


Cruach Tarbeirt Forest Design Plan 2015-2024

Cowal and Trossachs Forest District
 Cruach Tarbeirt
 Forest Design Plan

 Forestry Commission Third Schedule	
Map relevant to Application No.	033/CT/CT/15-1
O.S. Grid Reference	15-1
Map Scale	Map of
(Owner / Lessee)	
Signature
Date
Signature
Date
(For and on behalf of the Forestry Commissioners)	
Signature	<i>[Signature]</i>
Date	21/12/15



We manage Scotland's National Forest Estate to the United Kingdom Woodland Assurance Standard - the standard endorsed in the UK by the International Forest Stewardship Council® and the Programme for the Endorsement of Forest Certification. We are independently audited.

Our land management plans bring together key information, enable us to evaluate options and plan responsibly for the future. We welcome comments on these plans at any time.



Approval date: 21/12/15
 Plan Reference No: 033/CT/CT/15-1
 Plan Approval Date: 21/12/15
 Plan Expiry Date: 21/12/25

Cruach Tarbeirt Forest Design Plan 2015-2024

Cowal and Trossachs Forest District

Cruach Tarbeirt

Forest Design Plan



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FOREST ENTERPRISE – Application for Forest Design Plan Approvals
Forest Enterprise – Property - Cruach Tarbeirt Forest

Forest District	Cowal & Trossachs FD
Woodland or property name:	Cruach Tarbeirt Forest
Nearest town, village or locality:	Arrochar
OS Grid reference:	NN316068
Local Authority district/unitary Authority:	LL&TNPA

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 roads, tracks and quarries as detailed in my application.
3. I confirm that the initial scoping of the plan was carried out with FC staff on 3rd of August 2006.
4. I confirm that the proposals contained in this plan comply with the UK Forestry Standard.
5. I confirm that the scoping, carried out and documented in the Consultation Record attached, incorporated those stakeholders which the FC agreed must be included.
6. I confirm that consultation and scoping has been carried out with all relevant stakeholders over the content of the of the design plan. Consideration of all of the issues raised by stakeholders has been included in the process of plan preparation and the outcome recorded on the attached consultation record. I confirm that we have informed all stakeholders about the extent to which we have been able to address their concerns and, where it has not been possible to fully address their concerns, we have reminded them of the opportunity to make further comment during the public consultation process.
7. I undertake to obtain any permissions necessary for the implementation of the approved Plan.

Signed

Forest District Manager

Signed

Conservator

District

Conservancy

Date

Date of Approval

Date Approval ends:

Cruach Tarbeirt Forest Design Plan 2015-2024

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EIA Determination form if required

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Summary of Proposals

Table 1: Strategic Aims

SFS Key Themes	Relevant issues identified for Cruach Tairbeirt FDP
Climate Change	Carbon sequestration increased by managing parts of this forest through Low Impact Silvicultural System, retaining areas of broadleaves as continuous cover and establishing more native woodland and riparian woodland as permanent forest features on this site. There are likely to be some opportunities for contributing towards national targets for renewable energy via woodfuel.
Timber	Continue to grow quality timber sustainably and increasing potential for a range of timber products by expanding future options for continuous cover management and diversifying species selection
Business Development	Timber harvesting, woodland establishment and maintenance will contribute to the local economy. The woodland is highly visible and will be managed to enhance the landscape and contribute to the setting of local businesses as well as provide recreation opportunities for visitors to the National Park.
Community Development	Woodland used by local people for recreation.
Access and Health	The southern half of the woodland is well used for informal recreation, mostly walking and some cycling, by both residents and visitors. The Arrochar trail links Arrochar and Tarbet, and there is potential to develop an off road cycle route through the woodland as an alternative to the A82/A83.
Environmental Quality	The woodland is highly visible within the LLTNP, and contributes to the setting of Loch Lomond. Well scaled felling coupes combined with continuous cover management along the lower slopes aim to reduce the landscape impact of clear felling from the A82/A83 and key viewpoints in the surrounding area. The increase in broadleaved riparian woodland will help maintain water quality.

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Biodiversity	Some of the woodland lies within the Glen Loin SSSI, and the plan aims to enrich the woodland with native species where possible including expansion of the native woodland and extending riparian woodland along key watercourses. Proposals aim to maintain and manage the habitat for black grouse on the hill summit.
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1.0 Introduction

1.1 Setting and context

Cruach Tairbeirt is located on the western shore of Loch Lomond, and lies within both the Argyll Forest Park and the Loch Lomond and the Trossachs National Park. The woodland forms the backdrop to the villages of Tarbet and Arrochar. It is a feature at the head of Loch Long, and while its eastern flank lies within the Loch Lomond NSA, the Glen Loin SSSI lies on the west facing hillside, overlooking the Loin Water (see Map 1: Location Map, Key Strategic Designations and Viewpoints).

The forest unit covers a total area of 892ha, of which 118ha is open ground. The forest is predominantly coniferous, with 590ha of conifers, of which about 85% is Sitka spruce. The remaining 184 hectares of broadleaves includes an extensive semi-natural woodland which largely occupies the western slopes framing Glen Loin as well as a wide band of broadleaves alongside Loch Lomond.

The hill rises to 415m, while the woodland extends from mixed broadleaved and large larch and spruce at nearly sea level along the shore of Loch Lomond, to scattered slow-growing spruce close to the summit.

The woodland is highly visible, as it occupies the steep, terraced hillsides of a prominent 'stand-alone' hill on the side of Loch Lomond. The eastern flank of the hill curves into the loch, so that it forms a key feature in views looking along the length of the loch. It is most visible from middle range views, especially the eastern shore of Loch Lomond, for example from the West Highland Way and Inversnaid. The west facing hillsides are less widely visible, but from the A83 these can be seen rising behind Arrochar.

The whole hill is not visible from any one viewpoint, but from key hill summits – such as Ben Lomond – there are views looking down onto the

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woodland from where the extent of the forest is more apparent within a wide panorama.

From other viewpoints, there are intermittent glimpse views of the lower slopes (e.g. from the A82), or sustained views of short stretches of hillside, as from the Three Lochs Way and the café at Inveruglas.

The Glen Loin SSSI has been designated because of the Upland Mixed Ash and Upland Mixed Oak woodland. The forest lies within the Atlantic oakwood expansion area associated with western Loch Lomond.

The woodland also supports a number of nationally important LBAP species, including red squirrel, otter and black grouse. The latter are known to value the habitat on the hill summit.

Loch Lomond lies to the immediate east of the forest, while it is separated from open moorland by the deep wooded gorge of the Inveruglas Water to the north. On other boundaries it abuts farmland and other woodland, while both the villages of Arrochar and Tarbet are tucked in against the forest edge.

There is formal recreation provision, with waymarked access through the woodland between the villages in addition to looped access through the southern half of the woodland, which is most readily accessed from Tarbet.

The woodland is also used for informal walking and cycling, and there are several established paths to the hill summit.

Two large pylon lines extend through the woodland along the western slopes, extending from the Glen Sloy hydro scheme, which is being upgraded to form a much larger built feature outside of the forest to the north west.

The railway line between Glasgow and Crianlarich lies within the woodland along the lower southern and eastern hill slopes.

1.2 History of the forest

Cruach Tairbeirt was purchased by the Forestry Commission in the 1960s.

There is no existing full forest design plan, but an indicative plan and concept plan was prepared in 2006, which identified overall long term aims for the forest.

2.0 Objectives and aims of the plan

2.1 Aims of previous plan

There is no current forest plan.

2.2 Plan objectives

Following the review of the indicative plan and a review of the scoping responses, it has been agreed the management objectives and priorities which inform the new plan should be as follows.

Summary of objectives	Priority		
	High	Medium	Low
Developing a sustainable forest more able to withstand events associated with predicted climate change	<input type="checkbox"/>		
Enhancing the landscape and contributing to the scenic value of the National Park	<input type="checkbox"/>		
Producing wood and marketable timber	<input type="checkbox"/>		
Maintaining and creating new wildlife habitats, including consolidating the SSSI	<input type="checkbox"/>		
Native woodland restoration	<input type="checkbox"/>		
Providing public recreation		<input type="checkbox"/>	
Providing sporting use			<input type="checkbox"/>
Providing employment			<input type="checkbox"/>
Conserving archaeological features		<input type="checkbox"/>	
Protecting water quality and riparian habitats	<input type="checkbox"/>		

2.1 Aims of plan

Taking into account the earlier indicative forest design plan, and comments from the scoping meeting, as well as the strategic aims for forestry in this area, the aims of the forest are to:

Create a more diverse age structure for the forest. The forest is a relatively uniform, even-aged spruce plantation, which could be felled in a

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short timescale. However, this would create a high landscape impact in a short timescale. Proposals should aim to fell and restock over a thirty year period, depending on crop stability, to increase age diversity through staggered restocking. This will limit landscape impacts and create a forest that is more robust in terms of economic sustainability, habitat diversity and resilience to pests and diseases.

Develop a plan that recognises the existing and imminent impacts of wind blow. Wind blow is evident along the middle and lower slopes of the hill, and the plan should aim to reshape these areas to reflect landform as well as establish new coupes with well shaped wind form boundaries that should limit future wind blow impacts.

Minimise the impacts of the proposals on the landscape, and enhance the setting of Loch Lomond. The high visibility of much of this forest and its location overlooking Loch Lomond raise the sensitivity of the landscape aspects of the design. Proposals should aim to reflect the shape and scale of the landform and provide a long-term enhancement to the setting of Loch Lomond and the local visitor experience.

Expand and enhance the Glen Loin SSSI/SAC. This will result in more native woodland on the west side of the forest, especially on steeper slopes.

Increase the area of native woodland. This is especially targeted at PAWS on the eastern slopes.

Identify opportunities to minimise impacts on the existing path network. It is recognised that much of the wind blow is located close to the existing path network, and that the proposed forest road will have an impact on both the path routes and their setting. Long term, the proposals should provide a permanent framework which forms an attractive setting for a path network which integrates the new forest road network. The forest road will provide additional access, and this should aim to extend cycling provision, possibly as an alternative to the public road along Loch Lomond.

Increase opportunities for LISS. In addition to identifying potential for LISS management of the current forest, proposals for restocking should identify areas that could be managed as LISS in the future. The new road will help access to manage woodland for LISS.

Retain an element of mixed conifer in this woodland. This is likely to extend across the more accessible and productive slopes, outwith PAWS

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areas. It should enhance the setting of the path network and provide visual diversity. It will also both improve red squirrel habitat and meet the forest district timber production commitments.

Increase the area of open space. Proposals should maximise opportunities to expand open space on the summit of the hill, possibly associated with reshaping of the upper margin and creating open space adjacent to areas of native woodland regeneration.

Encourage natural vegetation of a shrub layer associated with the power line. It was noted that this is already beginning to occur, and that the cover should be maintained and allowed to expand.

To achieve these aims, this plan will need to take into account the following issues:

- Producing wood and marketable timber from a variety of species, re-establishing PAWS and restoring native woodland continue to be high priorities in terms of woodland management
- The changing context of predicted climate change, especially the increased likelihood of new pests and diseases, which is likely to influence species choice at restocking
- A combination of Low Impact Silvicultural System (LISS) and felling and restocking will be required to meet these objectives. However, options need to be reviewed to ensure that specific LISS techniques are realistic and that thinning is planned for young crops to create a suitable crop for LISS in the future;
- Enhancing the landscape of this woodland is a very high priority, due to its location and its contribution to the setting of Loch Lomond. The scale and shape of landform should therefore influence the size and shape of both LISS areas and felling coupes as well as species choice at restocking
- The native woodland habitat associated with Glen Loin SSSI should be extended and the influence of regenerating rhododendron, spruce or other non native species on this site should be reduced by careful design and species choice
- The woodland is used for informal recreation, and the size of coupes as well as species choice at restocking in the main recreation areas will need to create a small scale and diverse setting to enhance woodland experience;
- Protecting water quality and riparian habitats by reinforcing and where necessary establishing a permanent framework of riparian woodland;
- Deer management is required to achieve the necessary regeneration levels in the LISS areas and full establishment of broadleaves and some conifer

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species, especially if a varied species pattern is going to be successful at restocking;

- Harvesting and forest management operations will provide a range of employment opportunities throughout the life of this plan.

3.0 Background information

3.1 Physical site factors

3.1.1 Geology Soils and landform

The solid geology underlying the site is composed largely of psammite and pelite.

This gives rise to a mixture of poorly drained peaty soils and bog on hill tops, plateaux and in flat areas, and brown earths and podzols on better drained hillsides.

3.1.3 Climate¹

Mean annual temperatures in this region are about 9 degrees centigrade, with February the coldest month and July the warmest month. West Scotland is one of the more exposed areas of the UK, with strong winds being associated with the passage of deep depressions. While the glens and lower slopes are more sheltered, this region is characterised by the strong gale force winds that are more frequent on exposed hill tops and elevated slopes. The average annual rainfall for western Scotland varies between 1000mm and 3500mm, considerably wetter than the east coast of Scotland.

Therefore, while the forest is generally accessible all year round, both thinning and felling programmes need to take into account generally high rainfall levels as well as storm rains associated with sudden cloudburst. These may cause significant short term water run off, and possibly landslips on steeper, unstable slopes. In addition, the elevation of the forest means it is exposed to winds, which have an effect on assessing the stability of continuous cover and planning the timing and sequence of felling proposals. It is noted that there is already windblow in some parts of the forest, especially where the wind is funnelled along the glens between steep hillsides.

3.1.2 Water

There is a single private water supply point at Inverhoulin (NN 327 063).

¹ Summarised using data from the Met Office Regional Climate site for western Scotland:
<http://www.metoffice.gov.uk/climate/uk/ws/>

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When felling and restocking are carried out, the Forest and Water Guidelines (2011, fifth edition) will be strictly adhered to. Timber extraction will normally avoid crossing burns or main drains, but, where necessary, each crossing point will be piped or bridged.

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 the watercourses and water bodies.

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

3.2 The existing forest

3.2.1 Age structure, species and yield class

Sitka Spruce is currently the largest component of the forest, occupying about 85% of the conifer area. Broadleaves are the next biggest component of the forest area, extending to 184ha. This is largely found on slopes rising up from the shoreline of Loch Lomond and within Glen Loin.

Small areas of larch have been established on the lower slopes and along the upper edge of the forest around the eastern side of the summit, while there are small pockets of other conifers again largely along the lower slopes.

The woodland appears even aged, as the majority of the forest was planted over a 17 year period, with 76 % of the forest area planted between 1959 and 1976.

The main change over the forthcoming plan period will be an increase in the age range of the forest. This will be achieved through felling and restocking over an extended twenty to thirty year time scale. This will create a more diverse forest environment with greater climate change and economic resilience, as well as increasing habitat value.

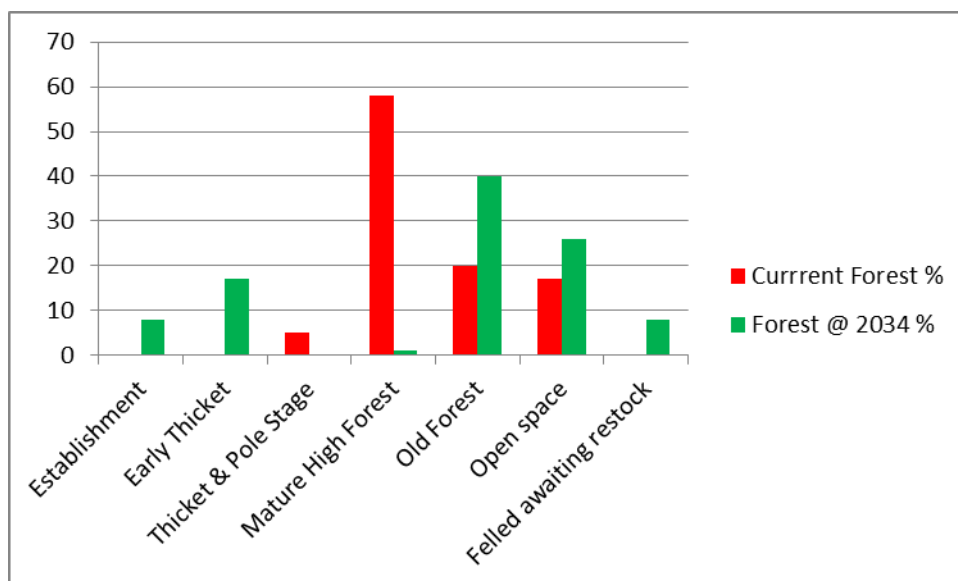
The replanted woodland will also have an increased amount of open space and an increase in species diversity, including for example, riparian woodland associated with the well defined gulleys and watercourse and a wider range of conifer species, particularly associated with the access routes. Expanding the species range will also assist in creating a forest which is

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robust in terms of disease and pest resilience. In addition, the plan aims to develop the potential for LISS, both in terms of identifying existing potential for management as continuous cover and through the establishment of species which are capable of LISS at restocking, if appropriately managed.

Table 1: Successional stage change over the Plan period

Age of trees (yrs)	Successional Stage	Current Forest %	Forest @ 2034 %
0 to 10	Establishment	0	8
11 to 20	Early Thicket	0	17
21 to 40	Thicket & Pole Stage	5	0
41 to 60	Mature High Forest	58	1
61 plus	Old Forest	20	40
	Open space	17	26
	Felled awaiting restock		8
		100	100

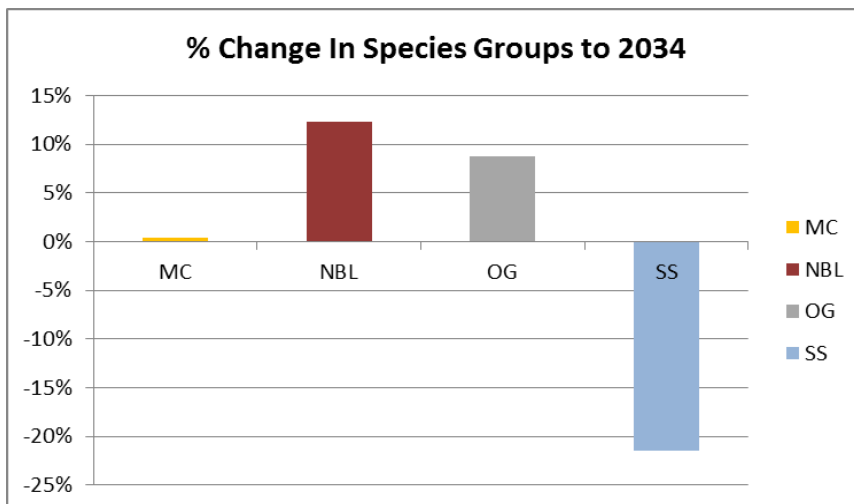
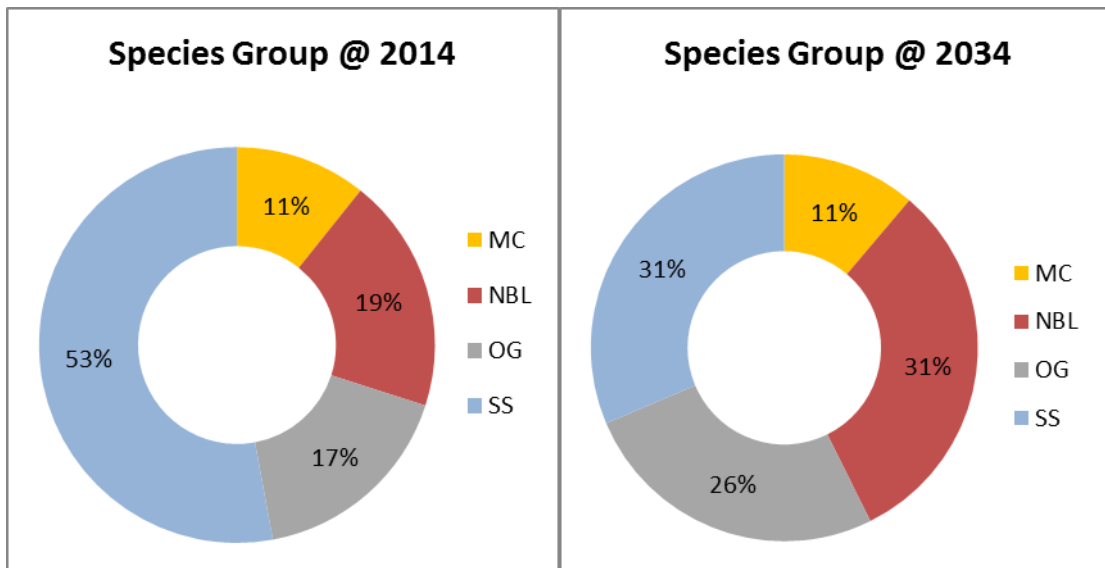


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Table 2 illustrates species change by 2034. This is accompanied by pie charts illustrating the change of species over time.

Table 2: Species change over the Plan period

Species Grp @ 2014	Area Ha	%	Species Grp @ 2034	Area Ha	%	% Change
MC	96.12	11%	MC	100.21	11%	0%
NBL	172.07	19%	NBL	281.78	31%	12%
OG	153.59	17%	OG	232.42	26%	9%
SS	473.6	53%	SS	280.97	31%	-22%
	895.38	100%		895.38	100%	



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3.2.2 Road Access

Vehicular access into Cruach Tairbeirt from the main public road is currently very limited and the forest is very poorly roaded. Access for timber extraction from the east is also limited by the railway line.

A new forest road is being proposed from a single access point along the A83, likely to be located to the east of the Arrochar Outdoor Centre. This new road is subject to a separate EA process which is detailed in an Environmental Statement prepared concurrently with this plan.

3.2.3 LISS/LISS potential

5% of the existing forest currently has the potential to be managed under Low Impact Silvicultural System (LISS). The opportunities for LISS are limited by crop characteristics and maturity.

Some of these areas are larch where recent wind blow has effectively thinned stands which now have the potential for LISS, although these will need to be monitored. LISS areas will be continue to be managed with varying degrees of intervention, from thinning and small group harvesting to the creation of natural reserves with minimal management intervention.

There is the opportunity to manage new spruce and other conifer species to establish the potential for future LISS across a larger proportion of the forest. This is more likely to be achievable because of the increased accessibility of the forest, which will allow thinning and group felling to take place.

The conifer areas will require active management to facilitate the development of LISS. Crop development and the impact of environmental factors suggests that an irregular shelterwood approach might be most appropriate. Thinning may be increased dramatically in the long term as the trees mature so that enough light is available to encourage regeneration.

3.3 Biodiversity

3.3.1 Habitats and species

Prior to being afforested, some of the lower slopes were farmed and there are still remnant mature broadleaved trees which pre-date afforestation. Heather and upland grassland as well as wetland still dominate the open summit of the hill.

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The west facing hill slopes are dominated by broadleaved native woodland, some of which is designated within the Glen Loin SSSI. This site is designated because of the presence of Ash and Oak Upland Woodland habitat. Cruach Tairbeirt is identified as a priority area for Atlantic Upland Oak Woodland expansion to provide a key Forest Habitat Network link between Loch Lomond, Loch Long and Cowal.

The most recent site management statement for the Glen Loin Woods indicates that the oak woods along the upper slopes are in unfavourable, declining condition. It suggests that this is due to heavy browsing by deer. Opportunities to increase deer control and expand the oak woodland should be identified in the plan.

Expansion of Atlantic Oak woodland is also a particular issue along the shores of Loch Lomond, where the existing broadleaved woodland contributes to linking this habitat network along the side of the loch. An extensive area of PAWS has been identified along the lower eastern slopes of Cruach Tairbeirt. This is likely to be suitable for the expansion of oak woodland, but may also be suitable for other BAP habitats, including ash woodland and wet woodland types.

Red squirrel and bats are present in this forest, and there are likely to be otters. Arrochar is designated a grey squirrel control area.

The moorland and the irregular forest edge have been identified by consultees as important habitat for black grouse.

3.3.2 Riparian habitat

There are several major and minor watercourses within the forest, including the steep sided glen of the Inveruglas Water. These offer opportunities for the expansion of riparian species, which would both enhance the habitat network and reinforce their visual presence within the wider landscape.

3.3.3 Invasive species

Rhododendron ponticum (*R. ponticum*) is evident along the lower slopes of the hill, and has encroached into the designated woodland at Glen Loin.

A management plan to tackle the spread of invasive species, including both *R. ponticum* and, in the SSSI, sycamore, will be produced during the first five years of the FDP. In relation to *R. ponticum*, the suggested priorities for control are:

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- Any individual *R. ponticum* or sycamore plants which are located, or seed onto the newly cleared sites adjacent to the existing designated SSSI at Glen Loin, where the lack of dense shade will encourage spread of the rhododendron
- Systematic approach to preventing any further spread of *R. ponticum* within the SSSI, by removing of *R. ponticum* in adjacent coupes before felling
- Establishing Sitka spruce in some areas to create dense shade to act as a barrier to limit spread of *R. ponticum* into key areas of native woodland and PAWS
- Removal of outlying *R. ponticum* within the remainder of the forest, with a view to containing *R. ponticum* within a defined area
- If resources allow, planned sequential removal of the remaining *R. ponticum* within the defined area, with priority given to those areas closest to the SSSI and PAWS.

In addition, there may be a need to control the expansion of spruce and other regeneration on the upper slopes to maintain the open space of the moorland.

3.4 Landscape, landscape designations and landuse

3.4.1 Landscape character and value

Cruach Tairbeirt lies within The Loch Lomond and the Trossachs National Park. Relevant special general qualities of the Park, identified by SNH², include:

- A world-renowned landscape famed for its scenic beauty
- The rich variety of woodlands; and
- Tranquillity

Within the Park, Cruach Tairbeirt straddles the landscape areas of Loch Lomond and Argyll Forest³

Additional, relevant special qualities identified in the Loch Lomond area include:

- Banks of broadleaved woodland

² Scottish Natural Heritage and Loch Lomond and The Trossachs National Park Authority (2010). The special landscape qualities of the Loch Lomond and The Trossachs National Park. Scottish Natural Heritage Commissioned Report, No.376 (iBids and Project no 648).

³ Landscape areas as identified in the Loch Lomond Special Qualities Report

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While additional relevant qualities identified in the Argyll Forest area include:

- A land of forests and trees

These qualities are also supported by the National Scenic Area citation⁴, which applies to the east facing slopes of Cruach Tairbeirt. The citation draws particular attention to the variety of scenery within the NSA, the range of woodland types and large amount of deciduous woodland, which add to diversity promoted by seasonal changes in colour.

Cruach Tairbeirt lies within the 'Forested Hills' landscape character type, as described in the Loch Lomonds and The Trossachs National Park Landscape Character Assessment (SNH, 2009). The opportunities for change identified in this character type reflect its location as a transition between lowlying farmed glens and the more wild and open higher hills. The landscape character assessment suggests that opportunities for landscape change⁵ should include:

- Create graded naturalistic transitions between the upper edge of the forest margins and surrounding open landscapes
- Create continuous cover forests
- Where possible convert plantation forests to native woodland with a high proportion of open ground or montane scrub
- Encourage responsible open access between the hills and adjoining glens

Collectively, these assessments reflect the high value of the woodland within this landscape and also recognise that Cruach Tairbeirt sits at a 'transition point' between the shores of Loch Lomond and the more wooded interior of west Argyll. The woodland should provide a well designed transition between the more structured and formal lower slopes and the open hill summit.

Furthermore, the extent and character of the woodland should be managed to reinforce the broadleaves along the banks of Loch Lomond, while enhancing the diversity of the woodland and the role of individual trees in the landscape.

⁴ Countryside Commission for Scotland (1978) Scotland's Scenic Heritage

⁵ Scottish Natural Heritage, 2009, The Loch Lomonds and The Trossachs National Park Landscape Character Assessment, page 78

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In addition, a naturalistic upper margin, grading between dense woodland and the open land of the summit, would be a preferred approach to the design of the upper edge, while identifying opportunities to incorporate more open space and more native broadleaved woodland would be considered a landscape benefit.

Finally, the internal woodland design is likely to be important in areas where access is encouraged, for example the paths to the summit of Cruach Tairbeirt and the internal forest paths.

3.4.1 Landscape character – project assessment

Site work carried out for the FDP identified that Cruach Tairbeirt is a ‘stand-alone’ hill which rises directly from Loch Lomond and is separated from adjacent hills by glens and low mountain passes. This reinforces its visual prominence.

The hill is elongated north/south, but its terrain is irregular and complex, with steep slopes alternating with minor summits and terraces. The main summit, rising to 415m, is rugged in profile, with rocky outcrops reinforcing the irregularity of the hill slopes.

The woodland is more diverse towards the southern end of the hill, with large trees from former pasture incorporated into the woodland on the lower slopes, as well as some remnant policy type planting and extensive broadleaved woodland.

Steep sided gulleys within the woodland are not easy to pick out from a distance, and while the open space around the summit is relatively well scaled, it could be extended to emphasise height and the importance of the hilltop.

There are no intrusively shaped external or species margins which need to be tackled in the re-design of the forest, but there is a wayleave occupied by power lines on the west facing flank of the hill. In addition, a new forest road is required to create access for forest management, and this will form a new linear feature within the forest.

The landscape reduces significantly in scale from the more open summit of the hill to the more enclosed lower slopes. Management coupes should wherever possible be designed to reflect both the irregular and complex shape of the terrain and this change in landscape scale.

Nevertheless, the opportunity to retain large areas of broadleaves and to manage the more stable crops as LISS along the lower slopes is likely to result in some large management coupes along the lower edge of the forest.

3.4.2 Visibility and Views

This forest is widely visible. While the whole forest is not visible from any one viewpoint, parts of the woodland can be seen from:

- The A82, especially heading north along Loch Lomond side – although the views are intermittent and partially screened by roadside trees
- The A83, especially from the west side of Loch Long heading north from Ardgartan, when again only part of the forest can be seen.
- The West Highland Way (WHW), which extends along the eastern side of Loch Lomond, offering frequent intermittent views of the eastern face of the hill.
- Inversnaid, including the WHW and the ferry pier and the Inversnaid Hotel
- The café and pier at Inveruglas
- The Three Lochs Way, a slightly elevated access route that overlooks the south face of Cruach Tairbeirt.
- From the loch, including the seasonal passenger ferries at Inversnaid/Inveruglas and to and from Tarbet, as well as from loch cruises and other boating traffic.
- The west side of Loch Lomond, most notably at the Firkin Point picnic site.
- Ben Lomond, a key munro
- The Cobbler, a well known and popular summit, as well as Ben Vane, Ben Ime and Beinn Narnain
- Ben Reoch (to the south, also accessible from Tarbet)
- Other local hills and summits.

The railway line passes along the lower slopes of Cruach Tairbeirt hill. Views from the train are limited to immediate trackside vegetation and occasional views up the slopes, but do not offer clear views of the hillside due to visual foreshortening. It has been suggested that consideration be given to opening up views of Loch Lomond from the railway, although this may conflict with the objective to retain broadleaved woodland along the lower slopes adjacent to Loch Lomond.

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Eight viewpoints (See Map 1) have been used to illustrate the felling and restocking proposals in the FDP. These were selected on the basis of amount of visibility and the significance of views.

These viewpoints are:

- Inversnaid Pier
- Firkin Point
- A83 near Ardgartan
- Ben Lomond
- Footpath to The Cobbler
- Three Lochs Way
- Little Hills (path to Ben Vane)
- Inveruglas Pier

In addition, a number of other views were selected as 'design viewpoints', taken into account by the designers, but not used to illustrate the FDP proposals. These are:

- The West Highland Way at Cailness
- A viewpoint in the middle of Loch Lomond
- The A82 south of Tarbet

The views from the summit of Cruach Tairbeirt are extensive and panoramic. In addition, however, there are opportunities for views along Loch Lomond from waymarked paths at a lower level.

There are at least three informal but well used routes to the summit, which offers fine views down Loch Lomond, to the islands, and west to the Arrochar Alps, as well as to Ben Lomond in the south east and north to Ben Vorlich.

Views from the waymarked loop accessible from the railway station carpark have in the past offered the opportunity to view south along the length of Loch Lomond, but these have now largely been overgrown by trees. These fine views could be opened up with well placed and designed felling proposals.

The remaining lower level routes (for example between Arrochar and Tarbet), are within trees and views focus largely on the detail of the woodland, with glimpse views across the glens. Wherever possible, continuous cover management of the woodland, and judicious thinning and

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felling should aim to diversify the woodland and experience of the woodland from these paths.

3.4.3 Neighbouring landuse

The woodland marches with another Forestry Commission owned woodland to the west. In addition, to the north, lies Inveruglas estate, and to the south, while the immediate neighbours are the villages of Tarbet and Arrochar where some private gardens back onto the forest, the neighbouring landholdings are Luss Estates.

3.5 Social factors

3.5.1 Recreation

The southern reaches of the hill are well used for informal recreation, with walkers and dog walkers from the local communities using the existing waymarked and informal paths. There are three well-trodden paths to the hill summit, with the preferred route to the east.

In addition, there is a path along the lower southern slopes that links Tarbet and Arrochar.

There is very little evident recreation use of the northern half of the hill, although this is likely to change when the new forest road is built.

3.5.2 Community

Two large villages, Tarbet and Arrochar, lie adjacent to the forest, and the village of Succoth is located in Glen Loin.

In addition to these communities, there are a number of hotels and guest houses in the villages, and the Army Cadet Centre is located on the A83 at the edge of the forest.

3.5.3 Heritage

A farmstead and field system has been identified in the south west corner of the forest between Arrochar and Tarbet. This is recorded on the RCHAMS Canmore mapping system⁶. This lies within an established broadleaved area which is unlikely to be felled.

6

http://canmoremapping.rcahms.gov.uk/index.php?action=do_details&numlink=127057&cache_name=c2l0ZW5hbWUsVGFyYmVOX3NIYXJjaHR5cGUsc2ltdGxIX29yYQ==&set=0&list_z=0

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The area more widely is known for its archaeological interest, and it is likely that there are sites which are hidden in the forest.

When felling and restocking are carried out, the Forests and Historic Environment Guidelines (2011) will be strictly adhered to. Site assessment prior to forest operations will identify potential areas of archaeological interest and detail recommended actions to ensure that the Guidelines are implemented.

Archaeological sites encountered during forest operations will be built into the network of open spaces defined in the restocking plan, and contribute to the habitat network as open glades. These additional sites not yet identified will require amendments to the restocking plan to accommodate the additional open space.

3.6 Statutory requirements and key external policies

The relevant external policies have been covered by topic in the text above.

(accessed on 12 July 2013)

4.0 Analysis and Concept

4.1 Analysis

Maps 4 and Table 3 below illustrate the factors, through consultation and review, which have significantly influenced the design and long term vision for the forest.

The main issues addressed by this plan are:

- **Timber production:** The forest has the potential to produce some good quality timber and is situated close to markets. Brash mats may be required to protect peat areas. There are areas of steep ground. There are opportunities to produce commercial, high quality timber output with a particular focus on maximising the range of timber products through practicing a combination of coupe felling and LISS as appropriate;
- **Native woodland and PAWS:** The area of forest managed as native woodland has increased, in part to consolidate the presence of the designated SSSI at Glen Loin and provide an adequate 'buffer' to allow its sustainable management and in part to restore PAWS sites on the eastern face of the hill;
- **LISS:** The area of forest managed as continuous cover has been reviewed, and increased potential to secure LISS management options has been identified to reflect site and crop potential. Opportunities identified include restocking with species which will maximise the suitability of the crop for LISS, and establishing a thinning programme which creates opportunities for LISS. LISS will underpin timber production, forest sustainability, biodiversity, recreation and landscape interests;
- **Deer and grazing damage:** The plan recognises that fencing is likely to be kept to a minimum, however some temporary internal fencing is likely to be required to protect more vulnerable species. Deer management will be consolidated and increased to proactively assist in the establishment of broadleaves through natural regeneration and the recruitment of regenerating Scots Pine and other commercial species within areas managed by LISS.
- **Landscape:** The main focus will be aiming to create well shaped management coupes that reflect landform shape on the east side of the hill, establishing a well shaped upper margin on the western face, and creating a diverse and more intimate scale of forest associated with the path network;
- **Riparian management:** Broadleaves along watercourses will be increased through planting and creating generous open space and recruiting natural regenerating broadleaves into the riparian zone;

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- **Biodiversity:** The main focus of management for biodiversity will be to retain suitable habitat for red squirrel and possibly black grouse. Any areas of wetland identified at felling will not be restocked, but left as open space to benefit wild life;
- **Recreation:** Informal recreation use will be maintained and the setting of paths enhanced. In addition, scope for a cycle route through the forest to provide an alternative route to the A82 along Loch Lomond will be explored;
- **Historic sites:** Where standing ruins and archaeological sites are identified, these will be subsumed into the network of open spaces.

4.2 Concepts of the plan

Map 5 (Design Concept) and Table 3 below illustrate how the issues identified in analysis have been taken into account in relation to the forest plan management proposals.

In summary the design concept aims to:

- Provide phased and well balanced felling proposals which will develop a diverse age and species structure which reflects landscape scale and landform shape;
- Replace less productive species and species which will not thrive in the face of climatic change with a range of timber producing species appropriate to changing site conditions which will improve the quality of timber production and maintain economic options;
- Maintain the percentage of continuous cover within the forest, and increase opportunities for expanding continuous cover in the future, through careful choice of restocking options on accessible ground;
- Establish felling and LISS management coupes which reflect landscape scale, ranging in scale from small scale coupes along the lower edge of the forest and within areas of high recreation interest to larger coupes on the hill summits
- Expand the amount of native woodland which will be established in the forest;
- Maintain and where possible enhance the habitat for red squirrel;
- Identify opportunities to increase native riparian woodland along watercourses or establish links to adjacent broadleaved areas through planting or through regeneration;
- Establish a sustained approach to deer management which will support the establishment of regenerating broadleaves and conifers, especially in areas where fencing and tube protection has been limited, and where LISS is the principal management technique

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- Retain the mature trees of minor species which create 'feature trees' or established species diversity within the forest, adding interest for those who use the forest for informal recreation

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Table 3: Analysis of opportunities, constraints and concept relative to significant plan objectives

Factor	Opportunity	Constraint	Concept
Creating a forest more able to withstand predicted climate change	Use LISS to help sustain woodland cover, and plan restock to create diverse range of species and resilient forest structure in terms of both species and age	Uncertainty in terms of pest and diseases, as well as weather related events. Some conifer and BL planting may be difficult to achieve without well resourced deer control.	Restock with varied species appropriate to predicted site conditions to ensure forest resilience. Manage lower slopes as LISS if possible and create buffers of riparian woodland around steep watercourses to reduce run off. Focus deer management on early years establishment
Enhancing the landscape and contributing to the scenic value of the National Park	Felling coupes and restructured woodland shapes could reflect the scale of topography and define the shape of landform more clearly than the current even aged woodland. New planting offers the opportunity to reshape the upper margin and to create an appropriately diverse species pattern that reflects character.	Extensive areas of broadleaves and potential for LISS along the lower slopes means that the even colour and texture of these areas are likely to limit opportunities to distinguish landform.	Use LISS on the lower slopes even although the relief of the landform will be lost. The broadleaves will reflect lochside character and add to autumn colour. Add species that further enhance this, such as aspen, and clearly define watercourses. Create well shaped and scaled coupes in clear fell areas.

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Table 3 continued:

Factor	Opportunity	Constraint	Concept
Producing wood and marketable timber	The combination of clear felling and LISS management will result in diverse timber products well suited to local markets, as well as sustainability and environmental objectives. Felling and restocking will also create a woodland of diverse age structure.	There is evidence of wind blow within the crop and this may limit opportunities to extend the felling period. In areas retained for LISS, dramatic thinning is likely to be required to create enough light for regeneration, and this may encourage wind blow. Larger timber sizes may limit market options. Once planted, early thinning of younger crops to establish LISS may be uneconomic.	The long term benefits of both age diversity and LISS management, including the contribution they make to landscape, biodiversity, recreation setting and economic sustainability are likely to outweigh risks associated with wind blow and costs associated with early thinning. Aim to consolidate thinning proposals into contracts which are most efficient. Continue to source markets for large timber sizes

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Table 3 continued:

Factor	Opportunity	Constraint	Concept
Maintaining and creating new wildlife habitats, including consolidating the SSSI in Glen Loin	Remove spruce and other non native species, including R ponticum, from the SSSI and adjacent slopes. Aim to consolidate the SSSI woodland with additional planting. Use LISS and new planting to reinforce red squirrel habitat and establish diverse species and age structure which will create new habitat. Create a habitat network combining open space, riparian woodland, BL, natural reserve and LISS. Maintain an irregular upper margin and moorland open hill to retain a suitable habitat for black grouse.	R. ponticum is widespread along the southern slopes and can spread from neighbouring gardens so may be difficult to eradicate completely. Regeneration and the establishment of new BL planting may be difficult to achieve without well resourced deer control.	Consolidate the SSSI by removing all species which do not reflect the protected habitat NVC on the west facing slopes and limit spread of R ponticum and self seeding conifers. Create a habitat network that links to adjacent woodland and open ground habitats. Maintain open moorland on the top of the hill, along with an irregularly shaped upper margin. Focus deer management on early years establishment

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Table 3 continued:

Factor	Opportunity	Constraint	Concept
Native woodland restoration	<p>Restore native woodland on PAWS on the west facing slopes.</p> <p>To establish links across the extensive Atlantic oak woodland that ranges along Loch Lomond, Cowal and Loch long</p>	<p>The sites occupied by PAWS currently offer the best ground for diverse conifer and other BL species, and restoring ancient woodland species will limit opportunities for other forms of species diversification.</p> <p>Regeneration and the establishment of new BL planting may be difficult to achieve without well resourced deer control.</p>	<p>PAWS restoration is a current FE priority, and therefore while the area is extensive, this should go ahead.</p> <p>Identify opportunities for regenerating broadleaves and plant large areas of broadleaves that are easier to manage.</p> <p>Focus deer management on early years establishment.</p>

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Table 3 continued:

Factor	Opportunity	Constraint	Concept
Providing public recreation	<p>To establish a diverse framework of open space and different species and age of trees, including established stretches of LISS, which will provide an attractive setting for a path network which takes advantage of views along Loch Lomond and the extensive scope of woodland and open space habitats.</p> <p>Opportunity to establish a cycle network using forest roads</p>	<p>The forest road network will irrevocably alter the setting and alignment of some of the existing road network and it will be difficult to achieve the intimacy of the setting of paths along the wider wayleaves required for forest roads.</p>	<p>Ensure that small scale felling and diverse restocking is used to create an attractive setting for the new road network.</p> <p>Manage existing LISS to enhance the setting of the path network, and establish new species which can be managed as LISS in the future.</p> <p>Clearly identify open space which can be maintained to reveal spectacular views.</p> <p>Explore the potential for establishing a cycle route through the forest as an alternative to the A82</p>

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Table 3 continued:

Factor	Opportunity	Constraint	Concept
Conserving archaeological features	To identify archaeological features and maintain an adequate setting for their on going conservation. There may be additional opportunities to link any sites to open space and habitat network within the forest and to the recreation network.	Ongoing retention of open space may be costly.	Identify and conserve archaeological sites, establishing open space that meets with the relevant guidance, but also considering linking sites to deer glades, or provide easy access, to ensure that on going management of open space is more likely.
Protecting water quality and riparian habitats	To maintain and where necessary establish permanent riparian woodland and open space along watercourses. Aim to link these to a habitat network within and outwith the woodland.	Limited opportunities to fence or use tubes to protect regenerating broadleaves. Regeneration and the establishment of new BL planting may be difficult to achieve without well resourced deer control.	Identify opportunities for regenerating broadleaves and plant large areas of broadleaves that may be easier to manage, possibly by linking to adjacent areas of BL established on PAWS. Focus deer management on early years establishment.

5.0 Forest Design Plan Proposals

5.1 Clear felling

Opportunities to manage the forest through clear fell have been identified and are included on the Felling Map (Map 6).

The main aim for clear felling over this plan period is to remove areas of wind blow and begin the process of restructuring the age of the forest cover.

Coupes adjoining felled areas will be retained until restocking of the felled area has reached a minimum height of 2 metres. If this is not possible, the Conservancy office will be notified and options discussed and agreed prior to further felling taking place.

Approximately 77000m³ of timber will be harvested in the 10 year period for which approval is sought, this harvesting being evenly spread across the period.

5.2 Thinning

Opportunities to thin existing woodland have been identified and are included on the Felling and Thinning Maps (Map 8).

The areas suitable for thinning are limited due to the limited access options constraining past silvicultural options.

The enhanced access, better returns to thinning operations & younger established crops will broaden the scope for thinning as the forest is restructured. Future thinning will be on going, especially when young trees reach thinnable age and have the potential for establishing LISS.

5.3 LISS

Opportunities to manage existing crops through LISS have been identified and are included on the Felling and Thinning Maps (Maps 6, 8).

Opportunities to establish species suitable for future management as LISS have been identified and these are noted on the Future Forest Restocking map (Map 7).

The LISS systems employed will be dependent on the characteristics of each site and the existing forest stands. The result will be a mosaic of

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interventions using a range of different systems, based primarily on two LISS systems will be employed.

Firstly, Group Shelterwood, which aims to produce a stand that is uneven-aged in appearance. In this system as the stand is thinned, areas of existing regeneration are identified and groups of trees are felled around these areas to open them up. The gaps are then gradually expanded at each intervention.

The other CCF system to be employed is Uniform Shelterwood. In this system the stand receives regular thinning treatments. These culminate in a very heavy thinning retaining approximately 100 mature trees per hectare to produce a good supply of seed allowing the area to regenerate.

This system tends to produce a more even-aged structure than the group systems.

The cycle for CCF areas is up to 10 years, which means that each stand of trees in will receive thinning treatment once in every ten-year period.

LISS will help maintain the population of red squirrel, woodland birds and other species which benefit from a stable habitat.

5.4 Future habitats and species

LISS is related to current conifer and broadleaved stands along some of the lower eastern and southern slopes, while along the west facing slopes, broadleaved cover associated with the Glen Loin SSSI will be retained.

Elsewhere, clear fell offers four main opportunities related to changing woodland habitats.

The first is to restore the extensive PAWS to native woodland, which will radically change the habitat and appearance of the east facing slopes.

The second is to similarly establish native woodland related to consolidating the presence and integrity of the Glen loin SSSI.

The third opportunity is to establish a varied age range of Sitka spruce that relates well to landform and can underpin future felling plans.

Finally, there is an opportunity is to identify soils that can sustain a diverse range of conifer and BL species in coupes that range in scale and

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distribution across the woodland, forming a network of species that could be thinned to form LISS in the future, create a semi-permanent framework for recreation and provide continuous cover for species that require stable habitats.

LISS and BL in particular will form part of a habitat network that extends through the forest and links to adjacent habitats consolidating a wider network.

Tree species that form the basis for future restocking are therefore likely to include:

Norway spruce, Douglas fir, Noble fir, Red cedar, Redwood

Oak, Birch, Aspen, Cherry

5.5 Management of open land

There will be an increase in open land within the plan area, with open space opened up along watercourses where conifer is currently planted, and new rides being established associated with well shaped coupe boundaries.

Most of the open land will be allowed to revert to a semi-natural state over the plan period, with an emphasis on allowing moorland to regenerate along the upper slopes and for broadleaves to colonise some of the spaces cleared along the watercourses.

Wetland, in particular, will not be replanted and forms a valuable, self maintained addition to the open space network.

Where ever possible, open spaces will be linked into a habitat network extending from Glen Loin to the open hill then on to the shoreline of the loch, and across the forest from north to south.

5.6 Deer management

The forest is not deer fenced, and to assist in the establishment of both planted and regenerating trees, robust and sustained deer control is required to underpin regeneration and recruitment of broadleaves and non-sitka spruce conifers.

5.7 Critical success factors

LISS – monitor levels of recruitment of understorey, to ensure that regeneration is working as expected. Monitor to ensure that diversity of species is being recruited as desired. Adapt silvicultural systems, including where necessary, much increased thinning, to improve light levels in conifer crops and to reflect the distribution of regeneration. Explore local niche marketing of forest products to enhance returns for LISS. Establish a targeted thinning programme that will bring relevant plan areas into LISS during the lifetime of the plan.

Deer control – it is vital that during the period of establishing broadleaves and native woodland, either through planting or regeneration, deer control is used to ensure success. Broadleaves should be monitored, and if necessary, replanting with fenced enclosures should be used if success rate is low after the first ten years of the plan.

Rhododendron ponticum control – all *R. ponticum* should be eradicated from the SSSI and adjacent sites during the lifetime of this plan. A removal plan should be established and implemented, with key areas targeted related to the felling and restocking programme.

Species diversity – Establishing a range of BL and conifer species that create a diverse setting for the path network and allow views to be maintained is important to maximise the role of the forest for informal recreation. This will also reinforce its contribution to the wider recreation resource of the National Park. The principle method of re-establishing productive conifer sites will be by restocking. Restocking will take place within four years following clearfelling, with appropriate species planted at 2700 stems per hectare (sph), aiming to achieve 2500sph at the end of the establishment phase. Restocking for productive broadleaved species will take place within the same timescale, but with planting densities of up to 3500sph (depending on species planted). The preferred method of establishing non-productive broadleaved woodland is by natural regeneration, and this is proposed where there is an appropriate seed source within 50 metres of the felling site. The aim is to achieve a density of 1100 sph within 10 years of felling – if at survey and review after 5 years this is unlikely to be achieved by year 10, then supplementary planting will take place to ensure establishment by that time.

Felling Schedule

The table below indicates approximate felling area and volume figures for the design plan area

Phase	Area (ha)	Volume (m ³)
1	63.4	29800
2	111.7	52500

Appendix I: Forest Design Plan Consultation Record

Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
Loch Lomond and Trossachs National Park		16 January 2013	<p>Highly visible woodland, within an NSA and the Park – at least six viewpoints required.</p> <p>Follow good forest design, with especial attention to significant areas of open space, exposure of topographic features, lower upper margin, redesign of forest edge and diversification of species.</p> <p>Restore PAWS (for example on the eastern slopes) and extend existing native woodland</p> <p>Identify stands and coupes that can be managed under CCF</p> <p>Identify and appropriately protect archaeological and cultural heritage sites.</p> <p>Ensure that popular informal access routes, eg to the summit of Cruach Tairbeirt, are taken into account in the restocking design, and consider improvements and expansion to access throughout the woodland.</p> <p>The Glen Loin oak woodlands SAC/SSSI are in unfavourable</p>	<p>Viewpoints agreed with the Park</p> <p>Key attributes identified in landscape analysis, and good practice guidance followed</p> <p>PAWS sites identified and proposals for restoration. Opportunities for native woodland expansion and CCF identified.</p> <p>Known archaeological sites protected as per Guidelines, and protocol in place for identifying unrecorded remains.</p>

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			<p>condition due to over-browsing be deer. Bracken and deer control should be undertaken to encourage natural regeneration.</p> <p>Rhododendron control is a major issue, and spruce and sycamore removal is also required, especially in designated areas and open moorland.</p> <p>Consider management of woodland to improve habitats for black grouse, red squirrel, bats, golden eagle and pearl bordered fritillary.</p> <p>Enhance riparian woodland within the forest.</p> <p>If resources allow, identify an opportunity to create a view of Loch Lomond from the railway line.</p> <p>Note that there are private water supplies in this area.</p>	
Arrochar Community Council		17 January 2013	Request to see draft proposals and offer advice on local knowledge	Presentation of the draft proposals to the local community council included as part of the consultation process.
Scottish Natural Heritage		18 January 2013	The FDP proposals should positively manage the SSSI/SAC within the woodland. The plan should also ensure that proposals take into account Black Grouse, red squirrel and otters if found in the woodland. Otters are a qualifying feature of the Loch Lomond Woods SAC.	Proposals will include consolidation of the SSSI and PAWS restoration. The upper margin of the woodland will be restocked with an irregular edge that will be amenable to Black grouse. Management of some trees

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				as LISS and the future strategy for PAWS restoration and long term LISS on lower slopes should enhance red squirrel habitat.
RSPB		14 January 2014	Black grouse are present to the east west and north of Cruach Tairbeirt and proposals should take into account their possible presence.	See above

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Appendix II: Tolerance Table

	Adjustment to felling coupe boundaries	Timing of restocking	Change to species (including boundaries)	Windthrow response	Changes to road lines
FC Approval not normally required	Up to 1ha or 10% of coupe - whichever is less	For productive species, up to 3 planting seasons after felling Up to 10 planting seasons for natural regeneration	Change within species group i.e. diverse conifers; broadleaves; Sitka spruce Non native conifers in native woodland areas and designated open space up to 400 stems/ha. <20% increase in area of Sitka spruce	Up to 2ha as a single unit with >50%windblow	
Approval by exchange of letters and map	1ha to 5ha or 20% of coupe - whichever is less	For productive species, 3 – 5 years after felling	>20% increase in area of Sitka spruce	2ha to 20ha as a single unit with >50% windblow	Additional felling of trees not agreed in plan Departures of >60m in either direction from centre line of road
Approval by formal plan amendment	>5ha	For productive species, over 5 planting seasons after felling	Change from specified native species Change between species groups as defined above	>20ha as a single unit	As above, depending on sensitivity

Appendix III. FDP Brief

The brief is contained within Section 2.0 – Objectives and aims of the plan.