Forestry Commission Scotland
Coimisean na Coillteearachd Alba

Planning

Cowal and Trossachs Forest District

Land Management Plan

Glen Croe

Cowal and Trossachs Forest District

Glen Croe

Land Management Plan

Approval date:

Plan Reference No:

Plan Approval Date:

Plan Expiry Date:

CSM 6 Appendix 1b

FOREST ENTERPRISE - Application for Land Management Plan Approvals in Scotland

Forest Enterprise - Property

Forest District:	Cowal & Trossachs
Woodland or property name:	Glen Croe
Nearest town, village or locality:	Arrochar
OS Grid reference:	NN271058
Local Authority district/unitary Authority:	LLTNP

Areas for approval

	Conifer	Broadleaf
Clear felling	219ha	
Selective felling		
Restocking	196ha	42ha
New planting (complete appendix 4)		

1. I apply for Land Management Plan approval for the property described above and in the enclosed Land Management Plan.

2. I apply for an opinion under the terms of the Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 for 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 25th February 2013.

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 land management 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 ……. Signed……

Forest District Manager Conservator

District …Cowal & Trossachs FD Conservancy……

Date 16th February 2018 **Date of Approval**……

Date approval ends ……..

CSM 6 Appendix 4

FOREST ENTERPRISE - Application for Approval of New Planting

1. Forest Enterprise – Property

Forest District:	Cowal & Trossachs
Woodland or property name:	Glen Croe
Nearest town, village or locality:	Arrochar
OS Grid reference:	NN271058
Local Authority district/unitary	LLTNP

2. Proposed areas to nearest tenth of a hectare

New Planting	
Open Ground	
Existing woodland	
Total	

3. Special areas and protected land

Designation	Area Name or Number	Comments

4. Proposal details of new planting

Area Name or number	Gross Area (Ha)	P Year	Spp	Area (Ha)	Open Ground (Ha)	Comments

I apply for Authority to plant 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 Cowal & Trossachs FD

Date .....

Date approval ends: .....

Please complete this form to find out if you need consent from Forestry Commission Scotland, under the **Forestry (Environmental Impact Assessment) (Scotland) Regulations 2019**, to carry out your proposed forestry project. Please refer to Schedule 2 Selection Criteria for Screening Forestry Projects under Applying for an opinion. If you are not sure about what information to include on this form please contact your local Conservancy office.

Proposed Work							
Please put a cross in the box to indicate the type of work you are proposing to carry out. Give the area in hectares and where appropriate the percentage of conifers and broadleaves							
Proposed Work	select	Area in hectares	% Conifer	% Broad-leaves	Proposed work	select	Area in hectares
Afforestation	☐				Forest roads	☒	3.7
Deforestation	☐				Forest quarry	☐	
Location of work		Glen Croe LMP area					

Description of Forestry Project and Location
Provide details of the forestry project (size, design, use of natural resources such as soil, and the cumulative effect if relevant). Please attach map(s) showing the boundary of the proposed work and other known details.
See section 3.2 of LMP and map M6. Forest roads includes ATV tracks.

Provide details on the existing land use and the environmental sensitivity of the area that is likely to be affected by the forestry project.
These are described in the LMP.

Description of Likely Significant Effects
Provide details on any likely significant effects that the project will have on the environment (resulting from the project itself or the use of natural resources) and the extent of the information available to assist you with this assessment.
There will be no significant landscape impacts.

Include details of any consultees or stakeholders that you have contacted in order to make this assessment. Please include any relevant correspondence you have received from them.
See LMP.

Mitigation of Likely Significant Effects
If you believe there are likely significant effects that the project will have on the environment, provide information on the opportunities you have taken to mitigate these effects.
No significant impacts.

Sensitive Areas	
Please indicate if any of the proposed forestry project is within a sensitive area. Choose the sensitive area from the drop down below and give the area of the proposal within it.	
Sensitive Area	Area
National Park (NP)	3.7
Select...	
Select...	
Select...	
Select...	

Property Details			
Property Name:	Glen Croe		
Business Reference Number:		Main Location Code:	
Grid Reference: (e.g. NH 234 567)	NN271058	Nearest town or locality:	Arrochar
Local Authority:		LLTNP	

Owner's Details					
Title:	Mr	Forename:	John		
Surname:	Hair				
Organisation:	FES		Position:	Planning Manager	
Primary Contact Number:	0300 067 6600		Alternative Contact Number:		
Email:					
Address:	FES				
Aberfoyle					
Postcode:	FK8 3UX		Country:		
Is this the correspondence address?			Yes		

Agent's Details					
Title:		Forename:			
Surname:					
Organisation:			Position:		
Primary Contact Number:			Alternative Contact Number:		
Email:					
Address:					
Postcode:			Country:		
Is this the correspondence address?			Yes		

Office Use Only	
GLS Ref number:	

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1.0: Summary

The Glen Croe Land Management Plan (LMP, see Map M1) area covers 3082 Ha, over half of which is open hill ground rising to 926m.

The land lies within the Loch Lomond and The Trossachs National Park (LLTNP) and is of high landscape significance. The forest and open hill offer a wide range of recreational opportunities with the Cobbler being a very popular hill summit.

The forest was established with timber production as a priority and timber production remains an important objective today, however extensive felling and replanting has created a more diverse forest structure with a wider range of species, and this helps to deliver multi-purpose benefits. The forest is FSC certified and the management will seek at all times to meet the UK Woodland Assurance Standard.

This LMP builds on the previous forest plans by outlining future forest management, alongside the future management of the open hill ground and issues such as slope stability above the A83 into the planning process.

The plan presents felling and replanting proposals for the first ten years (2019 to 2028) in detail. Forest road and track formation during this period are also detailed. The first ten years are important because this relates to the parts of the plan that seeks approval for specific forestry operations. These are set out in Section 2 of this plan.

The following ten years (post 2028) and beyond are also considered in the plan to indicate a direction of travel and to provide context. These long term plan proposals are set out in the maps associated for each individual zone, and then as a whole in Section 13.

Because the plan area is large and there are areas with very different characteristics, the plan area has been divided into five management zones, identified because of their common characteristics, issues and challenges and the plan is presented on this basis.

Objectives

Plan objectives for each zone have been identified, as well as overall objectives that cover the whole land area.

The aims which have informed the plan objectives are:

- Contributing to reducing land slips above the A83
- Maintaining a quality setting for recreation, both across the open hill and within the woodland;
- Enhancing the landscape, in terms of the views from the A83, the Rest and Be Thankful, key hill summits and the wider LLTNP;
- Sustaining timber production and diversifying timber product assortment as appropriate;
- Maintaining a buffer zone to protect the red squirrel stronghold in Cowal; and
- Improving water quality and habitats across the LMP area

Summary of management proposals

The felling proposals in the first twenty years of the plan can be summarised as follows:

Felling	Area Ha	% (not incl OL)
Phase 1: 2019 - 2023	78.45	6%
Phase 2: 2024 - 2028	140.59	10%
Phase 3: 2029 - 2033	174.10	13%
Phase 4: 2034 - 2038	124.31	9%
Total	517.45	38%

The species composition over the first twenty years changes over time as follows:

Species Group	Area Ha @ 2019	% @ 2019 (excl. OL)	Area Ha @ 2028	% @ 2028 (excl. OL)	Area Ha @ 2038	% @ 2038 (excl. OL)	% Change @ 2038
Mixed Broadleaves	5	0%	5	0%	5	0%	0%
Mixed Conifers/Norway spruce (MC/NS)	120	9%	165	12%	175	13%	4%
Native Broadleaves (NBL)	123	9%	141	10%	222	16%	7%
NBL/SS	0	0%	44	3%	65	5%	5%
Open Ground	283	20%	278	20%	297	21%	1%
Sitka Spruce (SS)	854	62%	752	55%	626	45%	-17%
Other Land (OL)	1697		1697		1697		
Gross Total	3082		3082		3082		
Forest Area	1385	100%	1385	100%	1385	100%	0%

NB. Area percentage is of forested area which incorporates the area designated as open ground in the above table

The biggest change in species composition relates to the proposed reduction of SS and the increase in broadleaves (BL) BL/ conifer mixtures. The main driver for this change is felling mature conifers on steep slopes above the A83 which are then proposed to be hot planted with a mixture of broadleaves and conifers with varied rooting depths to likely to assist in future slope stabilisation.

Additional opportunities to establish mixed conifers have also been identified in accessible areas where recreation is a primary objective and the roading network allows potential for future thinning. Some restocking of native woodland has also been identified to restore PAWS.

It is proposed to create a new road to take timber traffic in Glen Loin away from the village of Succoth and through the neighbouring Cruach Tarbert forest in the future.

In addition, it is proposed to increase deer culling during the first ten years of the LMP. This will require additional ATV access routes. Increased deer management will assist in developing ground cover vegetation on the open hill, which may reduce rainfall runoff and enhance the biodiversity value of the open land. Deer management is also required to help establish more diverse woodland, including slope stability woodland, in future years.

Overall, the operations planned for the forest during the period 2019 – 2028 include the following activities:

Planned operations	***2019 – 2028 plan period***
Felling	*219Ha*
Thinning	*114Ha*
Restock	*238Ha*
Road Construction	*1939m*
ATV Track Construction	*12994m*
Quarry	*One*

Note: Restock area includes areas already felled & awaiting restocking (39Ha).

Note: Road Construction & ATV Track Construction outwith the existing road/track footprint require both Prior Notification & an EIA determination.

Consultation & further Information

During the development of this plan we have consulted with the local community and other stakeholders. For further information on the plan please contact:

John Hair
Planning Manager

Forest Enterprise Scotland
Cowal & Trossachs Forest District
Aberfoyle
Stirling
FK8 3UX
john.hair@forestry.gsi.gov.uk

+44 0300 0676600 (Switchboard)
+44 0300 0676597 (Direct)
+44 07764 838735 (Mobile)

2.0: Legal and Regulatory Requirements

The Glen Croe LMP area covers 3082 Ha, over half of which is open hill ground rising to 926m., as shown on Map M2

2.1 Summary of planned operations

The operations planned for the Glen Croe LMP during the period 2019 – 2028 include the following activities:

Planned operations	***2019 – 2028 plan period***	***% of woodland area***
Felling	219Ha	16
Thinning	114Ha	8
Restock	238Ha	17
Road Construction	1939m	
ATV Track Construction	12994m	
Quarry	One	

Note: Restock area includes areas already felled & awaiting restocking (39Ha) and some integral Open Ground (19Ha)

Note: Road Construction & ATV Track Construction outwith the existing road/track footprint require both Prior Notification & an EIA determination.

2.2 Proposed Felling in years 2019-2028

As shown in map M3 (Proposed felling operations in the first ten years), it is proposed that 6% of the forest area will be felled between 2019 and 2023, and 10% of the forest area will be felled between 2024 and 2028. The breakdown of predicted yield is indicated below.

Operation	**Area**	**Indicative Yield T**	**% of Forest Area**
Clearfell Phase 1 (2019 - 2023):	78.45	29027	6%
Clearfell Phase 2 (2024 - 2028):	140.59	52018	10%
Thinning 2019 - 2028	114.13	6848	8%

Table showing felling areas & indicative yields from first ten years of plan

The change in age structure between years 2019 and 2028 is as follows:

Age Class	Area Ha @ 2019	% of stocked area	Area Ha @ 2028	% of stocked area
Open	1997		1961	
60+ Mature Forest	131	12%	157	14%
41 to 60 yrs Mature Forest	327	30%	284	25%
21 to 40 yrs Thicket	515	47%	402	36%
11 to 20 yrs Scrub/early thicket	89	8%	23	2%
0 to 10 yrs Establishment	23	2%	255	23%
Total	3082		3082	

2.3 Proposed thinning in years 2019-2028

Map M4 illustrates the potential for thinning in the first ten years of the plan. There is potential to thin 8% of the forest area during the ten years between 2019 and 2028.

2.4 Proposed restocking in years 2019-2028

Map M5 illustrates the restocking proposals in the first ten years of the plan. Species proposed for restocking in this first ten years are as follows:

Proposed Restock	**Area Ha**	**% of Area Restocked**
Mixed Conifer	37.54	14%
Native Broadleaves (NBL)	18.11	7%
NBL/SS	48.44	19%
Norway Spruce	7.76	3%
Open Ground	20.14	8%
Sitka Spruce (SS)	126.41	49%
Total	258.40	100%
Note: Restock Area includes Phase 1 & 2 (219Ha) and areas already felled (39Ha) but not restocked & areas of integral OG planted (19Ha)		

Table showing proposed restocking area breakdown from first ten years of plan

This restocking will change the forest species composition as follows:

Species Group	Area Ha @ 2019	% @ 2019 (excl. OL)	Area Ha @ 2028	% @ 2028 (excl. OL)
Mixed Broadleaves	5	0%	5	0%
Mixed Conifers (MC)	120	9%	165	12%
Native Broadleaves (NBL)	123	9%	141	10%
NBL/SS	0	0%	44	3%
Open Ground	283	20%	278	20%
Sitka Spruce (SS)	854	62%	752	55%
Other Land (OL)	1697		1697	
Gross Total	3082		3082	
Forest Area	1385	100%	1385	100%

Table showing proposed change in Forest Composition from 2019 to 2028
Note: Felled areas awaiting restock allocated as SS

The biggest change in species composition relates to the proposed reduction of SS and the increase in broadleaves (BL) BL/ conifer mixtures. The main driver for this change is felling mature conifers on steep slopes above the A83 which are then proposed to be hot planted with a mixture of native broadleaves and conifers with varied rooting depths to likely to assist in future slope stabilisation.

Where production is the key objective conifers will be planted at densities of approximately 2700 stems per hectare (sph) and broadleaves in the region of 3500. Restocking will be within two to three years of felling.

Target densities for natural regeneration, of native and non-native species, will vary depending on site objectives. On any given site density might vary between 250 sph to 1600 sph with an overall figure of approximately 1100 sph. Natural regeneration sites will be assessed five to eight years after felling. If it seems unlikely regeneration will become established by year 10, the site will be planted to achieve the desired stocking level at year 10.

2.5 Access and roading 2019-2028

Proposed new roads, maintenance of existing roads and proposed new ATV tracks can be found on Appendix Map A1: Roads & Infrastructure for the proposed route

Access difficulties in Glen Loin and timber traffic pressure on the village of Succoth will be addressed by the proposed link with Cruach Tarbeirt. 1939m of new road length will be built during the period 2019 – 2028.

Road maintenance for around 16484m of existing forest road will be required, subject to assessments pre and post harvesting.
All roads will require passing places at approximately every 200m, subject to terrain, and will be built to the design standard set out in the current version of the Timber Transport Forum Guidelines[1]

To assist in deer management, which in turn will assist in establishing broadleaves and soft conifers, as well as allowing a more natural vegetation pattern on the open land, 12994m of new ATV tracks are proposed.

2.6 Departure from UKFS Guidelines

The LMP seeks to follow the UKFS in all aspects.

The proposals for the management of North Glen Croe around the critical slope stability area will be determined by a specific site plan drawn up as a separate project. It is possible that given the importance of slope stabilisation then some aspects of this project may depart from the UKFS. An example would be that felling of the area may not take into account the 2m adjacency guideline. However the aim of the project would be to establish permanent native woodland cover managed on a LISS to achieve slope stabilisation objectives, and therefore age diversity between future coupes is not relevant.

Elsewhere, a 2m height differential is achievable across all restock areas, although delayed restocking may be required to facilitate this in specific areas.

[1] TTF Guidelines – The Design and Use of the Structural Pavement of Unsealed Roads (2014)

2.7 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 Beinn Bhans 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	>20ha as a single unit	As above, depending on sensitivity

3.0: EIA Screening Determination

See Map M6 EIA Determinations

3.1 Proposed removal of woodland

None

3.2 Proposed new roads and proposed upgrading of roads

Proposed Cruach Tarbeirt Link Road.

1939 linear m & 1.34Ha

The purpose of the road is to facilitate woodland management and to reduce timber traffic through Succoth Village.

There are no site designations.

The road hugs the northern slopes of Dubh Chnoc, gradually falling towards the open ground of Upper Glen Loin. Its appearance in the landscape as seen from prominent hills (Ben Vane, Ben Vorlich and Ben Lomond) has been examined using 3D software. Views are generally distant and road alignment is sensitive to the topography. In addition the road forms the boundary of two felling coupes which have widely separated fell years: this will reduce any potential impact. The northern coupe is not due to be felled till phase 5 (now 2039 – 2043) by which time trees in the southern coupe are expected to be at least 4m – 5m high, again masking the road. This masking will increase as both stands grow to maturity.

Ranger Track extensions & restock ATV Tracks

12994 linear m & 2.60Ha

The purpose of the low key tracks is to facilitate the management of restock sites and the improve access for deer extraction and consequently improve the effectiveness of deer control.

There are no site designations.

3.3 Proposed quarries

EIA determination already assessed, no EIA required.

4.0 Critical Success Factors

The main critical success factors within the ten years of this plan are:

- Fell the mature woodland in North Glen Croe and replace with woodland more likely to assist with future slope stabilisation.
- Upgrade the road network to facilitate thinning and harvesting.
- Enhance deer control by increasing resources and the development of appropriate access infrastructure.
- Engage thinning operations in target proposed CCF areas at the earliest opportunity.

5.0: Introduction

5.1 The existing land holding

The LMP area covers 3082 Ha, 55% of which is open hill ground.
The land lies within the Loch Lomond and The Trossachs National Park (LLTNP) and is of high landscape and visual significance.

Around 62% of the forested area is Sitka Spruce, most of which is managed on a clearfell basis. A large proportion of this area, especially in Glen Croe is on steep & rocky ground requiring winch extraction during harvesting.

In addition, the ground immediately above the A83 is deemed unstable and it is not recommended that a third rotation of conifers be planted.
As a result, there are opportunities to diversify the species, including establishing broadleaves to assist with long term slope stability, and alternative conifers to broaden the timber product assortment, create a setting for recreation facilities and establish diversity in the landscape.

The woodland also provides habitat for a number of LBAP species, including Red Squirrel, and contributes to a regionally significant Grey Squirrel Buffer Zone which aims to prevent Grey Squirrel from moving into Cowal. There are PAWS which have the potential to be restored, especially in north Glen Loin

The remaining open ground within the plan is mostly hill land. This open hill is used for sheep grazing on the upper west slopes of Glen Croe under a tenancy, but there is no agricultural use of the core open ground area located around the Cobbler. The open ground is also a valuable Golden Eagle range, and the river systems support spawning salmonids. There are several unscheduled ancient monuments.

The area is very important for informal recreation and access to a number of important hill summits, including The Cobbler and munros such as Beinn Ime and Beinn Narnain, as well as forest walks and the long distance Cowal Way.

These and other key features have contributed to the analysis of future management options. These are mapped on the Context and Key Features Maps M8a and M8b.

More detail on the existing physical characteristics and background to the site which has indo formed this LMP can be found in Appendix II.

The information required to inform the regulation of forestry activities over the next ten years, including the EIA screening determination, is set out in detail in Sections 2 and 3.

The following ten years (post 2028) and beyond are also considered in the plan to indicate a direction of travel and to provide context. These long term plan proposals are set out in the maps associated for each individual zone, and then as a whole in Section 13.

5.2 Setting and context

The Glen Croe LMP lies within the Loch Lomond and The Trossachs National Park (LLTNP). Much of the area is highly visible. It forms part of the backdrop to the head of Loch Long, and the village of Arrochar, and forms a major component of the view experienced from the Rest and Be Thankful Viewpoint on the A83.

A number of features beyond the LMP area have contributed to the analysis of future management options. These are also mapped on Maps M1a and M1b, and include:

- The important strategic transport link provided by the A83, which is also a scenic route used by tourists
- Several habitats of sensitivity nearby, including SSSIs at Ben an Lochain and Cruach Tarbeirt and new native woodlands to the north west
- The strategic significance of Glen Croe as a buffer zone to prevent grey squirrels migrating south into Cowal
- The popularity of hills such as the Cobbler, but also nearby Beinn Ime and Ben Vane, which are outwith the land holding but can be accessed through land managed by FES

5.3 LMP presentation.

The Glen Croe LMP has been divided as follows:

Objectives which are relevant to the whole plan have been set out in Section 6. These have informed the overall proposals for the whole LMP area.

The plan area is then subdivided into five zones, each of which has its own individual character. Sections 7 to 11 of the plan presents the analysis of key issues and challenges in each of these five management zones, and goes on to list the land management objectives and present relevant management proposals for each zone.

6.0: Whole Plan Objectives

Following the review of the previous plan (See Appendix II), an analysis of the scoping responses (see Appendix IV), and the challenges identified in each management zone, the following management objectives were identified for the whole plan area:

6.1 Whole plan management objectives

Objective 1: Ensure that coupes are well scaled and shaped to relate to the landscape character and scenic quality of the National Park, especially as viewed from key viewpoints.

The high visibility of much of this land, whether it be from the A83, The Rest and Be Thankful, Loch Long, Arrochar, or from one of the many access routes to the hills, and its location within the National Park raises its visual sensitivity. Proposals for felling and restocking the forest reflect the shape and scale of the landform. Proposals specifically address the removal of the straight upper margin between woodland and open ground. Proposals for managing the open land take into account the relatively remote character of the hinterland areas, and the transition between forest and open land as experienced by visitors.

Objective 2: Ensure that the forest continues to contribute to the District's timber production targets.

The plan area is well suited to commercial timber production with a good road network. Timber assortment is diverse, and the area offers the opportunity to grow unthinned softwood timber on a fell and restock cycle at upper elevations, as well as thinned commercial conifers in more sheltered locations, which have a higher log allocation. The aim would be to extend thinning where possible to increase the log output and potentially in the long term manage some of the forest as LISS. The current road network supports these objectives, but is in need of maintenance.

Objective 3: Retain Red Squirrel habitat and maintain/enhance the Grey Squirrel Buffer zone.

Although this area has a number of potential biodiversity objectives, this is the most important one. The aim during the first ten years of the plan is to create and maintain a successful buffer by establishing species that will not provide food for grey squirrels. At the next plan review, this approach will be reviewed in light of on-going research.

Objective 4: Increase herbivore management to provide a basis to increase opportunities for broadleaves (BL) and soft conifer establishment going forward, as well as improve the quality of the ground vegetation on the open land. Managing deer numbers will assist in the establishment of critical 'slope stability' woodland. In the longer term, decreased herbivore numbers will also provide future opportunities to create more woodland through natural colonisation of some of the more sheltered areas of open land.

6.2 Analysis

The delivery of each of the whole plan objectives has been analysed in terms of the opportunities and constraints in the table below. This in turn has influenced the design concept and subsequent management proposals in each zone as relevant.

6.3 Implementation of whole plan objectives

These objectives and relevant design concepts extend across the whole of the LMP area and will underpin the management of the land across all the five management zones. Opportunities to implement these objectives will be identified in all the management zones wherever possible.

The whole forest objectives are underpinned by good practice set out in the UK Forestry Standard (UKFS) and are integral to the delivery of multi-purpose forestry. Across the forest, and on a management zone basis the whole forest objectives are not in conflict with each other, but the ranking of these objectives may change within each individual Management Zone.

Analysis and Concept – Whole Plan

Objective	Opportunities	Constraints	Concept
Ensure that coupes are well scaled and shaped to relate to the landscape character and scenic quality of the National Park, especially as viewed from key viewpoints	There are well established areas of LISS and some existing diversity which can provide the core of proposals that reflect the landscape character. There may be opportunities, even in early years of the plan, to remove some of the most visible poorly designed external margins. Restructuring has already created some well shaped coupes to build on, and there are generally a good range of options for windfirm coupe boundaries	CCF options are very limited in the current crop due to the lack of thinning and crop type. Areas of younger crop planted along the upper margins, originally to improve the external shape of the forest, are likely to be a problem to manage. Similar aged forest over some extensive areas may limit coupe options. Some of the most visible poorly designed external margins are across steep, unstable slopes.	Design coupes that are larger along the upper margins and smaller in more sheltered lower slopes where landform is more complex and opportunities for crop diversity more likely. Where felling coupe shapes are compromised (due to access, lack of windfirm boundaries, etc..), then resolve the shape of the coupe at restocking. Ensure that wherever possible small patches of poorly grown crop are removed within larger areas of better growing timber. Develop a long term plan for the re-design of upper margins of the forest to reflect landform, including identifying opportunities for a more gradual transition between the forest and the open land. While recognising that many views are from moving vehicles or from trails, identify key static viewpoints as design viewpoints
Ensure that the forest continues to contribute to the District's timber production targets	The forest is well suited to commercial timber products on accessible slopes and has the basic road network in place. Diverse conifers and broadleaves along Loch Long can contribute to diversifying production. Targeting production on areas where growth rates are high and harvesting trouble free can increase economic performance of the forest even where gross area is reduced. Diversifying forest species can increase resilience	The conversion of North Glen Croe to permanent NBL slope stability cover (a plan requirement) will lead to significant reduction in timber productive capacity. Reshaping the upper margin will generally reduce productive area, although at higher elevations. Diverse conifers and BL produce less timber and wood products	Sitka Spruce will remain the most appropriate species, delivering a high value product on short rotation across much of this LMP area. Diverse conifers and NBL along Loch Long also have potential to deliver diversity in productive output, with comparable growth rates for some species on the better ground. Diversity of the productive output is strategically important, and deer management should focus on areas where this output is important.

Retain red squirrel habitat and maintain/ enhance the grey squirrel buffer zone	The current forest structure with mature NS, large areas of SS and limited areas of large seeded BL offers a good habitat for red squirrels, while acting as an effective buffer for greys. Increasing the range of diverse conifers, CCF areas and age class diversity are all actions that will improve red squirrel habitat and feed supply resilience.	In some areas oak may be precluded from restocks and this may impact negatively on wider biodiversity. The mature NS areas are developing an under storey of SS which may reduce the value of these areas to red squirrel over time	Retain large areas of SS as grey squirrel buffer. Assess and identify opportunities to manage Norway spruce and other appropriate conifers as LTR and CCF, including monitoring of SS regeneration under established NS stands. Identify opportunities to establish NS and other appropriate conifers when deer numbers allow. Establish small seeded broadleaves in any proposed BL planting – at least in terms of trees that are likely to seed in the next ten years.
Increase herbivore management to provide a basis to increase opportunities for BL and soft conifer establishment, improve the quality of the ground vegetation on the open land	Effective deer control could lead to a significant expansion of mixed woodland along the upper margin and increased floral diversity for a relatively low cost/ ha. Link the timing of deer control effort to the timing of browsing-sensitive restocks within the wider LMP area. Respond to wider national changes in deer management that may occur, specifically if deer numbers are reduced more generally across adjacent open ranges. Increased levels of deer control can work synergistically with high levels of public access by making the deer less settled in one area. Increased access to the upper forest margin, which is the critical locality for deer control, could help facilitate future management	Recreational access can constrain deer control. Track formation and deer control are expensive options. Neighbouring properties may have differing objectives and may be affected by reduced deer numbers.	Improve access for deer management along the critical upper forest margin. Group restock species sensitive to deer browsing into areas where deer control can be targeted. Create larger felling coupes as appropriate to facilitate deer control and make restock areas less sensitive to deer damage.

7.0: Introducing the Management Zones

The Glen Croe LMP has been divided into 5 Management Zones, each with common key issues, challenges and objectives that have informed the LMP. See Map below: M9 Management Zones Overview.

The Management Zones have been identified as follows:

Section 8: South & West Glen Croe
These slopes face east and north, and the terrain is irregular, including steep ground and rocky outcrops. The area forms the productive heart of the LMP area, although land to the south is less accessible. The plan in this zone also needs to take into account views from the Rest and Be Thankful, the Cobbler and the A83, as well as providing a setting for recreation facilities.

Section 9: North Glen Croe
These south and west facing slopes rise directly above the critical A83. Some of these slopes are steep and have been identified as relatively unstable. The plan in this zone will need to contribute to long term stability of these slopes, while also taking into account the view from the A83 and providing a setting for recreation facilities.

Section 10: Loch Long & Key Summits
This zone includes all the open land above the woodland to the east of Glen Croe, including the setting of the Cobbler. The key issues here are the need to accommodate the main access routes to the hills, and consider how best to manage the open land to enhance the relative wildness of this area. In the longer run there may be opportunities to extend diverse woodland above the existing treeline

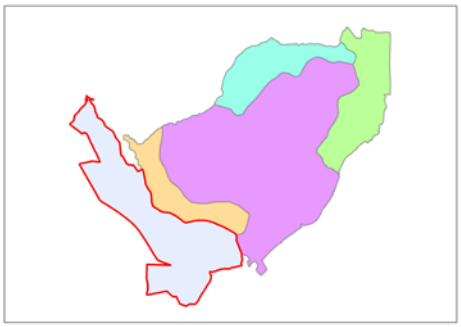
Section 11: Glen Loin
This zone includes areas which have been identified as PAWS, and which are close to the existing woodland SSSI at Cruach Tarbeirt. There is also a need to consider future access to this area, and to consolidate accessible areas of productive conifer

Section 12: Upper Glen Loin
This zone is less accessible than the rest of the plan area, and is currently characterised by poorer growing crops. Future management needs to balance roading requirements against likely productivity

The issues, challenges and management objectives have been identified for each zone. For each zone maps illustrate:

- the opportunities and constraints that affect each objective
- the design concept
- the management proposals (felling)
- the future habitat & species composition (restocking)

8.0: South & West Glen Croe Management Zone



8.1 Issues

- Steep ground which has formerly been allocated to CCF.
- Highly visible from Rest and Be Thankful viewpoint, the A83 and the summit of the Cobbler.
- Croe Water important for salmonids.
- Some less accessible areas of forest.
- Recreation and setting of Ardgartan on A83.
- Poorly designed straight upper margins of the forest & geometric layout of Larch restocks in upper glen.

8.2 Key challenges

- Converting proposed CCF to fell and restock coupes
- Assessing and developing access requirements
- Identifying appropriate restocking proposals for less accessible areas
- Developing a less even aged forest structure
- Managing potential impacts on the Croe Water
- Ensuring that scale and shape of coupes and restocking is related to landscape character
- Identifying appropriate areas for CCF that achieve multiple benefits for management input
- Enhancing the upper margin with the operational constraint of the forest boundary being close to the current forest upper margin.

8.3 Management objectives

Objective 1: Create well landscaped long term felling coupes & CCF areas that are productive & viable to manage economically.
This area is accessible and in parts relatively sheltered. It also is outwith the core area of higher recreation sensitivity, although there is public access, and while the slopes are steep in places, these slopes are not above critical infrastructure. The soils and the north and west facing aspect will support a high percentage of SS in this area, and the challenge is therefore to create accessible, well scaled and productive coupes with wind firm edges that form the core productive area of the Forest. Areas for thinning and potential CCF will be identified where the terrain and species can accommodate this to meet water quality, landscape, recreation and biodiversity objectives.

Objective 2: Identify opportunities to reshape the upper margin to better relate to landform.
Highly visible from key viewpoints, this is the most visually intrusive element of the forest in this area. Proposals should address the realistic re-design of this margin over time within land tenure constraints.

Objective 3: Increase forest diversity when viewed from the A83 and recreational facilities. Increase access options for hill descents and maintain open space in promoted bouldering sites. The Forest provides an attractive setting to a range of recreation routes and facilities, including access to higher hills. Consultees have specifically asked for more 'emergency descents' from the popular hill summits, and for open space to help keep bouldering locations dry and accessible. (The bouldering site issue is more significant in North Glen Croe).

Objective 4: Continue restructuring to enhance the ecology of the Croe Water.
Proposals should aim to provide a buffer of BL or species that might be managed as CCF wherever possible, along this river which is important for salmonids.

See Maps below: M10 South & West Glen Croe Opportunities & Constraints & M11 South & West Glen Croe Design Concept.

8.4 Felling and CCF proposals – South and West Glen Croe

8.4.1 Clear felling

Opportunities to manage the forest through clear fell have been identified and are included on Map**: M12.** Accessible clearfell coupes take into account future product assortment and reflect land form shape and scale and the views from the A83, the Cobbler and the Rest and Be Thankful. Smaller coupes along lower slopes also aim to help with future water management.

8.4.2 Thinning

Opportunities to thin existing woodland have been identified and are included on Appendix Map **A2.** These are located along the lower slopes, where appropriate soils and shelter offer opportunities for establishing longer felling cycles and increasing the diversity of future forest structure to meet landscape, recreation and water quality objectives.

8.4.3 Continuous Cover Forestry (CCF)

Opportunities to manage existing crops through CCF have been identified and are included on the Management Map **M12.**

Opportunities to establish species suitable for future management as CCF have been identified and these are noted on the Future Habitats and Species Map **M13**.

Opportunities for CCF are located along the lower slopes, where diversity of future forest structure will contribute to landscape, recreation and water quality objectives.

8.5 Future habitats and species – South and West Glen Croe

Future habitats and species proposals are included on Map M13.

The proposals aim to take advantage of the more accessible and fertile lower slopes to consolidate mixed conifer and BL species. This will provide the basis for future woodland management to contribute to enhancing the water quality along the Croe Water, the setting of recreation facilities, diverse views from the road and increase the diversity of timber products.

Species selected will avoid species that are attractive to grey squirrels, to maintain the buffer zone. The upper slopes will focus on Sitka spruce, to consolidate the softwood productive capacity of this zone.

9.0: North Glen Croe Management Zone

9.1 Issues

- Very steep and often unstable ground prone to slope slippage above the A83 constrains both felling options and access
- Operational issues for management of slope stability and general felling operations in the proximity of key trunk road.
- Mature timber crops on steep ground, some of which are unthinned
- Croe Water important for salmonids
- Partially visible from Rest and Be Thankful viewpoint and A83

9.2 Key challenges

- Felling & extraction of mature conifers on potentially unstable slopes above a critical transport route
- Converting conifer crops to slope stability woodland
- Extending protection forest above current treeline with slow growth rates, challenging fencing conditions & deer pressure.
- Managing potential impacts on the Croe Water

9.3 Management objectives

Objective 1: Increase transport infrastructure resilience by felling mature conifers on potentially unstable slopes, replacing with slope stability woodland type and extending this woodland above existing upper margins.

These slopes have been identified as potentially unstable (see slope stability Appendix map A3 and potentially pose a long term threat to the A83 as the

woodland matures and may become more prone to windthrow. Both restocking and new planting opportunities provide the opportunity to establish woodland with diverse rooting depths which could help reduce landslips across these slopes

Objective 2: In the slope stabilisation area, re-shape the upper margin and NBL species distribution to reflect landform, subject to the overriding objective of slope stabilisation.
Increase deer control on open hill to reduce long term impacts on vegetation contrast created by deer fencing. The proposals to establish NBL woodland and associated natural regeneration should contribute to landscape character, by increasing the relative wildness of these west facing slopes, and contributing to the relative wildness of the setting of the hills.

Objective 3: Adjust upper margin along southern end of management zone at restructuring to better reflect landform. Increase deer control to encourage the development of diverse open woodland on the upper margins.
Highly visible from key viewpoints, this is the most visually intrusive element of the forest in this area. Proposals should address the realistic re-design of this margin over time.

Objective 4: Increase forest diversity on southern section of zone when viewed from the A83 and recreational facilities. Increase access options for hill access / descent.
Increase open ground access options for key hill descents and maintain open space in promoted bouldering sites while also providing a diverse forest structure that enhances the setting of key recreation routes. The forest provides an attractive setting for a range of recreation routes and facilities, including access to higher hills. Consultees have specifically asked for more ‘emergency descents’ from the popular hill summits, and for open space to help keep bouldering locations dry and accessible.

See Maps below: M14 North Glen Croe Opportunities & Constraints & M15 North Glen Croe Design Concept.

9.4 Felling and LISS proposals – North Glen Croe

9.4.1 Clear felling

Opportunities to manage the forest through clear fell have been identified and are included on Map **M16.** Clearfelling to the north of this zone, where steep slopes rise up from the A83, will be challenging due to the presence of the road and difficult terrain, as well as limited existing forest access on potentially unstable slopes. This part of the plan will be taken forward by a working group who will identify the most effective way to remove this woodland. The remaining coupe pattern reflects the difficulty of accessing the upper slopes alongside the potential opportunities arising from smaller coupes along the more accessible and stable lower slopes. Along these lower slopes, the coupe scale and shape reflects management for water quality and views from the road as well as the setting of recreation infrastructure.

9.4.2 Thinning

Opportunities to thin existing woodland have been identified and are included on Appendix Map **A2.** These are located along the lower slopes, where appropriate soils and shelter offer opportunities for establishing longer felling cycles and increasing the diversity of future forest structure to meet landscape, recreation and water quality objectives.

9.4.3 Continuous Cover Forestry (CCF)

Opportunities to manage existing crops through CCF have been identified and are included on the Management **Map M16**.

Opportunities to establish species suitable for future management as CCF have been identified and these are noted on the Future Habitats and Species **Map M17.**

Opportunities for CCF are located along the lower slopes, where diversity of future forest structure will contribute to landscape, recreation and water quality objectives.

9.5 Future habitats and species – North Glen Croe

Restructuring proposals are included on Map **M17.**

The proposals in the north of this zone will establish slope stability woodland that offers the potential, through its multiple rooting structure, to provide long term, continuous cover woodland that will reduce the likelihood of slope slippage.

There are also opportunities to extend this woodland across open ground above the existing forest margin, and for reduced deer numbers to increase vegetation stability. Approval for woodland expansion is not being sought at this time.

Along lower slopes, species choice will contribute to the setting of recreation facilities, diverse views from the road and increase the diversity of timber products. Species selected will avoid species that are attractive to grey squirrels, to maintain the buffer zone. The upper slopes will focus on re-establishing Sitka spruce, to consolidate the softwood productive capacity of this zone.

10: Loch Long & Key Summits Management Zone

10.1 Issues

- Highly visible area of woodland at the head of Loch Long
- Main focus for recreation within the plan, including primary access route to the Cobbler and several key summits
- Area lies within Golden Eagle range and includes extensive areas of open land
- Woodland includes more extensive areas of younger crops which are often difficult to manage for recreation due to slope & terrain roughness.
- Forest area is well roaded, but potential forest access and management conflicts associated with crossing recreation routes
- Key area for deer control, with access to the upper forest margin being a critical limiting factor for deer control.
- Upper forest margin has potential for woodland expansion via natural processes if deer can be controlled. Mixed non-intervention forestry could contribute positively to slope stability, ecology and landscape.

10.2 Key challenges

- Managing the visitor zones within the context of wider forest management
- Ensuring that proposals do not compromise, and preferably enhance, the eagle range, including advice on management of open ground
- Identifying appropriate areas for LISS that achieve multiple benefits for management input
- Deer control with recreational constraints and improving access for extraction
- Monitoring and reacting to the outcomes of natural regeneration processes.

10.3 Management objectives

Objective 1: Manage the forest to provide the framework for a wide range of recreational activities and enhanced landscape experience, with an emphasis on The Cobbler path and associated routes as well as more distant views from the A814 and Arrochar.
Create areas of stable woodland around key recreational routes where frequency of interventions is minimised. The Cobbler is a significant visitor attraction which has a positive impact on the local and national economy due to the high visitor numbers. The management of the woodland offers the opportunity to enhance the visitor experience

Objective 2: Enhance the recreational, ecological & landscape value of the open hill & the fit of the existing woodland by a landscape scale expansion of mixed woodland above the treeline through natural processes.
Promoting the creation and development of a natural treeline will provide a built in mechanism to develop the wilder characteristics of this widely appreciated mountain landscape, which in turn should benefit wildlife and water retention across these more open upper hill slopes

See Maps below: M18 Loch Long & Key Summits Opportunities & Constraints & M19 Loch long & Key Summits Design Concept.

10.4 Felling and LISS proposals – Loch Long and Key Summits

10.4.1 Clear felling

Opportunities to manage the forest through clear fell have been identified and are included on the Felling Map **M20.** Clearfelling options in the first ten years of the plan are limited, as much of the crop in this zone is relatively young.

10.4.2 Thinning

Opportunities to thin existing woodland have been identified and are included on Appendix Map **A2.**

Thinning in this area offers the opportunity to set up woodland for CCF management around the path network, as well as contribute to timber assortment and landscape diversity

10.4.3 Continuous Cover Forestry (CCF)

Opportunities to manage existing crops through CCF have been identified and are included on the Management Map **M20.**

Opportunities to establish species suitable for future management as CCF have been identified and these are noted on the Future Habitats and Species Map **M21**.

Opportunities to manage areas as CCF have been identified where crop characteristics allow this. A particular challenge going forward will be how to carry out operations to maintain the wooded setting of the path access to The Cobbler, which could be established as a CCF area

10.5 Future habitats and species – Loch Long and Key Summits

Restructuring proposals are included on Map **M21.**

The sheltered location, relatively fertile soils and high visual and recreation interest in this area offers the opportunity to establish mixed conifer and consolidate broadleaves along the lower slopes of this zone. Sitka spruce will remain the species of choice at higher elevations. In due course there is likely to be an opportunity to extend the woodland margin uphill, through the establishment of new native and mixed woodland as deer numbers are reduced.

10.6 Management of open land

Open ground within this zone is highly significant. The most effective tool for managing the open ground within the LMP area is grazing management via deer culling and control of sheep. This should encourage the establishment of a more diverse vegetation pattern, which has the potential to reduce rainfall runoff and contribute to the development of a more naturalistic landscape character in this area, complementing the National Park's 'core wild area' objectives.

11.0: Glen Loin Management Zone

11.1 Issues

- More irregular land form includes smaller scale lower wooded hills
- Parts of this area are poorly roaded, and existing access includes roads of relatively steep incline
- Area of relatively even aged forest
- Access through Succoth for timber haulage can be problematic
- Large areas of mature Norway Spruce (NS) play an important role in Red Squirrel conservation & landscape, but management is problematic on steep rocky slopes and regeneration tends towards Sitka Spruce

11.2 Key challenges

- Assessing and developing access requirements
- Identifying appropriate restocking proposals for less accessible areas
- Developing a coupe structure that reflects the shape and scale of this irregular landform
- Developing a less even aged forest structure
- Assessing and developing access requirements Identifying appropriate restocking proposals for less accessible areas
- Creating new access route through Cruach Tarbeirt forest
- Management of mature NS stands to ensure continuity

11.3 Management objectives

Objective 1: Improve the forest road access to this area, reducing vehicle impacts on the village of Succoth and reducing the need for wagons to descend steep forest roads. Traffic through the village and on minor roads has been raised as a concern and there may be opportunities to link to the new road network at Cruach Tarbeirt.

Objective 2: Phase restoration of PAWS, to extend this habitat, building on the native woodland SSSI in Cruach Tarbeirt forest and the expansion of the Atlantic Oak Woods as promoted by the LLTNP. PAWS restoration is a national priority, but needs to be planned and resourced.

Objective 3: Identify accessible felling and LISS coupes that will contribute to the long term commercial productivity of the forest.
This relatively sheltered and fertile glen offers good opportunities to establish highly productive forest some of which could be managed as continuous cover.

Objective 4: Improving the status of the Allt Coiregrogain (currently Bad ecological potential) where this is due to forestry.
The condition of the Allt Coiregrogain is due to a number of factors outwith the control of the LMP. Nevertheless improving the riparian environment and catchment ecology may help to partially mitigate these external factors.

See Maps below: M22 Glen Loin Opportunities & Constraints & M23 Glen Loin Design Concept.

11.4 Felling and LISS proposals – Glen Loin

11.4.1 Clear felling

Opportunities to manage the forest through clear fell have been identified and are included on the Felling Map **M24**.
In the first five years of the plan, the focus will be on planning and improving the road network to limit future vehicle impacts on the village of Succoth and develop the link road to Cruach Tairbeirt. Early felling phases are timed to coincide with the improvements to the road network.

11.4.2 Thinning

Opportunities to thin existing woodland have been identified and are included on Appendix Map **A2**.
Thinning opportunities in this zone are relatively limited due to the age of the crop Thinning will be more achievable in the future as the improvements to the road network are implemented.

11.4.3 Continuous Cover Forestry (CCF)

Opportunities to manage existing crops through CCF have been identified and are included on the Management map **M24.**

Opportunities to establish species suitable for future management as CCF have been identified and these are noted on the Future Habitats and Species map **M25**.
Opportunities to manage the crop as CCF are limited in this area. Should resources allow, the main focus should be on developing the understorey of the Norway spruce retentions to ensure that future habitat still retains the Norway spruce element for the benefit of red squirrel.

11.5 Future habitats and species – Glen Loin

Restructuring proposals are included on Map **M25.**

Restocking offers the opportunity, in the longer term, to restore PAWS and expand the area of Norway spruce. This will consolidate the biodiversity interest in this area, including red squirrel habitat, while making the most of this sheltered glen to increase timber product diversity. Once road improvements are made, this area would benefit from establishing woodland that could be thinned and in future managed as CCF.

12.0: Upper Glen Loin Management Zone

12.1 Issues

- Less accessible and more remote glen
- Poorer soil, bad aspect and elevation limit options for species choice and future management
- Located within an area that is more readily recognised as the 'core' of a wild land area
- Areas of severe check and failed crop interspersed with better grown crop on the lower glen floor

12.2 Key challenges

- Identifying realistic restocking proposals that reflect the physical constraints of the area
- Identifying access options that reflect future restocking proposals, to limit the requirement for expensive infrastructure where this is not required for future rotations

12.3 Management objectives

Objective 1: Restructure the forest to reflect the intrinsic site constraints for commercial forestry using NBL in a matrix with SS and NBL expansion on the upper slopes.

The aspect and elevation of this site together with soil nutrition constraints on the upper slopes creates a sub-optimal environment for commercial timber production across many areas. The growth rate of commercial timber crops picks up on the Glen floor where nutrients are accumulating in flushed soils. The creation of a matrix of native and productive conifer woodland in

the right locations has the potential to minimise lost production and maximise multi-purpose forestry delivery.

Objective 2: Restore PAWS area and link with proposed long term NBL creation in the Upper Glen and with NBL creation / PAWS restoration to the east.
The restoration of PAWS areas works synergistically with the creation of wider NBL areas in the upper glen and previous PAWS restoration in the lower glen, and creates a linkage between these two areas. It also has positive impacts on the objective of improving the status of the Allt Coiregrogain.

Objective 3: Improving the status of the Allt Coiregrogain (currently Bad ecological potential) where this is due to forestry.
The condition of the Allt Coiregrogain is due to a number of factors outwith the control of the LMP. Nevertheless improving the riparian environment and catchment ecology may help to partially mitigate these external factors.

See Maps below: M26 Upper Glen Loin Opportunities & Constraints & M27 Upper Glen Loin Design Concept.

12.4 Felling and LISS proposals – Upper Glen Loin

12.4.1 Clear felling

Opportunities to manage the forest through clear fell have been identified and are included on the Felling Map **M28.**
There are no proposals to fell any of the woodland during the first ten years of the LMP. This is due to the current crop characteristics and poor growth of commercial crops due to aspect, soil and elevation, as well as the limited access to this location.

12.4.2 Thinning

There are no opportunities identified to thin this woodland in the current rotation, due to crop characteristics and poor access.
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12.4.3 Continuous Cover Forestry (CCF)

No areas have been identified as suitable for CCF within this zone. This assessment will be revisited at the next LMP review

Opportunities to establish species suitable for future management as LISS have been identified and these are noted on the Future Habitats and Species Map **M29.**

12.5 Future habitats and species – Upper Glen Loin

Restructuring proposals are included on Map **M29**
Restocking proposals currently illustrate a matrix of native woodland and mixed woodland with commercial conifer elements focussed on areas which are easily accessible and where growth could be good. There is potential for native and mixed woodland expansion above the existing woodland in due course when deer numbers are reduced.

13.0: Long Term LMP Proposals

Maps M30 & M31 show the Management (Felling) and Future Forest & Habitats (Restocking) as A3 overviews. These maps are also available as A0 1:10k scale maps in Appendix A4 & A5

The long term proposals in the LMP will lead to increased species diversity & an increase in the age range of the forest over the next twenty five years. 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 watercourses, slope stability woodland associated with steep ground above the A83, restored PAWS and a wider range of conifer species, along the lower and more sheltered, accessible slopes. Expanding the species range will assist in creating a forest which is robust in terms of disease and pest resilience.

The longer term application of CCF where appropriate will lead to increased diversity of timber products and where it is appropriate to manage CCF for biodiversity, recreation or landscape objectives.

Appendix I: Management Prescriptions

I/1.0 Forest Management Types

Clearfelling

This harvesting approach will be utilised where economics, access or soil conditions preclude Continuous Cover Forestry. Coupe design will seek to work with the landform and scale will vary with larger coupes on the upper slopes scaling to smaller coupes on the lower slopes. Building on the current age class diversity will be an objective, however the fast growth rates associated with the dominant SS cover may limit the options for retaining crops past the standard 30 to 50 year rotation length.

The presumption is that no felling will take place until the neighbouring restock areas have reached 2m.

Clearfelling is used as a management approach to remove Larch species where there is Phytophthora infection, and to salvage windblow.

Clearfelling provides more flexibility for restructuring. Large coupes can be restructured with more diverse species and new internal windfirm boundaries to provide an enhanced landscape in the second rotation and more coupe options. Large clearfells also offer an enhanced area for deer control and the potential to establish deer sensitive species without fencing. Along the western side of Glen Croe an established and well landscaped coupe layout, offers the potential to provide landscape and ecological diversity as well as a functional & streamlined management system, with predictable results in future rotations in terms of yields & issues.

Continuous Cover Forestry (CCF)

The LMP area is generally sheltered and this offers potential for the widespread application of CCF.

Soil is a key determinant of a site's CCF suitability, with good rooting depth being vital. Poorly drained or shallow soils increase the likelihood of windblow. The site fertility is generally medium under Ecological Site Classification (ESC), and this can also facilitate CCF by tending to reduce the vigour of competing weed growth.

Slope is however a major constraint to the more widespread application of CCF, and the negative impacts of slope in terms of cost and management options are exacerbated by often rough terrain with numerous boulders.

The areas managed as CCF are also very much constrained by the current crop in terms of age, growth rate and previous thinning. There is scope for the wider application of CCF in second rotation crops, particularly on the ridge dropping to the Loch, just north of Ardgartan.

Map M32 shows constraints for CCF across the plan area.

Within the LMP area CCF offers the following advantages:

- Enhanced landscape, with forest cover being a consistent landscape element which emulates natural European montane forest.
- Increased slope stability and reduced flood risk.
- Increased ecological continuity which is of benefit to the evolving forest ecosystem and specific species such as Red Squirrel.
- Ability to produce diverse and significant yields of a range of timber products including high quality timber.
- Creates a more aesthetic recreational environment.
- Can lead to reduced establishment costs, although often this is not the case.

CCF also has some disadvantages:

- Higher management, marketing & operational costs.
- Marketing smaller volumes of a very diverse output can be difficult particularly to larger heavily automated mills.
- Due to deer pressure and the relative shade tolerance and vigour of different tree species then there is a tendency towards the development of monocultures. Sitka Spruce, Western Hemlock & Beech will all thrive under CCF, often to the exclusion of other species.
- Determining outcomes and mensuration within CCF stands can both be difficult. In areas where a specific desired outcome in terms of succession is required, (for instance NBL along riparian zones and Norway Spruce to emphasise knolls), then expensive respacing or enrichment planting may be required to achieve the desired outcome.

Monitoring and active management of CCF is required to achieve wider LMP objectives. Enrichment planting and modifying light levels on the forest floor substantially can be used to manipulate the forest environment.

Uniform Shelterwood is the most applicable silvicultural technique for most of the forest area as this reduces many of the disadvantages of CCF while delivering many of the advantages. As the CCF stand matures, areas managed under Uniform Shelterwood can either continue on to the final removal of seed trees and the successor crop or evolve into Irregular Shelterwood or Group Shelterwood system. The latter may encourage more light demanding species and facilitate enrichment planting.

Some areas of NBL are also suitable for consideration in the longer term as CCF candidates, and these need to be considered on a case by case basis as the trees mature. Ensuring that any interventions have a positive environmental impact would be important. Some of the areas unsuitable for productive conifer CCF may produce a yield under NBL due to the lower tree heights involved and the potentially lower intensity and smaller scale of working.

Long Term Retentions (LTR)

Some areas of crop have been identified as areas of **Long Term Retention (LTR).** These are often areas with severe access issues or where it is environmentally beneficial to retain these areas. Subsequent plan reviews may move these areas into CCF management or integrate future felling with the surrounding crop as appropriate.

Increasing the light levels under areas of mature NS without a concurrent increase in deer control runs the risk of encouraging the development of a dense SS understorey. For Red Squirrel particularly this habitat change may be detrimental. The windfirm nature of the site and crop age offers the advantage that many LTRs will potentially be stable for many years to come even with no active management.

I/2.0 Thinning

Past thinning aspirations have been constrained by economics and harvesting constraints, and as a result the number of potential thinning sites in this rotation is limited, and these areas are shown on Appendix map A2. Line thinning with inter-row selection would be the most appropriate method for most of the areas, which would be first thinnings in mainly SS.

The areas potentially available for thinning in the next rotation are wider, but the viability of these would depend on the economic viability of the operations at the time.

I/3.0 Future Habitats & Species

Permanent native woodland habitats are proposed throughout the woodland to link the current NBL resource and PAWS restoration areas on the upper margins and riparian zones. There is some scope for recreating elements of the natural ecocline from the loch shore to the treeline. National Vegetation Classification (NVC) woodland types, or elements thereof, which may play a role across the forest include W7,W9,W11,W17 & W19. This wide range of NVC types reflects the diversity of soils, aspect and microclimate across the site as well as scattered areas of long established native woodland. Large seeded broadleaves are a key element of the natural woodland cover, but prescriptions under the Grey Squirrel Buffer Zone policy preclude the use of these species as plantings, although natural regeneration will not be controlled.

The CCF areas and restocks on the lower/mid slopes will include a wide range of mainly conifer species with Sitka Spruce (SS) on more challenging sites and as an element in other crops, Norway Spruce (NS) Grand Fir (GF), Western Hemlock (WH), Scots Pine (SP), Noble Fir (NF) and European Silver Fir (ESF). While Larch is not currently on the restock list, natural regeneration of this species will be significant across the forest. A range of other minor conifers (Western Red Cedar (WRC) Serbian Spruce (OMS) Japanese Cedar (JCR) would form elements of restocked areas where appropriate. The intention is to focus areas of deer sensitive restocks in geographical groupings in order to target elevated levels of control on these areas during establishment.

There is some scope for productive broadleaves managed as CCF on the lower slopes. Exposure, poor nutrient status and impeded drainage are factors limiting the choice of productive species at the highest elevations, with Sitka Spruce (SS) being the only commercially viable species. Across most of the site a wide range of species can be grown, although protection from deer is required for all softer species. Small scale variations in soil, drainage, aspect and exposure are used to guide the final operational planting plan.

As indicated above, the ESC data suggests that there are a wide range of species potentially suitable for the site, and this remains fairly constant under climate change models. Species range declines with altitude. Site amelioration via drainage, fertiliser and the first rotation may negate many limiting factors and widen species range in practice.

Climate change models suggest that the general trend will be towards a significantly warmer climate with higher winter rainfall and lower rainfall in the summer leading to a partial soil moisture deficit during the summer months. Increased rainfall and sudden heavy downpours may exacerbate the potential for slope instability in vulnerable areas, and future forest cover and species choice will take this into account.

In terms of the more general species choices for the next rotation the climate change models have limited impact on species choice according to ESC models. However this level of climatic change is likely to interact in the longer term with soil characteristics and this may have a positive impact on soil structure and widen the range of species potentially suitable for the site. There are also threats to the suitability of SS as a timber species if severe summer droughts become the norm.

A number of other factors have been considered in addition to ESC data, and these include:

- Current actual growth rates.
- Economic value & physical volume production.
- Landscape.
- Ecology and linkages.

The impact of tree diseases has guided species choice. *Phytophthora ramorum* in Larch; Dothistroma needle blight (DNB) & Ash Dieback have all had an impact on species choice and crop management across the UK. Within the LMP area Larch and Ash would have played a key role in both landscape and production, but these species are currently unavailable as restocking options. This situation should be reviewed at intervals in light of prevailing guidance.

Cowal & Trossachs FD LMP provenance guidance chart

Species	Guidance
SS	Improved QSS standard throughout
VPSS	Limited use in best locations
SP	High rainfall type specified as standard. W20
NSP	From the nearest appropriate zone near CFR areas
LP	Only ALP being used in mixture with SS on poorer sites
DF	Seed stand or coastal origin
ESF	Czech or central European
NF	Registered seed stands
GF	Scottish registered seed stands
WH	Registered seed stands with low fluting
WRC	Scottish seed stands
NS	Seed stands, Eastern European or Harz
JCR	Northern Japanese range
NBL	Region of Provenance 10, Native Seed Zone 106
XC	PSSB will advise on any other minor species
Notes: PSSB can provide the most up to date guidance on provenance selection including advice on best suited seed stands. Virtually all seed supplied by PSSB comes from registered seed stands and is based on geographic area compatibility. Use of VPSS has declined as seed orchard QSS improves and this also has a wider genetic base for resilience purposes.	

I/4.0 Operational Access

See Appendix map A1 Roads and Infrastructure. The forest is relatively well roaded with access to almost all the Phase 1 & Phase 2 coupes and CCF areas being served by the current road network. However the running surface quality has been constrained by the shortage of hard rock on site. A new quarry is proposed and road upgrades will be required to facilitate the proposed harvesting. A new road is proposed to link the northern part of the forest to Cruach Tarbeirt. Windblow or disease impacts may require the construction of new roads not envisaged at this stage.

Access tracks are required to facilitate harvesting and restocking on sites across the plan area, and these are shown in map A4. A number of ramps will be required to enable harvesting machinery to access felling coupes from the forest road. The precise location of these will be determined during operational planning but the expectation is that there will be up to a maximum of 6 ramps per felling coupe. Ramps will be approximately 3m wide and up to 15m long; they will not be treated as permanent features and will be removed when no longer needed.

Slopes are a constraint in places with winch working and cable cranes being required to work many areas effectively and safely. The relatively dense road network facilitates winch or cable crane harvesting. In some limited areas crops are practically inaccessible with even hand cutting being constrained by H&S concerns.

Extensions to deer extraction routes are proposed, and these are shown in Appendix map A1.

I/5.0 Deer Management

Reducing deer numbers and associated negative impacts is vital in order to deliver a range of plan objectives.

Deer activity across the forest is negatively correlated with human activity. Many areas on the lower slopes show medium deer impacts with significant regeneration of vulnerable species. On the upper slopes observation would indicate that deer (and feral sheep) grazing have a significant impact on regeneration and biodiversity. In addition to potential higher activity in these more secluded areas, the impact on regeneration may also be derived in part by slower growth rates widening the vulnerability window. There is also relatively high activity along the lower margins where this borders rough grazing that the deer use at night.

Deer often seek shelter in woodland in heavy weather, and consequently the upper forest margins are often areas with high levels of deer activity in all circumstances. When control efforts are intensified, then the deer's use of dense cover increases and nocturnal behaviour becomes the norm, and this again intensifies the grazing/browsing pressure on the woodland fringe. Clearly the woodland fringe is also the area of most significance in terms of woodland expansion via regeneration, so the focus of deer activity on these areas can have a negative impact on woodland expansion that is disproportionate to deer density across the full LMP area.

Restocks of vulnerable species are currently deer fenced.

The LMP area lies to the south of the Inveraray & Tyndrum Deer Management Group with estates to the North running stalking enterprises. Local experience suggests that while most of the hinds are hefted to the LMP areas there is some stag movement from the North. This movement might be constrained by extensive deer fencing in Upper Glen Loin Management Zone in later years if the NBL expansion proceeds in the area. Potential landscape scale reductions in open range deer populations may also occur due to National Policy changes on deer management.

Effective deer control involves committing resources in terms of personnel and equipment in a strategic way. The provision of good access for stalking and carcass extraction means that this commitment of resources is put to the best use. It is proposed therefore to extend ranger paths across the forest area where slope stability allows with the focus being on improving access to the forest margin. With drags down hill being relatively painless, this also brings wider areas of open hill into effective management.

Deer glades across the site may be of limited value and would probably represent a poorer investment in terms of resources than improving access.

The proposed extensions to the road network and restructuring will also improve the deer control environment and allow the deer management resource to be more efficiently used.

When deer control intensifies the law of diminishing marginal returns quickly comes into play, with escalating resources being required to control a declining number of deer. Deer are also very responsive to hunting pressure, and a strategic grouping of vulnerable restocks combined with a focussed control effort on these areas during establishment, has the potential to deliver adequate protection, cost effectively.

Large scale felling coupes and a reasonable number of similarly phased fellings across the Forest can help to reduce deer impacts on restocks. Conversely large areas of thicket stage conifers can make deer control more problematic. In these circumstances moving deer in a coordinated manner can be the only effective control option.

I/6.0 Open Ground Management

Deer control is currently the main tool available for open ground management. Feral & marauding sheep are also a factor, so grazing control of sheep by maintaining adequate march fences and liaising with neighbours is also important.

Deer control not only has the potential to facilitate the expansion of the woodland fringe, but it is also a major determinant of tree species diversity. NBL and montane scrub in particular can be suppressed and not evident, but with a reduction in grazing pressure this advance regeneration can develop very rapidly. Persistent high grazing pressure selectively favours SS regeneration.

The establishment of NBL areas on the upper margin can act as a future seed source to catalyse NBL expansion in the longer term. NBL along the upper margins can also act as non-intervention protection forest with limited impacts on total forest productivity, as the upper slopes have lower growth rates & higher extraction costs.

While climate & elevation will ensure that a natural treeline is achieved over time with a balance between open hill ground & forest, there are areas of higher value open ground that may be desirable to be kept open at lower elevations. Where natural processes favour the development of woodland on these areas, then it can be impracticable in the long term to maintain these areas without some form of targeted grazing management.

In terms of recreation, open ground along paths and at key viewpoints is important and these need to be considered in operational recreation plans. Clearfelling also creates transient open ground along recreation routes which can provide a range of novel and dynamic viewpoints.

I/7.0 Public Access & Core Paths

An integrated approach is required between the larger scale operations determined by the LMP and the smaller scale recreational plans required for managing the significant number of high value recreational assets within the LMP area. In addition the wider landscape quality is a key consideration and this is determined by large scale forest management activity. This integrated approach is partly facilitated by communication, having structures in place to encourage communication and involving the Communities, Recreation & Tourism (CRT) section in the LMP process.

The Cobbler path and associated routes are an extremely important recreational asset. Restructuring along the lower route and along the path itself has taken place, but the upper slopes of the forest through which the path passes are of a young age and with difficult operational access. It is proposed to defer management decisions on the bulk of this area until the crop has reached maturity.

Clearance of individual trees to enhance bouldering sites will be undertaken in consultation with the MCS. Most of these areas are located in open ground or NBL.

Path closures will be minimised and diversions used. CCF in this context can play a very positive role, but conversely requires fairly continuous management across the years which can in some instances be problematic. Conversely CCF can minimise the widespread landscape change that can occur with clearfelling, although clearfells can also have a positive impact by opening up transient open views from elevated paths.

The proposed new haul route linkage with Cruach Tarbeirt may create opportunities for a circular mountain bike route with Tarbert as the potential focus. New ranger trails may also facilitate public access to the open ground, and provide emergency descents. A number of low key hill access routes have been opened up and the proposal is to expand these, where budgets allow, as the forest is restructured by the provision of open ground or brashed routes.

I/8.0 Heritage Features.

There are a number of unscheduled sites and these are identified on the District GIS Layer, and these will be protected during operations in line with the UKFS. If new sites are found these will be mapped and recorded and protected from operations.

I/9.0 PAWS restoration.

There are a number of areas across the site where there are records existing on the Ancient Woodland Inventory. Ancient of Semi Natural origin (category 1a and 2a) woodlands will be restored as felling progresses. Opportunities to extend native woodland and make links with existing native woodland (for example at Cruach Tarbeirt) will be identified, with opportunities in particular located in the Glen Loin and Upper Glen Loin management zones, where native woodland restoration will also contribute to improving water quality.

Within the areas identified as Long Established of Plantation origin (1b, 2b and 3), the proposal is to establish or maintain via Low Impact Silvicultural Systems (LISS) areas of mixed broadleaves and mixed conifers.

Appendix II: Assessment of success of previous plan

Previous Plan Objective	Assessment of progress
To enhance the landscape value of the FDP area – by developing a coupe structure and altering timings to create a more diverse forest structure	Extensive restructuring has taken place and in key areas along Loch Long, this has greatly enhanced the landscape and recreational environment. Some areas of younger crop established along the upper margin to improve the upper margin and large areas of mature timber with limited options for landscaped coupes remain problematic
To enhance the [nature] conservation potential of the FDP area – by conversion of some of the plan area to native woodland, and the establishment of CCF as well as retention and consolidation of existing broadleaved areas.	Conversion of PAWS areas has taken place with NBL establishment currently patchy. Large areas of NBL along Loch Long have been created. CCF management hasn't taken place due to cost and slope constraints, and this means that many areas designated as CCF under the previous plan are not suitable in this rotation.
To enhance the recreation potential of the area – especially by replanting the woodland adjacent to the Cobbler path to retain views and create a more diverse and interesting forest structure. There were also a number of new routes proposed.	The felling and new planting of woodland adjacent to the Cobbler path has improved the setting and experience of the access route, by retaining views and creating a more diverse forest. It is now at the stage where thinning and management of the adjacent woodland is required to further diversify the forest structure

To foster economic timber production – by timing felling to optimise timber production and minimise the risk of windblow.	The site is generally windfirm and windblow limited. Timing felling to optimise timber production can be a difficult aspiration as it can reduce diversity and limit strategic considerations of timber supply. Generally felling has proceeded when crops were ready, but some crops are unavoidably past the max MAI age.

The Plan objectives have been largely met, and are still relevant. They have informed the objectives identified for this new plan, alongside additional information obtained during the scoping exercise.

Appendix III: Background information

The majority of the land that lies within the Glen Croe LMP has been managed by the Forestry Commission since 1952.

III/1.0 Physical site factors

1.1 Geology, soils and landform

The solid geology underlying the site is composed largely of schist, psammite and pelite. There are also glacial and glaciofluvial deposits along the lower slopes, including gravel, silt and clay.

The steep slopes are recognised as being prone to washout. This is a particular concern above the A83. In 2012, the FES commissioned a report from Coffey Geotechnics report[2] to explore and advise on slope stability. The report confirms that some glacial and glaciofluvial deposits in the area typically comprise sandy gravelly silts which appear to be prone to washout.

Boulders are also frequently present on these steep slopes above the A83. These are mostly very large, typically 1-2m3. The rounded nature and scattered placement of the boulders suggests that these are glacially deposited. There are localised areas where boulders are associated with rock fall from rock crags.

While some of these slopes that are likely to be prone to both wash out and falling boulders are open, several areas lie within mature forest that will require to be removed during the lifetime of the plan.

1.2 Climate [3]

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 sheltered by terrain, 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.

[2] Coffey Geotechnics, Forestry Commission Scotland Slope Stability Project – Geotechnical Assessment for Glen Croe, Assessment Report, October 2012

[3] Summarised using data from the Met Office Regional Climate site for Western Scotland: http://www.metoffice.gov.uk/climate/uk/ws/

Therefore, while the forest is generally accessible all year round, both thinning and felling programmes need to take into account the generally high rainfall levels as well as storm rains associated with sudden cloudburst. These may cause significant short term water run off, and may contribute to landslips on steeper, unstable slopes.

The area is generally sheltered below the current treeline which together with good soils creates stable crops with only limited windblow. Exposure is seldom a constraint to CCF in the lower elevations of the LMP.

1.3 Water

There are 9 private water supplies taken from these forests.

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.

The status of the water courses in the LMP area is shown in map A7.

The Allt Coiregrogain is the only one in bad condition where the status is partially derived from forestry impacts on the riparian environment. Normal forest restructuring in line with the UKFS will ameliorate these impacts, and this will be implemented as the LMP progresses.

The “bad” status of the Croe Water is due to large scale, long standing, HEP schemes in the upper catchment. Restructuring work along the river has already removed conifers with regeneration of NBL progressing, and this together with wider restructuring proposed along the tributaries should enhance the riparian habitat for migratory salmonids.

The Loin Water which has a large forestry catchment is classed as being at good status. Restructuring and an increase in NBL within the catchment as proposed for both this LMP and Cruach Tarbeirt should help to maintain the rivers condition.

II/2.0 Current land management

2.1 The existing forest

2.1.1 Species, age structure and yield class

The LMP covers an area of 3082 Ha, comprising 974 Ha of conifer forest, which is predominately Sitka Spruce, 128 Ha of Broadleaves, 283 Ha of integral open ground and 1697 Ha of hill land.

Sitka Spruce is currently the largest component of the forest, occupying about 62% of the forest area. The broadleaves are mainly native with Birch (BI) being the dominant species. 5 Ha of Rauli at the entrance to Glen Croe and along lower Glen Loin creates a very positive landscape impact in key areas.

The broadleaves are found predominantly along Loch Long, with a range of age class. Large areas of mature broadleaves tend to be absent, but some of the riparian zones contain pockets of older mixed NBL.

Norway Spruce dominates the Mixed Conifers and most of these areas are mature. Small pockets of older Larch occur as well as more substantial plantings of second rotation and younger Larch along Loch Long, at Ardgartan and in upper Glen Croe.

2.1.2 Access and roading

Vehicular access for forest management is relatively good along the slopes between Ardgartan and Succouth, and along the west side of Glen Croe, with good access to the main road. The east side of Glen Croe is easy to access from the public road, but access within the blocks is limited, and difficult to extend due to potential slope slippage.

2.1.3 Continuous Cover Forestry Potential

Much of the area currently allocated for CCF has poor road access, and therefore has not been thinned, is past its thinning window and is located on steep rocky slopes. These areas will now have to be managed on a clearfell system with new access provision, but could be revisited for CCF potential in the second rotation before the thinning window has passed if the roading pattern allows for this and CCF offer management benefits.

Some areas of younger crop and NS in key areas on more accessible lower slopes can be managed as CCF where this delivers wider benefits.

The management of mature unthinned NS as CCF can be problematic in terms of the likely regeneration of a dominant SS understorey. A reduction in deer pressure can adjust the relative competitive ability of SS and deer sensitive species such as NS, and this could lead to a more diverse and balanced successor crop.

Future CCF should focus on areas where there is clear potential to meet water quality, recreation, landscape or biodiversity objectives as well as increasing timber product assortment.

2.2 Biodiversity

2.2.1 Habitats and species

Red Squirrel and Bats are present in this forest, and there are likely to be Otters. Arrochar is designated a Grey Squirrel Buffer Area, with habitat management being the main mechanism used. The key elements of this approach are to establish and maintain large areas of mixed conifer and to limit areas of large seeded broadleaves.

The moorland and the irregular forest edge have been identified by consultees as important habitat for Black Grouse although the area is not a priority area.

The open hill provides hunting range for a pair of Golden Eagles.

2.2.2 Riparian habitat

There are several major and minor watercourses within the forest, including the Croe Water, Allt Coiregrogain, and the Loin Water. The Croe Water is important as a small Salmon river although this resource is not used for formal recreation.

2.2.3 Invasive species

Rhododendron is present across the site with the focus on the lower slopes. Reductions in grazing pressure on the open hill and within integral open ground need to consider the possible adverse impacts of deer control or livestock removal on the possible spread of Rhododendron.

Small areas of Japanese Knot Weed occur along the shoreline. This is currently outwith the LMP area, but should be monitored.

2.2.4 Potential pests and diseases

There is no active P ramorum in the LMP area.

Ash dieback is widespread across the area and will impact negatively on landscape and biodiversity. Tree safety considerations are perhaps the most practical short term consideration.

2.3 Landscape, landscape designations and visibility

The LMP lies wholly within the Loch Lomond and The Trossachs National Park and the Argyll and Bute North Argyll Special Landscape Area.

The special qualities[4] that relate to this area of the Park ('The Argyll Forest' area) make reference to the 'high hills' and 'deep glens' as well as the 'forests and trees' that are a key characteristic of this landscape.

The report draws particular attention to the 'remote...high hills and deep glens', the 'distinctive peaks' of Arrochar and the 'dramatic pass' of the Rest and Be Thankful, with its view framed by the steep hillsides and its historical significance, indicating that these aspects of this landscape are valued.

2.3.1 Landscape character

All the glens and hillsides within the LMP area lie within the **'Forested Hills'** landscape character type, as described in The Loch Lomond and The Trossachs National Park Landscape Character Assessment (SNH, 2005). The opportunities for change identified in this character type reflect its location as a transition between low lying farmed glens and the more wild and open higher hills. The landscape character assessment includes specific landscape guidelines for this area as follows [5]:

[4] 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).

[5] Environmental Resources Management (2005). Loch Lomond and the Trossachs landscape character assessment. Scottish Natural Heritage Commissioned Report No. 093 (ROAME No. BAT/AA302/00/01/123).

- Create graded naturalistic transitions between the upper edge of the forest margins and surrounding open landscapes
- Promote landscape and ecological diversity
- Encourage a high proportion of native species
- Limit the impacts of infrastructure such as roads, through the use of temporary tracks

The core of hills at the centre of the LMP lies within the **'Open Upland Hills'** character type as described in The Loch Lomond and The Trossachs National Park Landscape Character Assessment (SNH, 2005). The landscape character assessment includes specific landscape guidelines for this area as follows [6]:

- The existing diverse pattern of vegetation should be enhanced with native woodland generation...to achieve a more natural transition between lowland woodland to upland woodland, to...hills
- Limit new planting to the lower slopes, to ensure that the dramatic upper landform can be appreciated
- Recommended forest species include native woodland on more rugged slopes, and commercial woodland on smoother, less dramatic hill slopes
- Limit the impacts of infrastructure such as roads, through the use of temporary tracks

The National Park Authority has also published a 'Wildness study'[7] and this suggests that while the hill summits may indeed be perceived as relatively 'wild', the sides of the glens, and the lower glens are perceived as medium to low relative wildness.

Specific opportunities to take forward these guidelines within the LMP have been analysed as follows:

[6] Environmental Resources Management (2005). Loch Lomond and the Trossachs landscape character assessment. Scottish Natural Heritage Commissioned Report No. 093 (ROAME No. BAT/AA302/00/01/123).

[7] Carver et al, (2011). Wildness Study in the Loch Lomond and The Trossachs National Park

Guideline or issue	Opportunity	Action in LMP
Create a more naturalistic transition between the upper edge of the forest margins and upland open landscapes	Opportunities to extend semi-native, naturalistic woodland are likely to be most successfully achieved through natural colonisation of woodland up to a natural treeline.	Aim to bring down herbivore numbers in the core hill land area of the LMP during the first ten years of the LMP to assist in future opportunities to encourage natural colonisation of woodland along the upper margin
Promote landscape and ecological diversity	Increased riparian woodland, felling and restocking to extend age structure of the woodland, the continued management and establishment of diverse conifers as well as reduction in grazing should all increase diversity of habitats	In the first ten years of the LMP, age structure will continue to be diversified through felling and restocking, and reduction of herbivore numbers should assist in increasing the diversity of open habitats
Encourage a high proportion of native species – especially on more rugged landforms	On PAWS, on poorer ground, along upper margins, on steep ground where slope stability woodland is required, and in more remote and inaccessible locations, native woodland will be a key component of restocking	Establishment of slope stability woodland is likely to be the priority in the first ten years of the LMP, with some PAWS restoration towards the end of this period

Limit new planting to lower slopes	There are opportunities to alter the upper margin of the forest to create a more sympathetic shape relative to landform as felling proceeds – some of this may involve new planting to extend the margin up into sheltered dips and hollows.	The upper margin of the woodland has been altered to reflect the shape of the landform, by drawing the boundary down on the ridges and extending it higher up into hollows. This includes extending planting of native slope stability woodland to upper slopes, and encouraging montane woodland as appropriate. This new planting should strengthen the 'semi-wild' character of the landscape
Limit the impacts of infrastructure such as roads, through the use of temporary tracks	One new road has been identified, to allow timber haulage to be moved through the neighbouring Cruach Tarbeirt forest and reduce impacts on the road network and recreation sites	Several short ATV tracks, required to assist in deer management, will be included in the LMP, along with the route of the proposed new road.

2.3.2 Visibility and Views

See map M33 Location & Viewpoints below.

There are a number of key viewpoints that have informed the design of the woodland within the LMP. These viewpoints are:

- From the Rest and Be Thankful viewpoint, which is a popular viewpoint where visitors stop and admire the panoramic view down the length of Glen Croe. This is therefore the most significant viewpoint in terms of both visitor numbers and prolonged visibility – it is a sustained view. The woodland is also likely to feature in photographs from the viewpoint.
- The A83, travelling along the length of Glen Croe, although only the lower edge of the woodland and the deer/ catch fences will be visible, as the upper slopes will be screened by the growing trees. Note that drivers and passengers travelling along the road tend to focus on the view along the length of the glen
- A number of views from The Cobbler (Ben Arthur) and its access routes, above Glen Croe. Views of the woodland from this well-known and popular summit are foreshortened and partial, but access routes on the ridges offer good, elevated views of the south side of Glen Croe.
- Views from around Loch Long, looking across the loch to the forest below The Cobbler
- Views from the summit of Cruach Tarbeirt to the forested slopes of Glen Loin

Analysis of these viewpoints on site has led to the identification of 5 viewpoints (See Map M33) which have been used to illustrate the proposed new planting proposals. These were selected on the basis of amount of visibility and the significance of views.

These viewpoints are:

- View 1: Rest and Be Thankful viewpoint
- View 2: From the Cobbler, descent from the North Peak to Bealach a' Mhaim
- View 3: From Morelaggan south of Arrochar on the B814
- View 4: From the Arrochar Community Centre
- View 5: From the summit of Cruach Tarbeirt

2.4 Social factors

2.4.1 Recreation

This is a very popular area for walking, hill walking and cycling, and is an important focus for outdoor recreation within the LLTNP. The Cobbler, for example, attracts 50,000 visitors/year who access the hill through forest and across open hill covered by this LMP. The Rest and Be Thankful car park and viewpoint is also a significant attraction, while the LMP area also includes access routes to a number of key summits – such as Beinn Narnain, Beinn Ime, A' Chrois and The Brack.

Part of the Cowal Way passes through the forest, and there are a number of way marked routes. In addition, there are several 'boulders' used for bouldering within Glen Croe, and cycle routes along Loch Long.

2.4.2 Community

The village of Succoth is located in Glen Loin, and the Forest forms both a backdrop to the village and is also a popular route for informal walking. The village of Arrochar is also very close, although there are direct walks from this village onto Cruach Tarbeirt.

In addition to these two communities, there are a number of hotels and guest houses in nearby Arrochar, and the Forest Holiday lodges and the Ardgartan hotel located on the lochside at Ardgartan.

2.4.3 Heritage

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.

Appendix IV: Forest Design Plan Consultation Record

Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
Loch Lomond and The Trossachs National Park		23rd July 2013	Follow good forest design, with especial attention to softening the upper margin of the woodland, Restore PAWS over the next two rotations Develop proposals to improve the open ground habitat for golden eagles Identify areas of peat and propose measures for its future management to maintain and enhance this resource Identify proposals that will assist in soil stabilisation, especially above the A83, including new planting proposals on the slopes of Ben Lubhean. Identify and maintain key viewpoints on the Cobbler path, and enhance the visitor experience by diversifying tree species. Any expansion up into the open ground along the Cobbler path should retain some open space. NPA is keen to assist in the development of circular walking routes.	Viewpoints agreed with the Park Key attributes identified in landscape analysis, and good practice guidance followed PAWS sites identified and proposals for restoration. Opportunities for native woodland expansion and CCF identified. Known archaeological sites protected as per Guidelines, and protocol in place for identifying unrecorded remains.

			Other tracks would benefit from the establishment of open spaces to retain some key views. The revised coupe design should relate to landscape character, landform and scale. Restocking should aim to diversify species to enhance both woodland productivity and landscape character. There is considerable opportunity to improve the upper margin of the forest. The viewpoints for assessing the visual impact of forest design should be agreed with the NPA. These should include high level viewpoints from surrounding hills. The experience of the forest from the A83 should be taken into account. The 'relative wildness mapping' undertaken by the NPA should be taken into account. Future roading requirements should be shown in the plan if possible.	
Lochgoil Community Council		July 2007	Enhance the landscape (including upper margins as viewed from Rest and Be Thankful) and lack of species diversity Improve connectivity of planting between Ardgartan and Cruach Tarbeirt	Presentation of the draft proposals to the local community council included as part of the consultation process.

Scottish Natural Heritage		5th June 2013	Site specific issues identified include highlighting that a number of raptors use the open ground as hunting territory. Opportunities to lower the treeline should be considered, and woodland should not be extended significantly onto this area, although there may be opportunities for a small amount of new native woodland to be extended along the upper margins. The plan should also ensure that proposals aim to expand Black Grouse habitat and protect red squirrel. There would be benefits to developing a more strategic approach to deer management which would also contribute to enhancing the special interests in the nearby Ben an Lochain SSSI. The woodlands should be redesigned to reflect landscape and visual sensitivities, especially along the A83.	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 as LISS and the future strategy for PAWS restoration and long term LISS on lower slopes should enhance red squirrel habitat.

SEPA		20th June 2013	Plan is expected to contribute to meeting the ambition of achieving good water quality status in the Clyde catchment area by 2027. The plan should specifically refer to and follow the guidance within the Water Framework Directive and UKFS Guidelines and GBRs. The plan should include measures for dealing with invasive plant species that threaten the water environment if relevant. CCF opportunities should be identified and encouraged to mitigate against water run off. Identify areas of peat and propose measures for its future management to maintain and enhance this resource. The plan should identify measures to implement the FCS Guidelines on Water Management and protect water features, including wetland, flushes and springs.	Existing areas of BL will be retained, and opportunities to establish CCF or restore PAWS have been identified in key water catchments, which in due course will assist in improving water quality. The main focus of activity over the first ten years of the plan will be on establishing slope stability woodland which should assist in reducing sudden water runoff over time. FCS Guidelines on Water Management will be followed
SSE		15th July 2013	Trees surrounding SSE infrastructure should be removed as soon as is reasonably possible. Would like to see the felling proposals when they are in draft. Once felling has taken place, SSE will advise on the area which should not be replanted.	SSE will be consulted on draft felling proposals

RSPB		24th June 2013	A small number of Black Grouse leks were identified in 2011 and 2013 both within and adjacent to the LMP area. There is the potential to both deliver positive management for Black Grouse and connect local populations through appropriate management of both the woodland edges and the open hill ground	Following increased deer management, there is likely to be opportunities to develop a more natural transition between the woodland and open land which may benefit Black Grouse in due course
MC of S		29th August 2013	The area is popular with walkers and mountaineers, with key access to a number of summits. The experience of the visitors would be enhanced by improving the shape of the upper margins of the forest, diversifying the species, and expanding any remnants of North Atlantic oak wood. There are a number of popular crags used for bouldering within the forest, and these would benefit from cutting the tree stumps down as close to the ground as possible at felling, and retention of access routes and a more open setting for the individual boulders as specified. Access in the area would benefit from the development of more circular routes and increased access to Ben Brack, Ben Donich, the Cobbler and A' Chrois through the forest.	The setting of bouldering locations will be kept more open after felling has taken place. There are likely to be increased opportunities for coming off the hill in emergency situations as watercourses are opened up. There will be additional access for ATVs primarily for deer management, but these may also be accessible for hill walkers who require to descend from the hill in an emergency Path maintenance and any expansion in parking will be undertaken as resources allow.

			The MC of S would like to see a robust programme of path maintenance in place for all upland paths in the plan area. The development of 'emergency' routes from the hills through the forest to allow a quick descent in deteriorating conditions should also be considered to improve safety on the hills. Increased parking at Honeymoon Bridge for access to the hills and boulders. MCof S would like to see the development of an integrated plan across a number of neighbouring land owners to manage the whole of the Arrochar Alps and place the LMP in context. The MCof S would like to see a draft of the LMP.	