Dumfries and Borders FD

Ae Composite

Land Management Plan

V1.0

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.

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FOREST ENTERPRISE – Application for Land Management Plan Approvals in Scotland
Forest Enterprise – Property

Forest District	Dumfries & Borders Forest District
Woodland or property name	Kirkland, Old Forest, Queensberry and Striddriggs
Nearest town, village or locality	Ae
OS Grid Reference	NX 994 946
Local Authority	Dumfries & Galloway

Areas for approval	Conifer	Broadleaves	Open
Clear felling	978.67	1.78	*
Restocking	823.48	36.81	120.17

1. I apply for **Land Management Plan** approval for the property described above and in the enclosed Land Management Plan
2. I apply for an opinion under the terms of the **Environmental Impact Assessment (Forestry) (Scotland) Regulations 1999 for quarries and road building** as detailed in my application
3. I confirm that the initial scoping of the plan was carried out with FC staff in 2015
4. I confirm that the proposals contained in this plan comply with the UK Forestry Standard
5. I confirm that the scoping, carried out and documented in the Consultation Record attached, incorporated those stakeholders which the FC agreed must be included.
6. I confirm that agreement has been reached with all of the stakeholders over the content of the design 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 ……
Forest District Manager
District: Dumfries and Borders

Date: ……

Signed ……
Conservator
Conservancy: South Scotland

Date of Approval: ……

Date approval ends: ……

UKWAS summary sheet

Description	Percentage of forest block	Location of data
Restock main conifer species	65	Forester restock layer
Restock other conifer species	10	Forester restock layer
Open space	15	Forester restock layer
Mixed broadleaves	5	Forester restock layer
Transient open space (awaiting restocking)	5	Forester management layer
Managed for conservation/biodiversity (NR, MI)	12	Forester management layer
Long Term Retentions	2	Forester management layer
Natural Reserve	1	Forester management layer

Based on figures for 2026

EIA Determination form to be inserted once completed/received.

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Summary of Proposals

This Land Management Plan is the review of the Forest of Ae, which has previously been part of the larger Ae Composite Forest Design Plan, which included the Beattock blocks. There has been steady progress on the felling and restructuring programme throughout the previous design plan however the forest blocks are suffering from wind damage and there have been significant changes to the original plans as a result of the construction of the Harestanes windfarm within the Queensberry, Kirkland and Stiddriggs blocks.

This composite plan incorporates the forest blocks of Kirkland, Old Forest, Queensberry and Stiddriggs.

The principle factor of the plan is continued timber production and maintaining the principle species as Sitka spruce. There are areas identified as “treasured” and these are of higher importance for landscape, habitat and biodiversity where timber productivity will be of lower importance.

The forest blocks incorporate a number of different activities, other than timber production. These include power generation through the Harestanes windfarm (operated by Scottish Power), potential agricultural grazing in the fields within the forest blocks, 7stanes mountain bike trails and other recreational activities.

Coupe shape for current and future felling is of key importance, as this will have an impact on wind stability of both the current crop and the future forest. This plan will introduce the concept of hill top coupes and planting design with future harvesting operations in mind, rather than just replanting the existing shapes. The blocks are visible for a significant distance away and are of landscape scale, so proposals need to fit with the landform.

A key challenge of the plan is to fulfil the requirements of UK Forestry Standard and UK Woodland Assurance Scheme whilst planning practical operations that will not cause significant wind damage risk to the current rotation.

In order to increase diversification there is a reduction in Sitka spruce across the composite area though planting other conifer species and broadleaves reducing the reliance on one main crop species.

1.0 Introduction:

1.1 Setting and context

The Ae Composite Land Management Plan incorporates the four forestry blocks knowns as Kirkland (2317 ha), Old Forest (1792ha), Queensberry (1856 ha) and Stiddriggs (978 ha), which are situated at the south of the "Forest of Ae". These four forest blocks have a combined total area of 6959 hectares. The four blocks are a mixture of first and second rotation stands in an upland, large-scale landscape. This plan represents a full review of the existing management plans for Kirkland and Old Forest, which expire in 2016. The plans for Queensberry and Stiddriggs were revised due to the development of the Harestanes windfarm however, the opportunity has been used to synchronise the LMP timescales to give a 10-year approval period from 2017 to 2027.

The Ae composite covers an area which is predominately a large reserve of softwood timber and the majority of the crop is Sitka spruce. The softwood reserve has a high financial value however there has been significant wind blow across the blocks as well as modification to felling timing, due to the windfarm. The remaining crops also being susceptible to further wind damage and assessment of these crops is required to minimise the loss of productive crop.

The main access points to the forest blocks are by the Ae Forest District Office (NX 984 894), Ae Village (NX 982 894), Loch Ettrick (NX 952 941), Old Forest Nursery (NX 962 928) and Kirkland (NY 042 901). There is a key timber access for Queensberry and Stiddriggs along the Annandale Link Road which join the A701 south of Beattock.

Soils are generally poor having lower nutrition and higher moisture content, with the plateaus typically having surface water gleys and peat. Some valley sides have brown earths which offers more potential for tree growth and will support a wider range of species.

The climate is cool, wet and exposed which limits tree growth and species choice. Valleys are drier, warmer and less windy, offering alternatives to clear felling management and more diverse species choice.

Recreational use is important within the Ae composite area, with a numbers of formal recreation facilities offered. Recreation is encouraged on the National Forest Estate (NFE) and will not be restricted other than for operational safety.

All operations will be carried out to the internationally recognised forestry standard as required un the UK Woodland Assurance Scheme (UKWAS) and Forest Stewardship Council (FSC).

These forest blocks are part of the Dumfries and Borders Forest District and is certified by the Forest Stewardship Council (FSC). Certified woodlands are subject to regular audit by an independent audit body against the requirements of UKWAS. UKWAS is the independent certification standard for verifying sustainable woodland management in the UK.

1.2 History of the forest

The forest blocks that make up the Ae Composite were originally planted from the 1950s to the 1970s and the forest blocks are between first and second rotation with a large proportion having been restructured, with the exception of Stiddriggs which was planted later. The age class distribution is dominated by planting in the past 40 years, with only 12% of the forest area being over 40 years old.

The principle use of the forest has been timber production, there is a history of recreational use by the public, particularly in Kirkland and Old Forest, with formal recreational facilities including way marked trails and a recreational café at Ae. Ae is also one of the 7stanes mountain biking facilities.

1.3 Planning Context

The management of the Forestry Commission Scotland's NFE (National Forest Estate) is guided by Scottish Forestry Strategy (SFS) 2006, Strategic directions and the Forest District Strategic Plan.

Relevant issues under the SFS and Dumfries and Borders Forest District Strategic Plan Key Themes are identified in the design brief.

2.0 Analysis of previous plan

2.1 Aims of previous plan and achievements

The previous Ae composite plan covered a much larger area (9380 ha) too large and complex to cover all the issues relating the blocks individually. The blocks within the Ae composite are quite different from the blocks to the north at Beattock as the soils and lower levels of exposure on the valley sides in the south offer more diverse management opportunities. Covering too large an area by one plan tends to over-generalise the outcome and results in dilution of some of the more localised issues relating to the individual blocks.

The Ae forest composite looked at:

- Economic – Design plan to maintain commercial productivity.
- Sustainability – continue established restricting process, with expectation that it will take two rotations to fully complete.
- Biodiversity – develop biodiversity by creating a forest that can sustain a population of red squirrels and protect areas of Ancient Woodland Sites.
- Recreation – increase opportunities for walking, cycling, riding and active sports, encourage more use of the forest by a wider range of people and improve the quality of forest visits.
- Landscape sympathy – woodland shapes relate to the landform, diversity should gradually change with elevations, upper margins should shade out scrub and gorse in open ground, and conserve character of granite hills and open summits.
- Archaeology – scheduled and unscheduled monuments will be managed following expert guidance and will be protected during all forest operations.

The above objectives were to be met through a programme of felling and restocking operations. The felling programme in the previous plans was optimistic and was subject to a number of revisions during the plan approval period due to wind damage in stands that were not scheduled for felling and significant redesign due to the Harestanes windfarm. The restocking programme has been carried out following the previous plans with only a few amendments. See Appendix IV for a summary of the mid-term reviews of the previous plans.

The construction of the Harestanes windfarm was heralded as an innovative example of how keyhole felling for turbines can increase renewable energy capacity on the National Forest Estate without significantly compromising timber production. Expansive areas of broadleaves planted as part of the scheme will diversify the forest structure, improve native woodland connectivity, and bolster biodiversity.

2.2 How previous plan relates to today's objectives

The previous plans made reference to the risks of windblow and acknowledged that the restructuring operations would increase the risk to remaining stands. The level of wind damage within the forest resulted in amendments to the plan in order to schedule the clearance of wind-blown timber in preference to the felling of the more wind-firm stands. Many of the felling coupes identified in the previous plan are no longer appropriate.

The Harestanes windfarm is one of the first to be "keyholed" into a forest, however it still resulted in felling for turbines, substation land and roads which has not been anticipated in the original management plan. This prompted a review of the Queensberry and Stiddriggs plans but felled edges that were not wind firm have suffered damage as a result of the development and an update to the plans is required.

The restocking programme introduced more wind-firm shapes and this is a principle that must be continued. The future crops will need to be both wind-firm and fit with the landscape, particularly in the areas of high visibility, in order to fulfil the objectives. The previous plan however, did not focus the concept of hill top coupes or restocking to future felling coupes. This approach will be vital in order to improve the stability of the future forest.

Species choice needs revision as the previous plans included larches and Lodgepole pine. The Dumfries and Borders District has taken the decision that larch will not be planted for the next 10 years due to the risk of infection by phytophthora. Beyond this decisions will be taken depending on the policy at the time. *(See section 5.1.2 for an update on the situation with P.ramorum).*

3.0 Background information

3.1 Physical site factors

3.1.1 Geology Soils and landform

The rock type beneath the forest blocks are sedimentary types of sandstone and mudstone.

The soils are very varied across the forest blocks, with the most diverse types being in Old Forest and Kirkland. The lower slopes of Old Forest and Kirkland which follow the main watercourses are brown earths with some intrusions of surface-water gleys. Where the blocks rise up to the higher and flatter ground the soils change to ironpans, peaty surface-water gleys and some areas of bog. In contrast, Queenberry and Stiddriggs have very little brown earth soils and a higher proportion of bog-type soils. The majority of soils on the higher elevation areas of the forest have low nutrient and high moisture content.

The landform is classed as Dumfries and Galloway Foothills with forest and Southern upland in the Scottish Natural Heritage Landscape Character Assessment.

3.1.2 Water

The forest blocks have a large number of watercourses running through them and some of these watercourses are water supplies for the neighbouring properties. The felling and restocking will be designed following the Forest and Water Guidelines and all operations will be carried out in accordance with current best practice.

Flood risk is an issue that has become very relevant over the past few years. The Scottish Environment Protection Agency (SEPA) flood risk maps for the area shows a number of watercourses which have medium to high flood risk and further downstream there are vulnerable areas such as Annan and Dumfries. Management of the blocks will follow the Forest and Water Guidelines and will provide opportunities to slow water flow to settlements downstream.

SEPA has River Basin Management Plans (RBMP) for watercourses. The Ae composite area is covered by the Solway Tweed river basin district management plan, which was updated in 2015 in collaboration with the Environment Agency. The management plan seeks to achieve 273 of 321 water bodies that to good condition status by 2027. This management plan will help to address some of the issues by improving riparian zones by

removing first rotation conifers and increasing the mixture of open ground and broadleaved species.

The Solway-Tweed RBMP is a high-level document covering a large geographic area. None of the 161 water bodes nor areas of groundwater highlighted as having water quality worse than the 'good' category in terms of ground water fall within the composite area.

3.1.3 Climate

The varied topography of the forest blocks is also reflected in the range of climate. The more sheltered valley following the main watercourses to the north or Ae village is warm and moist with lower exposure when compared to the cool, wet and highly exposed upper elevation area of the site. The Old Forest and western edge of the Kirkland block are the most sheltered with the Detailed Aspect Score (DAMS) being below 13 whereas the upper elevation of Kirkland, Queensberry and parts of Stiddriggs DAMS ranges from 17 to 20.

3.2 Biodiversity and environmental designations

The forest blocks have a large diversity of wildlife and the previous plans sought to develop the biodiversity potential. Red squirrels are a priority species for FCS and are also included in the Local Biodiversity Action Plan (LBAP). One of the previous objectives, which is being continued in this plan is the creation of a forest for red squirrels, which will be achieved through the careful selection of suitable tree species such as Scots pine and Norway spruce.

The forest is also an important habitat for Black grouse (which is an FCS Priority Species), Goshawk, Owls, Nightjars, Otters and Badgers.

Black grouse are present on the western edge of the forest, ranging from 100 to 1000 metres way from the north and north-western edge of the Old Forest block. There are also lekking grouse recorded on the eastern and north- eastern of Queensberry. Opportunities to improve grouse habitat along these edges would hopefully encourage the continued development of the area for grouse.

There are two Scheduled Monuments in the plan area – Poldivan Bridge Cairn (Old Forest) and Wallace's House fort (Kirkland). Another sits just off FES land, but its impact zone extends onto FES land – Stiddrigg Cairn (Stiddriggs). There are also a number of unscheduled features recorded within the forest. All heritage features will be protected in accordance with the Forests and Historic Environment guidelines during all operations.

There are a few areas of Ancient Woodland in Old Forest and Kirkland, centred around the steep valley, which have been identified as either semi-natural or plantation origin. These areas are identified on the Ancient Woodland map. The semi-natural woodland areas which are planted with conifers will be felled and returned to native species in order to try and re-create the ancient woodland habitat. This will occur though the phased felling programme rather than felling any of these blocks. Some of the ancient woodland sites are already in areas which have been felled and restocked with native broadleaved species or are in areas undergoing LISS management so that the impact of forestry operations is reduced.

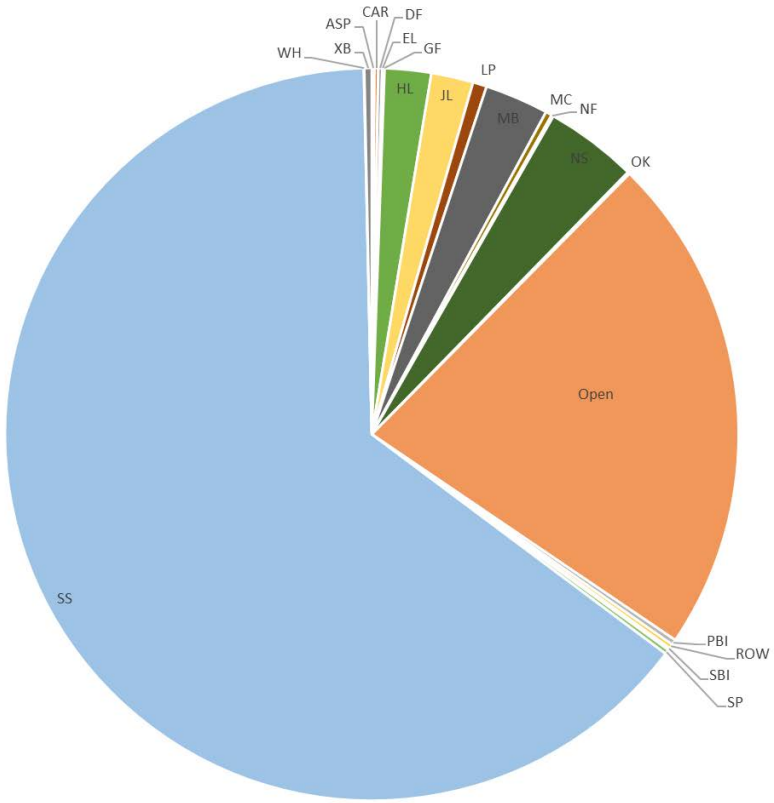
3.3 The existing forest:

3.3.1 Age structure and species

The tables below show the current species group distribution and age structure based on 2017 data. The pie chart shows the principle species composition of the five forest blocks, with a clear dominance of Sitka spruce.

Species Group	Area (hectares)	Proportion of total
Sitka spruce	4451.38	64%
Other Conifers	643.82	9%
Mixed Broadleaves	282.59	4%
Open Ground	1025.26	15%
Transient open space	556.44	8%
Total	6959.49	100%

Age class	Area (hectares)	Proportion of planted area
0-10	1189.70	22%
10-20	1231.05	23%
21-30	1317.42	24%
31-40	966.50	18%
41-50	139.99	3%
51-60	222.52	4%
60+	376.57	7%
Total	5443.75	100%



The current distribution of age and species reflects the high level of Sitka spruce planting and restocking throughout the 1970s to 1990s. This has resulted in a large proportion of the forest reaching economic maturity at the same time and a large area of the forest is now ready for harvesting.

3.3.2 Access

The forest blocks have a very good internal road network with established links to the A701 and wider public road network. Some road upgrades and improvement work will be required for harvesting but only a few areas will require additional road infrastructure to be created, these are shown as planned roads on the Management Map. The road network has recently been significantly increased within Queensberry and Stiddriggs with the infrastructure improvements brought about by the Harestanes windfarm. This additional road infrastructure give benefit to forest management as a large proportion of the forest blocks are easily accessible by road and all windfarm roads can be used for forestry purposes.

The A701 is an approved timber transport routes under the Timber Transport Forum whereas the C6N road which runs from the A701 through Ae village and Old Forest is a consultation route. The extent of the existing internal road network and the new access points Annandale link road between Stiddriggs and the A701 means much of the timber from

Stiddriggs, Queensberry and Kirkland can be to be hauled directly to the A701. Timber from the Old Forest will still need to be hauled down the C class road from Ae village which is a consultation route.

Public access, apart from motorised vehicles, is encouraged and the public make use of the forest for recreational purposes. There are formal recreational facilities at Ae, including car parks within the forest, waymarked routes and the blocks form one of the 7stanes mountain biking trails and a café.

3.3.3 Low Impact Silvicultural Systems (LISS) potential

The majority of site is not suitable for LISS management due to exposure and the high risk of wind damage. However, the more sheltered areas to the north of Ae village, which has significantly better soils have previously been managed on a LISS basis and this will continue. Increasing the area under LISS management is restricted by the climate, soils and resources available.

3.3.4 Current and potential markets

The forest is planted primarily for commercial timber production and this is unlikely to change due to the limited species suitability for much of the area and the current demand for timber. The current markets comprise of the sawmilling and paper producers in South Scotland and Northern England. There is potential for smaller material to benefit from the increased demand for biofuel which is a developing market, again offering potential in south Scotland and northern England. There are some small opportunities for the forest blocks to offer other resources to markets outside of the timber industry, such as venison.

The Scottish and northern English timber markets have a higher demand for Sitka spruce compared to other species. This demand has been built over the past decades as a result of owners planting Sitka spruce for its high yield and an industry reacting to the availability of those logs. It will take time for sawmills to adapt to other species and species other than Sitka spruce will, for the foreseeable future, have a smaller place in the market.

3.3.5 Harestanes windfarm

The Harestanes Wind Farm, constructed and operated by Scottish Power Renewables, is located in the Forest of Ae in Dumfries and Galloway. The Forest of Ae is owned by the Scottish Government, and actively managed by Forestry Enterprise Scotland.

The site comprises 68 turbines, has an overall capacity of 136 MW, and covers an area of 20km2 within the Forest of Ae.

The construction of the Harestanes wind farm created 11km of new forest roads in addition to the already existing forest road network. Felling associated with the wind farm commenced in 2011 and has included felling to allow the development of new forest roads, creation of turbine bases, the wind farm substation, early felling to maximise wind yield for the farm, and felling for wildlife mitigation, in particular short-eared owl, squirrel and black grouse.

There is an agreed Site Management Plan in place for the construction, operation and decommissioning of the windfarm between Forest Enterprise Scotland and Scottish Power Renewables. Forest Enterprise Scotland have continued to manage the Forest of Ae throughout construction, operation, and will continue to do so during decommissioning phases of the windfarm.

This Land Management Plan for the Ae Composite, must consider legal agreements between Forest Enterprise Scotland and Scottish Power Renewables in relation to felling dates for coupes and restocking plans as well as coupe shape compensation agreements. Particular attention must be given to timing of felling and restocking within areas of the wind farm which relate directly to wind farm consent conditions.

3.4 Landscape and land use

3.4.1 Landscape character and value

Landscape Design Guidance for Forests and Woodlands in Dumfries & Galloway written by Forestry Commission, D&G council and SNH classifies the Ae composite LMP landscape as ‘foothills with forest’ and offers the following quotes and guidance.

- Woodland shapes should relate strongly to the landform, with irregular, interlocking patterns. These shapes should apply both to overall woodland form and to the patterns of species and open ground within them.
- The scale of planting should increase with elevation, with larger elements at higher elevations grading down to smaller scale on lower slopes. The proportion of planted to unplanted and the proportion of species components within woodlands should respect the ‘thirds rule’.
- Diversity should gradually decrease with elevation, with more complex patterns on lower slopes. Crags, screes and rocky outcrops should remain visible within woodlands and upper margins should grade out to scrub and gorse on open ground.
- New woodlands should be designed to reflect specific site character, retaining elements of diversity and a balance with unplanted ground.

3.4.2 Visibility

Visibility of the site is varied, from very highly visibility from the A701 to almost invisible from anywhere outside the forest. The steep slopes within Old Forest and Kirkland form the backdrop to Ae village and is highly visible to the community. Landscape assessment and sympathetic coupe design is very important for the highly visible areas with small scale coupes being implemented in the lower slopes whereas large coupes will fit in the higher and larger landscape areas.

Other parts of the forest will be visible by recreational users, particularly as formal recreation is welcomed and encouraged. The main focus of recreation coincides with the better area in terms of soil and climate, so more diverse species and management types can be planned and implemented.

3.4.3 Neighbouring land use

The surrounding land to the north of Old Forest and to the west of Queensberry is open hill land with some livestock grazing. The land to the west of Old Forest is forestry managed by the private sector and a wind farm. Land to the east of Kirkland, Queensberry and Stiddriggs is farmland on a much flatter landscape stretching across to the M74. There are a number of small communities close to the forest and the forest forms a significant backdrop for the wider community and traffic on the A701 between Beattock and Dumfries.

3.5 Social factors

3.5.1 Recreation

Formal recreational facilities are available in the blocks and these are located around the village of Ae. Ae is one of the 7stanes mountain biking facilities and includes a cafe. There are also waymarked trails within the blocks and carparks within the Kirkland and Old Forest blocks to accommodate recreational visitors. Additional informal recreation occurs throughout the forest.

3.5.2 Community

The forest lies to the north, northeast and northwest of Ae and extends further northeast towards Beattock. There is some community interest in the blocks, particularly as they form the backdrop to the village of Ae. A number of people also travel to the forest for recreational purposes. The forest area is covered by the Ae, Closeburn, Johnstone and Kirkpatrick Juxta Community Councils.

3.5.3 Heritage

There is one scheduled ancient monument within the Kirkland block and a further number of unscheduled archaeology sites across the composite

area. Operations will be managed following any expert advice received and in accordance with the Forest and Archaeology Guidelines. The location of the scheduled monument is shown on the Management map and all monuments are shown on the Heritage map.

3.6 Statutory requirements and key external policies

United Kingdom Forest Standard (UKFS)
All operations will follow internationally recognised forestry standards in accordance with the United Kingdom Woodland Assurance Scheme (UKWAS) and Forest Stewardship Council (FSC).
Scottish Forestry Strategy
Scotland NFE and strategic directions
Dumfries and Borders FD strategic plan
Dumfries and Galloway Council Forestry and Woodland Strategy
Timber Transport Forum Agreed Routes
Scottish Power Energy Networks (SPEN)

4.0 Analysis and Concept

4.1 Analysis

4.1.1 Primary aims

Productive

- Recognise Forest of Ae's contribution to income for the National Forest Estate (NFE).
- Recognise Forest of Ae's contribution to the local and national timber processing sectors.
- Recognise local proximity to timber processing plants and woodfuel markets.
- Recognise potential impact of timber transport and use agreed routes including the new Annandale Timber haul route.
- Forestry and timber processing creates jobs, plan to maintain productivity into the future.
- Recognise Harestanes windfarm contribution to renewable power generation and income for NFE.
- Potential for small proportion of productive broadleaves in areas that facilitate management.
- Potential agricultural grazing of fields within the estate.
- 7stanes Mountain biking and the productive benefits to the rural economy.

The management objective is primarily to sustain a productive forest for timber and renewable energy.

Healthy

- Opportunity to redesign the forest to better mitigate against the threat of increased wind with permanent (and independent) coupe shapes.
- Design forest to become more resilient to pressure from climate change including species diversity and structural diversity.
- Locking up carbon in peat and timber.
- Water quality benefits of forestry.
- Our increasing ecological approach and less management intensity would suggest taking advantage of the potential Sitka Spruce natural regeneration in Forest of Ae.
- Using CCF where appropriate.
- Optimising land for wind farm and forestry uses.
- Tackle invasive threats to the forest including high risk of Phytopthora.
- Manage deer populations to levels to allow tree establishment.
- Climate change is increasing the moisture deficit and data indicates that the site is suitable for at least one further rotation of Sitka Spruce.

The management objective is to design a forest to be resilient to changes in climate and to provide mitigation through carbon lock up and renewable energy production.

4.1.2 Secondary aims

Treasured

- Staff, contractors and the timber processing sector recognise and appreciate the commercial outputs of the Forest of Ae.
- Long distance countryside trail through to Beattock and also core paths.
- Many people value the thrill and enjoyment of being involved in downhill mountain bike races during the year.
- Car rallies are accommodates in the forest and values by many.
- Ae is a centre for forest industry training, forest research and the rural education centre (Barony).
- Forest of Ae is the base for many modern apprentices in forestry and they benefit from the hub of learning and R&D.
- The openness and remoteness of the landscape is appreciated and treasured by many.
- People treasure the wildlife including red squirrels and many birds of prey.
- The local community treasure the woodland for access, employment opportunities and general rural development.
- Consider forest design to give stable visual identity to Scotland's productive forests.

The management objective is to continue to maintain provision of capacity for people to sustain livelihoods, improve quality of life and offer enjoyment.

Accessible

- Open access throughout the forest on way marked routes, core paths, PROW, countryside trails and informal routes.
- The forest is home to one of the 7stanes formal mountain biking facilities.
- Way marked footpaths in Valley of Ae.
- The development of the LMP should cross reference the Ae Master Planning exercise.

The management objective is to ensure that the forest is well promoted, welcoming and open for all.

Cared for

- Restoration of Ancient woodland sites, mainly in valley of Ae.
- To help diversify and support biodiversity increasing broadleaved species would be appropriate continuing the expansion of Ae Valley Broadleaves.

- Open habitats to be identified and protected (Survey 2016). The western edge of Forest of Ae is an important Black Grouse Habitat.
- The large conifer forest is a home for many red squirrels.
- Identify and protect scheduled and unscheduled ancient monuments.
- Protect water quality and consider downstream users including fish farm.
- Bolster natural reserves and minimal intervention riparian areas with use of long term retentions and change species on these transition areas from Sitka Spruce to alternative conifers in the next rotation.

The management objective is to identify permanent biodiversity habitats and create linkage to help support a variety of species.

Good value

- Manage the forest with professional and competent staff and contractors.
- Collaborating with neighbours/land managers including Annandale estates and Scottish Power.
- Optimise the land use including tree growth and windfarm operation.
- Maintain an effective forest road network to deliver timber/windfarm objectives.
- Optimise income from timber, renewable energy, recreation activity and venison.
- Manage the forest to UKFS standard and maintain UKWAS certification.

The management objective is to achieve the best value in delivery of public benefits and make the Forest of Ae one of the most profitable forests.

4.2 Design Concept

Theme / Analysis (see section 4.1)	Design Concept
(Healthy) **Climate change** is putting pressure on the forests.	Design forests to be more resilient to pressure from climate change including species diversity and structural diversity. Wind is a key limiting factor and the new design must provide some mitigation. Use ESC to plan the right species for the right site. Increase the % of alternative conifer species. Plan to protect soils and water.
Productive Forest of Ae is a large and highly **productive** area with integrated wind farm.	Plan fast growing species for timber production whilst accommodating social and environmental issues. Recognising that wind is a key limiting factor on rotation length and designing layout and rotation length to avoid windblow where possible. Limit thinning to the very best sites. Collaborate and consult with the windfarm owner in relation to optimising the forest design for timber production and electricity generation. Plan rotation lengths and felling age to maximise return. Design the future forest (the restock) to maximise the financial return whilst working within UKFS.
Treasured Forest of Ae has contributed to livelihoods and quality of life for many decades and is **treasured** by many people.	To maintain these benefits and capacity, plan for the future forest to accommodate into the future. Design the forest with the existing access routes in mind. Plan a landscape appropriate to the Landscape Character type and move away from geometric shapes towards following landform. Consult with community and stakeholders during development of the plan and beyond. Where possible allow access for learning and research alongside commercial forestry operations.
Accessible. With many tracks and routes threaded through the forest there is great opportunity for **public access**.	Design the forest to best support and enhance the various public access routes including; 7stanes cycle routes, long distance routes, walking routes and horse routes. Create flexibility in the design to accommodate potential design aspirations from the Ae master planning exercise 2016.
Cared for Forest of Ae currently supports much **biodiversity** but there is much potential to develop and expand through good forest planning.	Increase the Native broadleaves to at least 5% in line with UKFS. Restore Ancient Semi-Natural Woodland. Create Natural Reserves of 1% of conifer woodland. Following the recent large felling to accommodate the wind farm, use Long Term Retentions and Minimal Intervention management types to strengthen and support biodiversity and develop habitat networks. Design the forest to support Black Grouse and Red Squirrels. Identify and protect heritage features.
Good value	During the design phase, liaise with Scottish Power on the specific design around turbines and adjacent coupes. Plan effective timber transport routes for extraction from the future forest.

4.3 Potential tree species and structure

Tree species	Forest species in 2017 %	Potential future forest %	Reason for proposed change
Sitka spruce	64	58	Reduce in favour of productive alternative conifers mainly for resilience reasons
Other conifers	9	20	See above
Native mixed broadleaves	4	>=5	Increase to support biodiversity and for environmental benefits. Also the future forest must meet the UKFS of 5% minimum. Include some productive broadleaves in Ae Valley
Permanent open space	15	>=10	Permanent open space must be a minimum of 10 % to meet UKFS
Transient open space	8	c. 5	Typically felled land awaiting restock.

5.0 Land Management Plan Proposals

5.1 General prescriptions

Section 5.1 covers the prescriptions and issues that affect the whole composite area. Individual block prescriptions are detailed in sections 5.2 to 5.6.

5.1.1 Management Types

Low Impact Silvicultural Systems (LISS)
Much of the composite area is unsuitable for LISS management due to higher levels of exposure and poorer soil types and the total area planned LISS management has reduced compared to the previous plan. Areas on the steeper slopes and valley floor between Kirkland and Old Forest are suitable for LISS in terms of soils and climate and have been previously managed following this regime.

LISS management will help to increase the diversity of the woodland blocks both in terms of species distribution and age class. The trees in the LISS area are semi-mature and a continued thinning cycle will continue to develop the crowns of the retained trees as well as open up opportunities for young trees to grow and develop.

Additional areas for LISS management may be possible in the future following restructuring of the first rotation. Species choice in key areas will be important to enable the future selection of LISS coupes but the availability of labour and additional costs of management at this stage will limit how much the area of LISS can be increased.

Appendix iii contains the LISS plan which gives the outcomes and objectives for the LISS coupes in more detail.

Clearfelling (CF)
The vast majority of the composite area will be managed through phased clearfelling. This is key to the principle management aim of timber production within the forest blocks which are mostly planted with fast-growing coniferous species. The age class structure will be broken up through scheduled coupe clear felling with the principle aim of either 5 years between adjacent coupes or 2 metres of height growth. Restocking can be delayed in order to allow adjacent crops to reach 2 metres.

Clearfelling coupe size and shape will be in proportion to the landscape as far as possible with large scale coupes in the larger-scale parts of the

forests with the coupe edges following the landform, and smaller coupes in the lower valley.

The significant levels of wind damage across the composite area will have an on-going impact on the implementation of the clearfelling schedule and the coupe separation will not be possible in some areas of the forest in order to meet the UKFS guidelines. In these areas, which are shown on the coupe adjacency map, larger coupes will have to be felled prior to the 5 years/2 metres growth otherwise significant wind damage will occur. Allowing vulnerable stands to knowingly blow is not a sensible management decision as timber value is lost, operational costs are higher and harvesting wind-blown stands is a higher risk operation for forestry workers. This is particularly relevant where coupes have suffered significant wind damage and have to be cleared to prevent the loss of timber quality.

Where possible, coupes have been designed to follow resilient shapes, which are shown on both the Management Coupes and Future Species plans, so that the impact of harvesting on remaining coupes will be reduced. Where this is not possible (as detailed above), restocking will introduce these resilient shapes so that one large coupe now becomes several smaller and wind-firm coupes in the next rotation. This concept is explained in section 5.1.3.

Long term retention (LTR)
Areas have been identified where older crops can be kept for longer than the usual rotation length. These areas have been selected due to the improved tree stability which is a result of a more sheltered climatic area and/or better soils. LTRs allow for increased coupe separation and offers benefits for biodiversity and landscape where there has been large-scale felling.

Natural Reserve (NR) areas have been identified at the district level in order to give 1% natural reserves in plantation conifers across the whole Dumfries and Borders district. These areas are identified where nature conservation and biodiversity are the highest priority and there will be no requirement for management intervention. The Natural Reserves within the Ae Composite blocks for 0.5% of the total area.

Minimum Intervention (MI)
These are to be left to develop in a similar way to the natural reserves however they are of a lower priority conservation areas and some management will be permitted. Typically, these areas are in riparian zones with native species but they will require some form of active management to enhance their value, such as additional planting or removal of exotic conifer species to develop the habitat network.

Open / other

Designed open space within the forest is a very important part of the overall restructuring design. Areas such as hill tops which offer biodiversity benefits and landscape enhancement have been previously identified and felled and will be maintained. The shape of open space will need to follow the landform and where natural regeneration of exotic coniferous species has occurred, this can be removed if it is impacting on the benefits of open space. Removal of such trees is most sensible once individuals have established as browsing pressure may offer a natural control mechanism. This will be done when more than 25% of regeneration reaches 2 metres in height. Some areas, such as along the high voltage powerline, will require routine tree clearance to maintain a clear corridor for non-forestry purposes, however the clearance of trees along the powerline is the responsibility of the power transmission company.

The use of **open** ground habitats between coupes is essential to allow crop edges to develop resilience against exposure so that they are not susceptible when a neighbouring crop is felled in the future.

Each of the 68 wind turbines has a area of permanent open space around the base of the turbine structure. These areas will remain clear of trees throughout the operation of the windfarm in accordance with the requirements of the operator.

5.1.2 Future habitats and species

The vast majority of the Ae composite area will be planted with productive conifers species to continue commercial forestry. Although the principle aim is to maintain softwood production, with the primary species being Sitka spruce, there will be an increase of species diversity across the forest blocks with the proportion of Sitka spruce reducing over the next rotation.
Native woodland habitats are designed throughout the woodland and this is a practice that has continued from the previous land management plan. These native habitats are principally follow watercourses and integrate together to form a biodiversity network across the composite area. Additional areas of native species and habitats will be used to form habitats to encourage specific, such as black grouse.

The choice of species depends largely on the species suitability to the site and the Ecological Site Classification (ESC) has been used to inform the choices made. It should be noted that ESC is a tool used for modelling the predicted suitability of a species based on soil type and climatic data and does not take management targets or other factors, such as landscape into account.

Management objectives have identified the area around Ae village and the neighbouring watercourses and valley sides as a ‘treasured’ area. These areas have been prioritised for diverse conifer species whereas the higher,

more exposed areas which occupy the larger-scale landscape have been prioritised for productive Sitka spruce.

Natural regeneration (NR) of Sitka spruce has posed a challenge in the forest for many years, with attempts in the 1970s and 2000s to tackle the problem via re-spacing, cleaning and mulching. A management prescription is currently being worked-up to help decision making with two current situations:

1) Sites recently felled and ready for restocking - options may include hot planting and cleaning the crop of any NR if it appears; monitoring of NR and respacing if SS is the desired restock species; or monitoring of NR and cleaning prior to planting SS or other species.

2) For some second rotation crops (typically some phase three coupes) there are areas of dense SS NR (original thinking was that these would 'self-thin'). Options to manage these areas include mulching the whole site and replanting (expensive, least attractive option and would require SEPA liaison); mulching strips and then thinning with clearing saw / chainsaw; or 'feller-buncher' and chipping for biomass.

Attribute surveys are underway to assess all coupes with dense SS NR to assess crop density and height (supplemented with drone images). These will help to deduce the windthrow risk, and whether the crop's productivity is stagnating. By the Mid-Term Review (2022) there will be a proposal to manage phase three coupes where this SS NR problem exist.

Tree health. In accordance with FCS and Dumfries and Borders Forest District current policy, larch species will not be planted for the first 10 years of the land management plan due to the current risk from Phytopthora. This is unfortunate for landscaping as larch gives a diverse range of autumn colours. Larch species have been included from years 11-50 but the implementation of this is dependent on review of the disease, future risks and the current policy.

Similarly, the spread of Dothistroma may affect Lodgepole pine and Scots pine. Lodgepole pine can still be planted, but only as a nurse for Sitka spruce on sites with deep peat, Scots pine can be planted so long as the stock is clear of Dothistroma.

SPHNs to date

There have been a number of confirmed cases of Phytophthora ramorum in Ae Forest, with associated Statutory Plant Health Notices (SHPN). The table below summarises the situation to date. Although the site is outside the PR Management Zone, FCS provided (Jan 2017) a table of working tolerances specific to larch applicable to the Ae Composite LMP. This has helped plan pre-emptive felling of larch in Ae Forest to help mitigate the potential impact of a rapid spread, especially in the busy recreation areas. This is presented in appendix II.

Site	SPHN ref	Date issued	Area net larch (ha)
Green Hill	STH16_0736	30/08/16	23.3
Hawk Cleuch	STH17_0711	15/06/17	6.8
Green Hill (Gubhill)	STH17_0873	05/07/17	6.6
Capel Pool	STH17_1105	19/07/17	8.3
Auchenskew Loch	STH17_1035	06/09/17	3.7
Kirkland Hill	STH17_1036	06/09/10	4.9

See climate map for zones within the Ae composite area				Sheltered, moist and warm	Moderately exposed, moist and cool	Moderately to highly exposed, wet and cool
Climate zone (on map)				A	B	C
AT5				> 1100	700 – 1350	600 - 1200
MD				80 - 120	80 - 120	< 90
DAMS				< 13	13 - 16	>16
		SMR	SNR	e.g Ae Village and lower parts of the main watercourses	Lower and more sheltered parts of Kirkland and Old Forest	Hill tops and exposed areas around Harestanes windfarm
1	Brown	5	3	NS, DF, SP, RC, GF, PB**, [EL, JL]	NS, DF, SP, RC, (WH), (NF), GF, [EL, JL]	SS, SP, RC, WH, NF, [EL, JL]
3	Ironpan	5	1	SS, NS, SP, RC	RC, SS, (NF)	SP, (SS), [JL]
4	Podzol	5	1			SP, (SS), [JL]
6	Peaty gley	3	3	NS, SP, RC, SS, [EL, HL]	NS, SP, RC, (NF), SS, [EL, HL]	(SP), SS, [JL]
7	Surface water gley	2	3	NS, SP, RC, NF, SS, [JL]	NS, SP, RC, SS, [JL]	(SP), SS, [JL]
8	Juncus bog	1	3	RC, (SS)	SS	SS
9	Molina or flushed blanket box	2.5	2	RC, (SS)	RC, SP, SS, [EL, HL]	SS
10	Sphagnum bog	2.5	1.5		SS/LP*	SS/LP*
11	Blanket bog	3.5	1.5		SS/LP*	SS/LP*

[] = From year 11 onwards
() = lower preference species
* LP is nurse species only
** Productive Broadleaves

In order to deliver a diverse forest for the future, a range of species other than the core of Sitka spruce will be planted where site conditions allow and productivity is good. The table above has used the ESC as a guide to the species that could be used instead of Sitka spruce, based on the estimated >60% suitability (i.e. species is very suitable to site). Limiting factors in the higher elevation areas across the composite area mean that Sitka spruce will remain as the dominant species and possibly in mixture with Lodgepole pine as a nurse species on the worst soil types. Most diversity will be focused on the 'treasured' areas around Ae village which is the principle area where there is lower exposure and better soils.

The key principle species are:

DF Limited suitability but potential for planting on the slopes to the north of Ae village and on the eastern edge of Kirkland where suitability is the highest.

NS	Important species as an alternative to Sitka spruce and suitability is mainly limited by wind exposure. Opportunities to plant across the Old Forest and Kirkland as well as some parts of Queensberry. The ESC model suggests a far more restricted range that has been shown by previous experience so DAMS will be the key indicator for the species with the limit being 16.
RC	Suitable in many parts of the composite area, particularly in Old Forest and Kirkland, as it can tolerate wetter soils and higher levels of exposure.
NF	Suitable across all but the most exposed parts of the composite area and a useful alternative to Sitka spruce for timber production although timber quality is lower so extent will be limited.
SP	Alternative species where other conifers are less suitable and the ESC model shows suitability across much of the composite area. Pine has a lower productivity compared to other species however, it will grow well in areas where others struggle, for example on rockier areas.
SS	Planted to maintain a high-level of timber production and where other species are far less suitable. Suitability across much of the composite area is shown by ESC and proven by the success of the current crop.
Larch	Good alternative species to SS and it can tolerate wetter soils. ESC model shows a range comparable to SS and WRC. Inclusion in future forest design is from year 11 onwards in accordance with the current practice of the Dumfries and Borders District

Suitability of the species is likely to be maintained for the next rotation despite the predicted changes to climate. Damage to stands caused by severe weather is likely to change in the future, particularly an increase of extreme winds, and the design of the forest has been focused on matching the best species to the sites in order to meet the management objectives and also to design a resilient forest through the early planning of future coupe design.

Design of hill top coupes is important for the future resilience of the forest to extreme winds that are likely to continue and potentially increase in severity in the future. The design of the hill top coupes works with the landscape to give a more organic shape to the woodland and increase the width of rides between the coupes. The coupe design gives the future coupe shape and the gaps between will result in a more wind-firm edge being created around each coupe. This means that future phased felling will have a lower impact on the forest as the removal of one coupe will not adversely increase the exposure of the remaining coupes to wind damage and coupes can be felled independently.

Native broadleaves will be planted for biodiversity, landscape and environmental benefits. The opportunities for productive broadleaves are limited as the areas that are more suited tend to be the more difficult site to

conduct forestry operations. The forest district is focussing productive broadleaves in the blocks around the Solway and Tweed so there is only one area of productive broadleaves (Kirkland - coupe 21325a) shown on the Future Species map 2 km to the north of Ae village.

Native broadleaved species will be chosen based on their site suitability which depends on soils and climate, as well as management objectives. The area of native broadleaved woodland will be increased aiming for the target of a minimum of 5% by 2070 across the Ae composite area as a whole. These habitats will typically follow the riparian corridors with a mixture of native mixed broadleaved woodland and open ground with the open element being in addition to the minimum of 5% broadleaves.

Any areas identified as mixed broadleaves in the previous plan, which is lacking required density, will be brought up to specification by 2020.

Site	Management objectives	Species
Peaty, ironpan and gleyed soils with higher exposure	Riparian Black grouse Red squirrels	Downy birch Willow Alder Rowan Hawthorn
Better soils with lower exposure	Riparian woodland Red squirrels Social Landscape	Sliver birch Rowan Hazel Willow Hawthorn Alders Oak Aspen

5.1.3 Restructuring

The composite area is currently a mixture of first and second rotation crops which have been planted over the past 60 years, although the majority of trees were planted or restocked in the past 20 – 40 years (1970s – 1990s). The restructuring process is a way of moving from the monoculture homogenous forest block which covers the landscape to a structurally diverse forest, both in species and age. This also gives the opportunity to identify and retain crops that have wider benefits beyond timber and create habitat networks for the future. Past mistakes in planting and species selection can be addressed through the restructuring process in order to better meet multi-benefit management objectives.

The restructuring process across the composite has its challenges, particularly in the more exposed areas. Past planting and restocking has not always been sympathetic to the landscape and generally, felling and restocking coupes have not been spaced out sufficiently to give wind-firm edges. Large parts of the forest blocks are similar in terms of age and this will have a significant impact on the coupe separation process.

The clear felling operations associated with the windfarm have resulted in some areas suffering from wind damage due to the exposed 'brown edges' and these crops which are now at greater risk have been re-assessed for felling. Other areas within the Kirkland and Old Forest blocks have suffered significantly from wind damage and now require felling earlier than previously planned.

Due to the potential instability of some of the remaining stands due to windblow, it will not be possible to retain a number of coupes until the adjacent restocked coupes have reached 2 metres of height. Where it is not possible to meet the 2 metre (5 year) separation at felling, this will be imposed at restocking which in the medium term will give the separation recommended in the UKFS. The coupe adjacency map highlights those coupes where separation issues have been addressed by adjusting the restock year accordingly, thus creating the desired restructuring in the next rotation.

Felling and restocking coupes will be varied in terms of size depending on where they sit within the landscape. Generally smaller coupes will be in the lower areas and larger coupes will fit in the upper, larger landscape areas. In order to achieve the larger future coupes, there is a small amount of early felling proposed to avoid the geometric planting shapes to move on to the more organic coupe shapes for the future.

5.1.4 Operational Access

There are 8 main road access points what serve the blocks of the composite area, which are shown on the management map and these link the internal forest road network to the roads around Ae village as well as directly to the A701, which is an approved route for timber haulage. The Annandale link road gives direct access between the A701 and the internal forest road network through Stiddriggs and allows much of the timber form Stiddriggs, Queensberry and Kirkland to exit the forest directly to the main road network.

The composite area has a good existing road network, however a number of short extensions are required to reach out-lying coupes in order to keep a off-road timber extraction by forwarder to an economic maximum of approximately 1000 metres. The proposed roads required in the next 10 years are shown on the management map. These proposed roads avoid any

significant environmental impact on landscape, habitat, heritage and water and have been designed with the assistance of the Forestry Commission Civil Engineers. There is also the use of a bailey bridge proposed to access coupe 17231 in Queensberry from the existing road in Old Forest rather than constructing 1 km of new road.

There are a number of active quarry sites and these are also marked on the management map. The plan is to continue to utilise these sites for the planned road construction. Felling to extend quarries and excavations will not exceed 150% of the quarry area baseline at 2017.

5.1.5 Thinning Plans

Thinning will be implemented on commercial crops where there is a silvicultural benefit to the crop to improve timber quality or there is a need to help deliver wider management objectives. Although it is presumed that all crops will be thinned, there are limitations on operations as a result of soils and wind exposure. Generally thinning will be on a 5-year cycle and only be undertaken on mineral soils with a DAMS of less than 17.

5.1.6 Species distribution and age class

The species mixture across the composite area will reduce the dominance of Sitka spruce, in accordance with UKFS and UKWAS requirements and the design brief.

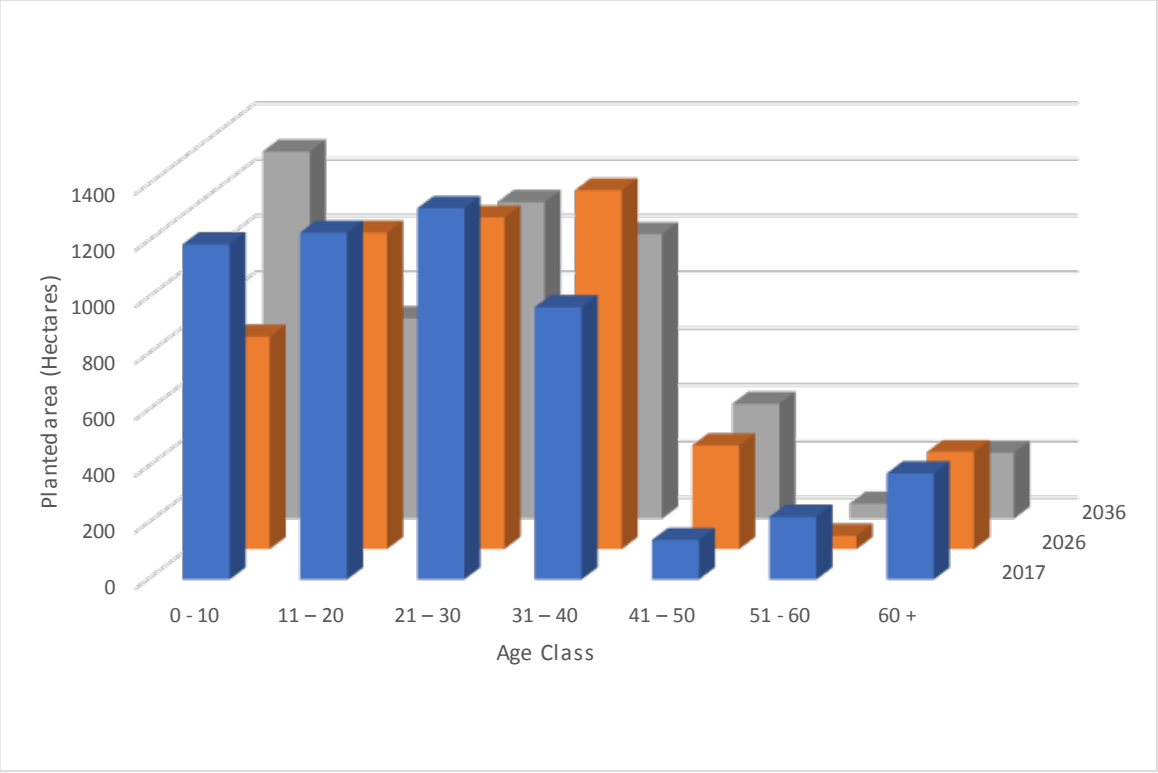
Species distributions for each block are shown in section 5.2 to 5.6 below.

Species Group	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
Sitka spruce	4500.14	65%	4189.35	60%
Other Conifers	709.61	10%	799.83	12%
Mixed Broadleaves	341.20	5%	371.29	5%
Open Ground & Fallow	1391.53	20%	1582.01	23%
Total	6942.48		6942.48	

The age class districting of the forest at year 10 will be weighted more heavily in the lower age classes, mostly due to the large areas that are being felled at a similar time as a result of the age of the current crop. This distribution is expected to balance out across the younger three classes at year 20.

Age Class	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
0 - 10	753.59	15%	1302.76	27%
11 – 20	1123.14	22%	710.25	15%
21 – 30	1176.47	23%	1123.14	23%
31 – 40	1273.14	25%	1008.91	21%
41 – 50	367.62	7%	407.30	8%
51 - 60	47.48	1%	53.09	1%
60 +	344.32	7%	233.35	5%
Total (planted)	5085.77		4838.80	

The graph below shows the age class distribution at 2016, 2026 and 2036.



5.1.7 PAWS restoration

There are 15 areas identified on the Ancient Woodland Inventory as Ancient of Semi-Natural origin (ASNO) as well as a further 7 areas classed as 'other', meaning that they appeared on the Roy map series but not on the early editions of the Ordnance survey maps. These areas are shown on the Ancient Woodland map. Previous management plans have identified the ASNO areas for either restructuring with broadleaves or management through LISS and this has been carried forward in to this plan in order to restore the ancient woodland sites. LISS management could be less damaging to any longer-established flora and fauna compared to clear felling.

5.1.8 Management of open land

Open ground within the composite area comprises of areas splitting the future coupes in to resilient shapes, land around Ae village, a few agricultural fields and windfarm infrastructure. The areas between coupes will allow for improved future crop stability and modifying the edge so that it fits that landscape rather than the geometric legal boundary. The intimate mixture of broadleaves and open ground will give a permanent habitat network, particularly along watercourses. Other areas will give improved habitat for black grouse such as the coupes in the north west of Queensberry.

Areas where open ground have been increased, which has resulted in a loss of planted ground are on the western edge of Queensberry at the highest elevation. The rationale behind this is: growth rates are low in these areas and the quality of timber is very poor; wind susceptibility is high and re-designing the forest edge to follow a more natural shape rather than the geometric legal boundary but it is important to achieve this without significant loss of production.

Black grouse habitat has been implemented along the western edge of Queensberry where the topography offers shelter for a more diverse range of tree species. This habitat has been created through a mixture of open ground and mixed broadleaved planting; this approach will be continued in the neighbouring coupes where there is sufficient shelter for more diverse tree species to establish. This area has been chosen there are known to be lekking grouse close proximity. Mixed broadleaves of birch and willow will be planted along with rowan, hawthorn, blackthorn and some juniper. Conifer species have been by restricted due to exposure and soil type, as well as the decision not to plant larch in the first 10 years of the plan.

Opening up the mouth of riparian systems and valleys can also encourage grouse to forage deeper into the forest and this can be achieved through the lower density planting of broadleaves (50% with open ground) along the riparian zones.

5.1.9 Deer Management

The four forest blocks fall within the Ae Main Block/Auchen Castle Deer Management Unit (DMU), which consists of 13 forest blocks. Deer Management for all four forest blocks is currently undertaken by two FES Wildlife Rangers.

The main objectives and targets for deer control are:

- To achieve restocking establishment by year 5, in accordance with OGB4, without the need for deer fencing
- To maintain a sustainable deer population
- To monitor the Fallow population and limit spread from neighbouring land
- Maintain populations so that less than 10% leader browsing damage occurs on all commercial tree species

Currently the three-year (2014-2016) average impacts recorded within the DMU is <10% so the management objectives are being met for the whole DMU.

With deer management objective currently being met, additional protection is not currently required. However, as the proportion of broadleaves and vulnerable conifer species increases further measures may be required.

Tubing of broadleaved trees remains an option as these are more susceptible to deer damage.

5.1.10 Public Access

The Kirkland and Old Forest blocks have car parks, waymarked trails and is one of the 7stanes mountain biking facilities with marked route throughout the blocks. In addition to the formal facilities, there are several core paths running through the Ae composite area and these are shown on the Management Coupes map.

All operations will be carried out with appropriate signage to warn the public of operation and closures of trails will be carried out in collaboration with internal recreation staff and relevant external bodies.

Public access is encouraged across the NFE and this is managed under the Scottish Outdoor Access Code.

5.1.11 Heritage Features

There is one scheduled ancient monuments within the composite area (Kirkland block) and a further three in close proximity to the east of Kirkland. The management type of this coupe is minimum intervention so there is very little risk of damage occurring though forestry operations.

A number of unscheduled sites exist across the composite area; these areas will be protected during forest operations and all operation will be carried out in accordance with the Forests and Historic Environment guidelines. Any new sites that are found will be mapped, recorded and protected from operations. Information will also be passed to the Dumfries and Galloway Council archaeologist.

5.1.12 Flooding

There are some potentially vulnerable areas to flooding downstream e.g. Annan and Dumfries. Restructuring of the Ae composite forest seeks to create a normalized forest and as such felling will have a very low impact on the downstream flooding particularly given that the river catchment area above the risk flood areas is so large. Also all operations will be managed to the UK forest standard and this includes increasingly using streamside buffers to help manage the water and slow the flow of water off the forest.

5.2 Stiddriggs Forest Design Plan

The majority of Stiddriggs will be managed using the **clearfelling** management type, with only one coupe scheduled for clear felling in phase one and a further five coupes scheduled for phase two of the LMP. Stiddriggs is the furthest north block in the Ae Composite LMP and have fairly high exposure in the west but this improves further east. The Harestanes windfarm has impacted on the block in the west, with 12 turbines and associated infrastructure being installed in recent years. Felling associated with the windfarm has resulted in some crops having exposed edges which are susceptible to wind damage.

Two areas of **natural reserve** have been identified, these will be retained in perpetuity and allowed to naturally develop to enhance the biodiversity value of the forest block.

The design of the restocking coupes will be important for future felling operations as wind-firm coupe design that follows the landform is essential to prevent potential wind damage problems caused by phased felling. The principle future species will be Sitka spruce, as a result of the exposure and soil types, however there will be a number of compartments with Scots pine and also a significant increase in broadleaved species along the riparian corridors.

There are three planned roads within the block, one has approval under the current Forest Design Plan and will be constructed within the next year but the two in the east will be required in the future for planned felling operations.

Species group and age class distribution of Stiddriggs at 2026 and 2036 (indicative only)

Species Group	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
Sitka spruce	658.28	67%	596.23	61%
Other Conifers	48.84	5%	65.99	7%
Mixed Broadleaves	19.81	2%	35.38	4%
Open Ground & Fallow	251.02	26%	280.34	29%
Total	977.95		977.95	

Age Class	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
0 - 10	112.10	18%	288.54	48%
11 – 20	127.67	21%	96.18	16%
21 – 30	0.56	> 1%	127.67	21%
31 – 40	146.02	24%	0.00	0%
41 – 50	228.11	37%	67.30	11%
50 +	0.78	> 1%	24.80	4%
Total (planted)	615.24		604.49	

5.3 Queensberry Forest Design Plan

The management coupe types are diverse within Queensberry although **Clearfelling** will be carried out across much of the block due to the higher altitude and exposure. There are limited opportunities to diversify the management type for the commercial crops as the exposure and soil type has a significant effect on crop stability. Coupe size and shape is larger for clearfelling as the forest is at the large scale. Coupes attempt to follow the landform to reduce the visual impact although past management, including felling for the windfarm has resulted in the continuation of geometric felling coupe shapes.

One **Natural reserve** have been identified in the west of Queensberry. Although this area is not visible outside the forest, it is a block of Sitka spruce and Norway spruce on a relatively sheltered slope which has the potential to allow natural development of the habitat without sustaining significant damage and create an important habitat network in the future.

The centre of Queensberry has steep slopes flowing a main watercourse and a number of tributaries. The management coupes either size of the watercourses, and on the steep slopes, are a mixture of **Minimum Intervention** and **Long-term retentions**. These management types have been chosen as there is an opportunity to maintain and enhance the native broadleaved habitats and extent the rotation of some conifer species in an area of lower exposure. This main core should form an important habitat network within the block to increase the biodiversity without major impact from harvesting operations. These areas have the potential to become **Natural Reserves** in the future.

Future species within the Queensberry block have been again been dictated by the soils and exposure. The more exposed areas will be restocked with Sitka spruce however the lower slopes in the ‘core’ area of the block will be

enhanced with diverse conifers and increased native broadleaves. Following comments and approvals in the current forest plan.

Species group and age class distribution of Queensberry at 2026 and 2036 (indicative only)

Species Group	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
Sitka spruce	1153.46	62%	1087.00	59%
Other Conifers	161.40	9%	137.05	7%
Mixed Broadleaves	112.07	6%	130.58	7%
Open Ground & Fallow	429.43	23%	501.73	27%
Total	1856.36		1856.36	

Age Class	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
0 - 10	145.03	11%	187.37	15%
11 – 20	389.54	29%	143.33	11%
21 – 30	463.57	34%	389.54	31%
31 – 40	214.45	16%	387.14	31%
41 – 50	0.08	> 1%	102.37	8%
51 - 60	1.36	> 1%	0.08	> 1%
60 +	147.35	11%	39.12	3%
Total (planted)	1361.38		1248.95	

5.4 Kirkland Design Plan

The Kirkland block is very varied with high levels of exposure on the high slopes, but there is significant improvement in both soils and exposure in the west of the block.

The higher elevation, more exposed areas have been impacted by the windfarm in the north of the block and these areas will be managed on a **clearfelling** basis. Much of this area is not highly visible from the surrounding area, except for long-range views from the east. The eastern section of the block however, away from the windfarm, is far more visible from the A701 and surrounding land. However, this is still a large landscape scale area and will suits the use of large felling coupes. Wind damage has occurred quite significantly within the west of Kirkland, partially due to the poor soils, and this has prompted some early felling to take place.
The south and west of Kirkland is a more diverse area with landscape scale planting on the high ground above Ae village which rapidly shrinks to medium to small scale at the bottom of the slopes. Coupe design in this area has been carefully chosen to promote future hill top felling coupes where possible which then merges in to **LISS** coupes on the lower slopes where a much smaller management type is appropriate.

The areas of **LISS** management is within the 'treasured' area running north from Ae village following the watercourse between the Kirkland and Old Forest blocks. This area has the best soil types and is the most sheltered of the composite area. The **LISS** area merges with the **long-term retention** and **minimal intervention** areas of Queensberry to form a large habitat network which runs through the centre of the composite area. Details of the **LISS** management are given in appendix iii.

Other riparian corridors within the block will be managed by **minimal intervention**. This management type has been chosen as these areas will benefit from increased broadleaved species and the lower impact management will allow the trees to develop into a more natural habitat.

Species choice for the future forest is more diverse across the block, although Sitka spruce remains the dominant species on the exposed areas, but these will be planted to give organic shapes centred on the hilltops in order to reduce wind damage during future phased felling.

Species group and age class distribution of Kirkland at 2026 and 2036 (indicative only)

Species Group	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
Sitka spruce	1514.74	65%	1467.81	63%
Other Conifers	262.02	11%	265.40	11%
Mixed Broadleaves	135.22	6%	138.02	6%
Open Ground & Fallow	404.65	17%	445.40	19%
Total	2316.63		2316.63	

Age Class	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
0 - 10	270.54	15%	429.66	25%
11 – 20	358.98	19%	265.26	15%
21 – 30	449.05	24%	358.98	21%
31 – 40	643.18	35%	403.43	23%
41 – 50	25.28	1%	181.45	11%
51 - 60	7.87	> 1%	2.02	> 1%
60 +	91.38	5%	83.35	5%
Total (planted)	1846.28		1724.15	

5.5 Old Forest Design Plan

The Old Forest block is the most diverse block within the Ae Composite area and is the only block that has not been affected by the Harestanes Windfarm.

The higher elevation and exposure area, which are principally the hilltops and area to the north of the block, will be managed following the **clearfelling** management type. The old forest has second rotation areas and there has been a number of areas affected by past geometric-shaped planting and felling which has resulted in wind damage. There is a need to change the coupe shape in the future to develop a more resilient forest.

In the north west and south west of the block, coupe separation to follow the UKFS is not possible, due to the levels of wind damage and need to fell adjacent coupes before restock establishment. The coupes where this will occur are shown on the coupe adjacency map. Whilst this approach is far from ideal, it will enable resilient coupe shapes to be planted so that the felling of the next rotation can be far more flexible.

The stands in the west of the block, adjacent to the public road, will be managed on a mixture of **natural reserve**, **LISS** and **minimum intervention** management types. These areas have some first rotation crops which have been allowed to mature into a diverse habitat and is also sufficiently sheltered to allow these types of management to occur.

Similar to west Kirkland, the far east of the block forms part of the 'treasured' area with the majority of the riparian corridor being managed using **LISS**. Details of the **LISS** management are given in appendix iii.

Phytophthora has been discovered within Old Forest. Under current plan health rules, all larch within a 250 metre zone around the infection have to be felled, which will impact on part of the **LISS** area in the west of the block. As the area is managed under **LISS**, hopefully this can be managed in a similar way to a group selection felling and will not have a long-term impact on the management of these compartments.

Species group and age class distribution of Old Forest at 2026 and 2036 (indicative only)

Species Group	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
Sitka spruce	1173.66	66%	1038.32	58%
Other Conifers	237.35	13%	331.38	18%
Mixed Broadleaves	74.10	4%	67.31	4%
Open Ground & Fallow	306.43	17%	354.53	20%
Total	1791.54		1791.54	

Age Class	Area in 2026 (hectares)	Proportion of total	Indicative area in 2036 (hectares)	Proportion of total
0 - 10	225.93	18%	397.20	31%
11 – 20	246.95	20%	205.48	16%
21 – 30	263.28	21%	246.95	20%
31 – 40	269.48	21%	218.34	17%
41 – 50	114.15	9%	56.17	4%
51 - 60	37.48	3%	26.19	2%
60 +	105.59	8%	110.87	9%
Total (planted)	1262.87		1261.21	

5.6 Critical success factors

Main critical success factors for plan development are:

- Resilient coupe shapes
- Maintained timber production
- Successful Deer management
- Diversification of species and structure in the Treasured areas
- Collaboration with the Windfarm operator

Appendix I: Land Management Plan Consultation

Consultation Methods

Consultation with Statutory bodies was carried out by correspondence only and is an ongoing process. The record below reflects the responses received to the 30th October 2016.

A public consultation meeting was held on 20th August 2015 at the Ae bike shop and café between 2pm and 7pm. This gave an opportunity for the community to view and make comments on the proposals in an informal 'drop in' environment. On display were the FDP design plan brief and a map showing the forest blocks on an aerial photographs.

On-going consultation is also via the FCS website at http://scotland.forestry.gov.uk/managing/plans-and-strategies/land-management-plans/1211-forest-of-ae

Consultation Record

Consultee	Date contacted	Date response received	Issues raised	Forest District Response
FCS arranged a public consultation drop in at Ae village hall to seek community views and give the public the opportunity to see the approach to the 10 year Forest Design Plan review. On display was the LMP design brief and Aerial photo map.	24th August 2015 2pm to 7pm	On the day	15-20 people attended the meeting at various times. People were generally interested in seeing our plans and overall agreed with the design brief. No notable comments regarding the plans were made so the feedback was taken as positive that the public are happy with the way the district is managing the forest.	

Consultee	Date contacted	Date response received	Issues raised	Forest District Response
RSPB	31 August 2015	2 September 2015	Black Grouse Open habitat survey Raptors	Black Grouse on west edge of Queensberry. Incorporate comments into LMP analysis
Dumfries and Galloway Council (Peter Norman – Biodiversity Officer)		12 August 2015	Support intention to increase native broadleaves and restore ancient woodland sites.	Incorporate comments into LMP analysis

RSPB

Issue Raised	Impact on LMP	Measures to be taken	Notes
Welcomed inclusion of Black Grouse as species for consideration for habitat management.	Species selection, planting and designed open ground density to improve habitat for Black Grouse	Design restock species and open ground to improve the habitat along the west edge of Queensberry as well as the north and north west of Old Forest.	Lekking grouse within 2 km of the western of Queensberry so species choice and habitat is important.
Open habitat survey	Open habitats will be part of the LMP future species design and location is important	Incorporate information from the identification of open habitats.	Noted.
Aware that sensitive raptors are in the vicinity.	No specific requirements	Follow guidance to improve habitat for raptors	Noted.

Consultation correspondence

The following pages are copies of the correspondence between FES and the consultees.

Appendix II: Tolerance Tables

	Maps Required (Y/N)	Adjustment to felling period *	Adjustment to felling coupe boundaries **	Timing of Restocking	Changes to Restocking species	Changes to road lines	Designed open ground ** ***	Windblow Clearance ****
FC Approval normally not required	N	• Fell date can be moved within 5 year period where separation or other constraints are met.	• Up to 10% of coupe area.	• Up to 3 planting seasons after felling.	• Change within species group e.g. evergreen conifers or broadleaves.		• Increase by up to 5% of coupe area	
Approval by exchange of letters and map	Y		• Up to 15% of coupe area	• Between 3 and 5 planting seasons after felling, subject to the wider forest and habitat structure not being significantly compromised.		• Additional felling of trees not agreed in plan. • Departures of > 60m in either direction from centre line of road	• Increase by up to 10% of coupe area • Any reduction in open space of coupe area by planting.	• Up to 5ha
Approval by formal plan amendment may be required	Y	• Felling delayed into second or later 5 year period. • Advance felling (phase 3 or beyond) into current or 2nd 5 year period.	• More than 15% of coupe area.	• More than 5 planting seasons after felling, subject to the wider forest and habitat structure not being significantly compromised.	• Change from specified native species. • Change Between species group.	• As above, depending on sensitivity.	• In excess of 10% of coupe area. • Colonisation of open space agreed as critical.	• More than 5ha.

NOTES:

* Felling sequence must not compromise UKFS, in particular felling coupe adjacency

** *No more than 1ha, without consultation with FCS, where the location is defined as 'sensitive' within the Environmental Impact Assessment (Forestry) 1999 Regulations (EIA)*

*** *Tolerance subject to an overriding maximum 20% open space*

**** *Where windblow occurs FCS should be informed of extent prior to clearance and consulted on where clearance of any standing trees is required*

Table of working tolerances specific to larch in Ae Composite LMP area

	Adjustment to felling period	Adjustment to felling coupe boundaries	Timing of restocking	Changes to species	Changes to road lines
FC Approval not normally required	Fell date for all larch can be moved and also directly associated other species	Larch areas can be treated as approved coupes. Other conifers directly associated with larch being felled, may also be removed up to an equivalent of 20% of the area occupied by the larch or 5ha, whichever is greater	To be undertaken within the overall plan approval period.	Replacement as per the agreed restock plan, but where this is not specified or is larch this may be replaced with either another diverse conifer (not SS) or Broadleaves.	
Approval normally by exchange of letters and map. In some circumstances Approval by formal plan amendment may be required		Removal of areas of other species in excess of the limits identified above.	Restocking proposals outwith the plan approval period.	Restocking proposals for other species which do not meet the tolerances identified above.	New roadlines or tracks directly necessary to allow the extraction of larch material.

Appendix IV:

Summary of Mid Term Reviews for Previous Plans

(The previous plans for Queensberry and Stiddriggs had not reached their mid-term review stage)

Old Forest (2006 to 2016) - review carried out on 06/01/14

Amendments	Several amendments approved for road lines, windblow and restock adjustments.
Felling	Some early felling and retention for extra volume and restructuring. Some adjacency issues highlighted by FCS.
Thinning	Areas ready for thinning lacking road access and not in thinning programme - suggested changes to programme resources. Concerns that areas flagged for LISS (especially west of public road) have missed thinning window - possibly need to plan some CF.
Restocking	As planned
Road programme	The new roads to the first thinning in the South have been missed and this needs addressing ASAP. The new road to 19028 (North of area) is currently being implemented
Has the implementation of the plan to date met the stated objectives?	Thinning - No. Improved records and planning required.
Are the aims and objectives of the plan still appropriate?	Things have moved on with species diversity since the creation of this plan and there are some areas of the plan that could include a greater variety of conifer

	species including DF, GF at lower levels and SP, NF at higher levels. The coupes to be restocked before the next review of the plan should be reconsidered in terms of species choice and maximum diversity adopted to deliver the management objectives.
Do proposals for the remainder of the 10 year approval meet the current objectives, standards and country vision?	Yes Need to reconsider the LISS management on the West side of the public road as this may be difficult to implement due to the delays in thinning.

Observations	Some damage following the Gales of 2013/14 but many of the roads have been cleared. Some roadside vegetation needs clearing but not urgent. Generally the roads were good having been well maintained.
Summary	Existing plan requires some adjustment.

Kirkland (2006 to 2016) - review carried out on 02/01/14

Amendments	Several amendments approved for quarry extensions, early felling, and for windblow clearance.
Felling	A number of coupes were held longer than planned due to extra felling associated with windfarm permissions. It was considered best to keep older trees where possible to enhance age class diversity.
Thinning	The majority of Kirkland FDP is a non-thin forest due to the wind exposure and poor soils. However, there are areas at lower altitude where thinning should be/ has been carried out.

	Some thinning has been done on the left of the main windfarm access road 21030 and this clearly is beginning to get too high and exposed for thinning on the Ae soils. CCF thinning near to the Ae offices is late and needs to be done now.
Restocking	All coupes seem to have been restocked as per the approved RS plan. Importantly there seems to be some really good permanent habitat networks being created in the riparian zones.
Road programme	Harestanes Windfarm access road has been constructed through Kirkland and this has improved the general access through straightening and realignment and through watercourse crossings. There is evidence of good water management with silt traps and catching fabric. In the NE there is a new road constructed for which approval was sought and approved. In the NEE the new road has been constructed as per the planned roads layer in the approved FDP. Otherwise the roads network is good.
Has the implementation of the plan to date met the stated objectives?	Yes. Very good progress with restructuring.
Are the aims and objectives of the plan still appropriate?	The aims and objectives are still largely very appropriate. In addition to these objectives is climate change including both carbon sequestration in trees and timber products but also adapting to climate change - there is opportunity to further diversify species in Kirkland to make a more resilient forest into the future. See below
Do proposals for the remainder of the 10 year approval meet the current objectives, standards and country	Felling - Yes. Restocking - No. Too much SS - need to diversify.

vision?	Alternative conifer species should be considered more - especially firs and pines, especially in light of Phytophthora limiting the use of larch. Diversifying species at beat up is also a way of introducing new species. NS, DF, GF, NF, SP should all be considered when beating up SS crops, particularly when the site is very suited to these species. Roads - Yes.

Observations	Some recent windblow in severe Gales of Xmas '13 but this is nothing to worry about. The building of the windfarm is going well and this is being embedded well into the forest. There are no known deer or wildlife issues. Riparian zones are developing well.
Summary	Existing plan requires some adjustment

Appendix III:

Ae Composite LMP - LISS Management Plan

Introduction

There are two areas within the Ae Composite LMP which have been identified for management under LISS. The largest area runs north-south between the boundary of the Old Forest and Kirkland blocks following a main watercourse. This area is very popular with recreational users as well as developing into an important habitat network, linking the upper areas of the forest blocks with the lower ground.

The other area is to the west in Old Forest, joining on to a Natural Reserve however, its proximity to the public road means management will be required.

The management of these areas will follow the Uniform Shelterwood system which is described below. This approach will be used to try and avoid wind damage occurring within the remaining crop, an alternative group approach, which is not recommended, would clear larger ‘pockets’ of trees and these small areas of felling would then be more likely to cause wind damage in the remaining stand.

Each coupe has been identified with the coupe number(s) and central grid reference and the management prescription is explained including description, coupe felling and establishment, intended outcome, monitoring and timing of operations.

The content of the plan is formatted as follows:

- Coupe number(s) and NGR
- Coupe felling
- Coupe establishment
- Intended outcome in 20 years
- Monitoring review
- Suggested timing of operations

Uniform Shelterwood Coupes

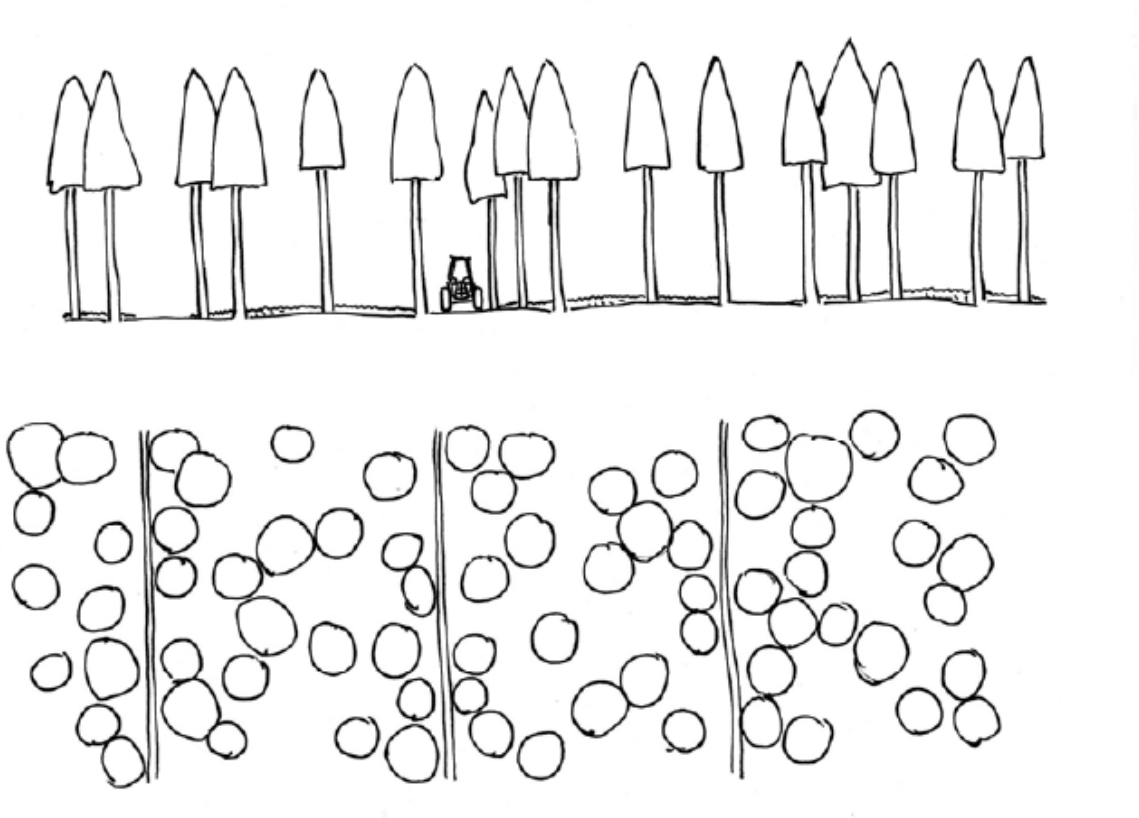


Figure 3.2b
Seeding felling, admitting sufficient light for the germination and survival of regeneration.

This system allows the retention of trees well beyond normal economic rotation. Frame trees are identified and marked. The coupe is then crown thinned, taking out 1 or 2 co-dominant trees around each frame tree. As bigger trees are removed in each thinning more light penetrates the canopy giving the forest a more welcoming internal look as well as opportunity for natural regeneration. Basal area (BA) can be used as there is a link between BA and canopy size and therefore light levels. The threshold BA for relatively light demanding species such as Sitka spruce and Douglas fir is between 25-35 m2 per Ha. Under planting can be used to diversity or change the species in the coupe for the next rotation. Target stocking density follows OGB 4 with a minimum 2500 stems per hectare at even spacing. As time passes and thinnings are done the existing mature trees will reduce in numbers through to the middle of this century when none will remain.

Old Forest old nursery site - Coupe 19276 (NX 960 931)

Coupe Description

This area was planted in 1935 and forms part of first rotation of Old Forest. The two species present are Sitka spruce and Norway spruce, with Norway being the larger proportion of the coupe. The area is not identified as any form of ancient woodland but sits between a natural reserve to the north and minimal intervention to the south. This coupe is adjacent to the public road so it will be highly visible and will allow old growth trees to contrast the commercial crops whilst being managed to keep the stand safe.

Coupe felling

150 frame trees will be marked per hectare and over the next few thinning interventions the remaining matrix trees will be removed gradually using the crown thinning method. A single co-dominant neighbouring tree will be removed at each thinning for the next 3 or 4 thinning interventions (5 year cycles). Both species will be retained with the best specimens being chosen as frame trees.

Coupe establishment

All establishment will be through natural regeneration with planting rarely needed but this might be needed where stocking insufficient. The majority of the coupe is Norway spruce but there is one subcompartment of Sitka spruce, these species will be maintained and any invasion of other conifer species, such has Western Hemlock, will be monitored and controlled as appropriate.

Intended outcome in 20 years

The pace of change should be slow as there are dramatic changes in the vicinity scheduled for the surrounding coupes though clear felling although any trees at risk of falling across the road should be removed at the earliest opportunity. In 20 years, the stand should have a lower density of large, old growth spruce with an understorey of establishing regeneration.

Monitoring/review

Regeneration and availability of light levels for regeneration will be monitored following thinning operations with establishment and protection of the natural regeneration being a key action.

Operation timing

Thinning is suggested in 2020.

Ae Valley East - Coupes 21290, 21362, 21384 and 21400 (NX 986 899)

Coupe Description

This area was mostly planted between 1946 and 1948 although some second rotation crops are present from the 1980s and the 1990s. The major species present are larches, Norway spruce and mixed broadleaves as well as an element of Douglas fir. The area is also identified as ancient woodland of semi-natural origin. These coupes are highly visible from Ae Village and will allow old growth trees to contrast the commercial crops and not have a detrimental effect on the landscape.

Coupe felling

150 frame trees will be marked per hectare and over the next few thinning interventions the remaining matrix trees will be removed gradually using the crown thinning method. A single co-dominant neighbouring tree will be removed at each thinning for the next 3 or 4 thinning interventions (5 year cycles). The key species for retention will be Norway spruce, Douglas fir and oak.

Coupe establishment

All establishment will be through natural regeneration with planting rarely needed but this might be needed where stocking insufficient. Future species will be as they are now, except for the area of Ancient Woodland where only broadleaves will be retained.

Intended outcome in 20 years

In 20 years, the stand should have a lower density of large, old growth trees with an understorey of establishing regeneration which will complement the recreational area and add landscape value looking on to the lower slopes.

Monitoring/review

Regeneration and availability of light levels for regeneration will be monitored following thinning operations with establishment and protection of the natural regeneration being a key action.

Operation timing

Thinning is suggested in 2019.

Ae Valley West - Coupes 19327 and 19439 (NX 983 919)

Coupe Description

This area was planted between 1929 and 2012. The southern tip of the coupes has first rotation trees from 1929 and second rotation trees from the 1960s and 1970s. These areas are prominent in the landscape when viewed from the village and roads to the south. The northern part of the coupes have a mixture of first rotation trees from 1939 and second rotation trees dating from the 1980s to 2012. The major species present are larches, Norway spruce, Sitka spruce and broadleaves. Part of the area is also identified as ancient woodland of semi-natural origin.

Coupe felling

150 frame trees will be marked per hectare and over the next few thinning interventions the remaining matrix trees will be removed gradually using the crown thinning method. A single co-dominant neighbouring tree will be removed at each thinning for the next 3 or 4 thinning interventions (5 year cycles). The key species for retention are Norway spruce, Sitka spruce, ash and beech. Larch in the north of the coupe have confirmed positive for Phytophthora and will need to be removed, in the area surrounding this felling zone, larches will not be retained due to the risks of infection in thinning operations over the next 10 years.

Coupe establishment

All establishment will be through natural regeneration with planting rarely needed but this might be needed where stocking insufficient. Future species will be as they are now, except for the area of Ancient Woodland where only broadleaves will be retained.

Intended outcome in 20 years

Wind blown trees, along with the diseased larch need to be removed as early as possible to reduce the risk of these damaging the retained trees, therefore, pace of change will be quicker than other areas. In 20 years, the stand should have a lower density of large, old growth trees with an understorey of establishing regeneration.

Monitoring/review

Regeneration and availability of light levels for regeneration will be monitored following thinning operations with establishment and protection of the natural regeneration being a key action.

Operation timing

Thinning is suggested from 2017.

Ae Valley Craigshields Bridge - Coupe 19434 (NX 984 937)

Coupe Description

This area was planted between 1939 and 1943 and is an area of first rotation confiers within the forest. These areas only visible from within the forest, however they are at the northern end of recreational routes. The major species present are larches, Norway spruce, Sitka spruce and some Scots pine. No part of the coupe is identified on the ancient woodland inventory.

Coupe felling

150 frame trees will be marked per hectare and over the next few thinning interventions the remaining matrix trees will be removed gradually using the crown thinning method. A single co-dominant neighbouring tree will be removed at each thinning for the next 3 or 4 thinning interventions (5 year cycles). The key species for retention are Norway spruce, Sitka spruce, Scots pine and larches in the north of the coupe. The larches in the south of the coupe are close to the area which has been infected by Phytophthora and will be removed.

Coupe establishment

All establishment will be through natural regeneration with planting rarely needed but this might be needed where stocking insufficient. Species will be predominantly Sitka spruce and Norway spruce with some larches, where the risk from Phytophthora does not prevent planting.

Intended outcome in 20 years

Wind blown trees, along with the larch in the south of the coupe will be removed over the next 10 years but the remainder of the coupe will have a slow pace of change as the trees are fairly spaced out. In 20 years, the stand should have a low density of large, old growth trees with an understorey of established regeneration.

Monitoring/review

Regeneration and availability of light levels for regeneration will be monitored following thinning operations with establishment and protection of the natural regeneration being a key action.

Operation timing

Thinning is suggested from 2023.