Forestry and Land Scotland
Coilltearachd agus Fearann Alba

Central Region
Whitelee Forest
Land Management Plan 2019-2029

Approval date:

Plan Reference No:

Plan Approval Date:

Plan Expiry Date:

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

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

FSC www.fsc.org FSC® C011771
The mark of responsible forestry

PEFC PEFC/16-40-1002 Promoting Sustainable Forest Management www.pefc.org

Forestry and Land Scotland
Coilltearachd agus Fearann Alba

Land Management Plan Details

LMP Name:	Whitelee Forest		
Grid Reference:	NS 587 442	Nearest town or locality:	Darvel, Strathaven, Eaglesham
Local Authority:		East Ayrshire South Lanarkshire East Renfrewshire	
Land Management Plan area (hectares):		5884	

Owner's Details

Title:	Mrs	Forename:	Carol
Surname:	McGinnes		
Organisation:	Forestry and Land Scotland	Position:	Regional Manager
Primary Contact Number:	0131 370 5622	Alternative Contact Number:	07917271577
Email:	carol.mcginnes@forestryandland.gov.scot		
Address:	Five Sisters House, Five Sisters Business Park, West Calder, West Lothian		
Postcode:	EH55 8PN	Country:	Scotland

Approval - to be completed by Scottish Forestry staff:

LMP Reference Number:			
Plan Period: (ten years) (day/month/year)	From:	To:	
Operations Manager Signature:		Approval Date: (dd/mm/yyyy)	

Contents

Version History

Version	Date	Comments
1.0		Initial Draft layout
1.1	10/07/2019	Amended layout
1.2	12/09/2019	Updated figures and text
1.3	01/10/2019	Updated text
1.4	16/10/2019	Updated text

1.0 Summary of proposals

At approx. 5884 Ha Whitelee Forest is the biggest productive forest within the former Scottish Lowlands Forest District, now part of Central Region, producing large volumes of standard quality timber. The intention is to maintain this function whilst continuing to diversify the structural and biological diversity of the blocks. Recent tree health concerns over various pines and the larch species have necessitated a re-evaluation of the previously planned species diversification for the block supporting the continued judicious use of Sitka Spruce predominantly in mixture with Lodgepole pine.

The proportion of native broadleaves within the forest will be increased and the move, initiated in previous plans, to create semi natural Forest Habitat Networks along the main riparian corridors continues.

The primary objectives for the plan are to continue the sustainable production of timber, enhance native woodland habitat networks and to maintain high quality access and recreation infrastructure.

Table 1 - Woodland changes

Species Breakdown	2019	2029	2039
Primary species: Sitka spruce	2978	2524	2323
Secondary species: other conifers	249	412	510
Broadleaves	139	213	277
Open, Successional, Felled, Other	2518	2735	2774
Total Plan Area:	5884	5884	5884

2.0 FCS Regulatory Requirements

2.1 Summary of planned operations

Table 2 - Summary of planned operations

Planned Operations	2019-2029
Felling (afforested area)	1012 Ha
Thinning	0 Ha
Restock (replanted area)	854 Ha
Woodland Creation (planted area)	40.8 Ha
Habitat Restoration (deforested area)	32.9 Ha
Road Construction	0.9 Ha
Quarry expansion	1.4 Ha

2.2 Proposed felling in years 2019- 2029

Table 3 – Clearfelling Phase 1 & 2

Phase 1 (2020-2024)												
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	Restock Year	Monitoring Comments
56	29.12	5330.69	16.23	-	-	-	-	-	-	12.89	2022	ongoing via Programme Manager and at mid term review
206	32.11	12159.87	28.22	-	-	-	-	-	-	3.89	2022	"
217	24.03	8815.03	15.58	-	-	-	1.82	-	-	6.63	2022	"
219	51.99	17695.82	39.15	-	-	-	2.03	-	-	10.81	2022	"
222	8.18	2898.17	5.83	-	-	-	-	-	-	2.35	2022	"
223	37.37	13423.38	28.75	-	-	-	-	-	-	8.62	2022	"
304	16.41	4957.52	10.62	-	-	-	4.47	-	-	1.32	2022	"
306	34.13	14015.48	32.08	-	-	-	-	-	-	2.05	2022	"
428	45.5	17700.58	39.47	-	-	-	-	-	-	6.03	2022	"
28	4.64	1162.3	3.14	-	-	-	-	-	-	1.5	2023	"
47	53.8	25446.34	34.29	-	9.29	0.24	-	-	-	9.98	2023	"
51	54.94	16560.39	34.03	-	1.16	-	-	-	-	19.75	2023	"
78	26.61	9374.5	15.3	-	4.94	-	-	-	-	6.37	2023	"
316	27.7	5727.41	21.62	-	-	-	0.47	-	-	5.61	2023	"
401	21.42	4721.96	15.59	-	-	-	0.2	-	-	5.63	2023	"
418	27.41	15083.17	25.91	-	-	-	-	-	-	1.5	2023	"
420	23.63	5977.79	17.03	-	-	-	-	-	-	6.6	2023	"
503	22.64	7599.11	18.87	-	-	-	-	-	-	3.77	2023	"
32	25.89	10388.04	18.69	-	-	3.56	-	-	-	3.64	2024	"
53	16.32	3574.87	9.96	-	3.3	-	-	-	-	3.06	2024	"
63	8.55	2661.1	7.02	-	-	-	-	-	-	1.53	2024	"
65	7.73	2297.54	5.22	-	-	-	-	-	-	2.51	2024	"
308	41.48	14418.61	34.37	-	-	-	1.05	-	-	6.06	2024	"
432	37.04	9379.5	26.32	-	-	-	0.1	-	-	10.62	2024	"
433	19.57	7192.1	14.42	-	-	-	-	-	-	5.15	2024	"
79	16.99	4672.38	7.74	-	5.11	-	-	-	-	4.14	2025	"
214	30.96	7271.8	17.8	-	-	-	0.94	-	-	12.22	2025	"
221	38.86	15953.4	32.75	-	-	-	-	-	-	6.11	2025	"
310	30.5	8675.48	24.04	-	-	-	-	-	-	6.46	2025	"
502	3.19	283.74		-	-	-	1.88	-	-	1.31	2025	"
26	30.74	12363.77	24.83	-	-	0.01	-	-	-	5.9	2026	"
82	30.54	7148.01	22.11	-	-	-	-	-	-	8.43	2026	"
85	8.34	1639.02	3.89	-	-	-	-	-	-	4.45	2026	"
Totals	888.33	296568.9	650.87	-	23.8	3.81	12.96	-	-	196.89		
Phase 2 (2025-2029)												
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	Restock Year	Monitoring Comments
44	22.02	6844.15	17.33	-	1.14	-	-	-	-	3.55	2028	ongoing via Programme Manager and at mid term review
86	24.88	5042.15	18.08	-	-	-	-	-	-	6.8	2028	"
204	24.14	13435.94	21.84	-	0.03	-	-	-	-	2.27	2028	"
19	35.13	10258.95	21.02	-	-	0.84	-	-	-	13.27	2029	"
59	35.96	14207.76	25.1	-	-	-	-	-	-	10.86	2029	"
331	22.67	9070.78	20.5	-	-	-	0.69	-	-	1.48	2029	"
4	9.97	235.98	0.79	-	-	-	-	-	-	9.18	2030	"
5	77.87	20905.63	46.82	-	-	-	-	-	-	31.05	2030	"
46	36.67	11517.22	25.91	-	-	-	-	-	-	10.76	2030	"
312	13.31	4623.04	8.57	-	-	-	-	-	-	4.74	2030	"
412	38.34	17423.18	31.41	-	-	-	-	-	-	6.93	2030	"
506	15.15	2647.69	6.75	-	-	-	-	-	-	8.4	2031	"
514	34.66	7941.3	26.29	-	-	-	-	-	-	8.37	2031	"
57	29.71	7605.91	16.11	-	-	-	-	-	-	13.6	2031	"
513	31.42	10676.92	31.09	-	-	-	-	-	-	0.33	2031	"
Totals	451.9	142436.6	317.61	-	1.17	0.84	0.69	-	-	131.59		

2.3 Proposed restocking in years 2019- 2029

Table 4 – Restocking of felled areas 2019-2029

Proposed Restocking of areas felled 2019-2029												
Coupe No.	Total Area (Ha)	SS (Ha)	LP (Ha)	SP (Ha)	NS (Ha)	Larch (Ha)	Other Con. (Ha)	Native Mixed B/Leaf	Open (Ha)	Year	Restock Method & Density (Restock/Nat Regen/Alt Area/Coppice/Open)	Monitoring Comments (Including any reason not to restock)
56	29.12	5.75	2.47					6.83	14.07	2022	Planting	SDA
206	32.11	17.88	7.66						6.57	2022	Planting	SDA
217	24.03	8.35	3.58					2.06	10.04	2022	Planting	SDA
219	51.98	20.69	8.86					4.76	17.67	2022	Planting	SDA
222	8.18							4.18	4	2022	Planting	SDA
223	37.37	15.27	6.54					3.19	12.37	2022	Planting	SDA
304	16.41	8.41	3.6						4.4	2022	Planting	SDA
306	34.13	13.3	5.7					6.04	9.09	2022	Planting	SDA
428	45.5	25.33	10.86						9.31	2022	Planting	SDA
28	4.64	1.98	0.85						1.81	2023	Planting	SDA
47	53.8	25.97	11.13						16.7	2023	Planting	SDA
51	54.93	13.53	5.8					5.84	29.76	2023	Planting	SDA
78	26.62	7.25	3.11					7.58	8.68	2023	Planting	SDA
316	27.7	12.34	5.29					2.4	7.67	2023	Planting	SDA
401	21.42	9.21	3.95					0.94	7.32	2023	Planting	SDA
418	27.42	16.48	7.06						3.88	2023	Planting	SDA
420	23.62							12.76	10.86	2023	Planting	SDA
503	22.64	9.03	3.87					1.95	7.79	2023	Planting	SDA
32	25.89	10.05	4.3					3.51	8.03	2024	Planting	SDA
53	16.32	5.94	2.54					3.07	4.77	2024	Planting	SDA
63	8.54	3.93	1.68					0.66	2.27	2024	Planting	SDA
65	7.73							2.85	2.56	2024	Planting	SDA
308	41.48	16.6	7.11					4.25	13.52	2024	Planting	SDA
432	37.04	16.37	7.02					1.33	12.32	2024	Planting	SDA
433	19.56	6.92	2.97					3.02	6.65	2024	Planting	SDA
79	16.99	7.33	3.14					1.28	5.24	2025	Planting	SDA
214	30.96							17.33	13.63	2025	Planting	SDA
221	38.86	18.36	7.87					2.98	9.65	2025	Planting	SDA
310	30.5	10.03	4.3					4.94	11.23	2025	Planting	SDA
502	3.19							1.88	1.31	2025	Planting	SDA
26	30.74	14.22	6.1					1.45	8.97	2026	Planting	SDA
82	30.55	11.71	5.02					2.98	10.84	2026	Planting	SDA
85	8.34	4.17	1.79						2.38	2026	Planting	SDA
44	22.01	10.28	4.41					0.98	6.34	2028	Planting	SDA
86	24.88	10.2	4.37						10.31	2028	Planting	SDA
204	24.14	12.43	5.33						6.38	2028	Planting	SDA
19	35.13	12.12	5.2					2.04	15.77	2029	Planting	SDA
59	35.96	16.53	7.08						12.35	2029	Planting	SDA
331	22.67	10.06	4.31					1.17	7.13	2029	Planting	SDA
4	9.97							5.02	4.95	2030	Planting	SDA
5	77.88	20.19	8.65					24.52	24.52	2030	Planting	SDA
46	36.66	12.21	5.23					4.48	14.74	2030	Planting	SDA
312	13.31	5.49	2.36					1.59	3.87	2030	Planting	SDA
412	38.34	15.85						11.26	11.23	2030	Planting	SDA
506	15.15								15.15	2031	Open	Survey
514	34.66								34.66	2031	Open	Survey
57	29.7	9.17	3.93					1.68	14.92	2031	Planting	SDA
513	31.41	11.92	5.11					7.97	6.41	2031	Planting	SDA
Totals	1340.18	482.85	200.15					170.77	484.09			

2.4 Access and roading 2019- 2029

Table 5 – Required new roading 2019-2029

Required new roading (2019-2029)			
Coupe No.	**Total Length (m)**	**Total Area (Ha)**	**Monitoring Comments**
4	259	0.10	ongoing civil engineering maintenance programme
32	205	0.08	"
78	56	0.02	"
221	859	0.34	"
514	916	0.37	"
Totals	2295	0.92	"

2.5 Departure from UKFS Guidelines

This LMP adheres to UKFS Guidelines although there is a preponderance of phase 1 felling coupes often neighbouring phase 2 coupes. This means that retaining stands adjoining other felled areas until the restocking of the first coupe has reached a minimum height of 2 m is very challenging. The reason for this situation is due to the relatively even aged nature of the remaining mature crops. Many coupes reach max MAI at similar periods and were therefore identified for felling in what is now phase 1 as part of the previous land management plan; this plan therefore generally aligns with what was previously proposed. As this is an highly exposed site delaying these coupes any longer runs a very high risk of large scale wind throws. Added to this is consideration of the impact the forest is having on the surrounding wind turbines. Most of the forest is subject to Short Rotation Forestry management and we are seeking to help mitigate the effects of turbulence exacerbated by overly elevated canopies on the turbines. In development of this plan FLS has liaised with Scottish Power Renewables and their forestry consultants Wood Plc. where we were made aware of several coupes in particular which were affecting turbine efficiency and output. In order to accommodate SPR we looked to bring coupes forward however for the most part the affected coupes were already proposed for phase 1 felling. It is FLS's view that despite the adjacency issues this plan proposes the resultant felling will have a minimal impact on the landscape due to the topography and similarly the impact of neighbouring coupes will be negligible as the neighbouring coupes in the lee of the prevailing wind are relatively recent restock areas where the crop has achieved 2m so wind throw will not present a significant issue. The planting design of the restock will facilitate smaller coupes in future allowing for greater diversity in the crop age structure.

2.7 Standards and guidance on which this LMP is based

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://forestryandland.gov.scot/what-we-do/planning/links

2.8 Tolerance table

Table 6

	Map Required (Y/N)	Adjustment to felling period	Adjustment to felling coupe boundaries	Timing of restocking	Change to species	Wind throw response	Adjustment to road lines	Designed open ground
SF Approval not normally required (record and notify SF)	N	Fell date can be moved within 5 year period where separation or other constraints are met	<10% of coupe size.	Up to 5 planting seasons after felling (allowing 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).			Location of temporary open ground e.g. deer glades if still within overall open ground design Increase by 0.5 ha or 5% of area - whichever is less
Approval by exchange of letters and map	Y		10-15% of coupe size.	5 years +	Change of coupe objective that is 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	Increase of 0.5 ha to 2 ha or 10% - whichever is less Any reduction in open ground
Approval by formal plan amendment	Y	Felling delayed into second or later 5 year period Advance felling into current or 2nd 5 year period	>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	More than 2 ha or 10% Any reduction in open ground in sensitive areas Colonisation of open Areas agreed as critical

3.0 EIA Screening Determination for forestry projects

Proposed Work							
Please put a cross in the box to indicate the type of work you are proposing to carry out. Give the area in hectares and where appropriate the percentage of conifers and broadleaves							
Proposed Work	Select (x)	Area in hectares	% Conifer	% Broad-leaves	Proposed work	Select (x)	Area in hectares
Afforestation	X	40.8	88	12	Forest roads	-	-
Deforestation	X	32.9	100	0	Forest quarry	X	1.4
Location of work	Deforestation – OS Grid Refs NS 648 461 & NS 660 446 Forest quarry – OS Grid Ref NS 608 450 Afforestation - OS Grid Ref NS 562 398						

Description of Forestry Project and Location
Provide details of the forestry project (size, design, use of natural resources such as soil, and the cumulative effect if relevant). Please attach map(s) showing the boundary of the proposed work and other known details.

3.1 Proposed deforestation

Habitat Restoration

We intend to fell ~33 Ha of conifer woodland to restore Blanket Bog Habitat (see **Habitat Restoration Maps 5e i-iii**)

In order to conserve this nationally important habitat and extend its local network, it is the intention of Forestry and Land Scotland to deforest the majority of the site by the following methods over time:

1. Harvest and extract timber to roadside areas where ground conditions, brash availability and economics allow in the period 2027/28.
2. Where and when economics allow, mulch onsite or fell to recycle (Where ground conditions and/or brash availability prohibit extraction) and block drains to re-wet the soil.
3. If appropriate, encourage areas already succumbing to wind-throw to further blow with removed protection and ground wetting by drain blocking.

4. Prevent and remove regeneration over coming years.

All operations will be carried out according to UK Forestry Standard Best Practice as well as other relevant guidance such as Water, Soil, Biodiversity and Historic Environment

3.2 Proposed forest road works

N/A (below 1.0 Ha threshold)

3.3 Proposed forest quarries

Linking Quarry X and Quarry X extension

The area between the existing Quarry X and Quarry X Extension, located in Whitelee Forest has been identified as a potential source of usable stone for the construction and maintenance of the forest and windfarm road network in Whitelee Forest.

The intention is to link these quarries expanding the quarry area by 1.4 Ha to produce a variety of usable aggregate sizes for upgrading and general repair & maintenance of forest roads in the area. A source of suitable stone in this forest is critical for maintenance in this forest. **Appendix VI: Quarry Design Review** and **Maps 5d i-iii** provide further background and detail on potential issues related to this work.

3.4 Proposed afforestation

High Carlingcraig Farm - new acquisition

High Carlingcraig Farm which marched with Whitelee Forest Block was purchased in December 2017 and has been incorporated into the wider block. The farm covers an area of 49.5 Ha It is the intention to create new woodland expanding Whitelee Forest as a whole. Section 7.4 Woodland Creation and **Maps 5c i-iv** provide further detail on this proposal.

Quarry X expansion - reclaimed areas

Reclaimed overburden sites will allow re – afforestation of 2.8 Ha of the former quarry area which was previously afforested. Mixed broadleaves will be planted at 1600 stems/ha.

Description of Likely Significant Effects
Provide details on any likely significant effects that the project will have on the environment (resulting from the project itself or the use of natural resources) and the extent of the information available to assist you with this assessment.
Deforestation – There will be a loss of non-native conifer woodland habitat however we will be restoring priority blanket bog habitat. Forest Quarries – See **Appendix VI: Quarry Design Review** *'Possible Environmental Impact'* Afforestation – There will be no significant negative effect only a positive gain of woodland habitat and a source of carbon sequestration. The woodland creation will be within a preferred area* for woodland expansion identified within the Ayrshire and Arran Forestry & Woodland Strategy 2014 ** land that offers the greatest scope to accommodate future expansion of a range of woodland types, and hence, to deliver on a very wide range of objectives. Sensitivities are limited and it should be possible to address any site-specific issues within well-designed proposals that meet the UK Forestry Standard and associated guidelines.*

Include details of any consultees or stakeholders that you have contacted in order to make this assessment. Please include any relevant correspondence you have received from them.
Desk and site based surveys of the have been carried out by both the FLS Environment and Heritage Manager and the Environment and Heritage Forester for the afforestation (see **Appendix V: High Carlingcraig Conservation and Heritage Scoping** and site survey report and maps) and the deforestation for habitat restoration. These surveys did not reveal any significant constraints so given this FLS has not contacted any external stakeholders in order to confirm this assessment. FLS has however contacted the Local Peatland Action Fund Officer, SNH & South Lanarkshire Local Biodiversity Action Group and received their support for the habitat restoration.

Mitigation of Likely Significant Effects
If you believe there are likely significant effects that the project will have on the environment, provide information on the opportunities you have taken to mitigate these effects.
FLS don't believe there will be any significant effects due to these projects. Our operational methodologies are detailed as follows: Deforestation Open Habitat Bog Restoration – See section 3.1 Proposed deforestation above Forest Quarries Quarry Expansion – See **Appendix VI: Quarry Design Review** Afforestation Woodland Creation – See section 7.4 New Woodland Creation below

Sensitive Areas	
Please indicate if any of the forestry project is within a sensitive area (see list below). Write in the sensitive area and give the area of the proposal within it.	
Sensitive Area	Area
Deep peat soil (Habitat restoration – open habitat bog restoration)	32.9 Ha

Property Details			
Property Name:	Whitelee Forest		
Grid Reference:	NS 587 442	Nearest town or locality:	Darvel, Stathaven, Eaglesham
Local Authority(s):	East Ayrshire South Lanarkshire East Renfrewshire		

Owner's Details			
Title:	Mrs	Forename:	Carol
Surname:	McGinnes		
Organisation:	Forestry and Land Scotland	Position:	Regional Manager
Primary Contact Number:	0131 370 5622	Alternative Contact Number:	07917271577
Email:	carol.mcginnes@forestryandland.gov.scot		
Address:	Five Sisters House, Five Sisters Business Park, West Calder, West Lothian		
Postcode:	EH55 8PN	Country:	Scotland
Is this the correspondence address?	Yes		

Office Use Only	
GLS Ref number:	

4.0 Introduction

4.1 The existing land holding

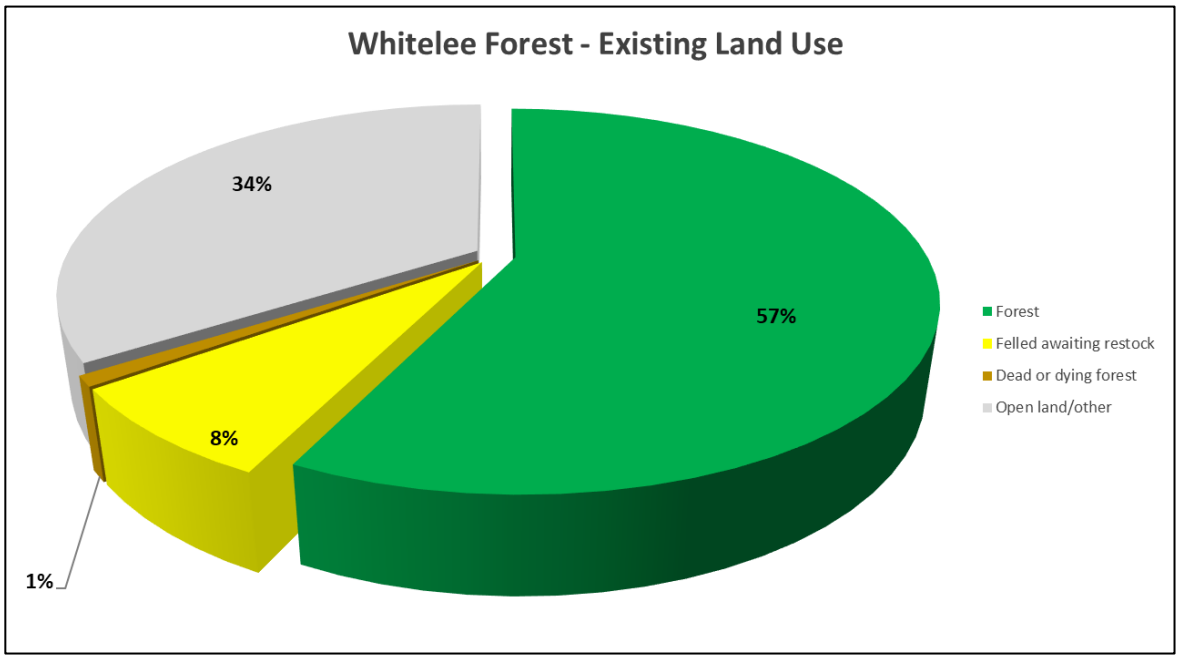
See **Appendix I: Supporting Information** sections 1.0 & 3.0

The current land matrix is as follows:

Table 7 – Current Forest Block land usage

Land use	Area (Ha)
Forest	3367
Open land/other	2013
Felled awaiting restock	452
Dead or dying forest	52

Figure 1 – Whitelee Forest Current Land Usage



4.2 Setting & Context

Whitelee Forest (~ 5884 Ha) lies on the moorland plateau between Ayrshire and the Clyde Valley. The forest is situated within three different local authority areas. Just over half of the forest lies within East Ayrshire Council, the remainder divided between South Lanarkshire and East Renfrewshire Councils. It is centred on flat plateau, with several arms stretching onto the slopes to the north and south, but deeply divided by strips of farmland. There is little relief on the plateau, but some of the larger burns cut deep gullies into the landscape with steeper slopes. The forest lies within the A726, M77, A71 roads located to the south of East Kilbride, the west of Stathaven and to the northeast of Kilmarnock (see **Maps 1 – Location & 2 - Setting & Context**).

The forest primarily functions to produce large volumes of cellulose from typical commercial conifer species.

4.2 LMP Presentation

The Whitelee Forest LMP has not been divided into any particular zones and therefore the objectives relevant to the whole plan are referred to in Section 5 with Sections 6 to 8 presenting the analysis of key issues and challenges and the management proposals for the site as a whole.

5.0 Plan Objectives

Following the review of the previous plan (See **Appendix I** Section 2) and consideration of the initial scoping internal FLS responses, **Appendix II** details the key issues and challenges faced as well the management objectives identified for Whitelee Forest.

6.0 Analysis & concept

6.1 Analysis

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

A major factor for consideration was the future management of various swathes of the forest where the crop seemed poorer quality than the yield class information in our sub-compartment database would indicate. In order to validate the SCDB information over these large swathes of forest FLS utilised Forest Research data where we were able to subtract Terrain Model elevation data from the superficial Surface Model elevation data to provide an estimated canopy height of the crop accurate to 1mx1m. This height data was then processed along with the underlying SCDB data for the predominant species (Sitka spruce with the age for the crop extrapolated from the planting year) using the Yield tables to produce a spatial YC heat map highlighting areas of potentially poor growth (see **Map 3d – Yield class heat map**). This estimated data was further validated by the instigation of a crop attribute survey of select areas identified as potential long term retention from the heat map data. The attribute survey generally confirmed the heat map estimations and the SCDB was updated accordingly. This analysis greatly assisted in understanding the extend of poor growth and which areas were potentially harvestable. This information along with other desk and field based survey and analysis are illustrated in **Map 4a - Key Feature Opportunities & Constraints**.

6.2 Concept

The analysis was used to develop an initial design concept highlighting general themes and outlining key considerations and activities which are likely to be most relevant during the plan period, and which formed the basis for these plan proposals for consultation with both the general public and key stakeholders (see **Map 4b - Initial Outline Concept**)

7.0 Long Term Land Management Plan Proposals

7.1 Management

All proposals have been designed in accordance with sound silvicultural and environmental principles, falling within the framework outlined by the UK Forestry Standard, the UK Woodland Assurance Scheme, FC Bulletin 112 Creating New Native Woodlands, FC Bulletin 115 Alternative Silvicultural Systems, FC Bulletin 124 Ecological Site Classification for Forestry and the current FC edition of Forest & Water Guidelines.

Patch clear-felling remains the most appropriate silvicultural system for Whitelee Forest and it is the intention to facilitate a move toward generally smaller coupe sizes in the future by judicious planting design. This will allow for further restructuring of the block and for a more structurally and biologically diverse forest as well as imparting greater flexibility for future management options (see **Map 5a – Management**)

7.1.1 Clear felling

Patch clear felling will continue be the most appropriate management approach for the forest which is predominantly productive conifer. While most coupe fell years are based on the optimal rotation lengths to reach Maximum Mean Annual Increment, various coupes are proposed for both early felling; such as the areas of Short Rotation Forestry around wind turbines, and others for retention; enhancing biological and structural diversity. It should also be noted that another important consideration was to smooth the current general peak in harvestable timber volume which was inevitable from this even aged forest; this has to be considered both at the block and regional level.

During the 10 years of the plan period, a total of 1012 ha, with a projected volume of 439,005 m^3, are designated for clear felling (see **Tables 8 & 9 as well as Figure 2** below).

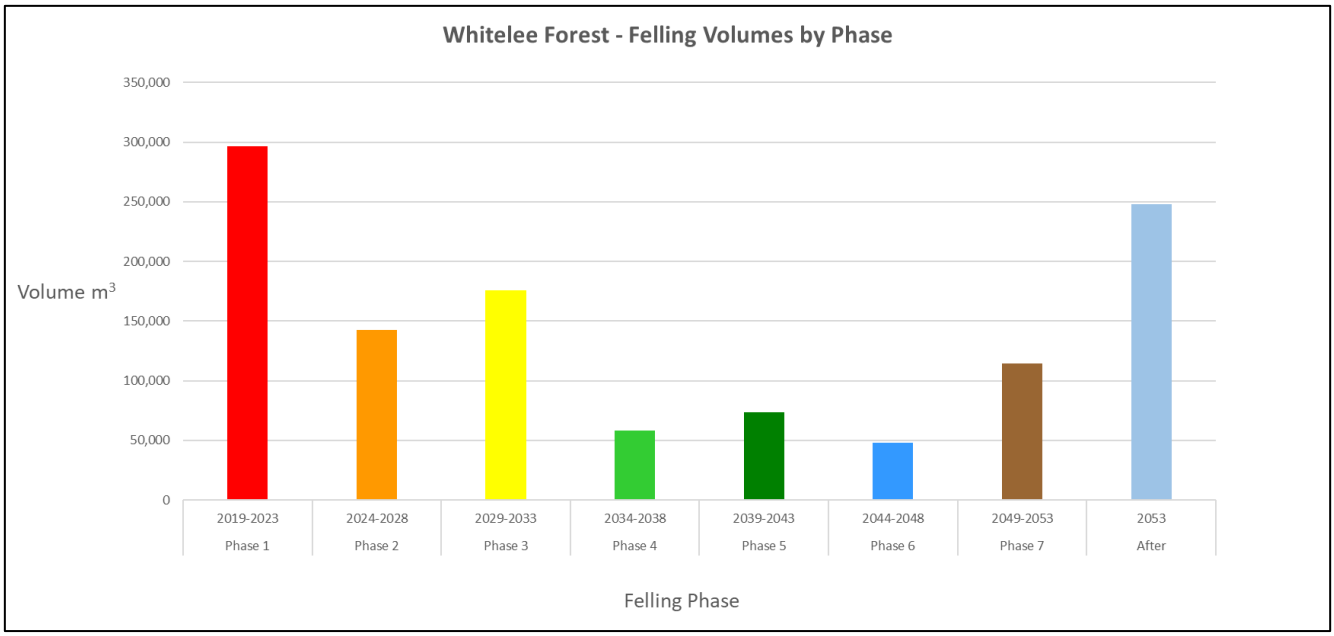
Table 8 – Phase Felling Area

SCALE OF PROPOSED FELLING AREAS (including LISS final fell areas)												
Total Forest Plan Area:		5884	hectares									
Felling	Phase 1	%	Phase 2	%	Phase 3	%	Phase 4	%	Long Term Retention	%	Area out-with 20yr plan period	%
Area (Ha)	691	12	320	5	375	6	120	2	386	7	1506	26

Table 9 – Projected Felling Phase Volumes

Phase 1 2020-2024	Phase 2 2025-2029	Phase 3 2030-2034	Phase 4 2035-2039	Phase 5 2040-2044	Phase 6 2045-2049	Phase 7 2050-2054	After 2054
296,569 m^3	142,437 m^3	175,911 m^3	58,289 m^3	73,335 m^3	47,693 m^3	114,556 m^3	248,078 m^3

Figure 2 – Projected Felling Phase Volumes



7.1.2 Thinning

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

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

Local regional policy is not to thin crops on areas with a DAMS score greater that 15; In the case of Whitelee Forest, as described in section 3.1.2, most of the forests are 'highly exposed' which means thinning operations would likely significantly increase the risk of wind throw. Not only this but as the soils are predominantly wet and soft, thinning operations would likely lead to significant ground damage and therefore thinning is not proposed in this block for future rotations.

7.1.3 Alternative to Clearfell Forestry (CCF)/LISS

As mentioned in the previous section this site isn't suited for thinning as the intended benefits of enhanced crop stability, increased tree volume and improved regenerative potential would be negated

by the risks to the crop from wind throw and therefore not conducive for management through Alternative to Clearfell methods such as LISS or Continuous Cover Forestry (CCF).

7.1.4 Restructuring

As mentioned in the Section 7.1 judicious planting design of the restock areas will facilitate more wind firm green edges within the future crop. This will allow for more flexibility to create new smaller coupes in the future allowing for the further age diversification of the forest. Alongside the age restructuring, further use of Lodgepole pine as a nurse and native wet woodland broadleaf species will also enable species restructuring.

7.1.5 Long Term Retentions

With most of Whitelee Forest planted on deep peat there are areas of the forest where the application of fertiliser hasn't sufficiently improved these crops which are in check or growing very poorly. As such many areas of poor growth will be retained beyond their normal rotation lengths in order to maintain the option of harvesting these areas in future. Future LMP's will reassess these areas and their merchantable potential at appropriate times where it may be concluded that these areas should be managed for biodiversity as minimum intervention or natural reserve.

7.1.6 Minimum Intervention and Natural Reserves

For various areas of the forest biodiversity will be the primary objective and we are prepared to commit such areas of land to minimum intervention management or leave as natural reserves. This minimum intervention classification need not apply in perpetuity and these areas may be reviewed and revaluated for alternative management in future plans.

7.1.7 Tree-health

In light of the Statutory Plant Health Notice in 2015 to fell *P. ramorum* infected larch and in line with FLS's Larch Strategy the region has proactively been working to mitigate the effects of any potential future SPHN within the block. Actions such as identifying coupes potentially at risk, producing pre-emptive work-plans for these as well as constructing roads during the previous plan or proposed in this plan will stand us in good stead to react quickly should the need arise.

7.1.8 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 of 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 and 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 will be maintained and will be considered during the five year Land Management Plan review.

7.2 Restocking proposals, future habitats and species

Taking into account all the survey and analysis information, and the objectives set out in the brief, a mix of productive conifer, semi-natural broadleaved woodlands are proposed, along with areas of open ground.

This plan has considered the design and location in relation to the natural and historic environment and green network opportunities.

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

7.2.1 Proposed Restock Species

While it is important to recognise the challenges posed to forestry in the future from predicted climate change and the increasingly diverse range of pests and diseases afflicting a range of tree species; the soils, climate and topography of the sites within this particular plan area limit opportunity to significantly diversify the species make-up of the forests.

Broadly this plan proposes continued use of Sitka spruce as the predominant productive conifer species with increased use of Lodgepole pine as a nursing mixture. This plan does however propose to improve the habitat network links chiefly through the development of semi-natural woodland along the riparian corridors. These forest habitat networks will be comprised of a matrix of native broadleaves and open space.

Despite the species limitations faced, this plan continues to build on work of previous plans to diversify the forests' age structure. This is achieved, where appropriate, by reducing the size of existing coupes and, when restocking, designing in more wind firm edges to increase the stability of neighbouring coupes and therefore allow for a greater range of options for future management decisions.

When considering restocking on areas of deep peat FLS will follow the guidance in *'FCS Practice Guide - Deciding future management options for afforested deep peatland'* i.e. where the current crop and ESC indicates clearly that the site will not produce second rotation good growth (SS ≥ YC 8 LP ≥ YC 6) we will look to either create peat edge woodland or restore to open peatland.

As described in section 7.1.5 Long Term Retentions we are proposing to retain various areas of the crop exhibiting poor growth with a view to potentially felling out with their normal rotation lengths. As described above following the guidance in *'FCS Practice Guide - Deciding future management options for afforested deep peatland'* we presently propose to restock these areas with site suited native wet woodland broadleaves given their unsuitability for productive conifer or habitat restoration. This decision is supported by running Ecological Site Classification reports on the areas (see **Appendix VII: ESC Report on broadleaf suitability**) as well as previous experience of planting similar crops in similar site conditions in coupes 301, 302, 403, 404 & 407 where Downy birch and Common alder have been successfully established using alternative cultivation methods, direct seeding and good drainage methods. It should be noted that these areas of LTR/wet woodland restock fall operationally out with the approval consideration of this LMP but rather set out our intended thinking at this juncture on these areas for further future consideration in subsequent LMP's (see **Map 5b – Future Habitat & Species**).

Table 10 – Proposed Restock Species

Species	Net area (ha)	%
Sitka spruce	483	36
Lodgepole pine	200	15
Mixed broadleaves	171	13
Open/other	486	36

Detailed restocking information is available in Section 2.3 Table 4 – Restocking of felled areas 2019-2029

7.2.2 Open habitat

Scottish Power Renewables remain responsible for the management within the Habitat Management Plan Area within which coupes 100, 200 & 383 fall. FLS will continue to monitor and remove natural regeneration on Wallace Gill Muir Bog. We intend to deforest 32 Ha of conifer in coupes 506 & 514 in order to restore the underlying blanket bog open peatland habitat as per the guidance in *'FCS Practice Guide - Deciding future management options for afforested deep peatland'*.

In order to conserve this nationally important habitat and extend its local network, it is the intention of Forestry and Land Scotland to deforest the majority of the site by the following methods over time:

1. Harvest and extract timber to roadside areas where ground conditions, brash availability and economics allow in the period 2027/28.

2. Where and when economics allow, mulch onsite or fell to recycle (Where ground conditions and/or brash availability prohibit extraction) and block drains to re-wet the soil.
3. If appropriate, encourage areas already succumbing to wind-throw to further blow with removed protection and ground wetting by drain blocking.
4. Prevent and remove regeneration over coming years.

All operations will be carried out according to UK Forestry Standard Best Practice as well as other relevant guidance such as Water, Soil, Biodiversity and Historic Environment (see **Maps 5e i-iii Habitat Restoration**).

7.3 Prescriptions

7.3.1 Productive Conifers

The primary function of the forest is to produce high volumes of softwood timber of relatively standard quality, predominantly providing for the small round wood and wood fuel market rather than the saw-log market.

As such and as per the Regional restocking strategy a reduced management input will generally be employed; meaning:

- lower cost or alternative ground prep methods
- restocking at average initial density of 2,700 stems/ha to achieve a final density of between 2,250 and 2,500 stems/ha with an emphasis on achieving overall stocking
- only top-up spraying or weeding as an absolute necessity
- a restricted SDA process to ensure that the objectives that are set for the site are being met and to inform any future management

Sitka spruce will continue to form the primary component of the productive conifer as it is well suited to the site with generally higher yield classes. Sitka will be planted pure where the soils are better but on the poorer deep peat areas it will be planted in intimate mixture with Lodgepole pine where the pine will act as a nurse crop hindering heather expansion in productive conifer areas.

Although Scots pine and larch were suggested and in some cases planted in various areas previously, due to the threat posed by (respectively) DNB and *P. ramorum* detailed in section 3.2.5, there will be no further restocking carried out using these species.

7.3.2 Semi-natural woodland

Various areas of the sites are potentially suitable to support Native woodland (as classified in *FC Bulletin 112 Creating New Native Woodlands*), the woodland type, locations and species are listed in Table 11 below:

Table 11 – Native Woodland Type

Woodland Type	Location	Species
W4 (Birch woodland)	Poorest ground, typically around bogs and also along riparian corridors.	Downy birch, Goat willow, Common alder

Deep peat and riparian areas will generally be lower density W4 woodland incorporating around 30% of open space. It is expected that a conifer component may develop in these areas through natural regeneration; this can be accepted however should be managed to ensure it remains a minor component.

7.4 New Woodland Creation

This plan proposes approx. 38 Ha of predominantly productive conifer new woodland on the recently acquired High Carlingcraig Farm which has been absorbed into the wider Whitelee Forest block. **Maps 5c i - iii** illustrate the various physical site factors such as soils, climate/exposure and constraints considered and **Map 5c iv** illustrates the indicative planting design for the area. A walk over survey was carried out in July 2018 by the Environment & Heritage Manager and Forester. Their observations from that survey are noted in **Appendix V: High Carlingcraig Conservation Scoping Record** with no significant conservation of archaeological features present. As such this report recommends that no further conservation or archaeological surveys* are necessary; the site has been previously improved with the same land use for well over a century.

**As per the UKFS Forests and historic environment guidance (2011) - Guidance note for Regional Environment Leads and Planners)*

7.4.1 Ground preparation

Deep forestry ploughing will not be permitted as a method of ground preparation to avoid sediment run-off and erosion. Shallow agricultural ploughing should not be used on slopes over 9%. Site sensitive ground preparation methods such as hand screefing and continuous mounding on slopes over 9%, will be adopted.

With regards drainage, appropriate methods will be employed in accordance with the most recent edition of the Forests & Water Guidelines in areas of commercial crop and no drainage methods will be employed in areas of native wet woodland as these species depend on moist or waterlogged soils.

7.4.2 Crop protection

It is likely that the proposed areas of new broadleaved planting will protected using tree guards with the new conifer planting reliant on herbivore management.

Table 12 below provides further detail as to the indicative species, densities, spacing and area, for each woodland category proposed.

Table 12 – High Carlingcraig Woodland Creation Prescriptions

Woodland Category	Indicative Species	Density (Stems/Ha)	Spacing (m)	Area (Ha)
Productive Conifer	Sitka spruce	2500	2.0 x 2.0	36.0
Lowland mixed deciduous woodland	Sycamore, Common alder, Aspen, Pedunculate oak, Wild cherry	3000	1.8 x 1.8	2.0

7.5 Biodiversity & Environment

7.5.1 Habitat Management

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

7.5.2 Habitat Restoration

This plan proposes to permanently deforest ~33 Ha of commercially planted conifer crop in order to restore the underlying areas of blanket peat bog which show good potential for successful restoration to functioning active bog (see section 7.2.2 Open Habitat)

7.5.3 Riparian Management

Due to resource constraints, it is not feasible to actively manage all watercourses within the site according to the classic riparian zone model, whereby an open ground buffer is maintained between watercourses and the forest edge in order to mitigate any potential adverse effects of adjacent land management, due to the potential for Sitka spruce regeneration along many of the watercourses if they are kept open.

In order to address this, buffer zone areas for all watercourses within the site have been calculated according to their size (based upon current Forest & Water guidelines, e.g. 20m buffer for water course channels more than 2m wide). For each buffer zone, an assessment as to the importance of the water course in terms of water quality, biodiversity potential and management accessibility was made, and a series of principle riparian corridors identified which will be actively managed as 'traditional' riparian buffer zones.

The remainder have been assessed in terms of potential for Sitka spruce regeneration, and where this is a significant risk they will be planted up with a relatively dense native broadleaf cover in order to minimise the chance of unwanted regeneration whilst still safeguarding water quality and biodiversity potential going forward.

7.5.4 Deadwood

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

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

- Riparian and wet woodland areas
- Minimum intervention and long-term retention areas
- Areas of significant existing deadwood

The UKWAS target is for an average of 20 m^3/ha, although it is expected that actual concentrations will vary widely across the site.

Table 13 – Assessed Deadwood Ecological Potential (DEP)

Assessed DEP	Area (ha)	Future Volume Estimate (m^3/ha)	Total Future Volume (m^3)
High	657	72	47,304
Medium	101	63	6,363
Low	3136	57	178,572

Total future potential is thus estimated at **60** m^3/ha.

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

- Retain small groups of live trees and/or single large trees to develop into deadwood, identify these from trees lacking commercial value or areas with bryophytes.
- Leave one very large fallen stem if possible on each site (>20cm dbh).

7.5.5 Important Species

The variety of species listed in **Appendix I** Section 3.4.1 & 3.4.3 demonstrates that forest of predominantly commercial conifer species can provide valuable habitat for a wide range of important flora and fauna. The management detailed thus far is expected to further enhance opportunities for various species e.g. restoring open bog habitat; developing a more structurally diverse forests; retaining areas of relatively open poor growth forest; and increasing the proportion of native broadleaves in particular along specific riparian corridors.

7.5.6 Invasive Species

Grey squirrel (*Sciurus carolinensis*) - As Whitelee Forest is not within a Red squirrel (*Sciurus vulgaris*) stronghold they are not deemed a threat to this species here and therefore this is not a driver for controlling them. Furthermore the tree species with the potential to be affected by grey squirrel form only a minor component of the forest so likewise this also is not a driver to introduce Grey squirrel control. With the confirmation of Pine marten in the forest we can expect these to act as a natural control of Grey squirrel.

7.5.7 Wildlife (Deer Management)

Full details of proposed deer management can be found within Central Region Deer Management Strategy (in conjunction with the Deer Overview Map), but the main objectives within Whitelee are:

- To enable restocking to take place without the need for deer fencing and to achieve a stocking density of 2500 stems per hectare at year five in accordance with OGB 4.
- The region aim for damage allowance is to keep leader damage levels below 10% on all commercial plantations.
- Ensure all Biological resources on the National Forest Estate remain in favourable condition (as per SNH guidelines).
- To maintain a sustainable deer population.

Deer control is managed using a contractor within Whitelee Forest.

7.5.8 Landscape

In producing this LMP FLS has considered the landscape character of the area and the guidelines outlined in SNH's landscape character assessment. FLS has also considered the impact our proposals would have on the wider landscape and it is our view that this impact would not be significant given the topography the forests sits on and the resulting restricted views at the wider large scale which otherwise could be considered significant.

7.5.9 Water

All operations will follow best practice as detailed in the current Forest and Water Guidelines. Timber extraction will normally avoid crossing burns or main drains, but, where necessary, each crossing point will be piped or bridged. Branches will be kept out of watercourses and trees will generally be felled away from the watercourses.

7.6 Heritage

The forest design illustrated in **Map 5b - Future Habitats & Species** considered the various heritage features shown on **Map 4a – Key Features, Opportunities and Constraints**, many currently hidden under trees and our future management intends to gradually reveal some of these going forward providing

enhanced context to them and also improving our ability to access and manage these features in the future.

Appropriate buffers have been applied by our Environment & Heritage Forester to all the different features across the sites e.g. kilns, sheepfolds, cairns, farm buildings, memorial stone, which are recorded within our heritage database. This is done in accordance with the guidance provided in the Forests and Historic Environment guidelines (2011), the SF policy document: Scotland's Woodlands and the Historic Environment (2008) and the supporting FLS Historic Environment Planning Guidelines. Features generally have buffers ranging from 5-10 metres depending on their nature but these can be wider or even have no buffer. Such constraints are identified and surveyed by Forest Regional staff prior to any work being undertaken in order to ensure that upstanding historic environment features can be marked and avoided. For operations, work prescriptions protect relevant historic environment features apportioning appropriate buffers clear from ground disturbing operations and planting. Opportunities to enhance the setting of important sites are considered on a case-by-case basis.

The following sub-sections provide further detail as to some features which will see specific management or work on them during the life of this plan.

7.6.1 Non-scheduled Archaeology

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

7.7 Operational Access

7.7.1 Forest Roads

We will require new internal roads in order to access felling coupes 4, 32, 78, 221 & 514 planned during this land management plan period (see **Map 5a - Management**). These roads collectively total 2.3 km which with a running width of 4 metres equating to 0.9 Ha and therefore this falls below the threshold for an EIA screening determination.

7.7.2 Quarry X expansion

To provide material for the new roads as well as for maintenance and repairs of the wider infrastructure we require to expand Quarry X by 1.4 Ha to link with the extension providing useable stone for the next 8 – 10 years. Linking the 2 quarries will require the removal of 0.9 Ha of conifer woodland however we will recover 2.8 Ha of remediated former quarry area which we will plant offsetting this loss. Further detail is provided in **Appendix VI: Quarry Design Review** along with a corresponding explanatory **Maps 5e i-iii**.

7.8 Management of Public Access & Core Paths

FLS regional staff will continue to liaise with local neighbours to promote and encourage use of the sites and Community Rangers will continue to work constructively with the Whitelee Countryside Ranger Service.

In relation to these continuing ambitions there are a number of access related projects due to be progressed on FLS land during the life of this plan including:

- Creation of a car park at Ardochrig
- Corse Hill Viewpoint
- Weavers Trail Upgrade and new path installation
- Carrot entrance improvements and path works
- Munzie burn path works
- Entrance upgrading at Alderstocks; Craigends; Laigh Hapton
- New path works at Laigh Hapton and Craigendunton reservoir

In order to manage trees along the core path and public rights of way for tree safety considerations or to open views and improve the overall visitor experience we have applied a 10 metre buffer along these sections of the access network which covers approx. 12 Ha., 25,760 trees with an estimated volume of ~ 3356 m^3 (see **Map 5f - Public Access & Core Path Management**). Some of these areas will be felled as part of the proposed felling coupe phasing but others coupes not due for felling within the life of this plan may need trees along this buffer zone removed for the reasons described. We only envisage requiring to do this intermittently when necessary and therefore wouldn't expect to impact significantly on the forest.

8.0 Critical Success Factors

The success of this plan will be based on whether the objectives set out in the **Management Plan Brief** (see **Appendix II**) are achieved. The table which forms **Appendix IV: Objective Appraisal, Monitoring & Evaluation** details how each objective will be appraised, where and when each objective will be monitored; by who and where it will be recorded. This will enable an evaluation of success as part of the mid and end of plan reviews.