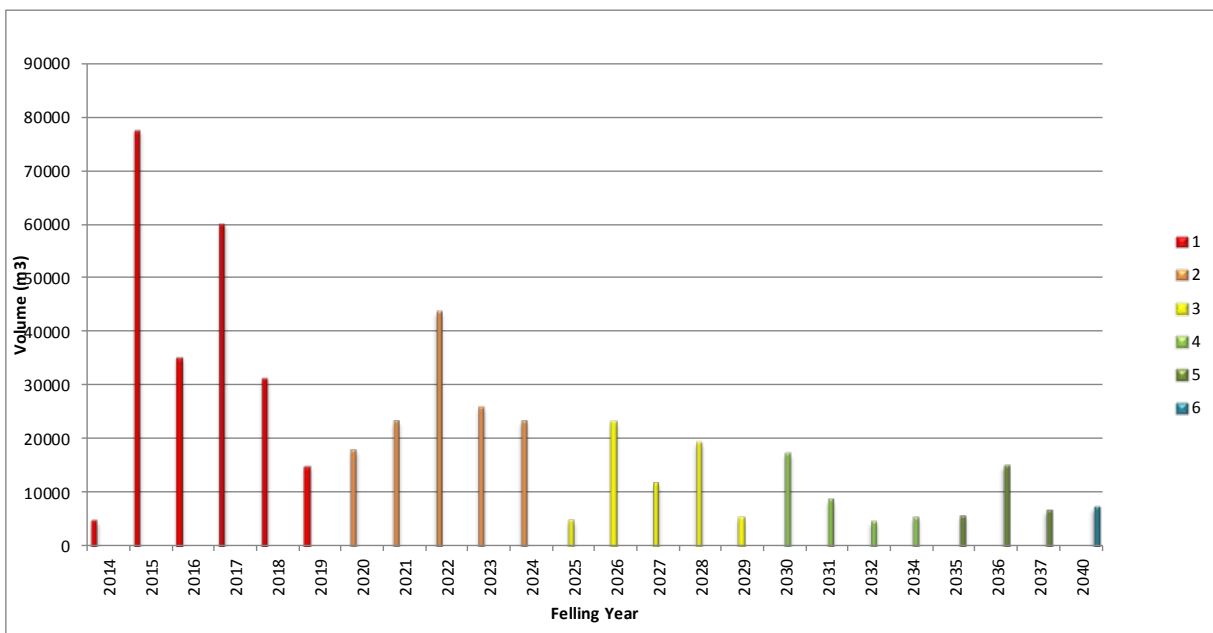
See **Map 5.1.1 – Felling Phases**

A total of ~460,000 m³ is projected to be felled during the lifetime of the plan, of which ~360,000m³ will be felled during the next 10 years.

Table 5.1.1b – Projected Felling Volumes, 2014-2034

Block	Felling Volume (m ³) Phases 1 & 2	Felling Volume (m ³) Phases 3 & 4
Auchentorlie	68,000	42,000
Auchineden	82,000	51,000
Knockupple	30,000	
Merkins	179,000	7,000
	359,000	100,000

Figure 5.1.1c – Projected Felling Volumes Overall



5.1.2 Thinning

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

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

Much of the site is considered too exposed for thinning (DAMS scores over 15), and the existing commercial conifer stands are unthinned, having long since passed the safe thinning window. Although the risk of windthrow is too great to conduct thinning operations, the use of self-thinning mixes when restocking (e.g. Sitka spruce/Lodgepole pine) may be considered in these areas as an alternative.

In the more sheltered areas (primarily on the lower slopes to the south, and along the east edge of Merkins), and where soil conditions are suitable, newly planted/restocked areas will be thinned in due course. Although standard practice is to conduct an initial thin when the crop reaches threshold basal area, the generally exposed nature of the site suggests that an early (and possibly heavier) initial intervention, followed by lighter subsequent interventions may be beneficial.

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

See **Map 5.1.2 Thinnable Areas**

5.1.3 Semi-natural woodland

The existing mature woodland on the south slopes at Gavinburn currently shows little sign of any successor trees coming through, due to browsing pressure on any natural regeneration. In order to preserve the existing policy woodland character of the hillside it is proposed to undertake limited underplanting within the existing areas, and to extend the wooded area further up the hill to reforest some of the currently open ground which was historically woodland.

Planting will be at relatively low densities in order to preserve the open character of the current woodland and the views up to the crags, and should utilise species which reflect the existing exotic element within the woodland. Separate areas will be planted over three separate phases 10 years apart, in order to introduce greater age and biodiversity value to the woodland, whilst also helping to increase its resilience.

Several areas of existing mature woodland (Auchentorlie Glen, Glenarbuck, Carling Glen) have been designated as Natural Reserves, and as such management actions are generally not permitted, although a removal program will be instigated for the *Rhododendron ponticum* present in Auchentorlie Glen .

5.1.4 Landscape

The existing conifer blocks are often poorly shaped in relation to landform, with long straight edges and a lack of diversity which does not always reflect the subtleties of the underlying landform. The acquisition of the central areas, and the proposed felling operations, offer opportunities to address this by:

- Reshaping the external margins of the woodland to better reflect landform
- Merging woodland edges with the open moorland more gently and gradually, to create a more visually integrated landscape
- Creating an internal forest structure which better reflects landform and ground conditions, in terms of age, tree species and creative use of open ground
- Developing a landscape which is visually as well as ecologically diverse.

The southern slopes at Gavinburn are a particularly diverse and highly visible feature and are the most sensitive location in terms of their landscape and visual sensitivity due to their high visibility, and because they contribute to the setting of a number of important features, including the Antonine Wall and the Clyde. The main landscape opportunities here are to:

- Maintain and extend the existing mature broadleaved woodland areas
- Use the potential diversity of woodland to maintain a visually diverse landscape
- Develop a woodland pattern which is well balanced with open space

See **Appendix V for visualisations**

5.1.5 Access

Nearly 360,000 m³ of timber is forecast to be harvested over the next 10 years across the various blocks. Operational requirements for harvesting such large volumes, and subsequent restocking, necessitate the construction of new internal roads as follows:

Table 5.1.5 – New internal road requirements

	Total Length (m)
Auchentorlie	1,400
Auchineden	3,400
Knockupple	2,300
Merkins	5,000
	12,100

In addition to internal roading infrastructure, two new operational access roads are planned into Merkins (from the north east via the upgrading of a previously de-adopted council road) and Auchineden (through the neighbouring estate).

See **Map 5.1.5 - Proposed Access**

5.2 Future habitats and species

Taking into account all the survey and analysis information, and the objectives set out in the brief, a complex mix of productive conifer, productive broadleaf and native woodlands are proposed, along with extensive areas of open ground.

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

The predicted future climate (based on Forest Research data) also needs to be taken into account, given the timescale over which the woodland will develop. For the Kilpatrick Hills, the climate over the next 50-100 years is predicted to move from being predominantly Cool/Wet to generally Warm/Moist, and by the end of the century may even tend towards a Warm/Dry climate. This would suggest that the length of the growing season may increase, but that there may be an increased risk of drought during summer if they become significantly drier.

The acquisition of the central area offers the opportunity to develop extensive Forest Habitat Networks (FHN) within the site. During restocking the opportunity will also be taken to develop habitat network links with some of the riparian woodland networks already present on neighbouring ground. Planting with native species matched to the soil types will create a high quality FHN, linking together currently isolated areas of woodland.

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Table 5.2 – Restructuring Considerations

Forest Block	Considerations
Auchentorlie	Consider use of slower growing, more windfirm species, particularly in areas where better soils offer a wider range of potential species.
Auchineden	Forest and Water guidelines mean that productive crops will need to be pulled back from the reservoirs, and this offers an opportunity to increase the amenity value of the woodland and improve their recreation potential.
Merkins	Supplementary guidance to FC Forests & Peatland Habitats guidelines proposes that where the current crop has a low Yield Class (below 8 for Sitka spruce, 6 for Lodgepole pine), restocking may not be the best option from a carbon sequestration perspective. In such areas a mix of open heathland and transitional woodland will be the aim, with the intention to achieve at least 20% canopy cover across the felled areas, concentrated on the better ground. Due to the extensive windblow across the areas in question, this will be investigated further to determine better the extent and location of transitional woodland after removal of the windblown crop.
Open moorland	The introduction of a broader range of habitats through the creation of low density native woodland (primarily along riparian corridors) will help diversify the area in both ecological and landscape terms, providing benefits for a broader range of flora & fauna whilst also subtly enhancing the 'wilderness' character of the interior plateau.

5.2.1 Proposed Species

Sitka spruce remains the primary productive crop, although it is important to recognise the challenges posed to forestry in the future, both by climate change and the increasingly diverse range of pests and diseases afflicting a range of tree species. Given this, it is important to introduce a broader range of conifer and broadleaf species into the productive mix, since this not only helps to increase the ecological and visual diversity of the woodland, but also serves to hedge against future risks.

The overall makeup of the productive woodland elements proposed is, broadly speaking: 75% Sitka spruce (or Sitka/Lodgepole mix), 15% alternative conifers and 10% productive broadleaves.

In recent years, a number of woodland establishment schemes within the district have experienced major challenges on some of the more marginal ground, with failure rates higher than might be expected. Although the

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causes are often due to a complex mix of interrelated factors, one of the most significant issues appears to be the use of planting stock whose provenance was not necessarily reflective of the site conditions. This can result in trees becoming stressed and more susceptible to infection (e.g. Birch canker on upland sites).

Given the large areas of native woodland planting proposed, it is therefore vital that wherever possible all planting stock is of suitable provenance – not just in terms of location of origin, but also that source stands are reflective of the final planting site in terms of climate, elevation, exposure etc.

See Map 5.2.1a – Future Species, 5.2.1b – Future Woodland Habitat and 5.2.1c Future Spacing

Table 5.2.1 – Proposed Species

Species/Habitat Type	Gross Area (ha)	%	Net Area (ha)
Sitka spruce	456.61	13.1%	388.12
Lodgepole pine	138.71	4%	117.90
Norway spruce	36.52	1%	31.04
Oak (productive)	36.19	1%	30.76
Aspen (productive)	29.22	0.8%	24.84
Macedonian pine	20.97	0.6%	17.82
Western red cedar	17.66	0.5%	15.01
Serbian spruce	17.32	0.5%	14.72
Douglas fir	10.74	0.3%	9.13
Coast redwood	9.00	0.3%	7.65
Noble fir	5.19	0.1%	4.41
Birch (productive)	4.66	0.1%	3.96
Wild cherry (productive)	3.60	0.1%	3.06
Norway maple (productive)	3.24	0.1%	2.75
Mixed conifers	2.62	0.1%	2.23
Japanese red cedar	2.36	0.1%	2.01
Grand fir	2.14	0.1%	1.82
Juniper	2.01	0.1%	1.71
W4	236.45	6.8%	71.91
W4/7	134.29	3.8%	45.85
W4/7 (Riparian)	103.16	3%	49.89
W4/17	84.57	2.4%	43.38
W7 (Riparian)	73.10	2.1%	50.49
W4/19	55.06	1.6%	1.79
W11	26.92	0.8%	23.23
W11 + local amenity species	26.10	0.7%	7.83
W7/17	24.44	0.7%	15.24

W7/11 (Riparian)	16.07	0.5%	6.87
W7/11	14.42	0.4%	9.93
W9	13.5	0.4%	12.75
W17	11.28	0.3%	7.89
Existing Woodland	280	8%	
Open Water	44	1.3%	
Open Ground	1552	44.4%	
Total	3494	100%	

5.3 Prescriptions

Although the extensive areas of windblow currently present across the site are due in part to delays in harvesting, it is also likely that a lack of drain maintenance (leading to wetter ground, and hence shallower rooting) may have exacerbated the problem. It is therefore important that a more active programme of drain maintenance is undertaken during the second rotation in order to try and mitigate against this – particularly given the increased likelihood of more severe weather events as a result of climate change.

Similarly, it is important to ensure that an extensive ride network is included within productive areas, since not only is this required for maintenance access, but it should also help to increase the amount of 'green edges', both to increase future felling options (in terms of felling coupe shapes) and as a way to potentially limit the 'domino effect' within stands whereby an initially small area of windblow spreads during subsequent storms until a green edge is reached.

5.3.1 Productive Conifers

Sitka spruce will form the major component of productive conifers, either planted pure or in mixture with Lodgepole pine. The latter mix will be used both on poorer peat areas (where the pine acts as a nurse) and on some of the more exposed areas (as a self-thinning mixture where operational thinning is impractical due to the increased risk of windblow).

Alternative conifer species (Norway spruce, Serbian Spruce, Douglas fir, Grand fir, Japanese red cedar, Western red cedar, Macedonian pine, Coast redwood) will be planted pure and in mixtures, generally on better soils and/or in more sheltered or lower lying areas. Noble fir will be planted on some of the more exposed areas due to its ability to cope well with higher winds and elevation.

Conifers will be planted at 2,800 trees/ha.

5.3.2 Productive Broadleaves, Conifer/Broadleaf mix

Oak will form the major component of productive broadleaves, along with Aspen, Birch, Cherry and Norway maple.

On the lower slopes at Gavinburn a productive mix with increased amenity value has been designed in order to maximise the visual appeal of the most visible areas of the site.

Productive broadleaves will be planted at 5,100 trees/ ha, and managed as short rotation forestry or high forest, or a combination of the two, as site conditions and tree growth dictate. For example within the main mix on the lower slopes at Gavinburn it is envisaged that the Aspen would be thinned out over time for biomass, the Cherry harvested after 60-80 years and the Oak left to grow on to final rotation (~120 years).

Oak will be group planted in mixture with Norway spruce. On the lower slopes of Gavinburn groups of Western red cedar will be planted in mixture with Oak, and also with Norway maple, to provide a visual transition between the pure broadleaf areas on the lower slopes and the conifer block further up. As the productive broadleaves mature, consideration may be given to underplanting with conifers in order to help maintain clean stems.

5.3.3 Semi-natural Woodland

Native Woodland types are classified in FC Bulletin 112, with the following types identified as suitable for the site:

Table 5.3.3 – Woodland Types

Woodland Type	Location	Species
W4 (Birch woodland)	Poorest ground, typically around bogs, hill slopes and valley-side flushes.	Primarily Downy birch, Alder and Willow with an additional component of Rowan and shrubs.
W7 (Alder-ash woodland)	Wetter slopes, gully sides and waterlogged areas.	Primarily Alder, but also Birch and Willow and a range of other trees & shrubs.
W9 (Upland mixed broadleaved woodland)	On the more fertile brown earths on lower slopes.	A wide range of broadleaved species including Oak, Birch, Rowan, Alder, Aspen, Gean, Holly, Hazel and shrubs.
W11 & W17 (Upland oak-birch woodland)	Valley sides and hill slopes.	Mostly Sessile Oak and Downy birch, but also Rowan, Aspen, Holly, Hawthorn and Juniper.
W19 (Juniper woodland)	Upland hill slopes.	Primarily Juniper, with some Rowan and Downy birch.

Within riparian areas (primarily along burns and around reservoirs and lochs), planting will generally be a variant on W7 woodland, and will include a significant (30% or more) element of open space. In accordance with current Forest & Water Guidelines, a 20m buffer zone will be left open on loch/reservoir shores, and a 5-10m buffer along watercourses, dependent on their width.

Around the edges of the main, more densely planted stands, a more open 'transitional' woodland will be planted. This will generally be a variant on W4 woodland, and will incorporate a high level (typically over 50%) of open ground, with the woodland planted in clusters whose density decreases with distance from the main stands.

Across the most exposed upland areas planting will be confined to the more sheltered valleys and drier knolls. Planting will usually be of W4 woodland (except on the slopes of the three Duncolms, where W19 will be planted) in clusters at variable density, and will incorporate significant amounts of open space (60% or more).

Within the existing forest blocks, and on the southern areas around Gavinburn, a more diverse range of native woodland types will be planted according to local conditions.

The recently planted areas at Cochno Hill contain a significant Ash component on the south facing slopes, some of which has been infected with *Chalara fraxinea*. The situation will be monitored but no remedial action is currently proposed, although this may be revised if significant mortality occurs.

The WGS scheme planted at Craighirst to the north of Cochno Hill has suffered extensive birch dieback, although the Alder and rowan are generally doing better on the more sheltered areas. Stocking density will be increased through the introduction of a wider range of species such as Hawthorn, Willow and Juniper where ground conditions are suitable. A component of Downy birch could also be included if a suitable upland provenance is available.

In order to reflect the existing policy woodland feel, the Kilpatrick Braes will be planted with a mixture including W11 woodland, locally occurring broadleaf species (Hornbeam, Beech) and a small component of high amenity value conifers (Coast redwood, Sequoia, Atlantic cedar, Grand fir).

5.4 Biodiversity and Management of Open Land

5.4.1 SSSI

The design proposals have taken into account all relevant restrictions/mitigation measures as detailed in the SNH-approved management plans, and in the case of Dumbarton Muir suitable buffers have been incorporated between the designated area and neighbouring areas of woodland. The western section of the Dumbarton Muir SSSI lies outwith FCS ownership, and so a larger 200m buffer zone has been applied since FCS do not have management control of this ground. In the eastern section (at Lily Loch), where FCS have full management control a standard 100m buffer has been applied.

5.4.2 Open ground

Blanket Bog and Upland Heath are the main priority habitats in terms of importance, and form large contiguous areas across the site.

In the short term (i.e. the next 5-10 years) the intention is to operate a minimal management regime on the extensive upland areas of open ground in order to allow the vegetation to recover from the previous intensive grazing (identified during the open habitat survey as one of the main threats to the bog habitat). This management approach has been confirmed by SNH (Site Monitoring Report issued Oct 2014) as helping the bog to improve from its current unfavourable recovering condition. The resulting variation in vegetation height and density should increase the mosaic of habitats available, to the benefit of species already present on site such as Black grouse. In the longer term it is likely that a low level grazing regime may be implemented to help manage the open habitat.

Other open space will remain within the main woodland areas to allow access for both wayleave maintenance and recreation.

5.4.2.1 Management of bog habitat

The 200m buffer zone around the neighbouring Dumbarton Muir SSSI to the west will be actively managed, and on other areas of blanket bog across the site a programme of tree removal, drain blocking and control of natural regeneration may be implemented.

5.4.3 Breeding Birds

A variety of breeding birds of conservation interest have been observed on site, including Skylark, Meadow pipit, Osprey, Merlin, Goshawk, Greenshank and Black grouse. The planned increase in native woodland areas, particularly by expanding forest habitat networks and riparian habitats, will help to diversify the available habitat range in order to benefit a wide range of bird species.

As part of a national program within the Forestry Commission, the site will be monitored for Black grouse leks. For lekking, nesting and feeding, Black Grouse require open areas - the birds appear not to use small, enclosed clearings even where the habitat within them may be suitable. It will be of great benefit to existing populations if corridors of good vegetation can link open ground within plantations.

It is important to maintain areas with a good mix of grass, heather and moss. The upper woodland edge that will be created, will provide ideal habitat for Black Grouse, providing shelter and feeding through the introduction of increased areas of edge habitat, which is the richest for most bird and mammal species. Removal of grazing will also benefit Black Grouse by allowing the development of the existing areas of Cotton grass to provide feed and shelter to the young in early summer.

Fencing represents a significant threat to Black Grouse, with research showing that losses as high as 25% of the local population can occur through collision when flying. Therefore in current and future Black Grouse management areas, deer fencing should be kept to a minimum, and any fencing within 1km of a lek must be marked.

The provision of extensive, contiguous areas of open ground on the central plateau, in conjunction with the introduction of a large woodland fringe/open habitat mosaic, will also benefit Cuckoo and other woodland birds.

5.4.4 Protected Species

The plan aims to improve habitats for protected species, and their presence has been accounted for in the location and choice of tree species.

All operations will adhere to SNH approved FCS Guidance notes and appropriate operational buffer zones will be established prior to the commencement of any works. If required, licenses to carry out operations will be applied for.

The woodland establishment should have little negative impact on existing protected species, which are found mostly in the existing woodlands and within buffered riparian edges or watercourses, and the proposed new planting areas will enhance and enrich opportunities for such species.

5.4.4.1 Otter

A number of small areas of native broadleaves near loch shore have been incorporated into the design for use as potential otter shelter, and to provide screening from nearby recreation routes.

All operations will be carried out in accordance with FC Guidance Note 35c – Forest Operations & Otters in Scotland.

5.4.4.2 Pine Marten

Wherever possible, suitable den locations (e.g. veteran trees in the Kilpatrick Braes) will be maintained to preserve and extend the habitats beneficial to Pine marten.

5.4.5 Wildlife Management

Deer control is vital to successful crop establishment, and the proposed increase in 'soft' conifer and productive broadleaves species means that there will be potentially vulnerable crops in a number of areas across the site, and deer numbers will need to be controlled by culling to minimise damage.

Full details of proposed deer management can be found within Scottish Lowlands Forest District Deer Management Strategy, but the main objectives within the Kilpatrick Hills are:

- Where possible, enable restocking to take place without the need for deer fencing, and to achieve a suitable stocking density at year five.
- Keep leader damage levels below 10% in productive coupes.
- Maintain a sustainable deer population.

In addition to the risk posed by deer, it is crucial that livestock from neighbouring land are excluded from the site during the establishment of new crops, since incursions by sheep and cattle are currently a significant issue on various parts of the site.

Foxes pose a potential threat to Black grouse due to the risk of predation – this will be investigated further and a separate management plan drawn up if appropriate.

Voles may represent a significant threat to young trees on the better soils across the site. Chemical control of vegetation in these areas can reduce the risk during establishment, but vole guards may be necessary. Raptor posts may also assist with control.

Brown and mountain hares are protected species which can cause damage to young trees. The site will be managed in accordance with FES Environmental Guidance Note 4 'Stopping Damage by Hares to Trees', and we will consult with Statutory Agencies if damage levels prove to be an issue.

5.4.6 Deadwood

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

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

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

The UKWAS target is for an average of 20m³/ha, although it is expected that actual concentrations will vary widely across the site.

Table 5.4.6 - Assessed Deadwood Ecological Potential

Assessed Deadwood Ecological Potential (DEP)	Area (ha)	Future Volume Estimate (m ³ /ha)	Total Future Volume (m ³)
High	311	150	46,671
Medium	1846	90	68,677
Low	763	30	55,393

Total future potential is thus estimated at **47 m³/ha**

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

- Take any obvious opportunities to retain deadwood in a coupe e.g. large veterans, deadwood in wet areas or inaccessible areas.
- Consider harvesting wind blow only when it is economic or required to make site safe.

5.5 Heritage

5.5.1 Antonine Wall World Heritage Site

Consultations with Historic Scotland indicated that the key concerns for the Antonine Wall are:

- To avoid planting on the course of the Wall, and on a suitable size buffer either side.
- Preserve key views from the course of the Wall up the slopes to the ridges and crags of the Kilpatrick Braes.
- Avoid planting blanket blocks of conifers that would impact on the landscape character of the buffer zone.

Careful design of the proposed planting on the slopes immediately above the course of the Antonine Wall will help to preserve views out through the use of open ground, lower density planting and shrubs.

The design of the wider southern slopes (which fall within the associated buffer zone) aims to respect the cultural context of the area, and to maintain a balance between woodland and open space, retain views of the tiered cliff faces and skyline, and contribute to landscape diversity.

5.5.2 Scheduled Monuments

5.5.2.1 Gallangad Burn Long Cairn

The area around the cairn will continue to be managed in accordance with the Historic Scotland-approved Management Plan.

5.5.2.2 Gallangad Muir Lang Cairn

Although located on neighbouring ground, the associated buffer zone for this monument includes a small area of the site on the northwest edge of Merkins. During restocking, the existing woodland will be pulled further back from this buffer zone, and a fringe of less densely planted native broadleaves will be introduced between the commercial timber stands and the site boundary, in order to improve the setting of the cairn.

5.5.3 Non-scheduled Archaeology

A suitable buffer will be maintained around all non-scheduled archaeological features, which will be kept open and free of trees. All operations in the vicinity of such features will be conducted in accordance with UK Forestry Standard Guidelines on Forests and the Historic Environment, with suitable steps taken to ensure their protection.

5.6 Water Quality & Quantity

Given the sensitive nature of the site with regard to water quality, especially within the Burncrooks Water Treatment Works catchment area, an assessment of the potential impact of the proposals on water quality and quantity was undertaken by a specialist hydrologist at Forest Research which indicated that:

- Existing drains should be checked to ensure that they are not connected to natural watercourses (to prevent significant releases of sediment/coloured water) prior to initiating a drains maintenance programme.
- Long term trends of increase water colour or dissolved organic carbon are thought to be driven by climate warming and/or decreased acid deposition, and are unlikely to be impacted by the limited planting of riparian broadleaves proposed. Furthermore, the establishment of riparian woodland and associated development of large woody debris should enhance the wetness of the riparian zone (by increasing hydraulic roughness and ponding back waters) as well as helping to reduce thermal stress to fish through riparian shade.
- Overall reduction in conifer cover, and similar levels of water use to non-woodland vegetation in the proposed areas of unproductive native broadleaved planting, is very unlikely to impact on water quantity and hence a detailed hydrological assessment of the balance between felling, replanting and new planting is *not* required.

All operations will follow best practice as detailed in the current Forest and Water Guidelines. Timber extraction will normally avoid crossing burns or main drains, but, where necessary, each crossing point will be piped or bridged. Branches will be kept out of watercourses and trees will generally be felled away from the watercourses. Felling will not exceed 20% of the catchment area within any three year period.

All felling and restocking will comply with the Controlled Activities Regulations (CAR) 2011 General Binding Rules with respect to appropriate buffer strips between any new planting and watercourses/waterbodies.

Site assessment prior to forest operations will identify recommended actions to meet these requirements.

5.7 Community & Recreation

The Kilpatrick Hills offers considerable potential for improving recreation opportunities, given that it contains significant areas of relatively wild land whilst still being directly adjacent to Scotland's largest population centre.

In order to increase the potential for informal outdoor recreation opportunities, it is necessary to improve local community access to, and involvement in, the site. This in turn can lead to benefits to the health and wellbeing of both local communities and visitors through quiet enjoyment, recreation and leisure opportunities across the site.

As set out in the Kilpatrick Hills Strategic Framework, the vision is for the Kilpatrick Hills to "emerge as a regionally important and highly accessible area providing a 'wilderness experience'. It should be a destination of choice for outdoor recreation, catering for a range of activities and accessible for a broad spectrum of abilities".

5.7.1 Community

Scottish Lowlands Forest District Staff will actively engage the local community to encourage use of the forest. FD Ranger staff will look for opportunities to build links with local community groups and schools, and the small area south of the A82 has been left out of the design process in order to allow for a community-led planting scheme.

5.7.2 Recreation

The existing network of recreation routes are used by a broad spectrum of users, including dog walkers, hikers, cyclists and horse riders. Following the acquisition of the central areas, there is now an excellent opportunity to link up some of these existing routes into longer 'loops', and to introduce new routes into some of the less well used areas of the site. In infrastructure terms these are likely to vary from formal, well-surfaced multi-use paths through to informal desire lines, depending on accessibility and location sensitivity.

See **Map 5.7.2 – Current & Future Routes**

In order to facilitate wider recreational usage of the site, the potential for introducing seating and low key signage at suitable locations along the main routes will be investigated. There may also be the potential to introduce some small scale picnic and/or camping areas.

Potentially the most significant planned route will be the John Muir Trail, a new long distance coast-to-coast route which runs for approximately 5km through the northeast section of the site. Where possible, felling and restocking operations within Merkins have been designed to minimise disruption to the overall trail route, and the choice of species along the route has been informed in part by the likely need to accommodate increased visitor numbers in future.

For further details of aspirations and proposals for development opportunities, refer to **Appendix VI (iv) Kilpatrick Hills & Surround Area Strategic Framework**