Forestry and Land Scotland | Coilltearachd agus Fearann Alba

West Region

Glen Creran

Land Management Plan

Glen Creran looking West, taken by Stuart Findlay

Plan Reference No: ******

Plan Approval Date: ******

Plan Expiry Date: ******

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FORESTRY AND LAND SCOTLAND

Application for Land Management Plan Approvals in Scotland

Forestry and Land Scotland - Property

Region:	West
Woodland or property name:	Creran
Nearest town, village or locality:	Appin
OS Grid reference:	NM 050520
Local Authority district/unitary Authority:	Argyll and Bute

Areas for Approval	*Conifer Ha*	*Broadleaf*	***Open Space*	*Other Land*	*Peatland Restoration*
Clear felling	*284.38*	*9.42*	*38.23*	*0*	*0*
**Restocking*	*145.11*	*74.15*	*180.63*	*0*	*0*
Selective Fell	*0*	*0*	*0*	*0*	*0*
Natural Regeneration	*0*	*1.78*	*1.73*	*0*	*0*

*Note: *Restock includes areas felled under previous Plan; **Open space includes land awaiting natural regeneration*

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

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

3. I confirm that the initial scoping of the plan was carried out with FLS and SF staff on 14/08/2019.

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 SF agreed must be included.

6. I confirm that agreement has been reached with all of the stakeholders over the content of the forest plan and that there are no outstanding issues to be addressed. Copies of consultee endorsements of the plan are attached.

7. I undertake to obtain any permissions necessary for the implementation of the approved Plan.

Signed …

pp Regional Manager

Signed……

Conservator

Region: West

Conservancy:

Date : 09/12/2020

Date of Approval: …….

Date approval ends: …….

Table of Contents – Glen Creran LMP

1 Regulatory Requirements

1.1 Summary of Proposals

Glen Creran supports Ancient Semi-Natural Woodland (ASNW) designated as SSSI/SAC lower down the glen with commercial conifer plantations further up the glen, above which is a huge expanse of open hill. The aim will be to maintain the designated sites in favourable condition, expand the native broadleaved woodland where appropriate and diversify the commercial forest to provide sustainable timber supplies, improve landscape impacts and to achieve a more diverse structure and range of species and habitats. The forested area will be managed as upper and lower forest zones: the lower zone as native broadleaved woodland; the upper zone as commercial conifers.

Lower zone:

The existing conifer coupes between and above the two areas of SSSI woodland will be felled and restocked with native broadleaves. On lower slopes, these coupes will be managed as productive broadleaved woodland under a Low Impact Silvicultural System (LISS) / Continuous Cover Forestry. The coupe that was previously felled has regenerated with a variety of tree species; non-native and invasive species will be removed, trees respaced where necessary and a thinning programme implemented.

A new road and forwarder track will be required to access the felling coupes, which will pass through the upper part of the SSSI. This site is currently under commercial conifers but the route will be micro-sited to avoid any remaining mature broadleaves, and to protect key lichen and bryophyte assemblages.

The SSSI /SAC will be managed according to the agreed SSSI Management Plan, to maintain the woodland habitats and other designated features in favourable condition. This will include promoting natural regeneration of native tree species, clearing scrub and bracken to create conditions suitable for Chequered skipper and Pearl bordered fritillary butterflies and controlling non- native and invasive species.

Upper zone:

Structural diversity will be improved by revising the felling programme to help increase age diversity over the longer term, while sustaining timber supplies and designing felling coupes with a better fit to the landscape. Species diversity will be improved where possible, through use of broadleaves and a range of conifers on better soils on lower slopes and by growing Sitka with other species such as Lodgepole pine and birch on upper slopes. Buffers will be created along watercourses and open canopied broadleaved woodland developed along the larger riparian zones, notably, the River Creran and Allt Eilidh burn.

The coupes adjacent to the SSSI will be felled and restocked with native broadleaves grading to mixed conifers/broadleaves, to create a buffer between the designated site and Sitka spruce stands, helping to prevent regeneration into the broadleaved areas. Mixed conifers and broadleaves will be restocked throughout much of the lower spur to improve diversity and where windthrow risk is lower, stands will be thinned and managed under LISS.

Peatland will be restored in an area that was previously under a reservoir and has since regenerated with scattered conifers and broadleaves that have been in-check due to deer browsing. The expectation is that a mosaic will develop of broadleaved trees along the riparian corridor and on upper slopes and scattered scrub where peat is thinner, interspersed with areas of sustained peatland where the peat is deeper.

Commercial forestry will be pulled back from the steepest ground and poorest growing conditions but native broadleaves will be encouraged to develop in these areas and above the existing timber line, closer to the natural tree line. On upper slopes, natural regeneration will produce an open habitat with scattered trees; priority open habitats will be protected.

Deer browsing pressure has been high throughout the forest in recent years and deer control is the main critical success factor for delivery of the LMP. Successful deer management is dependent on the strategic deer fence that runs from Glencoe to Glen Creran and maintenance of this fence will be a priority, as will focused deer control to protect areas of young trees and priority habitats.

Objectives

- Maximise returns from the current productive stands through coupe and access design and timing of harvesting
- Optimise production potential by focusing future conifer production on the most suitable areas, concentrating on the upper glen and reviewing options on steep and marginal ground
- Manage deer populations, to allow the successful establishment of planted and naturally regenerating trees and to maintain priority open ground habitats in favourable condition
- Manage recreation access by maintaining a network of trails and the Right of Way to Glenachulish and by creating new provision to the Fairy Bridge
- Increase the resilience of the forest to climate change and pests and disease, through design and species choice
- Manage and expand the native woodland habitat, focussing on the lower zone and above the current timber line
- Manage riparian areas to protect watercourses and develop open canopied broadleaved woodland along larger watercourses
- Protect and enhance the designated sites and features
- Restore areas of deep peat

Summaries of Management Proposals

The felling proposals in the first twenty years of the plan are summarised below:

Felling	Phase 1	Phase 2	Phase 3	Phase 4
Area in ha	112.7	219.33	78.98	63.93
% of area (not including other land)	8.8	17.2	6.2	5.02
Volume (Km3)	51,892	88,001	45821	47057

The species composition over the first twenty years is as follows:

Species Group	Current – 2021		Year 10 – 2031		Year 20 – 2041	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
Sitka Spruce	474	19.10	390	15.71	386	15.55
Norway Spruce	34	1.37	29	1.17	31	1.25
Larches	45	1.81	21	0.85	8	0.32
Mixed Conifers	188	7.57	148	5.96	119	4.79
Mixed Broadleaves	80	3.22	78	3.14	78	3.14
Native Broadleaves	209	8.42	277	11.16	368	14.83
Felled awaiting restock	68	2.74	87	3.51	17	0.68
Internal Open Space	173	6.97	241	9.71	267	10.76
Forested Area Total	**1271**	51.21	**1271**	51.21	**1274**	51.33
Open Hill	**1210**	48.75	**1210**	48.75	**1207**	48.63
Agriculture						
Open Water	1.2	0.05	1.2	0.0.5	1.2	0.05
Open Habitat Total	**1211.2**	48.80	**1211.2**	48.80	**1208.2**	48.68
LMP area Total	**2482**	100.01	**2482**	100.01	**2482**	100.01

The age class composition over the first twenty years is as follows:

Age Class	Current – 2021		Year 10 – 2031		Year 20 – 2041	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
0 – 10 yrs	156.8	15.23	255	27.04	246	24.85
11 – 20 yrs	42.3	4.11	147.7	15.66	246.7	24.92
21 – 40yrs	30.8	2.99	53.7	5.69	178.3	18.01
41 – 60 yrs	601.2	24.22	21.4	2.27	25.1	2.53
60+ yrs	198.9	19.31	465.2	49.34	293.8	29.68
Total	1030		942.9		989.8	

Productive Forest Area Statement

PHASE 1

** includes planting previously felled coupes with delayed restock*
*** shows final outcomes for P1 and P2 coupes*

FELLING AREA	*ha*	*ESTABLISHMENT AREA*	*ha*
Conifer	98.13	Conifer	79.98
Open Space	9.99	Open Space	37.96
Broadleaves	4.59	Broadleaves – NR	38.4
		Broadleaves – native planting	24.23
		Broadleaves – non-native planting	0
Existing Broadleaves	0	Existing Broadleaves	0
TOTAL	**112.71**	**TOTAL**	**180.57**

PHASE 2

FELLING AREA	*ha*	*ESTABLISHMENT AREA*	*ha*
Conifer	186.25	Conifer	65.13
Open Space	28.23	Open Space	71.22
Broadleaves	4.83	Broadleaves – NR	36.54
		Broadleaves – native planting	46.44
		Broadleaves – non-native planting	0
Existing Broadleaves	0	Existing Broadleaves	0
TOTAL	**219.33**	**TOTAL**	**219.33**

UKWAS Summary

Description	% of LMP Area[1]	Location of Data
Restock main conifer spp	39	Forester Restock Layer
Restock other conifer - Scots Pine	0.5	Forester Restock Layer
Restock – other conifers	4	Forester Restock Layer
Open Space[2]	11	Forester Restock Layer
Native broadleaves[3]	46	Forester Restock Layer
Management for biodiversity as primary objective (incl NR and MI area)	30	Forester Management Layer
LISS	18	Forester Management Layer
Natural Reserves	0	Forester Management Layer

Notes

1. The % will total more than 100% as the species and management categories overlap.
2. Only the larger areas of open space area recorded here. There many more small areas of open space within the broadleaf woodland.
3. The native broadleaves will be at variable stocking densities.

Planned Roading Operations

Planned operations	2021 – 2031 10 plan period
Road Construction	5.35 km

The roads to be constructed, as detailed on Maps 6 a & b will require local authority Prior Notification (PN) approval. This will be submitted following EIA determination approval by Conservancy, as included in this plan.

1.2 Activity Summary

1.1 Table of Clearfelling (Phase 1)											
Coupe No.	**Total Area (Ha)**	**Spp by Ha (SS)**	**Spp by Ha (SP)**	**Spp by Ha (LP)**	**Spp by Ha (NS)**	**Spp by Ha (Larch)**	**Spp by Ha (X con)**	**Spp by Ha (BLeaf)**	**Open Land by Ha**	**Restock Year**	**Monitoring Comments**
44150	40.79	20.99	0	0.23	7.06	2.13	3.33	4.55	2.5	2023	
44152	34.57	15.67	0	7.75	0	4.23	4.17	0	2.75	2024	
44153	37.34	25.62	0	5.1	0	1.48	0.37	0.04	4.74	2024	
Totals	**112.7**	**62.28**	**0**	**13.08**	**7.06**	**7.84**	**7.87**	**4.59**	**9.99**		

1.2 Table of Clearfelling (Phase 2)											
44145	78.32	64.9	0	0	0	1.02	0	4.67	7.73	2029	
44159	32.05	23.77	0.03	1.78	0.14	4.52	0.14	0.1	1.56	2029	
44136	74.22	31.69	0	24.33	0	5.54	0	0	12.65	2029	
44103	34.74	13.54	0	12.81	0	2.04	0	0.06	6.29	2029	
Totals	**219.33**	**133.9**	**0.03**	**38.92**	**0.14**	**13.12**	**0.14**	**4.83**	**28.23**		

1.3 Table of CCF Felling (Phase 1)												
Coupe No.	**Total Area (Ha)**	**Volume (M^3)**	**Spp by Ha (SS)**	**Spp by Ha (SP)**	**Spp by Ha (LP)**	**Spp by Ha (NS)**	**Spp by Ha (Larch)**	**Spp by Ha (X con)**	**Spp by Ha (BLeaf)**	**Open Land by Ha**	**Silv. Method**	**Monitoring Comments**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1.4 Table of CCF Felling (Phase 2)												
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1.5 Table of Thinning (Phase 1 & 2)								
Coupe No.	**Total Area (Ha)**	**Thin Year**	**Species**	**Thin-able Area (Ha)**	**Prescription for Thinning (including subsequent planned intervention)**	**Final Thinned Area (Ha)**	**Final Vol/Ha Removed**	**Monitoring Comments**
44144	26.67	2027/28	BI, SCI, SOK, MB, SS, ROW, HOL, EL, WH, BE	20.3	Area restocked in 2012. Clean in 2020/21 (or 21/22 at latest) by removing non- natives – including SS, WH, EL and BE. First thin in 2027/28 at age 15 years (intermediate thinning on a 5 year cycle, 0.5 thin intensity). Thin again at age 20 years (intermediate thinning, 5 years cycle, 0.7 thin intensity) then crown thin at 25 years, thin intensity fraction of 1). Subsequent thin every 5-7 years.			
44142	6.62	2020/21	MB, SS, DF, SP, SS, NS, SOK, HL, RC	4.25	Area restocked in 2001. Manage as irregular shelterwood with first thin 2020/21. Conifers to be line thinned at age 20 years (5 year cycle, thin intensity 1, removing 1 row for every 2 rows). At 25 years, intermediate thinning at 0.8 thin intensity, then at 30 years intermediate thin on a 7 year cycle at 0.7 thin intensity. Small area of Oak can be thinned from age 30 (line intermediate at 1.1 thin intensity no more than 1 in 7 rows removed) then crown thin from age 35 (1.3 thin intensity) then at 40 and 47 years, reducing thin intensity to 1. From 55 years, neutral thin every 10 years.			

1.5 Table of Thinning (Phase 1 & 2)								
Coupe No.	**Total Area (Ha)**	**Thin Year**	**Species**	**Thin-able Area (Ha)**	**Prescription for Thinning (including subsequent planned intervention)**	**Final Thinned Area (Ha)**	**Final Vol/Ha Removed**	**Monitoring Comments**
					Remove HL at first thinning (2020/21) and remove HL in adjacent coupe 44143 at the same time. Restock these discrete areas with MB at 1600 stems / ha.			
44109	14.39	2025/26	SS, BI, CAR	11.22	Restocked in 2006, manage as irregular shelterwood, first thin 2025/26. Conifers to be line thinned at age 20 years (5 year cycle, thin intensity 1, removing 1 row for every 2 rows). At 25 years, intermediate thinning at 0.8 thin intensity, then at 30 years intermediate thin on a 7 year cycle at 0.7 thin intensity.			
44139	16.92	2030/31	SP, BI, ASP	10.49	Restocked in 2015. Thin to favour best stems; first thin when stand top height is 10 – 12 m or basal area 20 – 30 m3 /ha.			
44114	30.26	2029/30	NS, SS	19.82	Assess for thinning every five years and target removal of any larch during the plan period. First thin at 15 years if stand height achieved, otherwise leave until 20 years. Intermediate line thin on an initial 5 year cycle, but with a harder thin on coupe margins. Aim to retain both species in the stand for as long as possible, managing in groups if necessary. Retain BLs along watercourses and ride / track edges.			

1.5 Table of Thinning (Phase 1 & 2)								
Coupe No.	**Total Area (Ha)**	**Thin Year**	**Species**	**Thin-able Area (Ha)**	**Prescription for Thinning (including subsequent planned intervention)**	**Final Thinned Area (Ha)**	**Final Vol/Ha Removed**	**Monitoring Comments**
44112	12.33	2029/30	SS, SP	9.43	Assess for thinning every five years and target removal of any larch during the plan period. First thin at 15 years if stand height achieved, otherwise leave until 20 years. Intermediate line thin on an initial 5 year cycle, but with a harder thin on coupe margins. Aim to retain both species in the stand for as long as possible, managing in groups if necessary. Retain BLs along watercourses and ride / track edges.			
44108	16.82	2029/30	SS, SP, NS	10.26	Assess for thinning every five years and target removal of any larch during the plan period. First thin at 15 years if stand height achieved, otherwise leave until 20 years. Intermediate line thin on an initial 5 year cycle, but with a harder thin on coupe margins. Aim to retain sub-dominant or minor species, where possible, to maintain species mix. Retain BLs along watercourses and ride / track edges.			
44105	24.82	2029/30	SS, SP	17.64	Assess for thinning every five years and target removal of any larch during the plan period. First thin at 15 years if stand height achieved, otherwise leave until 20 years. Intermediate line thin on an initial 5 year cycle, but with a harder thin on coupe margins. Aim to retain both species in the stand for as long as possible, managing in groups if			

1.5 Table of Thinning (Phase 1 & 2)								
Coupe No.	**Total Area (Ha)**	**Thin Year**	**Species**	**Thin-able Area (Ha)**	**Prescription for Thinning (including subsequent planned intervention)**	**Final Thinned Area (Ha)**	**Final Vol/Ha Removed**	**Monitoring Comments**
					necessary. Retain BLs along watercourses and ride / track edges.			
44131	15.49	2029/30	OMS, NS, BI, NF, JL	13.88	Assess for thinning every five years and target removal of any larch during the plan period. First thin at 15 years if stand height achieved, otherwise leave until 20 years. Intermediate line thin on an initial 5 year cycle, but with a harder thin on coupe margins. Aim to retain sub-dominant or minor species, where possible, to maintain species mix. Retain BLs along watercourses and ride / track edges.			
44133	16.79	2029/30	SS, NS, AR, NF, JL	9.27	Assess for thinning every five years and target removal of any larch during the plan period. First thin at 15 years if stand height achieved, otherwise leave until 20 years. Intermediate line thin on an initial 5 year cycle, but with a harder thin on coupe margins. Aim to retain sub-dominant or minor species, where possible, to maintain species mix. Retain BLs along watercourses and ride / track edges.			

1.6 Table of Total Felling for Approved Plan Period											
Method	**Total Area (Ha)**	**Total Volume (M^3)**	**Spp by Ha (SS)**	**Spp by Ha (SP)**	**Spp by Ha (LP)**	**Spp by Ha (NS)**	**Spp by Ha (Larch)**	**Spp by Ha (X con)**	**Spp by Ha (BLeaf)**	**Open Land by Ha**	**Comments**
Clearfell	**332.03**	**142,707**	**196.18**	**0.03**	**52.0**	**7.2**	**20.96**	**8.01**	**9.42**	**38.22**	
Thinning	**181.11**	**6333**	**58.3**	**21.52**	**0**	**19.39**	**1.2**	**15.65**	**15.75**	**49.21**	
CCF	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
	513.14	**144,803**	**Grand Total of Felled Timber Proposed for Plan Period**								

1.7 Table of Restocking – including incomplete RS from previous plan													
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
44150	40.79							6.82		31.25	2.72	2023	Native broadleaves planted outwith SSSI area at variable spacings to achieve 1,100 to 1,600 stems/ ha of net plantable area at year 5. Hot planting, with no mounding and minimal ground	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													disturbance. A further 31.25 ha BLS to be restocked by NR (within SSSI area) by 2033 to achieve 1,600 stems / ha. By 2033, total BLS area will be 38.07 ha with 2.72 ha remaining as open ground	
44152	34.57	16.95	2.26	0	0	0	7.76	2	0		5.6	2024	Mixed conifers (SS/NF/LP, SS/NF and SS/MC) and SS/BI mixes to be planted to achieve 2,500 stems / ha of net plantable area at year 5. Native MB planted in areas indicated between watercourses to achieve 1,600 stems / ha. A further 1.45 ha BL NR expected to establish in riparian zones by 2038, leaving 4.15 ha open ground.	
44153	37.28	15.68	0.9	0	0	0	0	6.65	0		14.05	2024	Below road: Strengthen broadleaves in riparian zones by planting	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													60% BLS: 40% open ground in the western section (3.49 ha), with 50% planted BLS: 50% open in the upper area in the eastern section (4.32 ha) below the road, at variable spacings and aiming for 50% canopy cover along the watercourse itself. Two stands of conifers – SS/LP (60:40) in the northern section (2.24 ha) and SS/BI (80:20) in the southern section (1.97 ha) at 2,500 stems / ha. BI to be planted in groups at least 30 m diameter within the SS planting. Above the road: Restock with SS to achieve 2,500 stems / ha apart from an area in the northern part of the coupe	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													that is showing poorer growth, to be planted with SS:BI 40:40 in an intimate mixture with 20% open ground. Wide buffers (variable, 15 – 60 m) along riparian zones and natural regeneration of BLS (BI, ROW, SCI/WL) with 40 – 50% open space along watercourse. A further 2.36 ha BLs NR to be established by 2038, leaving 7.51 ha open ground.	
44145	78.32	0	0	0	0	0	0	33.45	0	18.08	26.79	2029	Native broadleaves planted in the lower part of the coupe, with natural regeneration across most of the upper slopes. Planting at variable spacing 1,100 – 1,600 stems / ha. Where soils are better (brown earths grading to	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													iron pans) and conditions are suitable, trees will be planted at 3100 stems / ha (1.8 m spacing) for productive broadleaves. Anticipate a further 18.08 ha BLS (associated with 13.45 ha open ground) natural regeneration established by 2038. By 2038 it is expected there will be 51.53 ha native BLs and 26.79 ha open ground.	
44159	32.05	14.97	0	0	0	0	4.72	3.95	0		8.41	2029	Stands above and below the upper road to be planted with SS / BLS (80:10 with 10% open ground) and MC / BLS (80:10), with BLS planted in discrete groups, minimum 30 m diameter. Conifers planted at 2,500 stems / ha and BLS at 1,600 stems / ha. Northern section above	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													road planted with a 50:50 SS/BI intimate mixture at 2,500 stems / ha. Elsewhere, BLs planted at variable densities along watercourses and ride/road edges with overall 40% open space but to achieve 50% canopy cover along watercourses. Leave 10 – 15 m buffer unplanted around scheduled cairn in Southern part of coupe and avoid planting conifers within 10 m of larger watercourses and 5 m of channels (< 1m wide). Leave 10 – 15 m buffer around scheduled monument (cairn).	
44136	73.2	31.78	0	0	0	0	1.73	9.01	0	12.41	18.27	2029	SS, SS/MC and SS/ BI mixtures planted at 2,500 stems / ha. Plant 50:50	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													SS/BI as intimate mixtures but where there are lower proportions of BI, plant BI in discrete groups, minimum 30 m diameter. Where growth has previously been poor and along watercourses, encourage natural regeneration of BI and other site appropriate native BLs, with enhancement planting if required after 5 years. Anticipate a further 12.41 ha BLs NR established by 2038, leaving 18.27 ha open ground.	
44103	34.74	8.08	0	0	0	0	3.85	1.83	0		20.98	2029	SS and SS/MC and SS/BI 50:50 mixes planted at 2,500 stems / ha, in intimate mixes. SS/BI planted in 60:30 mixture on upper slopes in	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													northern part of coupe. Plant BI in discrete groups, minimum diameter 30 m, 1,600 stems / ha and the SS at 2,500 stems / ha. A further 4.25 ha BLS natural regeneration along riparian zones to be established by 2037/38, leaving 16.73 ha open ground.	
44110	20.21	13.28	0	0	0	0	0	1.83	0		5.1	2023	Coupe previously felled and not yet restocked. Plant 100% SS above the road at 2,500 stems / ha and 80% SS: 20% BI mix below road, with BI at 1,100 – 1,600 stems / ha in discrete groups towards stand margins and close to open ground and watercourses, minimum 30 m diameter. SS at 2,500 stems / ha. NR of BLs along	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													main watercourses allowing 50% canopy cover, allowing successional development along other watercourses but removing conifer regrowth in riparian zone. Where conifers are planted, leave a buffer along watercourses (min. 10 m where channels >1 m)	
44115	16.95	7.9	1.98	0	0	0	0	2.03	0		5.04	2022	Previously felled and not yet restocked. Plant with 80% SS and 20% LP to achieve 2,500 stems / ha. Plant native MB in riparian zone along Allt Eilidh (60% BLS, 40% open ground) to create open canopy riparian broadleaved woodland. Leave an unplanted buffer along other watercourses (10 m for channels 1-2 m wide	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													and 5 m for channels < 1 m wide).	
44132	21.3	4.36	0	1.86	2.84	0	2.2	1.48	0	1.56	7	2022	Previously felled and not yet restocked. Plant pure SS and mixtures of SS, NS, SP, BI, MB, MC in discrete groups at 2,500 stems / ha. Promote NR of BLs in main riparian zones to achieve 50% canopy cover along the watercourses. Leave variable width unplanted buffers (10– 40 m) along other watercourses, to develop as successional but removing any conifer regeneration that occurs within 10 m of the watercourse. A further 3.12 ha NR along river riparian zone by 2033 (1.56 ha BL and 1.56 ha open).	
44160	9.4	2.01						5.1			2.29	2022	Coupe previously felled for Hydro development.	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													Restock native MB along riparian corridor with 30 – 40% open space, leaving a 5 m unplanted corridor along the line of the Hydro penstock. MB planted at 1,600 stems / ha at variable spacings. SS planted in N section of coupe to achieve 2,500 stems / ha. A further 0.1 ha NR of native BLs expected along smaller riparian zones by 2035.	
44142 Subcpt 1810G	0.38							0.38				2023	Subcompartment containing 100% HL to be felled when rest of coupe is thinned, followed by restocking with native BL at 1600 stems / ha.	
44143 Subcpt 1810G	0.4							0.4				2023	Subcompartment containing 100% HL to be felled when adjacent coupe 44142 is thinned / rest of subcompartment 1810G is	

1.7 Table of Restocking – including incomplete RS from previous plan														
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Felled Awaiting NR**	**Open (Ha)**	**Year**	**Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)**	**Monitoring Comments (Including any reason not to restock)**
													felled, followed by restocking with native BL at 1600 stems / ha.	

1.8 Table of New Planting													
Coupe No.	**Total Area (Ha)**	**SS (Ha)**	**LP (Ha)**	**SP (Ha)**	**NS (Ha)**	**Larch (Ha)**	**Other Con. (Ha)**	**Native Mixed B/Leaf**	**Other B/Leaf**	**Open (Ha)**	**Year**	**Planting Method & Density (Planting/Nat Regen)**	**Monitoring Comments**
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

1.9 Table of Civil Engineering				
Proposed Activity (Road/Quarry)	**OS Grid Reference**	**Forest/Coupe**	**Description (Length/Area/Construction)**	**Monitoring Comments**
Road	NN 0800 5369	44152, 44157, 44154, 44122, 44124	1.88 km road in upper spur, upper forest zone - GC1 Creag Fhada and GC1 PR Glen Creran final phase PR. Construction to UK forestry guidelines.	
Road	NN 0511 5105	44151, 44150, 44575	2.28 km road in lower zone, above and between areas of SSSI/SAC - GC13F Coire Seileach (phase 1) Glen Creran. Construction to UK forestry guidelines	
Road	NN 0810 5172	44135, 44136	1.19 km road in eastern part of lower spur (upper zone) to reach P2 coupe. Indicative only – forwarder track may be required instead, if coupe is restocked with broadleaves (depending on soil/ground conditions - decision to be made closer to harvesting).	
Forwarder track	NN 0335 4996	44145	0.42 km forwarder track in lower forest zone – GC13F. Construction to UK forestry guidelines.	

1.10 Table of Other Projects				
Proposed Activity	**OS Grid Reference**	**Forest/Coupe**	**Description (Length/Area/Construction)**	**Monitoring Comments**
Environment works	NN 0703 5378	44130	Peatland restoration: Survey and block side drains to increase water table, leaving main watercourse untouched Remove conifer regeneration where it occurs Once coupe to East is felled (44157 - 2032/33) plant margins with alder, willow and other site appropriate native BLs leaving 40% - 50% open ground – also accept natural regeneration of native BL along margin - to create a fringe of scrub woodland, transitioning to open peatland habitat Allow natural regeneration of BLs on ridges, where peat is thinner and along the riparian zone on thinner, sandier soils but control any regeneration that intrudes onto deeper peat.	
Environment works	various	44106, 44595, 44593, 44591 44585, 44592, 44575, 44579, 44581	Management as per SSSI Management Plan: Rhododendron control, including bushes that have seeded into areas outwith the SSSI – on upper slopes and in the Coires. Targeted thinning of dense regeneration to favour lichen assemblages. Limited scrub clearance and bracken whipping to create conditions favourable for Chequered skipper and Pearl bordered fritillary butterflies. Deer control to protect young growing trees.	

1.10 Table of Other Projects				
Proposed Activity	**OS Grid Reference**	**Forest/Coupe**	**Description (Length/Area/Construction)**	**Monitoring Comments**
Environment works	various	44138, 44160, 44115, 44132, 44135, 44136, 44153	Management of riparian areas during clear felling, restocking and thinning operations. Protect watercourses during felling / thinning; avoid drainage directly into watercourses / use silt traps and avoid work in extremely wet weather. Retain BL in riparian zones during clear fell. Avoid restocking conifers in riparian zones, leaving 20 m unplanted along River Creran and any sections of Allt Eilidh or other watercourses that are > 2 m wide. 10 m buffer for watercourses 1- 2 m and 5 m for < 1 m. Riparian native BL woodland – planted at up to 1100 stems / ha where specified, otherwise natural regeneration – to achieve an overall canopy cover of 40-50%. Remove any regeneration of conifer species.	
Environment works	various	44145, 44151, 44150	Retain and protect all mature / veteran native BL and standing dead trees during harvesting and thinning operations.	
Environment works	various	All	Protect breeding & resting sites where identified or found, during felling, thinning, restocking or other management operations. Environment team to advise prior to commencement of operations	

1.10 Table of Other Projects				
Proposed Activity	**OS Grid Reference**	**Forest/Coupe**	**Description (Length/Area/Construction)**	**Monitoring Comments**
Heritage	NN 0595 5140	44159	Manage scheduled monument (cairn) according to the agreed Scheduled Ancient Monument Management Plan, notably: Retain 10-15m buffer around monument unplanted Maintain marker posts and tape around area Remove SS/JL seedlings where they occur Control bracken Monitor trees for windblow and remove any fallen trees Coupe scheduled for clear fell in 2027/28 – protect site during felling operations, with no machinery to enter taped off area	
Tree health	various	44144, 44145, 44150, 44142, 44143, 44159, 44101, 44501, 44104, 44160, 44152, 44156, 44134, 44136, 44103, 44157, 44124, 44107, 44111, 44155, 44153	These coupes contain larch and will be checked regularly for signs of disease. Coupe 44160 – felled in 2020 under an amendment for an Hydro scheme development but should be checked to ensure that all larch trees were removed during felling. Coupes 44136, 44152, 44153, 44103, 44159, 44150 and 44145 are due to be felled during the lifetime of this LMP (phases 1 and 2) – harvesting would be brought forward in the event of a SPHN or evidence of P. ramorum.	

1.10 Table of Other Projects				
Proposed Activity	**OS Grid Reference**	**Forest/Coupe**	**Description (Length/Area/Construction)**	**Monitoring Comments**
			Coupe 44144 contains young larch trees (ca 2012) within the restock that should be removed at the earliest opportunity. Coupe 44101 contains larch trees planted in 2009 – sub-compartment 1803A (8.41 ha) with 15% JL (1.26 ha) and 85% SS (7.15 ha). The sub-compartment can be accessed from the forest road. Consideration should be given to taking the larch out now if possible. Adjacent coupes 44142 and 44143 will be managed under irregular shelterwood but between them contain 0.78 ha HL planted in 2001 (sub-compartment 1810G). This is a discrete sub-compartment containing 100% HL. Coupe 44142 will be thinned in 2020/21, at which time HL should be removed and the area restocked with MB. First thinning intervention for coupe 44143 is scheduled for 2034/35 but HL should be removed in 2020/21 at the same time as thinning coupe 44142 and area restocked with MB. Sub-compartment 1810G is easily accessible from the forest road.	
Tree health	various	All but particularly 44595, 44106, 44585, 44592, 44145	Monitor ash trees for ash die-back (Chalara). Retain dead/dying trees apart from accessible areas close to rides, trails, roads etc., where they may present a hazard.	

1.3 EIA Screening Determination

See separate documents.

1.4 Other Regulations

Standards and guidance

This land management plan has been produced in accordance with a range of government and industry standards and guidance as well as recent research outputs. A full list of these standards and guidance can be found here:

https://scotland.forestry.gov.uk/managing/plans-and-strategies/land-management-plans/links

The intention is to try to avoid adjacency issues, ensuring that restocking in a coupe has reached a minimum of 2 m height before the adjacent coupe is felled. However, for practical reasons and due to the fairly uniform age structure of the forest, it may be necessary to fell some adjacent coupes consecutively. Where this occurs, mitigation measures will be taken to achieve the required height difference by felling the first coupe at the beginning of the five year felling phase and the adjacent coupe at the end of the next felling phase and by restocking the first coupe promptly.

Other Tree Felling in Exceptional Circumstances

FLS will normally seek to map and identify all planned tree felling in advance through the LMP process. However, there are some circumstances requiring small scale tree felling where this may not be possible and where it may be impractical to apply for a separate felling permission due to the risks or impacts in delaying the felling.

Felling permission is therefore sought for the LMP approval period to cover the following circumstances.

- Individual trees, rows of trees or small groups of trees that are impacting on important infrastructure (as defined below*), either because they are now encroaching on or have been destabilised or made unsafe by wind, physical damage or impeded drainage.

  * Infrastructure includes forest roads, footpaths, access (Vehicle, cycle, horse walking) routes, buildings, utilities, services and drains.

The maximum volume of felling in exceptional circumstances covered by this approval is **40** cubic metres per Land Management Plan per calendar year. A record of the volume felled in this way is detailed below and will be considered during the five year Land Management Plan review.

Table of Other Felling				
Date	**Coupe/Area**	**OS NGR**	**Volume**	**Comments**

1.5 Tolerance Table

	Adjustment to felling coupe boundaries	Timing of restocking	Changes to species	Wind blow clearance	Changes to road lines
Scottish Forestry Approval not normally required (record and notify SF)	10% of coupe size	Up to 5 planting seasons after felling (allowing for fallow periods for Hylobius)	Change within species group E.g. Scots pine to birch, Non-native conifers e.g. Sitka spruce to Douglas fir, Non-native to native species (allowing for changes to facilitate Ancient Woodland policy)		Departures of up to 60 m from the centre of the road line
Approval by exchange of emails and maps	10-15% of coupe size	5 years +	Change of coupe objective likely to be consistent with current policy (e.g. from productive to open, open to native species).	Up to 5 ha	Departures of greater than 60 m from the centre of the road line
Approval by formal plan amendment may be required	> 15% of coupe size		Major change of objective likely to be contrary to policy, E.g. native to non-native species, open to non-native	More than 5 ha	As above, depending on sensitivity

2 LMP ANALYSIS

2.1 Introduction

Glen Creran forest lies about 21 km NE of Oban at the upper end of Glen Creran and is accessed from the public car park at Elleric, towards the end of the minor public road that runs along the glen. The nearest village settlements are Appin and Barcaldine, approximately 7 km to the West and South West.
The Land Management Plan (LMP) area covers 2,482 ha of forest and open land that extends from sea level to 760 metres, with conditions varying from sheltered glens to exposed hillsides and sub alpine conditions at the highest elevations. The LMP will be guided by the Strategic Plan that will cover all the linked forests that form Scotland's Forests and Land in North Argyll.

Creran comprises two distinctive zones: the upper part of the forest supports productive conifer plantation while the lower part is native broadleaved woodland, mainly Ancient Semi-Natural Woodland (ASNW) designated as the Glen Creran Woods SSSI and SAC. The commercial conifer planting is predominantly Sitka spruce with some larch, Scots pine and other conifer species, planted in the 1960's, with small areas of 1970's planting.

The southern margin of the native woodland zone, in the lower glen, lies adjacent to the Glasdrum National Nature Reserve. The forest is bounded by Scotland's National Forest and Land holdings of Duror and Bealach to the West and Brecklet to the North - the open hill is contiguous between these blocks, with private estates neighbouring to the East, South-West and North-West.

The forested area covers 1,185 ha, comprising currently, 697 ha conifers (72% of the current tree cover) and 269 ha broadleaves (28% of the current tree cover). The open ground extends to 1,365 ha, the majority of which is hill ground.

The commercial forest is even-aged and a relatively large area is at, or close to, economic maturity. A challenge will be to increase diversity to improve resilience, while maximising productivity. This relatively poor age diversity impacts both the flow of timber from the forest over time and on the structural and visual diversity of the forest. The previous felling programme predicted a spike in production volume in 2025-29, thereafter many coupes harvested later in the felling programme will be past their optimum rotation age at felling. Restructuring of coupe sizes and felling sequences is required, to gradually even-out production, optimise production of the most promising coupes and to diversify age, species and spatial structure as much as possible. There is 45 ha of larch, which is vulnerable to Phytopthora ramorum and plans to harvest these at the earliest opportunity will be reviewed.

There are two areas of SSSI/SAC in the lower zone, separated by commercial conifer coupes. The coupe on the lower ground here has been felled and deer fenced and is regenerating naturally with native and non-native species but the coupes on the upper slopes await felling.

Other than the adjacent FLS land, near neighbours are an Estate to the East and agricultural land to the West. The lower part of Glen Creran has ribbon settlements of individual houses and farms along its length. One private house lies in a plot within the FLS land holding.

The public car park at Elleric, which lies in the native woodland part of the forest, is well used by visitors who use the trails through the native woodland and by hillwalkers bound for the nearby Munros or the Public Right of Way to Glenachulish. The recreational trails attract people into the forest and indications are that numbers will increase, the popularity of the area reflecting the growing visitor numbers in North Argyll and Lochaber.

2.2 Plan Objectives

- Maximise the returns from the current productive stands through coupe and access design and timing of harvesting
- Optimise production potential by focusing future conifer production on the most suitable areas, concentrating on the upper glen and reviewing options on steep and marginal ground
- Manage deer populations, to allow the successful establishment of planted and naturally regenerating trees and to maintain priority open ground habitats in favourable condition
- Manage recreation access by maintaining a network of trails and the Right of Way to Glenachulish and by creating new provision to the Fairy Bridge
- Increase the resilience of the forest to climate change and pests and disease, through design and species choice
- Manage and expand the native woodland habitat, focussing on the lower glen and above the current timber line
- Manage riparian areas to protect watercourses and develop open canopied broadleaved woodland along larger watercourses
- Protect and enhance the designated sites and features
- Restore areas of deep peat

Key challenges

- Successful establishment of broadleaves and soft conifer species will be dependent on adequate deer control or erection of additional deer fencing if control cannot be achieved over a sustained period
- Deer pressure needs to be reduced and then managed at sustainable levels that allow successful establishment of planted and naturally regenerating broadleaved and conifer trees. The strategic deer fence helps to control movement East – West but deer also access the forest from neighbouring ground to the SE and SW and from the FLS land holdings to the North and NW. Deer management requires strategic planning across the entire FLS land in the area as well as working closely with the DMG
- The upper zone is dominated by a small range of conifer species of similar age; forest structure needs to diversify in species and age structure, to achieve sustainable timber

production and help improve resilience to climate change and pathogens. Increasing conifer age and species diversity will be a challenging, longer term aim and won't be achievable within a single rotation but progress towards this can be made in the shorter term

- There are various areas where trees are in check or have failed. Restocking plans need to address this problem, using species that are suitable for the soils and other growing conditions
- Promoting expansion of native woodland above the existing timber line must protect priority open habitats
- A large number of small watercourses ultimately drain into the River Creran, which is currently in Good condition. All forestry operations will follow UKFS Forests and Water Guidelines and should minimise risks of sedimentation or acid run-off, through introduction of riparian buffers; timing and phasing of operations; avoiding direct drainage into watercourses; protection of watercourses at crossing points and by use of silt traps or vegetation filtration to catch fine sediment
- The condition of the SSSI/SAC broadleaved woodland needs to be improved and maintained - the condition of some designated features (upland oakwood; mixed woodland on base-rich soils associated with rocky slopes; Chequered skipper and Pearl-bordered fritillary) is unfavourable, declining. Deer browsing pressure is a key contributing factor
- Non- native species include Rhododendron ponticum, Western Hemlock and beech. The Rhododendron has been mostly removed through a partnership project but removal of regeneration is ongoing and bushes that are establishing at higher levels in the Coires also need to be removed. A small area of mature Western hemlock and some young regeneration/planted trees also pose a threat to the SSSI/SAC broadleaved woodland areas and need to be removed
- Managing native / broadleaved woodland outwith the SSSI areas, to develop markets and maximise productive capacity from broadleaved woodlands
- Managing thinning regimes effectively and thinning early enough in the production cycle and at the right time, to ensure growth of healthy, windfirm trees; to maintain the desired stand structure and composition and ultimately, to achieve the desired forest
- Planning and delivering an efficient road construction programme to help optimise the harvesting programme, manage native woodland establishment and minimise impact on the designated sites and features
- Sustainable timber haulage – the public roads leading from the forest are a Timber Consultation Route and harvesting must be programmed to ensure that volume production does not exceed haulage capacity. Close cooperation with the Local Authority will be required

2.3 Analysis and concept

Upper forest zone:

Issues	Opportunity	Constraints	Concept
Optimise production potential by focusing future conifer production on the most suitable areas, concentrating on the upper glen and reviewing options on steep and marginal ground	A range of species are suitable for areas of better soils on lower slopes, with Sitka grown in pure stands or in mixture in more exposed locations. Areas of existing poorer growth, on wetter /poorer soils, can be restocked with non -commercial species, mainly broadleaves, which will contribute to biodiversity and climate mitigation (through carbon sequestration). On steeper ground, options include long term retention of some areas, allowing successional development. Opportunities for growing productive broadleaves on some of the better soils on lower slopes.	Risk of climatic and disease impacts restricts restocking species choices. Deer browsing pressure may also limit restock species choices and timing of restock. Increased frequency and / or intensity of storm events may limit rotation lengths.	Increase species diversity in suitable areas and use species best suited to the site. Identify areas of better growing conditions and focus production on these, using a variety of species on better soils in more sheltered conditions. Pull back productive forestry from very wet or poor areas; allow natural regeneration in these areas and promote to successional woodland. Consider planting site-suitable native species in these areas where appropriate. Restock species in mixtures where possible, including mixtures of Sitka with birch or other conifer species on some of the more exposed sites. Grow productive broadleaves in lower end of upper zone, where soils are suitable at lower elevations.

Issues	Opportunity	Constraints	Concept
Maximise the returns from the current productive stands through coupe and access design and timing of harvesting. Create long-term felling coupes that are scaled appropriately for the landscape and are productive and economically cost effective to manage	Current felling coupes are too small but consecutive fell periods are close together in places, creating adjacency issues exacerbated by deer browsing pressure on restocked areas. Opportunity to increase coupe size; revise felling schedule for a better fit to landscape and to design coupes to take account of riparian areas more effectively. Accommodate hydro-scheme and related works in coupe design and felling programme.	Many of the coupes with adjacency issues have been felled or are scheduled for the next 5 years, which may limit the scope of changes that can be made. Reshaping fell coupes will require substantial redesign of felling schedule. Hydro development has minimum impact on coupe shapes and felling programme.	Revise coupe sizes, shapes and felling schedule to fit the landscape, provide sustainable timber production volumes and support development of a more diverse forest design structure. Design coupes to minimise negative impacts of felling on watercourses and to improve riparian zones.
Enhance forest diversity	Diversify age structure and species through phased felling and restocking programme. Strengthen the broadleaf component in the upper zone and consolidate the areas of existing native broadleaved woodland in the lower zone. In the longer term, management of some coupes as CCF, under systems such as shelterwood, will help to increase diversity of age structure and introduce more spatial layers.	Consider need for fire breaks; which areas to maintain as open and which to allow as successional, and how to maintain open ground (if deer control reduces browsing pressure). Deer management will be essential to protect young broadleaves and soft conifer species. Management of CCF will require timeous	Plant, and promote natural regeneration of, native broadleaves in riparian areas, on hill slopes and in the area linking the two sections of ASNW (SSSI/SAC). Plant mixed conifers and MC/MB on the glen floor in more sheltered locations on better soils. Create open space between restock coupes to link to open hill. Early introduction of thinning regimes for coupes identified for shelterwood or other CCF systems.

Issues	Opportunity	Constraints	Concept
	Protect and enhance other priority habitats and link open space within the forest to the open hill.	implementation of thinning regimes.	
Remove conifers from key riparian zones and encourage development of broadleaved trees in the larger riparian areas, maintaining at least 50% open ground along watercourses.	Potential to improve and maintain status of watercourses through forest management and development of riparian broadleaved woodland. Protect status of River Creran, although catchment on one side is outwith FLS ownership.	Maintaining low levels of deer browsing pressure will be essential for establishment of broadleaved trees. If fencing does prove necessary, then this may limit areas where natural regeneration is possible.	Create buffer zones around watercourses. Protect riparian area during harvesting and keep conifer restock a minimum of 20 m away from larger watercourses (> 2 m channel width) and 10 m from smaller watercourses (< 2 m channel width). Many of the smaller watercourses in Creran have a channel < 1 m wide and are on steep ground, so narrower buffer zones (< 10 m width) are applicable. However, buffer width in these cases will be maximised as far as is practicable. Promote natural regeneration or plant native broadleaves along larger watercourses to a maximum 50% canopy cover, creating dappled shade conditions.

Issues	Opportunity	Constraints	Concept
			Identify key areas for natural regeneration and consider protection with fencing if deer control proves insufficient.
Minimise grazing / browsing pressure on planted and naturally regenerating trees	Reduce deer browsing pressure, working within Deer Management Group, to enable successful establishment of a diversity of planted and naturally regenerating broadleaves and soft conifer species. Manage deer population across the strategic plan area, focusing effort on reducing pressure on areas of young and regenerating trees.	Part of deer fence has re-routed following land disposal. The new fence breached in places but has been repaired. Deer may move across the river below the end of the deer fence. Further investigation required on deer movement into and through the area. Recent history of high deer pressure in the glen that has checked crops and caused restock failure. Deer management must focus on deer behaviour / movement, not just on population size. Herbivore Impact Assessments will be crucial. Any shooting leases must be framed to ensure that FLS can implement the deer management plan effectively.	Deer control will focus on reducing browsing pressure on vulnerable crops, working closely with neighbouring landowners and the DMG. Restocking may be delayed within tolerances if necessary, to enable deer browsing pressure to be reduced to sustainable levels that allow successful tree establishment. The deer management plan will cover the whole of the FLS land-holding in the strategic plan area, informed by Herbivore Impact Assessments. Options to realign the strategic deer fence so that it sits on FLS land, at the boundary, will be pursued. A Business Case will be considered for a strategic deer fence around the three Coires, on the western side of the block, to protect and promote natural regeneration of native broadleaves and the soft conifer

Issues	Opportunity	Constraints	Concept
		Evidence of neighbouring cattle ingressing the southern end of the upper zone. Potential that some open priority habitats may be impacted negatively, by a reduction in deer browsing and lack of sheep on hillside but indications are that this impact is likely to be limited.	planting in part of the upper forestry zone.
Restore and maintain priority open habitats across the LMP area.	Restore peatland area in coupe 44130. Identify priority open habitats and designated interests on upper slopes, to protect these and focus woodland expansion through natural regeneration of native broadleaves in other areas.	Drainage management in the peatland area should not impact the adjacent productive stands or the downstream hydro project.	Develop detailed plans to block side drains from the peatland area, to raise water levels slightly. Fell an area of conifers above the restoration area and leave to develop naturally or consider planting native spp. on upper margins. Remove any non- native regeneration that ingresses into the peatland area but accept natural regeneration of native broadleaves on ridges/ thinner soils, with the expectation that a mosaic will develop of sustained deep peat with scrub woodland along riparian

Issues	Opportunity	Constraints	Concept
			corridor and on drier slopes and thinner peat. A separate Open Habitat Management Plan will outline management of priority open habitats across the strategic plan area.
Restore areas of deep peat	Areas of deep peat around exist in the area of the old reservoir and associated riparian zones, interspersed with areas of thinner soils and drier ridges. Trees (including conifers) have started to regenerate across much of the area. Opportunity to restore peatland areas and fell conifers from margins to widen the restoration area.	Access to the area to fell conifers at the margins is difficult and these will need to be taken when the adjacent coupe is felled.	Block drains leading from the old reservoir area, leaving the main watercourse untouched. Remove natural regeneration from the area. When adjacent coupe is felled, leave margins open but restock higher slopes with native broadleaves to create open canopy scrub woodland. Create a mosaic of deep peat with scattered scrub woodland on drier ridges, thinner soils and riparian gravels.

Lower zone:

Issues	Opportunity	Constraint	Concept
Continue to enhance and expand native woodland in	Development of native broadleaved woodland to link the two areas of ASNW/ SSSI/SAC. Encourage natural	Removal of conifers in 44144, 44145 and 44150 will require	Restock felling coupes between the ASNW (SSSI/SAC) areas with native broadleaves, allowing natural

Issues	Opportunity	Constraint	Concept
ASNWS/PAWS zones through removal of non-native conifers and encouraging establishment of locally native species	regeneration of broadleaves on hill slopes following removal of conifers, planting site native broadleaves if natural regeneration does not provide required density. Natural regeneration (supplemented by planting if necessary) of native broadleaves along riparian zones. Protect ASNW by removing conifers and invasive non- native species in the vicinity.	road construction through upper edge of SSSI – EIA required. Road will involve crossing gullies with bryophyte interest (designated feature) including large gully (8 m span). Forwarder track will involve crossing a gully using a log bridge. Natural regeneration or planted broadleaves will suffer high levels of deer browsing without sufficient deer control. Additional deer fencing may need to be considered if deer control alone is not sufficient.	regeneration with supplementary planting where required. Promote natural regeneration of broadleaves on upper slopes and along gullies, through effective deer control. Prepare Business Case and EIA for deer fencing and large scale native woodland creation project around the three Coires (at a later date).
Grow productive broadleaves on lower slopes in coupes that lie between the existing ASNW/SSSI.	Soils and other growing conditions are suited to production of high quality broadleaved trees, managed as LISS.	Deer pressure must be maintained at sustainable levels. Careful selection and management of growing stock to produce timber of sufficient quality. Species choices limited by disease issues and need to avoid INNS.	Improve productive capacity by restocking some of the area linking the existing ASNW with broadleaves managed as productive stands.
Remove non- native and invasive species from the ASNW areas and open hill	Build on the existing successful Rhododendron removal programme being delivered under the community partnership.	Previously extensive growth of Rhododendron, subsequent treatment of regrowth is a long term commitment.	Continue to remove any Rhododendron regrowth within the forest and any new generation along gullies and the open hill.

Issues	Opportunity	Constraint	Concept
		Potential regeneration of Western hemlock, beech and other non- native species in and around the ASNW areas.	Remove Western hemlock, beech and other invasive non- natives from the coupes between the ASNW / SSSI areas.
Protect areas of slope instability and watercourses with high peak flow	Plan ahead to ensure that unstable slopes and loose boulders do not impact on roads, utilities and adjacent properties. Manage riparian zone above car park to reduce peak flow.	Risk of works related to construction of trails or removal of non-native species creating disturbance to loose boulders or unstable ground. Large scale conifer felling in coupes adjacent to watercourse could increase peak flow during very high rainfall periods.	Safety monitoring of unstable areas and loose boulders. Most footpath works will have limited impact on slope stability but still require monitoring. Harvesting in coupe 44145 close to watercourse (Allt a' Mhuilinn) should protect watercourse and be timed to avoid high rainfall events. No large- scale felling close to watercourses are planned.
Protect native tree species and important bryophytes during management operations	Protect and enhance native tree and bryophyte species when harvesting and restocking and during road construction	Roadline required to reach coupes 44144, 44145 and 44150 will pass through the top edge of the SSSI/SAC and need to cross watercourses rich in rare bryophytes.	Road will be micro-sited to avoid any mature broadleaved trees and any known areas supporting native seed banks (the SSSI areas within these coupes are mainly under non-native conifers, currently). Watercourse crossings will be microsited to avoid important bryophytes, using temporary crossings where possible.
Promote important bryophyte and lichen	Protect and enhance key lichen and bryophyte assemblages	Targeted thinning operations, scrub removal or invasives	Remove invasive and non-native species, as outlined.

Issues	Opportunity	Constraint	Concept
assemblages, as per the SSSI management plan		removal constrained by access issues in native woodland areas.	Deliver targeted thinning / scrub removal programme on dense regeneration, as per SSSI management plan, in discussion with SNH.
Habitat management to favour chequered skipper and pearl bordered fritillary butterflies	Habitat improvement for key butterfly species.	Scrub and bracken clearance may create areas that are attractive to deer – increasing browsing pressure.	Scrub clearance in targeted areas. Bracken whipping in identified areas, as per the SSSI management plan and in discussion with BCS and SNH.
Deer management to promote and protect natural regeneration of native broadleaves.	Coordination of deer management across the entire strategic plan area and with neighbouring landowners / DMG. Prioritise effort in ASNW and on areas of young planted and regenerating trees.	Deer may preferentially move between native broadleaved stands and open hill, spending more time in broadleaved areas than in conifers. ASNW / SSSI areas abut onto neighbouring ground on three sides.	Ensure that herbivore impact assessments are carried out timeously, referring to the Woodland Grazing Toolkit and that this informs deer management planning and activity. Focus deer control effort on areas of young regeneration and planting and where most effective to reduce deer pressure / impacts. Deer management plan to also consider impact on priority open habitats.
Manage recreation access by maintaining	Opportunities to improve signage from car park and way marking.	Some large boulders lie within the general area of broadleaved woodland through which the Pine	Create a second car park (500 m SW of Elleric Car Park) with a new waymarked trail along part of route

Issues	Opportunity	Constraint	Concept
and expanding the existing network of trails through the native broadleaved woodlands; creating new provision to the fairy bridge and maintaining access to the long distance route to Ballachulish.	Opportunities to extend trails to fairy bridge and circular routes to hill; provide additional car parking. Increasing informal access to the Fairy Bridge is potentially impacting on private water supplies. Provision of a formal route from a new car park would help to protect these supplies. Opportunities to improve ranges access to hill – which will also benefit visitor access.	Marten trail passes and in places, close to the public road. These should be inspected regularly for any stability issues and taken account of in any trail construction / maintenance and tree removal works. There is potential for peak flow on the Allt a' Mhuillin burn during extreme /high rainfall events. The car park and surrounding area have not flooded previously but there is potential for an issue in future, if climate change leads to wetter weather. A bridge failure on the Pine Marten trail has necessitated closure of that part of the trail.	of an existing ride, to take walkers to the Fairy Bridge and onto existing Pine Marten trail, returning by the same route. The existing car park will be retained for walkers accessing the hills and using the long distance routes. The section of the Pine Marten trail that leads from the existing car park will be closed. Options to create new ranger access to the hill will be investigated (to facilitate deer management and INNS control) which will also benefit visitors.

3 LMP Proposals

3.1 Management

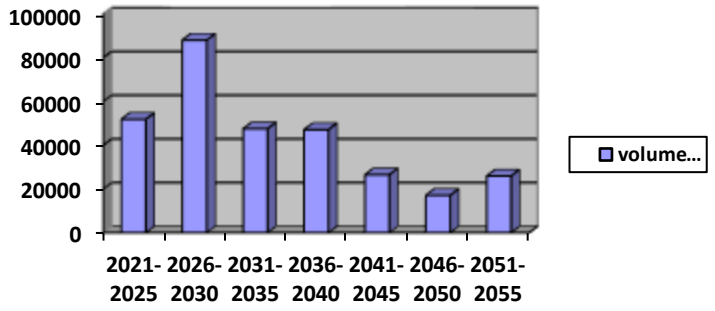
(See Maps 3 a - d for Management Proposals)

Clear Felling

Due to the age of the trees and ambient exposure levels, clear felling will remain the predominant management type across the upper zone of the forest during the current rotation. Many of the existing felling coupes were too small, for landscape and practical reasons, and had adjacency issues. These have been redesigned to create larger scale coupes that better fit the landscape and to produce a sustainable timber volume across the rotation. Moving forward, the aim in the next rotation will be to manage more of the forest under Continuous Cover Forestry but clear felling will still be required for most of the conifer coupes in more exposed conditions in the upper zone.

Two large coupes will be felled between the two SSSI/SAC areas of ASNW in the lower zone during the life of this plan, prior to restocking and restoring to native woodland.

24 ha larch will be felled during the 10 year lifespan of this LMP.



Total conifer volume production (m^3) per felling period over the next 40 years

Thinning

The opportunity for thinning was missed for current coupes and although there is not a high incidence of windthrow at present, the risk is unknown and may increase as stands on poorer soils are opened up during felling. But a thinning programme will be implemented for recently planted areas. Where soil conditions are suitable and windthrow risk is acceptable, the trend will be to manage as much of the forest as is practical under continuous cover forestry, during the 2nd rotation. The aim will be to favour good stems of all suitable main crop species and remove wolf trees early, thinning stands on a 5 – 10 year cycle.

Thinning should commence when the stand top height has reached 10 – 12 m, usually at 15 – 20 years and when stand is fully stocked (at or above threshold basal area). For coupes more at risk of windthrow, the first thin will be as early as possible and will be a rack thinning, followed by a matrix

thin if the stand is stable. It is vital that thinning happens at the right time and that it commences as early as possible once restock is established.

Where broadleaves are planted in intimate mixture with conifers, the outer one or two rows of conifers on the South side of broadleaved trees will be removed at first thinning and the broadleaves selectively thinned, removing any adjacent conifer rows and selectively thinning the rest of the crop at the second thin. Where groups of broadleaves are stocked in a matrix of conifers, conifer rows adjacent to the broadleaved groups will be removed and broadleaved trees thinned selectively. Potential final crop trees will be identified for selection.

Light thinning / limited scrub clearance will be undertaken in the native broadleaved woodland in the lower zone, as per the SSSI Management Plan, to create suitable conditions for important lichen assemblages and to open up clearings for butterfly management.

Amenity thinning will also be carried out here as necessary, to protect / improve recreational areas around the car park and trails or to deal with problem trees.

See Maps 4 a & d for detail on areas to be thinned and Appendix VIII for prescriptions.

Low Impact Silvicultural Systems (LISS) / CCF/ min intervention

Most of the ASNW in the lower zone will be managed under minimum intervention, apart from limited areas of thinning or scrub clearance, as described above or to remove any non–native species. The restocked areas between the two SSSI/SACs will be managed under LISS, with the intention to grow productive broadleaved woodland on the lower slopes.

Elsewhere, broadleaved and mixed conifer / broadleaved stands will also be managed under Continuous Cover Forestry in the 2nd rotation, with a particular focus on coupes in proximity to the River Creran and the Allt Eilidh burn, to help reduce risk of sedimentation, flooding and potential acid run-off. There are also small areas of minimum intervention associated with these LISS areas.

Summary of LISS coupes:

Coupe	Species	Notes	Next thin date
44144	BE (0.66%) BI (53%) CAR (15%) HL/JL (1.3%) HAZ (2%) HOL (2%) MB (5%) OK (22%) ROW 3%) SCI (8%) SS (3%) WH (0.69%)	Remove non-native species (including BE, WH and SS) by 2021/22 at the latest. First thin in 2027/28 (age 15 years) favouring OK and BI and selecting the best stems for production. Continue to weed out any non-native regeneration.	27/28
44143	HL (33%) RC (52%) SOK (16%)	Remove HL at earliest opportunity and restock large gaps with OK and BI, with minor native BLs. First thin when restock is about 15 years old, favouring OK where possible.	34/35
44142	DF (46%) HL (9%) MB (0.07%) NS (5%) RC (3%) SOK (2%) SS (35%)	Commence thinning as soon as possible (by end of 2021 at the latest). Remove all HL in first thin. Thin on an initial 5 year cycle, to favour best stems but try to retain as many stems of minor species as possible.	20/21

Coupe	Species	Notes	Next thin date
44097	DF (0.36%) JL (2%) NF (2%) NS (37%) OMS (58%) SS (0.86%)	Remove all JL as soon as possible (by end 2021). Thin on an initial 5 year cycle, to favour best stems but try to retain as many stems of minor species as possible.	37/38
44139	ASP (14.8%) BI (15%) SP (30%), open (40.2%)	Thin on an initial 5 year cycle, starting at 15 years or when stand top height has reached 10 – 12 m (20 – 30 m3 /ha basal area) to favour best stems in SP / BI / ASP mixture but aim to retain ASP in the stand. If possible, remove JL from adjacent coupe 44146 (LTR) at the same time.	30/31
44135	SS (100%)	First thin at 20 years; line thin on an initial 5 year cycle.	33/34
44109	HL (0.1%) NS (0.03%) SP (0.05%) SS (99.8%)	Remove any HL by end 2021. First thin at 20 years; line thin on an initial 5 year cycle. Retain minor species during thinning where possible.	25/26

Natural Reserves (NR)

There are no Natural Reserves within the Creran LMP area.

Long Term Retentions (LTR)

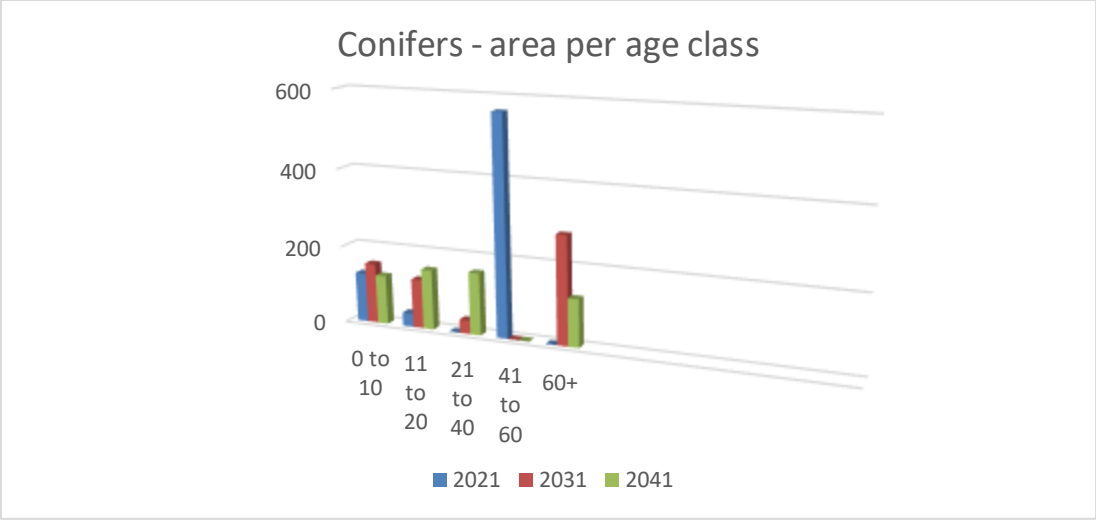
Three coupes in the upper zone have been identified for Long Term Retention, to retain some older age classes and help increase age and species diversity. Coupes 44159 and 44117 contain Sitka spruce planted in 2006 and 1964 respectively. Coupe 44154 supports stands comprising 71% Noble fir, with 23% Sitka spruce and almost 5% Lodgepole pine, planted in 1967. The fairly high yield classes across much of the stand (YC 22-24 NF) indicates the high soil fertility in places, although this is highly variable across the coupe and across the block as a whole.

Resilience

RESTRUCTURING:

The main purpose of restructuring is to create truly multi-purpose forests, meeting a wide range of objectives including enhancing landscape, biodiversity, productivity, community/recreational opportunities whilst protecting and improving the setting of heritage features and restoring priority habitats. Increased species and age class diversity also increases the resilience of the forest.

The current age structure is fairly uniform, so opportunities to improve age diversity during the current rotation is relatively limited. Currently, older age groups are represented mainly by the broadleaved component in the lower forest zone (Creran South). Small areas of conifers have been identified for Long Term Retention; together with the areas identified as LISS and the strengthened broadleaved riparian zones, these will eventually help to broaden the age range of the forest.



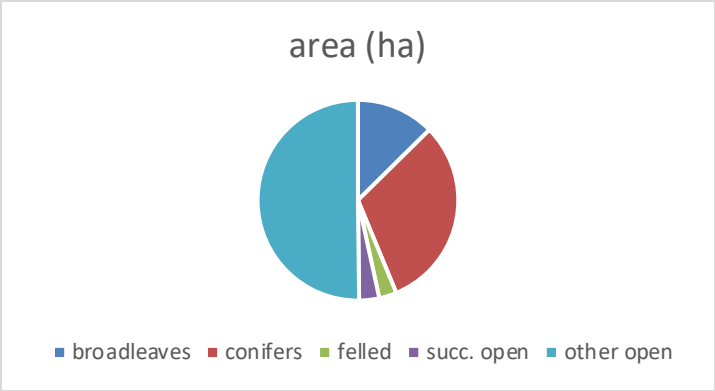
In the lower forest zone of Glen Creran, the focus will be in converting the existing conifers coupes to mixed native broadleaves, linking the two areas of designated ASNW and managing much of the restock as productive broadleaves where possible. The ASNW will continue to be managed for biodiversity and to maintain the designated features in favourable condition.

In the upper zone, effort will be on growing a mixture of species where conditions allow; designing felling coupes to fit the landscape; improving riparian areas by developing open canopy broadleaved cover and promoting natural regeneration and successional development of broadleaves. It won't be possible to significantly increase the proportion of alternative conifers in the shorter term, as many of the areas suitable for a diversity of conifer species will be restocked with broadleaved trees. But in the longer term, conifer diversity will improve, as a range of species are introduced to benefit from the more sheltered conditions created by management under CCF.

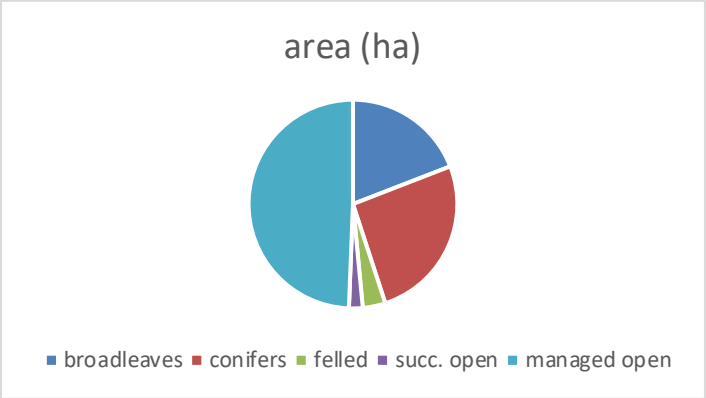
Coupes that exhibit large areas of failed or checked growth, such as coupe 44136, will be reviewed at harvesting because, although parts of the coupe are on wet and poorer soils, the reasons for large areas of poor growth are not clear and previous (historical) deer incursions may have played a part. Long Term Retention is not an option here due to presence of larch. Sitka spruce will be planted where conditions allow and poorer areas will be allowed to regenerate naturally with broadleaves, also allowing conifer regeneration where this occurs. If natural regeneration fails in these poorer areas then low density planting of birch, alder, willow, rowan, hawthorn and other suitable native species will be considered, retaining at least 50% open space. Peatland restoration in coupe 44130 will further diversify the forest and improve biodiversity.

Changes in species composition during the first 20 years:

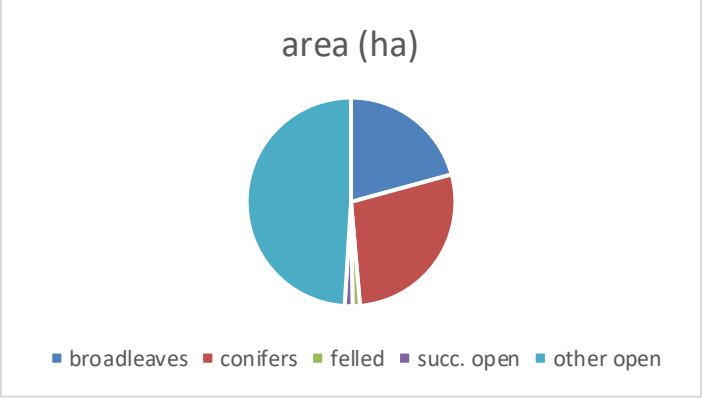
2021



2031



2041

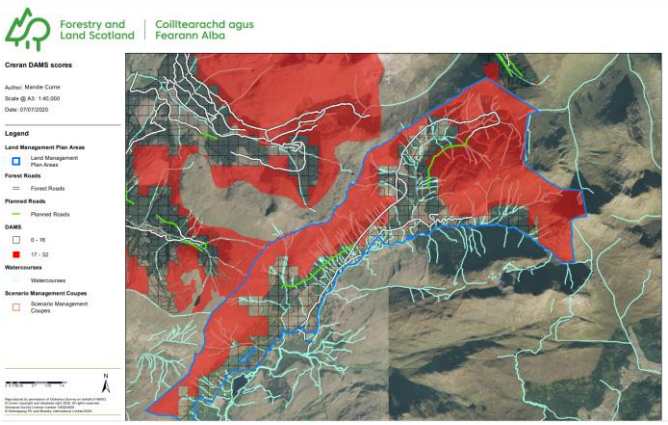


CLIMATE CHANGE:

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, in places. In terms of the next rotation, these figures have limited impact on species choice, according to ESC models and the short rotation of Sitka spruce across much of the site further reduces the risk of climatic impacts. However, this level of climatic change is likely to interact in the longer term with soil characteristics and this may impact on soil structure and the range of species potentially suitable for the site. In more sheltered areas, the effects may be positive, enabling a wider range of potentially suitable species. But in much of Creran, higher rainfall may lead to greater leaching and podsolization where soils are free draining and greater waterlogging where drainage is poor. There are also threats to the suitability of Sitka spruce as a timber species if significant summer droughts on thinner soils become normal, especially on higher ground and along ridges. This needs to be reviewed and our response agreed to climate change locally. But where possible, a mixture of species will be grown, including mixed conifers and mixtures of conifers and broadleaves.

There is some evidence of previous windthrow but this is fairly limited to the more exposed coupes on upper slopes. However, the windthrow risk is unknown as coupes are opened up by adjacent felling. Prevailing SW winds can funnel up through the glen and an extreme storm event could create significant damage. DAMS scores range between 11 – 14 on lower slopes closer to the River Creran and 15 – 16 throughout most of the forest, rising to 17 – 20 on upper slopes, in both the upper and lower forest zones. Early and timeous thinning intervention in restocked coupes will be vital, to develop windfirm stands and to facilitate ongoing management under CCF where possible.

Areas with high Dams scores (17 and above) are shown here in red:



TREE DISEASES AND PESTS:

A rise in the type and scale of tree diseases and pests increasingly impacts species choice and forest management. The most serious disease in the region currently is *Phytophthora ramorum* in larch, which is subject to statutory plant health notices (SPHN). Larch is no longer a viable tree species for forestry on the west coast. It is no longer being planted and existing stands of larch will be removed early wherever possible. Creran has approximately 45 ha of larch, occurring in 20 coupes; trees will be monitored for signs of disease (details provided in Appendix VIII). Where pre-emptive felling is not feasible, access will be created to larch stands, to facilitate felling if this needs to be done quickly.

Where practical, larch will be removed from adjacent coupes during harvesting and all larch regeneration will be removed where this occurs in felled and restock coupes, open ground, ride and road sides.

Dothistroma Needle Blight (DNB) affects a range of conifers, notably pine species, and occurs in the region but hasn't yet been recorded in the North Argyll strategic plan area. Native pinewood forests are at particular risk and planting of pine is restricted in those areas.

Ash Dieback (Chalara) is caused by a fungal pathogen (Hymenoscyphus fraxineus) characterised by leaf loss and crown dieback in infected trees. It is spreading through West Region with the expectation that at least 90% of the ash will be lost. The disease hasn't been identified in Glen Creran but has been recorded in the vicinity (Benderloch) and is thought to be present in Appin and Lismore. Pre-emptive felling of ash is not being undertaken in the hope of being able to identify some resistant trees. But trees will be monitored around visitor zones and roads / tracks and any diseased trees removed where necessary, to protect public safety.

Ash is a unique tree in the forest environment. It supports a rich ground flora, due to its light canopy and readily decomposed leaf litter, and a diversity of insects and birds. As a long lived tree, ash can support many specialist deadwood species and hole- nesting birds, as well as roosting space for many species of bat. Ash bark is alkaline and supports a wide range of epiphytic lichens and bryophytes and attracts snails. The loss of ash will have a devastating impact on the landscape and the biodiversity of our woodlands and at Creran, this would affect many of the features on which the SSSI designation is based. It is thought that a proportion of trees may have some tolerance to the disease, so that the population might recover over time (probably 50 years or more). With this in mind, consideration must be given to how the loss of ash in the designated sites would be addressed and what species might be used to replace ash in areas of planted restock or woodland creation. Given the unique features of this tree, no single species can replace it and it is likely that a mixture of native species would be required instead. This will require careful thought and planning, and species mixtures will need to be very site specific. Birch, rowan and aspen may be suitable for planting near to native woodland areas, although these are pioneer species and not very long lived. Natural regeneration of ash in native woodland areas may occur, if there is even a small proportion of ash trees that are tolerant or immune to the disease. Sycamore may be considered in areas for timber production, although not in the vicinity of ASNW.

FIRE RESILIENCE:

Due to climate change there is an increasing risk of fires across the National Forest Estate (NFE). The proposals within this plan aim to limit the risk in Glen Creran through improved age and species diversity, as well as maintaining open rides and glades. The road and track network will also provide a barrier for fires and enable access to areas if a fire does occur. There are no public roads adjoining the boundary of the commercial forest. The private house at Salachail could present a potential increased risk. The FLS coupes immediately around the property will be managed under LISS and care should be taken when thinning, to avoid creating or exacerbating a potential funnel effect around the house. Coupes immediately upwind of the property are young restock (planted in 2006 and 2015). Steps could be taken to strengthen the broadleaved content of the coupe margin, to create a more fire resilient margin.

FLOOD RISK:

The SEPA flood maps indicate a high to medium flood risk in the area around, and immediately South of, the Elleric car park (see map 9). This flood risk is primarily associated with the River Creran and is mostly on land adjacent to FLS land but it also includes risks from surface run-off, which would primarily be associated with clear-felled areas upslope. Also, peak flow indicators suggest the potential for high flow levels running down the Salachan burn above the car park, which could potentially cause flooding down to the road and car park. This has not happened to date and is less likely in future as the coupes upslope of the car park are existing native woodland (ASNW) or restocked areas that will be managed as native woodland under LISS. Other coupes in the vicinity are broadleaved and mixed planting. These areas are under Minimum Intervention or LISS management and the continuous tree cover will help to mitigate any peak flow. But further mitigation can be achieved through establishment of broadleaved woodland in riparian zones upstream; management of forestry under LISS within the wider vicinity and careful design of management coupes further upstream on higher slopes, to reduce surface run-off.

Coupes much further upstream, on higher slopes between the SSSI areas, will be felled over the coming years and restocked as broadleaved woodland. During felling, precautions will be taken to minimise run-off, including use of buffer zones and avoiding felling during periods of extremely wet weather. Forestry drains will be designed and maintained to avoid discharge direct into watercourses; silt traps will be deployed during harvesting and timing of felling operations will avoid periods of heavy rainfall. The aim will be to establish broadleaved trees in these coupes as early as possible.

Most of the impact from the flood risk is along the bottom of the glen, which is outwith the FLS ownership boundary and although the area around the car park could potentially be affected, the risk here is thought to be limited. There are no domestic properties in the immediate vicinity.

Operational Access

Area of forest	Section Name	Length (m)
Upper forest zone, upper spur	GC1 Creag Fhada	1,240
Upper forest zone, upper spur	GC1 PR Glen Creran final phase PR	640
Upper forest zone, lower spur	Un-named – indicative (forwarder track may be constructed instead)	1,190
Lower zone, above SSSI	GC13F Coire Seileach (phase 1) Glen Creran	2,280
Total		**5,350**

Timber Haulage within the forest area is set out in the following protocols: Protocol for timber transport operations.

The primary “in forest” route runs NE to SW from the upper and lower “spurs” in the upper forest zone to the Elleric car park, where it joins the minor public road. This route is not used by other

commercial forest neighbours but it is an access route to the Hydro scheme development on the Allt Eilidh burn and is used by a private dwelling situated at Salachail, within the forest.

The unclassified public road runs from the Elleric car park through lower Glen Creran and joins a larger unclassified road at Glasdrum, at the head of Loch Creran and then the A828 at Creagan Bridge. This is a Timber Consultation Route via the Argyll Timber Transport Group, a forum with representation from a number of stakeholders including Argyll & Bute Council, Timber Growers, Merchants and Hauliers. The Local Authority will be consulted prior to any harvesting to ensure that volumes can be managed regarding haulage capacity on the roads.

The design of the forest roads will conform to both the Timber Transport Forum document "The design and use of the structural pavement of unsealed roads 2014" The design and use of the structural pavement of unsealed roads and SNH's "Constructed tracks in the Scottish uplands – revised Sept 2015" Constructed Tracks in the Scottish Uplands.

All roads will be built from material won locally where possible, along the proposed roadlines. A quarry already exists in the forest with sufficient quantities of stone to construct the proposed routes; additionally this stone will be used to maintain the current road network. It is unlikely the quarry or borrow pits will exceed the threshold requiring further EIA determination. The proposed roads will have a limited effect on landscape. Maps 6 a – d provide detail.

3.2 Establishment

(See Maps 5 a - d - future habitats and species and restocking plans for the first 10 years)

Restocking

On the better soils, the nutrient and moisture regimes become more favourable for a wider range of alternative conifer species, which could include: Norway spruce (NS), Douglas fir (DF), Noble fir (NF), Scots pine (SP), Lodgepole pine (LP), European silver fir (ESF) and a range of other conifers such as Grand fir (GF), Western red cedar (WRC) and Serbian spruce (OMS) as small elements – as well as broadleaved species grown as productive woodland. Some of these species are already present on the site although the broadleaves and the softer, diverse conifers are vulnerable to deer damage. Use of the Ecological Site Classification (ESC) decision support tool provided suggestions on the suitability of different tree species for various locations, which were ground truthed where possible. Suitable species that best meet the plan's objectives will be chosen. Conifer diversity won't increase in the short term as many areas that might have been restocked with alternative conifers will be under broadleaves but in the longer term, management under CCF will enable the introduction of a wider range of conifer species that can benefit from the more sheltered conditions that are created.

Exposure, poor nutrient status and impeded drainage are factors limiting the choice of productive species at higher elevations, with Sitka spruce (SS) being the only commercially viable species (See DAMS map, earlier). On more challenging sites Sitka spruce and Lodgepole pine (Alaskan) mixtures can facilitate the establishment and growth of a productive SS crop. Birch (BI) can also be grown with Sitka spruce to improve growing conditions, grown in discrete stands where BI stocking densities are lower and in intimate mixtures where the species percentages are more evenly balanced. Where BI or other BL are planted in discrete stands, these will be designed as clumps of BI / broadleaves (minimum 30 m diameter) to provide some distinctive habitat close to riparian areas or open ground, and potentially to create biodiversity "stepping stones", linking native and semi-natural habitats. Further information is provided in coupe prescriptions (Appendix VIII).

Native broadleaved species will be planted or promoted to regenerate naturally, in the coupes between and above the SSSI/SAC areas, linking the mixed native woodland. Some of this area will be grown for productive broadleaves under Continuous Cover Forestry, using site appropriate native species. Local seed sources will be used for native trees planted in and around the SSSI areas.

Most conifers will be restocked to achieve a minimum density of 2,500/ha net plantable area at year five (or when considered to be established); Scots pine stands will be planted to achieve 1,600 stems / ha at establishment. Broadleaves established through natural regeneration will be expected to achieve a minimum stocking density of 1,600/ha over a 5 to 10 year period, supplemented by planting if necessary to achieve the required stocking density. Broadleaves will be planted to achieve 1,600/ha at five years on most sites, reduced to 1,100 stems / ha in native woodland areas. Broadleaved planting identified for timber production will achieve a minimum stocking density of 3,100 stems / ha (1.8 m spacing) at year five. Most coupes will be restocked within 2 years unless specified (e.g. for pest control) or if a delay is required pending reduction in deer browsing pressure. Restocked compartments will be monitored and maintained throughout the establishment phase, with losses replaced to maintain stocking density.

Surveys of natural regeneration areas in this plan will be made at year 5 to assess progress and again 10 years after felling. Full establishment will be achieved by year 10, planting when necessary to supplement natural regeneration.

Cultivation methods in future rotations will aim to aid tree establishment while minimising soil disturbance and the need for herbicide treatment. Ground around and close to the SSSI areas will be hot planted as soon as possible after felling, to reduce weed growth; avoiding mounding and soil disturbance.

The impact of tree diseases increasingly guides species choice. *Phytophthora ramorum* in larch, Dothistroma needle blight (DNB) in pines and Ash Dieback have all had an impact on species choice and crop management across the UK and were taken into consideration when selecting restock species for Creran.

Woodland Creation

Future woodland creation is being considered, through expansion of the existing native woodland into the three Coires and extending to above the existing timber line along gullies, primarily through natural regeneration but supplemented by planting where required. The area involved potentially covers more than 152 ha – all or some of this area could potentially regenerate with native woodland. This significant area of potential woodland creation will be vulnerable to deer pressure, so a case may be made for deer fencing an extensive area. This requires considerable consideration, preparation of a Business Case and an EIA determination, so it will be progressed as a separate project and treated as an amendment to the LMP if it goes forward. Any detailed proposals will be informed by the Strategic Plan for the North Argyll Forests, which is in preparation and will be underpinned by an Open Habitats Management Plan.

Natural Regeneration

Permanent native woodland habitats have been identified for expansion and/or establishment following felling operations. Typically these areas will include open space as well as native broadleaved woodland. Birch is well suited to most of the area and would make a positive contribution to biodiversity. But areas between and adjacent to the existing ASNW support fertile soils and a range of native broadleaved tree species can be established, suitable for mixed woodland on base rich soils. Broadleaves will also be planted for timber on lower slopes in this area and managed as LISS. Natural regeneration of native species will be promoted where possible, particularly in the vicinity of the SSSI/SAC but this may not be possible in the upper reaches of the upper zone, where there are few broadleaved seed sources, so planting will be required in these areas. Elsewhere, planting will supplement areas where natural regeneration is insufficient.

A Natural Regeneration Survey of areas identified for regeneration in this plan will be made at year five after felling, to assess progress. If there is evidence of suitable natural regeneration and/or the potential for achieving full stocking but this is unlikely to occur by year 10, a request may be made to the Conservancy to extend the time period for regeneration to occur. If this is not the case the area will be planted.

Riparian Management

Establishment of native broadleaved woodland along the riparian corridors will help to alleviate flood risk by reducing the speed of run-off. Management of broadleaves with 50% open space will create conditions suitable for salmonids and other key species in the River Creran and major tributaries. Natural regeneration is likely along riparian zones close to the larger watercourses where there are existing seed sources (assuming that deer pressure is sufficiently low) but seed sources are sparse on the upper reaches and planting will be required, to supplement or replace natural regeneration, in those areas. A minimum 20 m buffer will be created along the larger watercourses (where the channel is > 2 m wide) and a 10 m buffer for smaller watercourses (1 – 2 m width) to protect them during harvesting. But there are many even smaller burns running along very narrow gullies, often on steep ground. In these areas, the buffer created will be 2 – 5 m wide.

There is potential for natural regeneration of conifer species within the riparian corridors. Ideally this would all be removed but in practice, up to 15% conifer regeneration will be accepted in smaller corridors in the upper zone before intervention to remove it.

3.3 Open Land

Integral open ground within the forest area delivers a significant part of the forest's ecological value. Within the forest, open ground will be maintained along rides and some of the smaller riparian corridors. The aim will be to achieve 50% open canopy along larger riparian corridors to maintain suitable invertebrate and fish habitat in the watercourses. The hill slopes and tops will be left as open ground, with the exception of some potential native woodland expansion above the existing timber line where appropriate, notably in the three Coires area. An open habitat survey has been completed and areas of priority open habitat identified, to ensure that any native woodland expansion does not impact them. An Open Habitat Management Plan will be prepared to underpin the wider Strategic Plan and this will inform future open habitat management within the Glen Creran LMP area.

The existing open ground in coupe 44130 will be maintained as mostly managed open and a peatland restoration project implemented, through blocking any side drains and removing any regenerating conifer trees across the area. The expectation is that native broadleaved scrub will develop along the watercourse and on drier slopes or thinner soils, interspersed with areas of sustained peatland, creating a mosaic of habitats.

3.4 Deer Management

(see Appendix V, Deer Management Plan)

3.5 Visitor Zones and Public Access

A new trail will be created from the small stretch of forest road situated 500 m SW of the existing Elleric car park, leading to the Fairy Bridge and linking to the Pine Marten trail, returning via the same route. The trail will be serviced by a new car park located at the end of the short forest road. This route will improve access to the Fairy Bridge, which is already being visited by increasing numbers of people and will help protect the private water supplies, which are vulnerable to impacts from visitors currently using informal routes to get to the Fairy

Bridge. The potential to work with affected residents to help protect and improve private water supplies will be investigated.

The existing car park at Elleric will be maintained, for use by people using the Public Right of Way or accessing the nearby hills. The formal route linking from the existing Elleric car park to the Pine Marten trail will be closed permanently, although ranger access to the hill in this area will be considered, which will also benefit visitor access. See maps 7 a & b for details.

The access to the Public Right of Way will be maintained where it passes through the forest. The forest road network also provides walkers with opportunities to enjoy and explore the forest and access the higher hills. This informal access is managed under the Scottish Outdoor Access Code (SOAC).

3.6 Heritage Features

There is one Scheduled Monument listed under the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) – a cairn measuring 12.5 m diameter in the upper forest zone, close to the forest road at Salachail. The N and S sides of the cairn have been damaged by previous forest track and drainage works. The most recent Scheduled Monument Management Plan is in Appendix IX.

A number of unscheduled archaeological features have been found across the lower and upper forest zones, including various building remains (most of which are depicted on the 1875 6 inch OS maps) townships and sheepfolds, footbridges, cultivated remains, a standing stone, a stone dyke, copper mines, a rock shelter and a slate seat. At least 17 charcoal burning platforms have been identified between Allt a' Mhuilin to the NE and the Eas an Diblidh to the SW.

These sites will be managed in accordance with the Forests & the historic environment guidelines and will be protected during operations in line with the UKFS (see maps 8 a & b - Conservation & Heritage Features). If new sites are found these will be mapped, recorded and protected from operations. Detailed operational work plans will be drafted nearer the period of felling and will include a full range of mitigation measures to safeguard archaeological features. Additionally, the restocking proposals are sympathetic to both the features and their immediate environs. Further advice will obtained from the FLS Archaeologist if required.

There are no immediate plans to manage these sites for visitors but interpretation may be considered in future. The scheduled monument (cairn) in coupe 44140; charcoal platforms in coupes 44106/44591 and the slate seat in coupe 44585 are relatively accessible to visitors.

3.7 Habitats & Species

Areas of the forest support bats, otters and raptors, which are covered by the European Protected Species regulations. Prior to any harvesting operations, FLS will undertake a pre commencement survey in the coupe to check for the presence of any protected species. The relevant FCS guidance notes: Wildlife and Forest. Operations 31-35 d will be adhered to if protected species are found to be present.

The SAC / SSSI woodland in the lower zone supports a number of key habitats and species. Qualifying features in the SAC are western acidic oak woodland, mixed woodland associated with base rich soils on rocky slopes, and otters. Notified natural features for the SSSI are upland oak woodland, bryophyte assemblage, lichen assemblage and Chequered skipper and Pearl bordered fritillary butterflies. Management of the woodland to maintain these features in favourable condition will be undertaken as per the agreed SSSI/SAC Management Plan. In particular, this will include deer control to minimise deer browsing pressure; scrub clearance to favour Chequered skipper and bracken control to favour Pearl bordered fritillary butterflies. Opportunities to expand the native woodland through natural regeneration, further up the hill slopes closer to the natural tree line, will be investigated and will be dependent on successful management of deer pressure.

Other areas of broadleaved trees will be managed and where appropriate expanded, along riparian corridors, above the existing timber line and in successional open areas.

Natural regeneration will be monitored, to assess progress against objectives and to ensure that priority open habitats are maintained and are not negatively affected.

The areas of open water and bog in coupe 44130 will be managed and peatland areas restored through felling of some of the conifers fringing the coupe and by blocking some of the side drains running from the area.

3.8 Invasive Species

Some Rhododendron ponticum regrowth remains in places throughout the lower forest zone, including in the designated woodland, following an ongoing removal programme that is being delivered in partnership with the local community and other organisations. Continued treatment of this regrowth will be a priority, including removal of bushes that have infested upper slopes in the Coires.

Western hemlock is growing in various coupes in both upper and lower zones and while it can be a useful contribution to productive forestry, it can be invasive if growing in or near areas of native woodland, softer conifers or priority habitats. Young Western hemlock trees are recorded in coupe 44144, which is to be managed under LISS. The trees will be removed at the earliest opportunity ahead of implementing the thinning programme. Small numbers of young trees may also have encroached into native woodland areas in coupes 44579 and 44575, which are under minimum intervention. Where these occur, they will be removed at the earliest opportunity, when the young trees are cleaned from the adjacent coupes. Elsewhere, Western hemlock will be felled as per the felling programme and restocking of this species will only be considered in the upper zone if there is no potential for regeneration along riparian corridors.

There is dense bracken growth in clearings and above the existing tree line in the ASNW. Bracken whipping is carried out annually to create conditions suitable for Pearl bordered fritillary butterflies but there is potential for bracken control in some additional places to promote natural regeneration of native broadleaved species.

3.9 Local community

FLS will continue to work in partnership with the local community to eradicate non-native species in the native woodland areas and will continue to liaise with residents and the wider community on

other management issues in this zone. A significant programme to remove Rhododendron ponticum is underway, with larger bushes already removed and regrowth being managed on an ongoing basis. Plants that have seeded on upper slopes and into the Coires will also be treated. FLS teams will communicate with residents on proposed recreational access and any maintenance works, to ensure that public access is appropriate and private water supplies protected. Opportunities to work with affected residents to help protect and improve private water supplies will be investigated.

4. Critical Success Factors

- Deer control will be the main critical success factor for restocking by planting or natural regeneration of both commercial and native woodland. The approach taken will be deer culling (working with the Deer Management Group) combined with the strategic deer fence and possibly, limited use of exclosure fences where appropriate (a detailed Business Case will be required before any additional fencing is considered). Close collaboration with neighbours and other partners will be crucial to successful deer management

- Where deer are adequately controlled, natural regeneration will need to be managed timeously, to achieve the desired species in all crops and to remove non-native species from the native woodland areas

- The continued control of INNS, particularly Rhododendron, is required to protect the native woodland and commercial crops. Control of other potentially invasive species such as beech, Western hemlock and Sitka spruce in the vicinity of the SSSI/SAC woodland areas will also be required to protect qualifying and notified features

- Access is also key – the timing of road construction to access felling coupes needs to synchronise with production requirements and this will determine the harvesting and restocking programmes. Continued access for adequate deer control is also important

- Continuing to cater for the growing number of visitors to Glen Creran who are looking for short walks, as well as those accessing the hills and Public Right of Way and locals who use local trails and rides. Provision of an alternative trail to replace the existing route to the Pine Marten trail will need to be supported by adequate car parking and signage