West Argyll Forest District

Barcaldine

Land Management Plan

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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Summary of Proposals

The Forest District's Strategic Plan for West Argyll Forest District includes a vision statement, to which each individual Land Management Plan (LMP) will make a contribution. The District Vision Statement states that 'West Argyll FD will be a key land manager in Argyll, producing quality timber for the market, providing sustainable employment in both the public and private rural sectors, and opportunities for renewable energy projects. We will also provide well-managed native woodlands for wildlife and places for enjoyment for visitors and local communities'. The Barcaldine LMP revision contributes to the District Vision by seeking the following outcomes:-

Economic context

- Approval for 446.1ha of felling, to be completed within the plan period, and 406.8ha of restocking by natural regeneration is being sought, for completion within 10 years of felling.
- Timber production from felling and thinning yielding 28.9Km^3 in Phase 1 and 19.9Km^3 in Phase 2.
- Construction of 0.965Km of new forest roads and 1.3Km of forwarder track in Phase 1 requires EIA determination and Prior Notification. A total of 0.4Km of new roading will be required in the second five years of the plan.
- Reassessment of management types and felling dates based on current crop condition, thinning and need for restructuring.

Environmental context

- Creation of habitat networks design framework for the woodland.
- Protection of archaeological sites.
- Restoration of Ancient Woodland sites requiring 98.6ha of conifer removal in the plan period.
- Development of future species rationale that meets FES PAWS policy 2016 guidance, results of suspect PAWS survey findings and delivers a practical solution for future management of PAWS sites.
- Protection of designated sites.
- Species diversification or change in response to Climate Change Agenda, national targets for broadleaves, UKWAS and plant health issues.
- Enhancement of Glen Dubh water catchment area, including working with Scottish Sea Farms renewables over water quality priorities.

Social context

- Landscape enhancement, views from public roads and recreation facilities to be considered.
- Edge management as part of the Visitor Zone policy, delivered through hardwood thinning operations and conifer thinning in association with ongoing long-term thinning contract.
- Consideration of rural development opportunities on FCS land.
- Consideration of community interest groups' aspirations for the area.

1.0 Introduction

1.1 Setting and context

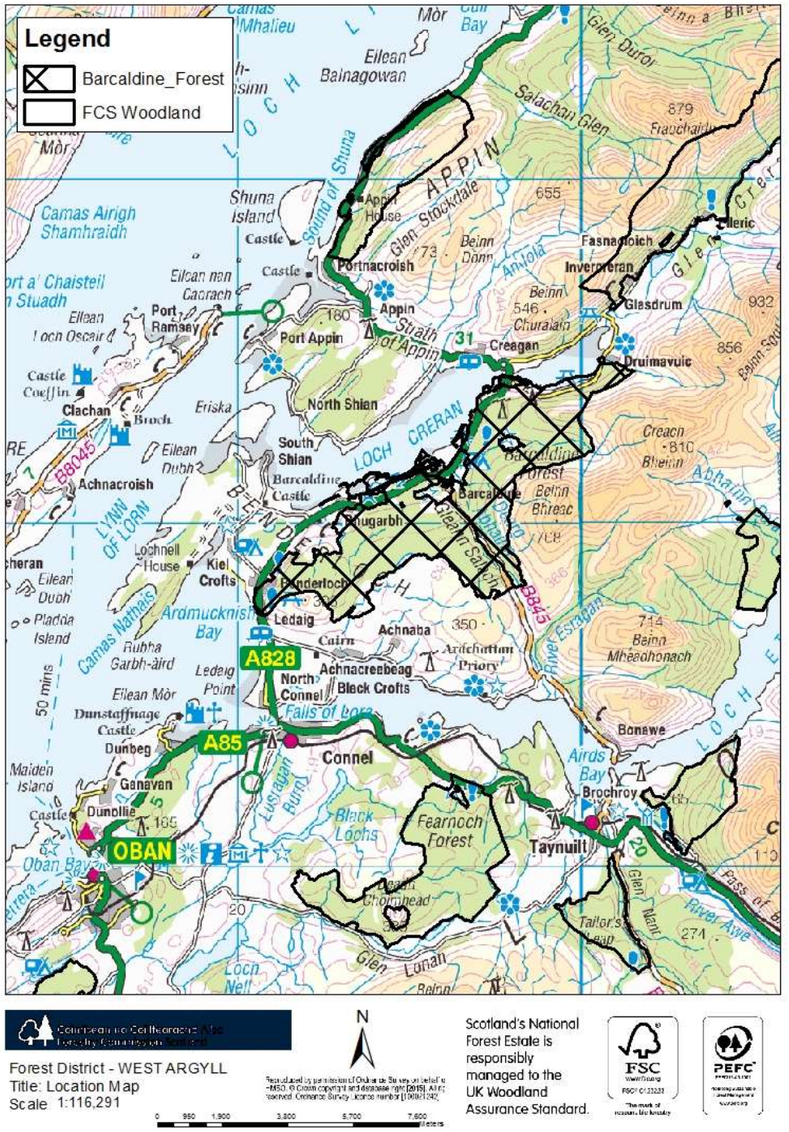
The plan for Barcaldine covers 2633.9. The previous plan expired on 22/03/2016. The forest forms much of the backdrop to Barcaldine village. Parts are very visible from a number of locations, including North and South Shian, Creagan, Benderloch and Connel. The forest contains a number of recreation facilities and Sutherland's Grove. There are also a number of private residences and commercial tourist attractions adjacent to the forest, including the Sealife Centre. A number of private and public water supplies affect the forest area, including the Marine Resource Centre beside Loch Creran which utilises its reservoir in the forest for hydro-electricity. The A828 runs along the lower edge of the forest. The B845 runs through Glen Salach. The old route for the A828 skirts the edge of the forest along the side of Loch Creran around the head of the loch. A number of environmental designations affect the forest or lie immediately adjacent to it, including the Glen Creran Woods SSSI/SAC within the forest, Loch Creran SAC and the Lynn of Lorn National Scenic area adjacent to it. Loch Creran is also an important shellfish growing area. Two scheduled Ancient Monuments are also located in the plan area.

SNH and Argyll & Bute Council are the Forest District's statutory consultees. SEPA, RSPB and ConFor are also routinely consulted on plan revisions. The Community Council has been made aware of the plan revision proposals. The Consultation Record provides a summary of all formal correspondence, issues raised and FD responses (see appendix II).

The primary objectives of the plan from the design brief can be summarised as follows: -

- Timber production – commercial conifer areas.
- Development of internal habitat networks, with contributions to the wider external networks.
- Protection and enhancement of designated sites/areas.
- PAWS restoration.
- Protection of the water supplies, including SSF renewables and water quality priorities.
- Landscape and visitor zone enhancement.
- Consideration of rural development opportunities on FCS land.
- Consideration of community groups' aspirations for the area.
- To comply with the Forest and Water Guidelines.
- To comply with UKWAS guidance for certification.
- Species diversification or change in response to the Climate Change agenda and plant health issues.

Map 1.1 - Location Map



1.2 History of the woodlands

Policy woodland planting associated with Barcaldine House comprising oak and beech, with other broadleaved species, Scots pine and other conifer species range in date from 1870 to 1929. Sutherland's Grove was planted in 1921 and named in honour of Lord John Donald Sutherland in 1950 as the founding father of the Forestry Commission in Scotland. He was a member of the Acland Committee that recommended the setting up of the Forestry Commission in 1919. He became a Forestry Commissioner in 1935. Most of the early coniferous planting has since been felled. Planting of commercial conifers continued over the next few decades, including over sites classed as Ancient Woodland. Restocking commenced in 1969 and has continued intermittently since. The forest was home to the Lorne District office until 1994. A small workshop operated where the current depot stands until closed in the 1990's. Some trees near the car park at Sutherland's Grove were planted to commemorate the Dunblane massacre of 1996. Thinning operations have been carried out in some of the older crops, but wind damage has occurred in recent years requiring clearfelling.

2.0 Analysis of previous plan

A number of general issues and events have arisen within the plan areas since the above changes. These include:-

- Forest resilience to climate change would encourage further species diversification.
- Plant health issues have resulted in bans on planting larch, ash and Lodgepole pine (with the exception of Alaskan provenance in mixture with spruce).
- New policy guidance relating to the conservation of deep peat may affect existing proposals to restock areas of low yield class Sitka spruce.
- National policy is now to restore about 85% of Ancient Woodland sites. The former Forest Design Plan (FDP) future species map was updated to reflect this change. Conifer regeneration has arisen in some of these areas.
- The former FDP is being replaced by a Land Management Plan (LMP), which seeks to look more widely at subjects both within and without the plan area.
- Some proposed CCF areas have blown down and been cleared; others have not been thinned and thinning intentions need to be reconsidered. Windblow above Benderloch posed risks to the footpath and potential issues of disturbed material falling onto the A828, requiring intervention. Felling above Benderloch is still to be completed. Windblow by Achanreir was raised as a concern by SSE posing a threat to a powerline, which was subsequently dealt with. Several approved felling coupes either await felling shortly or are currently being felled. One coupe north-east of Benderloch has not been felled due to access issues.
- The management agreement with the Marine Resource Centre (MRC)(now Scottish Sea Farms) expires in 2019. It requires FCS to produce quinquennial catchment management plans to advise MRC of planned operations. The last plan expired in 2014.

The Mid-term review for the plan in 2010 concluded that the plan remained fit for purpose, but with the need for and having been subject to several amendments for felling and road construction. Attention was drawn to the loss of landscape design intent to vary the upper planting boundary above Eas na Circe, due to infilling of designed open space largely with broadleaved regeneration. This area is an Ancient Woodland site, the upper edge of which coincides with the boundary fenceline. There is little evidence of broadleaved regeneration above the fenceline.

Use of small felling coupes in LISS areas was also discussed in the review, as a means for encouraging broadleaved regeneration on PAWS sites. This has not been taken forward, although clearance of some windblown pockets has achieved this suggestion in consequence.

Landscape enhancement was given a high priority under objectives in the previous plan. Two areas addressed in the plan, the southern forest edge by Beinn Lora and the forest edge at the head of Glen Salach, were redesigned as per the plan. Most other objectives were only to be achieved over a longer timescale, including restructuring, PAWS restoration, and reduction of acidification of the Abhainn Teithil through conifer removal.

3.0 Background Description

3.1 Site factors

3.1.1 Geology and soils

Steep ground within the forest (over 35%) (See Map 3.16), is limited to a few specific locations. The face above Benderloch is noteworthy, including some low cliffs. Sections of Glen Salach, particularly the river gorge and upper edges of Beinn Bhreac are more significant. Eas na Circe and the slopes around the associated hill top of Coire Circe (379m) represent the largest area of steep ground in the plan area.

The solid geology roughly divides down Glen Salach, reflecting the difference in topography between the two halves of Barcaldine. East Barcaldine comprises quartzite grit and interstratified quartzose mica schist. West Barcaldine is mostly undifferentiated andesite and basaltic lavas and tuffs. There are smaller areas of quartzite grit, whilst above Benderloch is an area of Lower Old Red Sandstone. The geology dataset is however fairly generalised. Beinn Lora is prominent summit

(308m), just outside the southern edge of the forest. Am Maoilean (225m) was the site of a fire tower.

Detailed soil data (see map 3.1) is not available for the southern half of west Barcaldine and most of northern east Barcaldine. Lower slopes are characterised by brown earths, podzols and ironpans. Further up into the forest, there are peaty gleys, flushed and unflushed blanket bogs and some surface-water gleys. Pockets of blanket bog occur within the matrix of brown earths and peaty gleys, often giving rise to patches of poorer growth. Peat depths are less than a meter in surveyed areas. Much of the southern half of west Barcaldine is broadly classed as Unflushed blanket bog, but may well be predominantly peaty gleys.

3.1.2 Water

- **Soil, water and air quality**

No areas of slope instability have been identified. Some loose rocks above Benderloch have been noted, but appear stable unless disturbed. Concerns have been expressed by some local residents, including questions about ownership of the cliffs.

The Dearg Abhainn was classed as 'good by 2015' under the Water Framework Directive. However, reassessment in 2014 classed it as poor due to physical barriers preventing migratory fish movement. It was not considered feasible to remove the barrier and no improvement was anticipated by 2027. A weir is present. This and the immediate surrounding area is not on FCS land. The source of the Dearg Abhainn is not on FCS land. A number of smaller watercourses also run through the forest, which have not been assessed. The Abhainn Teithil was however considered to be at risk in 2007, including from coniferous forestry, which saw the redesigning of coupes to start to open up the watercourse above the reservoir. The first coupe along the watercourse was felled in 2015. A weir is present immediately north of the caravan park.

Two reserve public water catchments cover the southern part of the forest. One supply serving Barcaldine abstracts water from the Dearg Abhainn, where there is a weir and pumping station south of Barcaldine House. The other is served by a reservoir above Achnacree. This reservoir is on private ground, but is almost completely surrounded by FCS land. Two lochans, Dubh Loch Mor and Dubh Loch Beag feed water into the reservoir catchment. The former is in FCS ownership, the latter lies immediately adjacent to FCS land. Private water supplies have largely not been identified, although three were identified in the previous plan (Achacha, Achinreir and Drimavuic). However, Achinreir appears to be on the mains supply now as the pipeline runs past it to a header tank on the forest edge immediately to the east (see map 3.2). The pipeline runs west firstly along the southern side of the forest road to Achacha, then along the powerline corridor out towards Mill Farm. It also runs east to the weir on the Dearg Abhainn and around various properties. A second pipeline provides the mains supply. It continues all the way along the A828, before crossing over Loch Creran at the bridge.

Scottish Sea Farms (SSF) now own Loch Glean Dubh reservoir, having recently taken over from MRC (Marine Resource Centre) ownership. The reservoir powers a hydro-electric turbine in the centres' complex. It will provide water for a new salmon hatchery from October 2018. Their current estimate is that the water throughput to the new hatchery can only be shut off for a maximum of 24 hours. They will monitor water quality and quantity fortnightly in relation to harvesting activity and have undertaken regular sampling over the last 12 months. Water quality concerns focus on bacterial and solid contamination potentially arising from ground disturbance, although the new plant will filter the water intake and treat it with UV radiation. This will be designed on sampling results over the last year, but is not expected to cope with every scenario. The system will not recycle water. The hatchery will house a full year's salmon production. The centre also provides bulk water for any clients requiring it. The route of the pipeline down to the centre has not been digitised. Its route follows a ride and is a polythene pipe. SSF intend to drain the reservoir to allow a full inspection of the dam, which is thought to be 25-30 years old. The dam and intakes are currently considered to be in good condition and are regularly inspected. SSF have suggested that periods of heavy rain where the dam overspills or where the reservoir is empty, are higher risk situations when buffering of water quality will be reduced.

A 20-year management agreement was signed on 30th July 1999 between Scottish Ministers and MRC, setting out a catchment management plan, with expectation that the agreement would be renewed at the end of the period (see supporting documents for a copy). A synopsis of the terms is as follows:

- Every fourth year FCS will prepare an outline silvicultural plan and specification for the next 5 years and be sent to MRC.
- A detailed annual list of operations with maps will be provided by FCS by 30 September each year for the 12 months commencing 31st October of the same year. MRC may request that FCS do not carry out some or all of these operations, provided notice is given by 31st October the same year. FCS may substitute alternative sites, subject to the agreement of MRC. FCS may submit additional costs where incurred from these changes, but MRC are not bound to accept the additional costs, but may refer this to arbitration as outlined in the management agreement. MRC have one month to respond to alternative proposals and additional costs, otherwise they are deemed to be accepted by MRC.
- MRC may request the postponement of restocking of up to one year, but FCS are entitled to claim compensation when this occurs. The amount of any compensation is calculated using the formula in the management agreement.
- MRC may claim compensation for loss of fish caused by water pollution resulting from negligence on the part of FCS.

In addition, MRC made the following requests in 2006:

- Felling coupe size to be restricted to 5ha (not agreed due to costs).
- Felling and roading operations to be carried out in dry weather.
- Minimal use of herbicides/pesticides/fertilisers (chemical reduction strategy covers).
- Increase in use of broadleaves to decrease acidification.
- The reservoir not to be stocked with fish and fishing severely restricted or banned for bio-security reasons (agreed not to stock).

It is currently intended to revise the plan in the light of management and production changes at the centre, with a greater emphasis on regular meetings and establishing communication protocols.

External to the FCS boundary, a tributary to the Abhainn Teithil, the Eas Garbh, is noteworthy. This appears to cut deeply through an eroding gully before spreading out as a large alluvial fan before entering the Abhainn Teithil. This appears to be a natural phenomenon, but may deposit quantities of silt into the Abhainn Teithil, just above where it enters FCS land.

There are several fish farms in Loch Creran. The loch is also noted for shellfish production.

3.1.3 Climate

- **Adapting to climate change**

Continentality is in the range 20-22.5, being fairly typical for much of Scotland, apart from the higher parts which are more typical of more mountainous west coast areas with lower continentality (15 - 20). The climate data for the forest indicates much falling into 'Warm, moist, moderately exposed' (See Map 3.3). Coldness, exposure and wetness increases with altitude, with the highest parts being classed as 'Cool, wet, highly exposed'. DAMS are mostly in the range 12-17 (maximum scores). Only the highest edges and section above Benderloch (area known locally as Siberia) are more exposed. Windblow to date has either been largely precipitated as a result of felling adjoining coupes or following thinning. Some pockets of windblow are also evident in some more exposed areas. Improvements in forest design and silvicultural choices will help offset the impacts of future gales on the forest. Species choice is more limited in the cooler wetter, more exposed areas.

Effective joined up habitat networks help mitigate the effects of climate change by facilitating the movement of site type species through the network. Internal native woodland networks are fragmentary. Outwith the forest boundary, there are comparatively few networks south of Loch Creran. Extensive open networks on private land surround the upper edges and link with areas of open hilltop within the forest (see map 3.7).

Deep peat soil types where present provide a natural carbon sink. There are no deep peat projects in the forest at present, although Lochan nan Ron represents a restored area of quaking bog.

- **Flood and Catchment Management**

No cases of flooding directly attributable to the forest area are known. SEPA's flood risk data shows up fields around the SSF site, Barcaldine School, caravan park and fields associated with the Dearg Abhainn and Abhainn Teithil as high risk flood areas. Flood Risk Management Maps There are no recent known cases of flooding. The reservoir and associated water draw-off for the hydro-scheme and hatchery reduce and control volumes flowing down beside the school, caravan park and SSF site. SSF intend to reduce intake to the plant from early 2017, when demolition of the existing buildings will start, which will result in increased flows down Gleann Dubh. Some drainage water flowing down the sides of the pipeline from the reservoir have caused minor issues in the car park, but his has been remedied by cutting a drain round this section of the car park. Risk to 'canyoning' activities form sudden releases of water from the reservoir has also been raised as a possible concern by FCS.

SEPA's flood risk data shows flood risk associated with the Abhainn Achnacree, although the reservoir may influence this. One or two buildings beside Loch Etive may be at risk.

3.14 Renewable energy

There are no renewables schemes apart from the SSF hydro scheme. The SSF scheme, once the hatchery is open, will divert more of the water to the hatchery. Power generation will be insufficient to power the whole plant, with none being made available to the national grid. However, there is an adjoining hydro-scheme on the Glen Creran Estate, utilising the Allt Buidhe, which in part forms the north-eastern boundary to the forest.

MRC obtained planning consent for a biomass plant and lorry access off the A828 in 2006. This has not been progressed, but is being reconsidered by SSF. Offsite chipping was a requirement due to noise concerns in the local community.

3.15 Infrastructure (see map 3.13)

A number of powerlines cross the northern and coastal fringes of the forest. Some of these are underground associated with the A828. Other underground cables are

associated with residential properties. Another overhead powerline runs up Glen Salach.

There are two telecommunications masts in South Creagan, with associated powerline cabling from the north-west.

3.2 Biodiversity and environmental designations

3.2.1 Designated sites

Natura sites and SSSI's (See Map 3.6)

Glen Creran Woods SSSI/SAC

The majority of the woods lie in Glen Creran and are covered under the FDP for Creran. Only the Dallachullish section (86ha) is within the plan area.

Qualifying features for the SSSI (Site Information) as a whole are listed as:

- Upland oakwood
- Lichen assemblage
- Bryophyte assemblage
- Chequered skipper butterfly (Glen Creran)
- Pearl-bordered fritillary butterfly (Glen Creran)

Qualifying features for the SAC (Site Information)are:

- Mixed woodland on base-rich soils associated with rocky slopes.
- Otter

Management actions pertaining to the Dallachullish section are;

- Maintain existing deer fence
- Remove invasive exotics including Japanese knotweed
- Undertake regular monitoring of features.

Loch Creran SAC

The Loch Creran marine SAC has been designated for the habitat 'Reefs' which is listed on Annex 1 of the Habitats Directive. The site is notable for biogenic reefs of the calcareous tubeworm *Serpula vermicularis,* which occurs in shallow water on the periphery of the loch. It is the only UK known site. In addition, there are horse mussel (*Modiolus modiolus)* reefs in the upper basin of the loch. Associated with the reefs are a number of other marine species and species rich assemblages. SNH list a wide range of operations that might impact on the protected reefs. Those pertinent to forestry refer to risk o increased concentrations of dissolved nutrients with potential to cause deterioration of reef habitats and communities; and sedimentation from run-off, with potential to smother reefs. http://www.snh.gov.uk/docs/B16627.pdf

Ancient Woodland sites (See Map 3.8)

Ancient Woodland is recorded on the NCCS Inventory maps. The amount of remnant native woodland and presence of regeneration is very variable across the sites. All sites in the forest were resurveyed in autumn 2016. The survey brief included identifying areas of suspect non-PAWS with a view to allowing replanting with conifers in these areas. It also included remapping of polygon boundaries to reflect survey findings.

3.2.2 Species and habitats (See Map 3.5)

Birds

- A Sea eagle has been seen at the top end of Loch Creran. A former nest site was located in Glen Salach until the tree snapped.
- Several buzzards' nests have been found, one also having been used by a sparrowhawk.
- Nest boxes have been erected at Sutherland's Grove and around Achacha.
- Black grouse have been observed lekking on open tops (Coire Circe and Coire Bilochdaig (last recorded sightings were in 2011).
- Tawny owls nest in old beech trees above Benderloch.

Other wildlife

- Square-spotted clay moth has been seen near Barcaldine House. Xestia stigmatica - Wikipedia, the free encyclopedia
- *Sciara militaris* (Dark-winged fungus gnats) (army larvae) are found near Achacha.Sciaridae - Wikipedia, the free encyclopedia
- Red squirrels are seen around the forest and several drays have been identified.
- Wild cats have been seen in the forest.
- There are bat boxes in Sutherland's Grove. Some old oak trees near Achacha are potential bat roosts. Bats roost in old beech trees above Benderloch.
- Chequered skippers have been seen in several locations around west Barcaldine. An area immediately north of Achacha was cleared of conifers for butterfly habitat in 2005.
- There are several badger setts around Achacha, Achinreir and Benderloch.
- There are several fox dens around Achacha and Achinreir.
- Dragonflies are seen on a boggy area north of Beinn Lora.

Open land

Detailed open habitat survey has not yet been undertaken. An example of Schwingmoor or Quaking bog is to be found north of Beinn Lora at Lochan nan Ron. Open hill tops occur at a couple of locations - Coire Circe and Sgorr Nighean Eoghainn. Coire Circe is contiguous with more mountainous land rising to Meall nan Caorach, Meall Garbh and Creach Bheinn (810m). FCS owns a couple of fields around Barcaldine village (Home Farm and Achanreir), let to a local farmer, but most of the fields here are in private ownership. There are no buildings associated with these fields in FCS ownership, Home farmhouse and agricultural buildings being in private ownership.

Open Water

In west Barcaldine, Dubh Loch Mor lies within the FCS boundary, with its southern edge bordering private ground. The long northern shoreline comprises a very narrow ribbon of open space and native woodland, with a pole-mature larch fire belt behind. The southern long edge borders open hill ground.

Dubh Loch Mor is on private ground, but its western edge borders FCS property. This edge comprises a narrow ribbon of open space and native woodland, with a pole-stage larch fire belt behind. Open hill ground surrounds the remaining loch sides.

The Achnacree reservoir and immediate surrounds are on private ground, but otherwise almost entirely surrounded by FCS property. Its immediate surrounds are occupied by mature broadleaved woodland.

Lochan nan Ron is a small area of standing open water in a larger area of bog. The mature conifers partially surrounding the bog were felled in 2012, with an intention of creating permanent open space or native woodland. The path to Beinn Lora skirts its edge.

Feur Lochan is a tiny wet boggy area east of Lochan nan Ron. It is partly shaded by mature conifers.

The Gleann Dubh reservoir in east Barcaldine, noted under 3.1.2, is not stocked with fish at the request of the MRC (now SSF). Mature conifers have recently been removed from around 50% of the shoreline, with open space and mixed broadleaves being planned under the previous FDP. The immediate catchment is dominated by coniferous woodland, but more than two thirds of the catchment is open hill top on private ground.

Several sections of intertidal zone are also recorded under the land holding. The largest area, north of Mill Farm, comprises mudflats. Coastal tidal zones extended from here round to Home Farm and from the SSF site to the head of Loch Creran. These areas are currently classed as 'open water' on the sub-compartment database. SSF make use of a section beside their works, including a jetty and storage of fish cages.

Native Woodlands

The Glen Creran Woods SSSI/SAC represents the largest tract of native woodland in the plan area, covering 82.8ha. Much of the adjoining areas are classed as Ancient Woodland sites and show either evidence of native woodland regeneration or existing remnants, despite being dominated by coniferous woodland. Native woodland is apparent around many of the lower parts of the forest. Some of this has probably been planted when part of the Barcaldine Estate. Native woodland has also been planted more recently in a number of areas, mostly for amenity. Some areas of native woodland have been either underplanted or enriched using beech.

Deadwood

Deadwood priority has been assigned according to the ecological classification of the site. Medium and high priority areas comprise existing native woodland, PAWS and riparian areas around main watercourses. A deadwood target of 20m3/ha across the whole forest is an UKWAS target.

Invasive Exotic Species

Western hemlock regeneration occurs at some locations associated with Ancient Woodland sites. Some Japanese knotweed has been recorded within the Glen Creran SSSI/SAC south of Dallachulish. Rhododendron is also present in the Barcaldine village area, including within the Glen Creran Woods SSSI between Barcaldine and South Creagan cottage. Some dense areas exist in the Achanreir area. Further bushes are found along the borders of the A828 between Mill Farm and Barcaldine village.

Deer Management

Red, Sika and roe deer are all present in the forest. FCS holds the shooting rights over the forest area. There is a deer larder at Barcaldine. East Barcaldine's external boundary is deer fenced, with sporting estates adjacent holding high deer numbers.

Landscapes and Ecosystems

There are few areas of native woodland immediately adjoining or connected to existing or planned native woodland within the plan area. Existing networks within the forest are fragmentary, although internal Ancient Woodland sites (see Map 3.8) offer potential for more unified and extensive native woodland networks in the future. External Ancient Woodland site networks are also fragmentary. Current external landuse is unlikely to favour significant native woodland network development in the future. Woodland networks link to the remainder of the Glen Creran Woods SSSI/SAC in Glen Creran itself. A low density scatter of native woodland extends along the steeper western side of the B845 south of the FCS boundary and connects up with the WGS native woodland scheme along the River

Esragan. This network continues in a fragmented state down the Dearg Abhainn to the north.

Open habitats are extensive around the southern edges of the forest. These are largely classed as undifferentiated heather moorland (see map 3.7) or Blanket bog. North of Benderloch, landuse is more mixed, with some extensive areas of deep peat Blanket bog, crofting (e.g. Kiel Crofts), semi-improved pasture, small commercial conifer plantations and pockets of semi-natural native woodland. Much of this area, like the Moss of Achnacree to the south of Benderloch, is relatively flat, in contrast to the forest area. A couple of areas of open land are partly enclosed within Barcaldine Forest; Mill Farm and Achinreir. Mill Farm is classed as improved grassland (Land use class 5.1).

3.3 The existing forest

3.3.1 Age class, species and yield class

- **Age class (see table 5.6)**

Age classes are quite varied across the forest, but even-aged in discrete blocks where restructuring has not yet started or where first rotation crops were felled and restocked on a relatively large scale in the past. The increasing area of old growth woodland reflects maturing broadleaves and conifers managed under LISS. Crop stability in most areas allows rotation lengths to be extended, with a resultant higher proportion of older age classes. Age class within the Glen Creran Woods SSSI is mostly old growth. Variation in native woodland age classes will continue to develop as PAWS areas are felled and left to regenerate over time. Age classes in LISS stands are also showing increased variation where an understorey is developing, particularly in the general vicinity of Sutherland's Grove.

- **Species (see Table 5.5)**

Sitka spruce is the main commercial conifer species, occupying 48% of the plan area. Broadleaves account for 12% of the plan area, but this area has not been fully assessed for species breakdown, including percentage of non-native species. Beech is the most significant non-native species (1%), planted as part of the Barcaldine House estate afforestation. Larch occupies 6% of the plan area - but is unaffected by *Phytophthora ramorum* so far. Lodgepole pine has been used in mixture with Sitka spruce on deep peats up Glen Dubh. Here a self-thinning mixture leaving the SS was expected, but the mature crops still contain a significant amount of LP. *Dothistroma* is present in five areas of Scots pine north of Dubh Loch Mor, but not in Lodgepole pine in the same area. Other conifer species account for 6% of the area. Of these, Douglas fir has grown well on the brown earths in east Barcaldine.

- **Yield class (see map 3.11)**

Pure Sitka spruce has achieved high yield classes (18-24) on the better quality ground. Yield class decreases on deep peat sites, typically in the range 10-14 for SS. Yield class also decreases with elevation, again in the range 10 -14 for SS on upper margins and high points. DF has achieved YC20 in Sutherland's Grove. Much of the forest was resurveyed in 15/16.

- **Timber Quality**

The forest grows Sitka spruce and Douglas fir of reasonable form. Other conifer species are also of reasonable quality. Broadleaves are more variable, notably mature oak and beech. Survey of some mature beech, oak and ash in the general area of Sutherland's Grove found some marketable timber, but most was deemed suitable only for firewood. Exposure and soils limit broadleaved establishment and production of good tree form. Some more sheltered parts may be suitable, provided they are adequately protected against deer browsing.

3.3.2 Access

- **Timber transport**

Timber currently exits the forest onto the A828 and onto the B845 (northern section) (consultation route). Timber from the Dallachulish section exits onto the former A828 around the head of Loch Creran, which is an agreed route. Some timber has recently been removed via the car park at Benderloch. This was a short-term measure whilst timber immediately above the village was felled. The bridge above Mill Farm has recently been repaired to allow timber to exit from West Barcaldine directly onto the A828.

The pier owned by SSF is being used for limited timber transport by sea by private companies, but the pier has yet to be structurally assessed by SSF for its continuing suitability for this kind of operation.

- **Quad access**

Built access tracks for quads exist in some places, often associated with recent restocking. Access is currently considered satisfactory for deer control.

- **Rights of Access**

FCS has a right of access through Mill Farm. FCS gave up its right of access through Achinrier when the field was sold. The access to the kennels at Achacha had been used by members of the public and the owners of the kennels, but the bridge at the head of the field was recently condemned and the road blocked for vehicular access,

with another access route being created to the north using an existing forest road and upgrading an old forwarder track.

3.3.3 LISS Potential

Much of the forest area is suitable for thinning. About 300ha have currently been thinned, but windblow following thinning in some areas has resulted in clearfelling, reducing the total thinned area recently. These clearfelled areas, notably south of the Sealife Centre and west of the Gleann Dubh reservoir, were classed as conifer LISS/ATC. However, in the light of recent experience, use of conifer LISS/ATC has been scaled back to a couple of core areas, centred on Sutherland's Grove and beside the pottery. However, conifer thinning work has been suggested over some 700ha over the next few years.

Native woodland areas are all managed under LISS. Future areas, such as where PAWS restoration occurs, will also be managed in this way. Some may be thinned in the future.

3.3.4 Current and potential markets

- **Timber supply**

Timber markets are outwith the FD area. BSW Kilmallie is the closest sawmill to the forest. The majority of the sawlogs go to this mill. Pallet currently goes to James Jones at Lockerbie, but may go to Kilmallie in the future. Small Roundwood and thinnings mainly go to UPM Caledonian Paper at Irvine or Iggesund Paperboard at Workington. The potential biomass plant at SSF may offer opportunities for small roundwood and hardwood supply in the future, with potential for development of a chipping plant within the forest.

- **Hardwood timber**

No hardwood timber is currently felled for commercial use. Potential beech markets are currently being explored. Woodfuel is the most likely end use for most broadleaves. Some areas of broadleaved regeneration may be suitable in the future. Local markets for timber also offer limited potential.

- **Timber in construction**

High spruce yield classes may reduce suitability of use for construction. Use of alternative slower growing species and provenances may be adopted where suitable where SS is likely to achieve a yield class above 20.

3.4 Land holding

Several sections of the A828 are included in the land holding, whilst other sections are excluded. All former forestry residential buildings are no longer in FCS ownership. The old railway bed north of Barcaldine to South Creagan is in FCS ownership. As noted under section 3.2, the intertidal zone from the jetty at the depot at Rubha Garbh right round to Druimavuic at the head of Loch Creran, with the exception of a section beside the SSF holding, is in FCS ownership.

The Gleann Dubh reservoir is owned by SSF. SSF own the weir just north of the caravan park on the Abhainn Teithil. It is associated with the nearby pumping station. These features were used by Scottish water in the past as part of the local water supply infrastructure. SEPA also use it as a measuring point for the compensation flow from the reservoir. The weir south of Barcaldine House is in private ownership.

A significant ribbon of lost land above the FCS fence extends round much of east Barcaldine. It otherwise is contiguous with the private hill ground above. It amounts to 22.4ha. However, above Eas na Circe is some 3.7ha of 'extra land' taken in by the FCS fence and largely regenerated with broadleaves and some conifers following clearfelling. One additional area of lost land amounting to 9.4ha is located at the head of Glen Salach in west Barcaldine. Again this is mostly open ground with a little riparian native woodland. More minor boundary discrepancies exist around much of the rest of west Barcaldine.

Achinreir, Mill Farm and Achacha represent private land holding largely surrounded by the forest. FCS land also surrounds many of the private properties associated with Barcaldine village, Bars Lodge and Home Farm. Agricultural land in FCS ownership exists in the form of several fields in the vicinity of Barcaldine village. These are currently let. FCS also own a section of shoreside native woodland between the Sealife Centre and the fields at Home Farm, which includes a section of the old railway bed, now part of the Sustrans cycle route. One small section of land forming part of the access in SSF is claimed by SSF under their disposition for the site.

3.4 Landscape and landuse

3.4.1 Landscape character and value

- **Landscape**

SNH's Landscape Character Assessment (Landscape Assessment of Argyll and the Firth of Clyde, Review No. 78, 1996) puts most of the forest within the 'High Tops' landscape type. Its key pertinent characteristics include:

- Rugged, steep-sided mountain ranges with a massive scale.
- Diverse landform with gullies, scarp slopes and rocky screes.
- Striking exposed rock faces, with scrubby birch-oak woodland in gullies.
- Fast-flowing burns, waterfalls and small upland lochs are attractive.
- Extensive conifer plantations on some lower slopes.

The forest area is at the lower end of the scale of ruggedness and massiveness and generally lacks striking rock faces. The lower and upper reaches of the Abhainn Teithil and the Dearg Abhainn are attractive watercourses with waterfalls. The forest currently presents a relatively extensive conifer dominated sweep of hillsides when viewed across Loch Creran.

The lower edges are classed as 'Lowland Ridges and Moss'. Its key pertinent characteristics include:

- Coastal lowland with low ridges separating narrow, linear glens or flat areas of moss.
- Rocky ridges are densely wooded and linear glens are a patchwork of marginal pastures.
- Shoreline and off-shore islands have a more undulating landform and a more open character.
- Some relatively large houses in sheltered coves; scattered, more recent development elsewhere.

Those parts within the forest area are more undulating with knolls, whilst the area around Barcaldine village is an alluvial former floodplain of the Dearg Abhainn and Abhainn Teithil.

No part of the area or adjacent area is classed as a 'Historic Landscape', but the Barcaldine House estate clearly was designed, with remnants of tree-lined avenues still in existence on the estate, plus remnants of extensive mixed and broadleaved woodland enclosed by stone walls on FCS land. The walled garden is another feature, now used as a caravan park, close to the forest boundary.

- **Strategic planning zones (see map 3.12)**

  Design objectives in each forest area have been broadly assessed by dividing each area into three strategic planning zones. These zones also form the basis for the forest operations Tolerance Table, given in Appendix II. Zones present in the plan area are as follows:-

  - **Landscape and Amenity zone –** This comprises the more visible parts above Benderloch and along Glen Salach that are not otherwise in the Native Woodland Zone. In addition, the shoreline areas have been included. The area covered amounts to 237ha.
  - **Native Woodland zone –** This has been constructed based on the extent of the Ancient Woodland layer and existing native woodland remnants. It did not attempt to create native woodland networks. It covers 947ha (36% of the forest area). Most of the lower areas are sensitive in the landscape.
  - **Low Sensitivity Zone –** Comprises the less visible parts and those without native woodland interest. However, some of these areas have landscape sensitivities.

3.4.2 Visibility

Landscape Quality (see Map 4.4)

Improving landscape quality is of particular importance along the main tourist roads and around key recreation areas. Improvements to the southern forest edge above Benderloch as seen from Connel were incorporated into the previous plan, of which most have been implemented or are scheduled over the next 10 years. The hillside above Benderloch is also sensitive in views from Tralee, the current approved design converting the difficult harvesting face to native woodland. This process has only recently been started.

The approach to the forest from the north via the A828 through the Strath of Appin to Creagan is also sensitive, affording good views of the forest area. The Dallachulish section was raised as a concern during the consultation phase of the old plan, where there was a desire to see this face converted to native woodland, to replicate that on the northern shore of Loch Creran. At the time, this was not adopted. Since then the national policy on restoration of Ancient Woodland sites has resulted in this face being planned for complete restoration to native woodland. Similar restoration will affect much of the lower ground throughout the plan.

The forest area lies adjacent to the Lynn of Lorne National Scenic Area. This encompasses Lismore, Ardmucknish/South Shian, Port Appin/North Shian, Shuna and smaller satellite islands around Lismore and associated areas of sea. However, the special qualities contributing to the designation refer to the distinctive islands, their geology and associated lush vegetation, plus historic associations, which are absent from the plan area. However, the surrounding areas are seen as a mountainous, large scale backdrop, although views tend to look outwards towards Lismore. Views from within the designated area will encompass the plan area in a much wider landscape backdrop. The Benderloch section is visible at a distance of 11Km from the ferry routes to Mull and beyond. This is also visible from Achnacroish on Lismore at a distance of 7Km and east Barcaldine at 12Km from the same location. Only the upper parts are visible and even on a clear day, only broad shapes rather than detail are seen. There are similar views from other points on Lismore aswell.

Argyll & Bute Council's Local Plan, currently under revision, maps east Barcaldine as within their Area of Panoramic Quality (APQ) (formerly Areas of Great Landscape Value (AGLV)) for North Argyll. These areas highlight where any proposed development would be looked at more critically. http://www.argyll-bute.gov.uk/sites/default/files/ldp/adopted/Proposals%20Maps/Area%20Maps/Adopted%20Lorn%20Map.pdf

SNH's Wild Land areas includes most of northern Argyll (Glen Etive mountains area), focused on the more mountainous and inaccessible areas. Its western boundary runs along the eastern edge of east Barcaldine. Wild Land is not a statutory designation, but is nationally important in Scottish Planning Policy and where any development is seen as sensitive. Mapping Scotland's wildness - Scottish Natural Heritage

3.4.3 Neighbouring landuse

Areas to the south and east are used for hill grazing. The Glen Creran estate and Ardchattan estate have sporting interests. The Ardchattan Estate also has a native woodland scheme along the River Esragan. A motor racing circuit lies close to the southern edge of the forest above Achnacreebeg, accessed from the south. Some small-scale tourist destinations (see tourism section below) have associated land, notably the Sealife Centre which owns former FC plantations along the northern side of the A828. Benderloch village lies immediately below the Beinn Lora section of the forest. Mixed agricultural land and mixed woodland borders on the north-west side, north of Benderloch. Beaver Timber Company is located at Bars Lodge. Creran Marine is based at Home Farm, and provides yacht storage facilities, moorings and boat repair services, plus two holiday chalets. SSF also provide some moorings and lease part of the site to an aquaculture company. Another fish farm is based at Rubha Garbh.

- **Fences**

A deer fence borders the upper edge of east Barcaldine (See Map 3.9). At the B845 there is a cattle grid. The deer fence continues round to Dubh Loch Mor. Inspection dates vary, some now quite dated, but all recording the fence as in good condition. A stock fence continues from the loch to Ledaig, mostly in poor condition but dated survey records. The next section associated with the cliff above the A828 has no recorded fencing data, but is in poor condition. The stock fence resumes at the car park in poor condition. There are anomalies between the FCS legal boundary and current position of some private householder fences in this section, which have generally replaced the former stock fence, sometimes on a different alignment. The condition is described as good above Culcharron, round to Mill Farm. Stock fencing thereafter including along the public roadside, is poor. Stock fencing around Barcaldine House policies is recorded as in good condition, but the record is very dated. There is no record of the type or condition of fencing around Achinreir or the FCS owned fields at Home Farm and by Achanreir housing site. There is no external fencing from Barcaldine below Sutherland's Grove to Dallachulish, where stock fencing in poor condition resumes, bordering the SSSI. The section bordering the old A828 is recorded as in good condition. This is also a very dated record. One internal deer fence protecting native woodland planting and regeneration exists north of the Gleann Dubh reservoir.

3.5 Social Factors

3.5.1 Recreation (See Map 3.17)

- **Tourism**

A number of recreation facilities are provided in the general area. Sutherland's Grove is a specific tourist destination within the forest. Externally, the Scottish Sealife Sanctuary is a popular destination. Tourist accommodation and facilities are provided at a number of locations close to the forest, many of which enjoy views of the forest. These include; Barcaldine Castle, the Creagan Inn, the Barcaldine caravan park (Oban Camping and Caravanning Club site), the Argyll pottery, Twisted Wheel Café, Appin holiday homes, Lochside Lodges, North Ledaig Caravan Park and Tralee Holiday Park. Other facilities are provided in Benderloch and surrounding area. SSF provides storage facilities for yachters and moorings in Loch Creran. Oban airport lies to the south of Benderloch.

- **Making access easier**

No all ability trials are currently provided. Forest walks and cycle routes are provided around the forest. Walking is the most popular form of leisure access to the forest (68% - survey data 2012/13), 85% of visitors arriving by car and 35% having a dog. A Sustrans cycle route follows the line of the old railway and by-passes the SSF centre following a route through the village. The old coffin route up Glen Salach is not a Public Right of Way. A number of informal mountain bike trails were created about 2005 by the North Argyll Cycle Club. A number of these have been affected by windblow and changes within the club reducing usage. The cycle club hold events in the forest. An Oban based mountain bike club are currently considering opportunities to develop trails in west Barcaldine. The North Lorne Orienteering Club (NL Leisure, based at Kilbowie) uses the Sutherland's Grove area and has recently established a course here. Other orienteering clubs also use the area.

A number of the routes are classed as Core Paths. Three of these exit the forest on the southern side onto private ground. One accesses Beinn Lora; another descends via Achnacreemore to the Moss of Achnacree; the third descends via Achnaba to the coastal road along the northern side of Loch Etive.

- **Recreation**

Car parks and picnic sites are associated with the forest walks and cycle routes. The car park at Eas na Circe is no longer advertised, but continues to be used by members of the public accessing the shore. 58% of visitors surveyed were on a short break or holiday. Campervans use the car parks overnight, which is discouraged. Some outdoor activity providers run events in the forest, such as Stramash and Hebridean pursuits. Visitor numbers are estimated at 20,000/annum. Stramash About Stramash | Stramash, Scotland's Outdoor Social Enterprise use the forest for their activities.

A Visitor Experience Plan has been drawn up, covering Sutherland's Grove and Benderloch, to help manage and improve visitor experience in these areas. Themes, topics and messages include highlighting the unique character of Sutherland's Grove, providing an inspiring experience for visitors and telling the story of the grove. Improvements to be implemented included; signage visibility, surfacing and drainage. Some work on opening up viewpoints was recommended. This included some thinning and high pruning in the grove area, and tidying up brash and windblow. Dog fouling was seen as a high priority issue to be dealt with.

Visitor Zone mapping highlights priority areas for edge management – the Welcome Zone, centred on picnic sites and car parks; the Interactive Zone, adjacent to forest paths and roadside edges; and the Passive Zone, forming the backdrop to these routes and facilities, where lower intensity management may be implemented. Most facilities have received only a low level of edge management, but this is only expected to take place when there are operations in the immediate area. Visitor zones are quite extensive throughout the forest, reflecting use of the forest road network for access.

3.5.2 Community

- **Community Engagement – Neighbours**

Neighbours include residents around Barcaldine and Benderloch; isolated dwellings including Achacha (kennels) and Achinreir; commercial tourist facilities including the Barcaldine Holiday Park, Sealife Centre, SSF and Argyll Pottery. In addition, neighbouring estates include; Glen Creran and Ardchattan. The Barcaldine Community Association is active in the forest, holding events and leasing a site for storage of event equipment. The local primary school is also undertakes forest based educational activities.

- **Partnerships**

There are no existing community partnerships associated with the forest.

- **Community Ownership and management**

No community interests have arisen to date. There are no community groups associated with the forest.

3.5.3 Heritage

- **Cultural Heritage**

There are two scheduled monument in the plan area. One of these is located on an island in a small bay off Loch Creran, known as 'Dalrannach, cairn 255m WNW'. Dalranach | Canmore. The other site comprises of two features near Achacha, known as 'Achacha, cairn and standing stone 400m WNW of'. These are located within the open wayleave of a powerline. Achacha | Canmore Achacha | Canmore

A number of unscheduled archaeological features are associated with the forest area. These include various buildings, including old farmsteads, settlements, sheepfolds, stone walls, wells, shielings, charcoal platforms in east Barcaldine, bridges and eight 2nd WW structures built to defend a section of the coast north of Barcaldine village.

Policy - Archaeological features will be protected in accordance with the Forestry Commission's Archaeological Guidelines, and UK Forest Standard guideline 'Forests and the Historic Environment'. Standard prescriptions from the West of Scotland Archaeology Service include; leaving 5 meters either side of walls and linear features unplanted and 20 meter buffers around localized sites. Breaches in linear features will be kept to an absolute minimum. Other buffer zone widths are defined for each monument on the conservation plan and against the overlay key.

3.6 Statutory requirements and key external policies

The following official designations exist in the plan area:-

- APQ – Area of Panoramic Quality, North Argyll
- Ancient Woodland sites
- Powerlines and wayleaves
- Two scheduled Ancient Monuments
- Glen Creran Woods SSSI/SAC
- Lynn of Lorn NSA (adjacent area only)
- Loch Creran SAC (adjacent area only)
- Glen Etive and Glen Fyne SPA (adjacent area only at extreme north-eastern corner)
- Wild land- Loch Etive mountains (adjacent area only)

Key external policies include:-

- Scottish Government policy on Woodland Removal
- Scottish government woodland expansion aspirations

- Latest advice on tree diseases, species choice and biosecurity protocols (FES Larch Strategy).
- Measures to combat Climate Change (Climate Change (Scotland) Act 2009)
- Scottish Outdoor Access Code
- Community Empowerment Act (2015)(see FES Community Asset Transfer Scheme (CATS)).

4.0 Analysis and Concepts for each site factor

A new District Strategic Plan the period 2014 -17; http://scotland.forestry.gov.uk/images/corporate/pdf/WestArgyllDsp2014-17.pdf expands on six key themes introduced in the National Strategic Directions document, http://scotland.forestry.gov.uk/images/corporate/pdf/FES-strategic-plan.pdf making specific district responses to these key commitments. The Corranbuie & Skipness FDP revision now needs to take these into consideration. These themes are as follows:-

- **Healthy,** achieving good environmental and silvicultural condition in a changing climate.
- **Productive,** providing sustainable economic benefits from the land.
- **Treasured,** as a multi-purpose resource that sustains livelihoods, improves quality of life, and offers involvement and enjoyment.
- **Accessible,** local woodlands and national treasures that are well promoted, welcoming and open for all.
- **Cared for,** working with nature and respecting landscapes, natural and cultural heritage.
- **Good value,** exemplary, effective and efficient delivery of public benefits.

National key commitments under these themes and the district's specific action response are highlighted where relevant in the text below.

4.1 Analysis

4.1.1 Physical site factors

4.1.1.1 Geology, soils and landform

The underlying geology influences the landform. Three distinct areas of landform, Benderloch, the remainder of west Barcaldine and east Barcaldine, reflect this geological split. Steep ground can also be related to this, with Benderloch and east Barcaldine having a much higher proportion. This gives rise to some more challenging areas to harvest, particularly above Benderloch and around Coire Circe. There are operational and environmental justifications for turning some of these areas over to native woodland in the next rotation.

The limited availability of accurate soils data will mean some uncertainty in species choice selection. The general indications are that most of the steeper slopes have either Brown earths, podzols or ironpan soils, which will support a wider variety of species. Areas generally classed as Blanket bog look likely to contain significant areas of more favourable soil types. There is no apparent correlation between areas of windblow and soil type or between yield class and soil type, but due to the incomplete and generalised soils data, firm conclusions cannot be reached. One or two small areas of potential candidate Blanket bog restoration can be identified in west Barcaldine, although none appear to be of particularly high ecological value.

(National Key Commitment (Healthy): We are exploring how to best steward the carbon resources locked up in the Estate's trees and soils.

4.1.1.2 Water

Further progress to improving the status of the Abhainn Teithil will only occur over the next 25 years due to crop age and restructuring requirements. However, much of the watercourse has a riparian corridor already containing native woodland, although there are only a few gaps to produce dappled shade conditions favourable for fish. Restoration of PAWS will considerably expand the native woodland corridor, including around the reservoir. This will also help develop resilience for the reservoir from potential soluble or woody debris entering it as a result of harvesting operations. No annual list of operations has been provided to MRC under the management agreement in the past. SSF hope to develop protocols to replace the management agreement. SSF are supportive of establishing native woodland within the catchment. They would encourage operations that minimise impacts on ground conditions. Current LMP proposals minimise felling interventions over the next 10 years to just two coupes. SSF have suggested that where possible, any proposed felling within the catchment be completed ahead of the commissioning of the new hatchery. Thinning activities are propose within the catchment, a situation that will be kept under review in the light of potential impacts on ground conditions, rotation length and windblow risk. The reservoir catchment covers about 1050ha of which about 31% is on FSC land. 3% of the catchment area was felled in the last 5 years. A further 3% will be felled in Phase 2. (UKFS - Where water bodies are sensitive to nutrient enrichment, including shallow coastal lochs designated for shellfish, limit any clearfelling to no more than 20% of the catchment in any 3 - year period).

The Dearg Abhainn and reserve catchment will also benefit over time through PAWS restoration and native woodland habitat network development to the southern edge of the forest. The catchment covers 820ha, of which about 51% is FCS land. Some 6.5% of the catchment will be felled in Phase 1 and 2.5% in Phase 2. 4.7% of the catchment was felled in the previous 5 years. (UKFS - No more than 20% of the catchment of a public water supply shall be felled in any 3-year period).

The Abhainn Achnacree reserve catchment will see increased use of native woodland around the reservoir, lochans and feeder burns where these are on FCS land. The catchment area is 692ha. Of this about 42% is FCS land. Some 9% of the catchment will be felled in Phase 2. 2% of the catchment was felled and replanted in the last 5 years.

No operations are planned that would directly affect any of the Loch Creran shoreline in FCS ownership. Potential negative indirect effects from watercourses that flow off FCS land into Loch Creran will be avoided through adherence to the Forest and Water guidelines during all forest operations.

4.1.1.3 Climate

- **Adapting to climate change**

Windiness is the main climatic factor affecting the forest. Critical decisions on when and whether to thin, and whether stands can be converted to continuous cover are all dependent on accurate assessment of windthrow risk. DAMS data is the best available method of assessment to assess risk, using maximum scores to guide thinning and timing of felling decisions. Scores suggest much of the forest is sufficiently sheltered to allow thinning and longer rotation lengths. These scores are used in the Forest Gales software to predict risk and guide rotation lengths. Reasons as to why significant areas of thinned crops have blown down recently seem to relate to wet and windy weather occurring soon after thinning, although these were all significantly delayed first thins. This however has not changed the desire to thin significant new areas in the near future, but will be subject to review in order to meet volume storage aspirations.

Development of robust habitat networks is seen as part of the strategy for developing resilience against the effects of Climate Change. Development of native woodland networks within the forest is achievable through PAWS restoration and linking of existing native woodland areas. Native woodland development along the Dearg Abhainn and Abhainn Teithil will help reduce flooding events downstream, which could otherwise become more frequent given Climate Change rainfall predictions for the west coast. The combination of soil types and DAMS suggest that the forest is suitable for increasing species diversity, favoured under the Climate Change agenda.

Best practice guidance will be followed in relation to water management on restock sites. Most sites have adequate amounts of slope allowing natural drainage, hence the need for drainage ditches is likely to be low. Additional precautions will be taken in the Gleann Dubh catchment in line with the agreement with MRC/SSF.

(National Key Commitment (Healthy): We will help the Estate adapt to climate change and become more resilient to pressure. District specific action: Current evidence suggests that West Argyll will remain a core spruce-growing region, but we will also seek to increase locally suitable native species and other suitable conifers to increase forest diversity).

4.1.1.4 Renewable Energy

SSF operates a hydro-scheme off the Gleann Dubh reservoir. No other hydro-schemes have been tabled.

A wood based energy scheme has been proposed but not taken forward so far.

(National Key Commitment (Productive): We aim to realise the Estate's renewable energy potential, while achieving a reasonable balance with other objectives. District specific action: We will work with energy businesses to increase renewable energy generation in the District in line with the Scottish Government's 2 Gigawatt target for 2020 and the wind energy guidance in the Argyll & Bute Landscape Wind Energy Capacity study (or successor documents)).

4.1.1.5 Infrastructure

Infrastructure resilience has improved in recent years following clearance of windblow adjoining powerline corridors in west Barcaldine. There are no current requests for infrastructure resilience felling from SSE.

4.1.2 Biodiversity and environmental designations

4.1.2.1 Designated Sites

Glen Creran Woods SSSI/SAC - Control of rhododendron and Japanese knotweed are in progress. Conifer removal from a section south of Creran Bridge as part of a larger felling coupe (42173) has recently been completed. Site condition monitoring is undertaken by SNH. Buffering of the woodland from conifer seeding is ongoing as adjacent coupes are felled and restored to native woodland.

4.1.2.2 Species and habitats

Ancient Woodland sites

Nearly all areas can be fully restored over time. Restoration of some areas where seed sources are lacking, notably in parts of west Barcaldine, may either take longer or require planting. Sutherland's Grove will be enhanced rather than fully restored, to keep the historic mixed woodland character. Conifer regeneration is an issue in some areas. In these cases, the conifers will be allowed to grow on to full rotation and then felled, or be progressively removed by thinning where conditions are suitable.

One area in west Barcaldine was planted with Copper beech (coupe 43561). It has been decided to retain this as there was little evidence of native woodland remnants or regeneration, but should any native woodland regeneration arise, then the surrounding Copper beech will be removed. The survey of autumn 2016 reclassified the southern part of this site as suspect non-PAWS, so may be replanted with conifers at the next rotation.

Other suspect non-PAWS areas have been identified around the periphery of Sutherland's Grove and Eas na Circe. Factors favouring restoration to native woodland on these sites include native woodland habitat connectivity, presence of broadleaved regeneration, slope steepness and visual amenity. Factors favouring replanting with conifers include absence of broadleaved regeneration and seed sources, potential good productivity for commercial conifers and replication of mixed woodland around Sutherland's Grove. Each site has been assessed on this basis and prescriptions shown on the future species and habitats map. In addition, an area of non-PAWS south of Gleann Dubh, classed as Long-established plantation origin woodland has been allocated for restoration to native woodland to strengthen native woodland habitat connectivity (Cpts 1634 (pt), 1656, 1657 (pt).

(National Key Commitment (Cared for): We are restoring around 85% of areas on ancient woodland sites to largely native species – remaining areas will be enhanced through our management. District specific action: We will continue to enhance ancient woodland remnants and restore plantations on ancient woodland sites to native woodlands, removing mature conifers from 100 ha during 2014-2017).

Birds

Several species will constrain the timings of forest operations in the immediate area to known nest sites. Liaison with SNH and RSPB will provide further information on current nesting of sensitive species (see confidential annexe).

Other wildlife

The forest area of Norway spruce will be increased for species diversification and landscape enhancement. This will benefit Red squirrels.

SNH requested that they be consulted regarding any operations planned where *Sciara militaris* (Dark-winged fungus gnats) (army larvae) are found.

Deer Control

Deer numbers are currently relatively low. The strategic deer fence against the Ardchattan Estate/Glen Creran Estate will be maintained. There are no plans for internal deer fences at present. Open space is however limited for deer control.

(National Key Commitment (Healthy): We will help the Estate adapt to climate change and become more resilient to pressure. District specific action: We will deliver our Deer Management Plans for each of the Deer Management Units in West Argyll District in collaboration with neighbours and key stakeholders).

Native Woodland

Native woodland regenerates in most of the lower parts of the forest. Seed sources are available in most places. Some higher elevation sites have also shown good regeneration, particularly around Coire Circe. Most PAWS sites also contain an element of native woodland. However, most existing areas of native woodland have some exotic species content. Native woodland habitat networks have been strengthened through PAWS restoration, the creation of linkages in places and limited use of productive broadleaves on non-PAWS sites. Some use of beech on non- Ancient Woodland sites will be continued as part of the historic landscape of the area.

(National Key Commitment (Cared for): We aim to increase broadleaf tree cover from the current 8% of woodland cover to around 20%. District specific action: Our new Land Management Plans will use data from the Native Woodland Survey of Scotland to identify where expansion of broadleaf woodland will improve the habitat network and buffer ancient woodland fragments).

Open habitats

There are few open habitats within the plan area. The largest, Coire Circe, is showing a certain amount of broadleaved regeneration on more favourable parts of the site. This not currently a concern as the NVC site type is likely to be Upland heathland as opposed to more sensitive NVC types. Scorr Nighean Eoghainn was detached from the external open habitat by a band of conifers until these were recently felled. The former design envisaged an open corridor linking the hilltop to the external open habitat, which will be created when the remainder of the site is restocked.

There is currently no intention to refence any of the external boundary anomalies along the legal boundary. These areas are generally rockier than the ground within the FCS fence. The 8.4ha steep triangle on the southern edge of Gleann Salach is unsuitable for anything other than low density broadleaves. Its straight southern boundary is unsuitable as a forest edge in the landscape and is best left open or additional land acquired.

The upper edge of Dallachulish, east of Coire Circe, was designed as open space with some variation in the upper margin to overcome the former straight edge to the forest. This was also in part extra land. However, regeneration of both broadleaves and conifers has infilled this area, recreating the straight edge. The natural tree line is higher than the fenceline, with little native woodland present. Ideally a natural tree line would be developed in this area, but acquisition is unlikely and fencing it more challenging than the current line. A feathered edge would be preferable on the FCS side of the fence, but it is likely to need frequent interventions to sustain it which is unlikely due to cost.

(National Key Commitment (Cared for): We are committed to maintaining the best open habitats in good ecological condition. District specific action: We will continue open habitat surveys in West Argyll District to ensure completion by 2019).

Deadwood

Currently about one third of the wooded area is anticipated to have medium or high deadwood potential. This has not been verified on the ground. Some of these areas, notably PAWS, seem little different from adjoining plantation areas classed as having low potential. Windblown pockets offer additional deadwood in low potential areas.

Invasive species

Rhododendron will be removed as part of the district's eradication policy. Japanese knotweed will be removed when it is found.

(National Key Commitment (Healthy): We are committed to dealing with invasive plants and animals that threaten habitats and biodiversity. District specific action: We have treated 25% of the rhododendron in West Argyll and have moved 2,250 ha into the follow-up phase, tackling particular concentrations in Appin, Carradale, Lochgilphead and on Mull).

4.1.3 The existing forest

4.1.3.1 Age class, species and yield class

There are environmental, landscaping and social reasons for increasing diversity. Increasing diversity may have possible benefits for countering possible effects of climate change. Differences in growth rates and age classes, give some flexibility in timings of felling and restructuring. The current age class structure of the forest is noted in Table 5.6. The overall balance is reasonably good, but is less so when looking at individual sections of the forest. Restructuring should diversify these areas, provided windblow does not become an issue.

Current minor species distribution does not generally reflect the landscape and amenity priority areas. Neither does minor species layout reflect any landscape design intent in nearly all cases. SS has mostly been the most productive species over the whole plan area. Beech has grown sufficiently well in places to provide some marketable timber. There are no reported cases of *Phytophthora ramorum* or *Chalara* in the forest or the surrounding area. *Dothistroma* has been found in five separate but locally grouped areas of pure Scots pine planted in 1993, in the vicinity of Dubh Loch Mor in west Barcaldine. There are no immediate plans to fell these areas due to their small tree size. The total area involved amounts to 7.6ha.

Although there are some relatively low yield class SS/LP crops, notably at the head of Gleann Dubh, most sites are likely to achieve a satisfactory yield class at the next rotation. Mounding, better drainage, use of SS/LP self-thinning mixes and improved provenance in the second rotation should help achieve improved yield classes. High SS yield classes in some areas will result in timber of lower strength. Current policy is to substitute SS with other minor conifer species in these areas, where suitable.

(National Key Commitment (Healthy): We will help the Estate adapt to climate change and become more resilient to pressure. District specific action: We will implement mitigation strategies for current tree disease threats, such as *Phytophthora* disease of larch (tackling existing and new outbreaks), *Dothistroma* needle blight of pine, and *Chalara* disease of ash (if it becomes established in Argyll)).

(National Key Commitment (Productive): We intend to manage at least a quarter of our expanding broadleaf woodlands to produce quality hardwoods and woodfuel. District specific action: We will increase the area of broadleaf trees for the production of quality hardwoods and woodfuel during 2014-2017. We will bring timber to the competitive market that is suitable for biofuel projects).

4.1.3.2 Access

The final road network is in place for east Barcaldine. In west Barcaldine, several spur roads are required over the next 20 years. The forest road proposal (790m) above Mill Farm through Doilet Wood is designed to minimise any impact on the planted oakwood below it rather than cutting through it, although this adds to the length of the road. Access to a Phase 3 coupe immediately east of Achacha is restricted by the water pipeline running along the south side of the road north of Achacha and by the powerline serving the property. Extraction onto this shared access would not be acceptable. Two options were proposed, to build a spur into the coupe or to upgrade the forest road to the south. As the latter appears in reasonable condition, this option is preferred.

A couple of forwarder tracks are also planned. These include a spur to the north of Benderloch, skirting the edge of the steep face above Culcharron. This spur is intended as a forwarder track to provide access for an off-road winch and forwarding along it. Its position is dictated by the extraction lines needed for effective winch operation. Its position just over the crest of the slope will limit its visibility in views from Tralee. Brash from associated whole tree processing will be used on the track. Any remaining brash after extraction is complete will also be spread on the track to reduce is visibility in the landscape. A short forest road spur, out of sight from the west, is also needed to help assist with timber movement. The extreme north-western corner of this coupe may prove too challenging to access, so may either be felled or left. Discussions with SSE will be required here as a powerline runs along the bottom of the coupe.

A second forwarder track will be required in the edge coupe south of Benderloch (43039). There is a cliff about 150 meters up from the western point of the coupe beyond which timber needs to be winched up. An access track is therefore required to get the winch down to the cliff edge. This track will be screened from the sensitive Connel view by the ridged landform. Brash from the winching process will be used on the track.

Not all existing roads will be maintained, some being used as forwarder tracks and others maintained to a lower standard for recreational use. Access to Achacha including public access to the kennels there was diverted north in 2016 following failure of the bridge at the forest boundary. The bridge has been closed to traffic and will not be renewed.

Access to a coupe (43790) west of the B845 planned for felling in 2018 will require a short spur off the public road. The site is constrained by the gullied watercourse and powerline higher up, the only realistic site for the spur being immediately north of the bridge. Windblow is affecting both sides of the road here, with the adjoining coupe of blown Lodgepole pine in East Barcaldine (42967) to be taken at the same time. This will require an upgrade of the associated forest road to the east of this coupe and an adjoining watercourse bridged for forwarder access. Access is unavoidably then onto the B845, which is a consultation route.

(National Key Commitment (Productive): We will use our work programmes to promote the development of the forestry and land management sectors. District specific action: We will construct 75km of new forest roads to improve access to manage the National Forest Estate in West Argyll).

4.1.3.3 LISS Potential

DAMS data (see map 3.4), thinning coupe data, crop, soil and topography data have been assessed in order to identify possible coupes suitable for conversion to LISS. Steep and difficult working sites are generally excluded. DAMS data suggest opportunities for thinning may exist over the majority of the forest area. This is now largely restricted to subsequent rotations, except where thinning has already started. However, thinning of first rotation hardwoods may be possible in some places, particularly for amenity, as part of Visitor Zone Management or PAWS restoration. Otherwise, existing areas of native woodland are managed under Minimum Intervention. Sutherland's Grove represents the main area of mixed woodland for which LISS management is proposed. One additional area below the pottery has also been identified. Other areas of conifer formerly intended for LISS have been reassessed and considered unsuitable on stability grounds so have been reclassified for clearfell management. All existing native woodland areas will be managed under LISS, some of which will be managed to yield some hardwood timber. Decisions on whether to assign coupes to LISS will be taken nearer conversion time.

(National Key Commitment (Healthy): We are committed to high quality silviculture and, increasingly, to using alternatives to clearfelling. District specific action: Opportunities for low impact silvicultural systems will increase in the next rotation as more forest becomes accessible by road. We will review where alternatives to clearfelling can be practised (taking into account the climate change predictions of increased rainfall and more storm events) and include this in our Land Management Plans as they are developed. Low impact silvicultural will be concentrated in native woodland areas).

4.1.3.4 Current and potential markets

Timber markets are likely to remain outwith the forest district, unless the wood fuelled renewable energy scheme is progressed. Appin Woodworkers have also expressed interest in a site for milling in the forest. Beaver Timber is located at Bars Lodge, who make products such as garden sheds. They do not currently buy wood from FCS. Markets for hardwoods are currently being explored. Some planting of commercial broadleaves is envisaged in the plan.

Should *Phytophthora ramorum* be found, it would be felled under a Statutory Plant Health Notice. Timber would have to go to approved sawmills for processing. Felling of larch within a defined 10Km buffer zone would be restricted to the period 1st June – 16th October.

(National Key Commitment (Productive): We aim to provide at least three million cubic metres of softwood timber per year on a sustainable basis. District specific action: West Argyll District will bring 500,000 cubic metres of timber to market each financial year. We will adjust this as necessary in line with the development of plant health issues and windblow events).

(National Key Commitment (Productive): We will market timber in ways that encourage value adding and create additional jobs in manufacturing and processing, while recognising the benefits of contributing to local economic activity, especially in more fragile rural areas. District specific action: We will hold a 'log-shop' event annually for the local sale of specialist timbers to support small-scale wood processing. We will endeavour to assist small-scale timber business start-ups with short-term wood supplies).

4.1.4 Landscape and landuse

4.1.4.1 Landscape character and value (see Map 4.4)

SNH's Landscape Character Assessment

The suggested specific landscape guidelines for 'High Tops' that are pertinent to the plan area are as follows:-

- Forestry should be concentrated in areas with a relatively homogenous landform and should not extend uninterrupted across adjacent ridges and valleys. Wherever possible, the upper limit of plantations should allow development of a natural tree line.
- Narrow fast-flowing mountain burns, with their scattered bank-side vegetation, and small upland lochs are a focus for views along mountain valleys. Forestry plantations should be designed to ensure that the setting of these important local landscape features is carefully conserved.
- The expansion of native woodland, Scots pine and broadleaves into all natural sites should be encouraged.

Development of a more natural tree line would benefit the upper edges of east Barcaldine. This would help ameliorate the straight upper edge and avoid issues of deforestation. However, as has been seen above Dallachulish, complete infilling with regeneration may occur over time, reinforcing the straight edge effect.

Potential exists to pull back conifer planting from the edges of the Dubh lochs and the Gleann Dubh reservoir. Existing native woodland should be able to colonise these areas and create a more attractive edge to these features.

Restoration of PAWS will see further native woodland expansion within the forest area. Introduction of Caledonian provenance Scots pine into these areas may have some justification based on remnant Caledonian pinewood immediately north of the Creran Bridge.

Two areas have been highlighted for their importance in the landscape; Sutherland's Grove for its mixed woodland managed under continuous cover; and Glen Creran SSSI/SAC at Dallachulish and associated northern face of Coire Circe for its existing and potential native woodland. There are also grounds for replicating some of the historic policy woodland character where this does not conflict with PAWS restoration. Use of beech and Douglas fir where suitable are examples of policy woodland species to be favoured.

The suggested specific landscape guidelines for 'Lowland ridges and moss' that are pertinent to the plan area are as follows:-

- Identify and conserve the landscape setting of archaeological sites, as well as the sites themselves.
- Conserve and restore stone walls using local materials and techniques.
- Manage mixed woodlands on ridges and take steps to control rhododendron which is endemic in some areas. Woodlands should be thinned and selectively replanted with local species to maintain the diverse character.

Archaeological sites will benefit from conifer removal and establishment of open buffers. Settings can be enhanced through use of diverse tree species outwith the buffer in most locations. Several stone dykes are highlighted in the archaeology dataset and others exist around the forest. However, funds do not permit their restoration, but their courses will benefit from open buffers after harvesting.

Thinning and restoration of Ancient Woodland sites will help diversify the landscape. Rhododendron is relatively scarce within the plan area, but pockets of dense growth exist around Achanreir.

Areas of 'Lowland ridges' along the northern edge will be returned to native woodland through PAWS restoration or productive broadleaved planting. These areas are more visible so will be enhanced through native woodland restoration.

4.1.4.2 Visibility (see Map 4.4)

'Siberia' - Landform analysis suggests much of the area can accommodate large coupes where shape is not critical as is generally not visible. Some coupes have also cut across hill tops which require redesigning to fully encompass them.

The forest edge above Achnacreebeg car racing circuit cuts across the summits of two low hills. This edge will be improved by removing woodland from these summits and replanting the adjoining area with native woodland.

Benderloch - The area above Benderloch is more rugged with steep slopes and high tops. It is also very visible from a distance. It is important to avoid skyline edge conifers; hence taking coupes right over the hill top and removing the southern coupe now is necessary (See Map 4.6 Viewshed analysis from Tralee). Steep faces require an element of winch work and access creation for winching. These factors favour taking large coupes to overcome the visual and logistical difficulties these sites pose, and converting them to native woodland for landscape, amenity and practicality.

Glen Salach - East Barcaldine is sensitive in views from Loch Creran and beyond. Scale generally can accommodate relatively large coupes, but these should avoid being too rectangular through adoption of linear forest roads and watercourses as the only boundaries. The upper edge should be scalloped and consideration given to fencing in the lost land to provide future opportunities for additional scalloping. Views from the immediate area require smaller coupes on lower slopes to avoid scale of felling appearing too large.

The B845 is enclosed by conifer plantations for much of its length, with occasional views where clearfelling has taken place or glimpses through breaks or along the line of the road towards South Shian. Tree species diversification and increase in open space would benefit the route, but sustaining open space free from regeneration will

be difficult to achieve if resources are not available. Some edge management will be necessary to secure road resilience, although incidents of blown trees across the road are rare. Veteran trees add character and diversity to the route and should be retained where safe to do so.

Sutherland's Grove and Gleann Dubh - Recreation routes provide the primary views of the area. Visitor Zone management prescriptions will influence immediate views, whilst species choice and thinning prescriptions will affect the broader character of the area. The previous plan created several open vistas for public views, notably around the reservoir. Larger coupes can be accommodated further up the glen. PAWS restoration influences much of the area. Upper edges are more visible from distance. The head of the glen would ideally be afforested if it had been in FCS ownership to balance upper edges.

Dallachulish - The upper edge is too straight, but unlikely to have resources to prevent recolonization of original scalloping with broadleaves. The private land above shows no sign on native woodland regeneration, reflecting management policies. This ground becomes increasing unsuitable for forestry and fencing within a relatively short distance. Several bold blocks of larch are unsympathetic to the overall landscape appearance, but their relatively young age mitigates against felling now. Management following PAWS restoration may prove challenging given the steepness of the face. Some mature Sitka spruce singles are apparent in the SSSI. Reducing opportunities for further seeding were incorporated into the previous plan by felling adjoining conifer crops as a priority.

Achanreir - Views from the walks, roads, and housing in this area are only of edges of west Barcaldine and glimpses of short sections of upper east Barcaldine to the forest edge below Beinn Bhreac. Adjoining trees and woodland generally screen most of the view. Views from the A828, SSF and Home Farm see more of the upper edge to east Barcaldine below Beinn Bhreac. This also highlights the need to reduce the tree line on the ridge running down north-west of Coire Fuar, highlighted in the view from South Shian.

A828 Corridor - North from Barcaldine village, the road passes the entrance to Sutherland's Grove, with mixed mature woodland, seen as edges, and including some beech. Beyond that, oak-dominated native woodland, coastal fringes and rock-cut embankments fringe the road. Where views are obtained, these look out across Loch Creran. More extensive views of the northern side of the forest are only obtained when the Creran Bridge is reached.

South of Barcaldine village, the road is overshadowed by mature broadleaves, a few remaining mature conifers. Recent clearfells on FCS land present only a short steep face to the road, with no views beyond. Some rock-cut embankments also fringe the road. The Sustrans cycle route runs parallel to the road. Some dense rhododendron is present along some sections. South of the pottery, views across the fields at Mill Farm reveal edges and limited views of the immediate coniferous forest. South of this, the forest onl becomes visible once the steep hillside above Benderloch becomes visible.

4.1.4.3 Neighbouring landuse

Most upper areas are utilised for sporting and sheep grazing. Here there is generally little evidence of native woodland except in inaccessible gullies and crags. Much of this area above east Barcaldine is unsuitable for commercial forestry due to elevation and rugged terrain. Some areas around the periphery of west Barcaldine could offer potential for commercial forestry. They also show more evidence of native woodland development. Beinn Lora is more rugged, offering little scope for commercial forestry, but is developing some native woodland cover around the lower fringes. This can be extended through the FCS Benderloch section when converted to native woodland. Lower areas facing Loch Creran score 5.1-5.2 for land capability for agriculture, extending across the FCS boundary. Improved pasture, including fields around Barcaldine village score 4.2, providing textural and landuse diversity in the landscape, hence preferably retained in agriculture. Starter farm potential has been identified here.

4.1.5 Social Factors

4.1.5.1 Recreation

No new recreation facilities are planned. Further landscape improvements through Visitor Zone Management and forest redesign will improve the attractiveness of the forest over time to visitors. Operations include thinning and high pruning to increase visibility.

Plans to develop a mountain bike link from Sutherland's Grove to Eas na Circe in 2005 were considered unrealistic due to concerns about its route through the SSSI, aswell as lack of funding. The North Argyll Cycle Club also proposed extending an existing route to Am Maoilean in west Barcaldine, but funding again was an issue. The club has since become more road focused, so use of existing informal mountain bike trails has decreased. Some of these may have been lost due to windblow being cleared. The current advertised cycle routes in east Barcaldine all utilise existing forest roads.

(National Key Commitment (Productive): We will work with partners to develop the Estate's potential for tourism. District specific action: We will work with our local partners in the Argyll Forest Tourism Initiative and Visit Scotland, as well as local destination organisations, to develop the forest tourism potential of Argyll).

(National Key Commitment (Treasured): We are committed to creating more uniquely special places across the Estate and to delivering benefits to an increasingly diverse range of Scotland's people. District specific action: We will

define and invest in the management of visitor zones to make them more attractive and welcoming).

(National Key Commitment (Accessible): We will continue to invest available resources into high quality facilities that encourage and help visitors experience and enjoy the outdoor environment. District specific action: We will make use of our visitor survey data to refocus our investment in recreation facilities on projects that improve the quality of sites in Argyll with higher footfall).

4.1.5.2 Community

No community partnership or ownership initiatives are currently being planned.

4.1.5.3 Heritage

The Achacha standing stone and cairn have been protected from forest operations in the past and lie within areas of permanent open space. The only action required is the control of bracken around the cairn. There is provision for the removal by hand of any seedlings that arise. A main forest drain on the edge of the scheduled area should ideally be left as it is rather than maintained in order to protect sub-surface components of the cairn. There are no plans to improve access to the sites.

The Dalrannach cairn requires monitoring of existing woody shrubs and potential for additional woody growth. Where and when deemed necessary, these will be removed in accordance with the agreed management plan. The island is tidal, making public access difficult. FCS has no right of access along the coastal farm track, so provision of public access by vehicle is unlikely, although parking is available at the pottery.

The district's Cultural Heritage Strategy details working methods around sites. The district's heritage records have been consulted, which include data from searches of the RCAHMS inventories, WoSAS online data and NMRS. Old one-inch Ordnance Survey maps have also been checked for sites.

4.1.6 Statutory requirements and key external policies

The Council's Areas of Panoramic Quality covers the area. Planned forest road construction is minimal and unlikely to have any landscape concerns.

Ancient Woodland sites will be progressively restored, although the timescale, particularly for LISS management sites, being over a longer time period than with clearfell sites. Sites around Sutherland's Grove will be enhanced rather than restored, to conserve the distinctive historic character associated with the estate afforestation and early FC plantings.

Powerlines will be widened where necessary in agreement with SSE. The principal line through the forest runs up Glen Salach. It is affected by a combination of conifer and broadleaved regeneration, resulting in corridor widths as low as 5m. SSE is likely to deal with any issues close to the line. Regeneration in the future is likely to maintain varying amounts of woody growth within the minimum buffer zone and beyond along much of the line. Other shorter lines around Barcaldine village and Mill Farm are also likely to experience woody regeneration. A high percentage of these corridors will be within native woodland areas in the future.

The Glen Creran Woods SSSI has benefited from conifer removal from adjoining coupes over the last few years, with native woodland planned by natural regeneration. Further work to remove rhododendron is in hand. Plans to remove beech through thinning operations in the area are also ongoing.

4.2 Plan Concepts (See Map 4.3)

4.2.1 Physical site factors

4.2.1.1 Geology, soils and landform

SS/LP mixtures will be used on confirmed deep peat sites where acceptable yields are achievable. Very few areas are likely to merit restoration or conversion to edge woodland under the FCS deep peat policy. No application of fertiliser or heather treatment is planned, with most second rotation crops likely to achieve satisfactory growth rates. Where steep ground poses significant constraints on commercial forestry, use of broadleaves managed under LISS will be favoured. Forest redesign takes into consideration underlying landform, using existing riparian corridors and unplantable areas as coupe boundaries where possible.

*National theme - **Cared for** - delivery through forest design that respects landform; Blanket bog restoration.*

4.2.1.2 Water

The Forests and Water Guidelines will be followed. SSF will be kept informed as per the management agreement. Scottish Water will be notified if any operations might affect the reserve water supplies. Detailed survey for private water supplies will be undertaken as part of the site Work Plan arrangements. Private water supply owners will be contacted ahead of operations in their water catchments. Key riparian habitat corridors and water bodies will be given wider buffers (15 - 30m).

Percentage of catchment felling in any 3-year period will be kept below 20% (UKFS requirement).

4.2.1.3 Climate

Native woodland habitat networks will be created to increase resilience against climate change. Windfirm boundaries will be adopted or created in the plan. Standard 20m open coupe buffers will apply, except where broadleaves or permanent woodland cover is present. Tree species diversity will be increased to strengthen resilience against climate change.

4.2.2 Biodiversity and environmental designations

Management of the Glen Creran Woods SSSI will be in accordance with SNH's management plan.

Full PAWS restoration is envisaged for the plan area except around Sutherland's Grove, which will be enhanced. Full restoration may take more than one rotation. Ancient Woodland sites and existing native woodlands form a basis for creating a native woodland habitat network. Natural regeneration is the preferred method of establishment of such sites.

Timings of operations and buffer zones will follow specified guidance for key species.

*National theme - **Cared for** - delivery by development of improved habitat network linkages; protection and enhancement of open habitats.*

4.2.3 The existing forest

4.2.3.1 Age class, species and yield class

Forest restructuring will be continued or implemented as necessary to achieve a balanced age-class distribution. Species diversity will be increased and mixtures used where viable. Species choice will take into consideration future climate predictions for the area. Species choice will also respond to existing yield classes, to avoid producing structurally inferior timber from high yield class crops. Species selection will avoid the use of disease-prone species. The plan will deliver 36% native woodland over the course of time (See tables 5.6 & 5.8).

*National theme - **Cared for -** delivery of at least 20% broadleaved woodland cover contribution to FD Strategic Plan target of around 20% cover through the design.*

*National theme - **Healthy** - delivered through species diversification, removal of diseased trees and planting of alternatives to increase resilience against Climate Change.*

4.2.3.2 Access

A new road is required in Phase 1 above Mill Farm. A spur to access the coupe above the race track above Achnacreebeg will be required in Phase 2. A forwarder track and short spur road will be needed to access the steep coupe north of Benderloch in Phase 1. Forwarder tracks will be required to access the coupe on the southern edge of the Benderloch face.

No road network linkage proposals from neighbours are currently anticipated.

*National theme - **Productive** - delivery through contribution to FD Strategic Plan road construction target of 75km.*

4.2.3.3 LISS Potential

LISS opportunities in second rotation conifer crops on lower slopes will be considered where thinning is achievable on potentially stable sites. Permanent conifer retentions managed by Minimum Intervention will not be thinned. Native woodlands will be managed under LISS, but most are unlikely to be thinned in the future due to access issues. PAWS restoration will expand the area managed under LISS over time.

*National theme - **Healthy** - Area managed under LISS will be increased over time.*

4.2.3.4 Current and potential markets

Conifer thinnings will continue to be marketed from the forest. Markets for hardwood thinnings will continue to be explored. Removal of beech from the Glen Creran SSSI and from Ancient Woodland sites offers potential for both hardwood timber and firewood. Development of a balanced age-class distribution will enable a sustainable flow of timber to markets to be achieved from the forest. Opportunities for small-scale rural development projects, including timber, and potential biomass energy generation will be encouraged.

*National theme - **Productive -** delivery through commercial conifer timber production; and productive broadleaves through thinning beech.*

4.2.4 Landscape and landuse

4.2.4.1 Landscape character and value

Increased use of broadleaves and PAWS restoration will strengthen native woodland habitat corridors, providing greater visual unity across the landscape. These changes will take time to establish. The character of Sutherland's Grove will be maintained through continuous cover management and appropriate species choice. Some of the character of the former policy woods will be replicated by the planting of beech on non-Ancient Woodland sites.

*National themes - **Treasured and Cared for** - delivery of landscape improvements through species diversification and restructuring.*

4.2.4.2 Visibility

More visible parts of the forest, including recreation routes, are the focus for changes in forest design. Diversifying species choice, matching coupe shapes to landform, and feathering of edges are examples of techniques applied to the more visible parts of the landscape. Sensitive upper forest edges will be scalloped.

4.2.4.3 Neighbouring landuse

The current policy of maintaining deer fences around the forests will be continued, working with neighbours as appropriate. Opportunities to realign fences onto or near to the legal boundary will be explored when fence replacement is due. The Forests and Water guidelines will be adhered to when working upstream of water supplies.

*National theme - **Healthy** - delivery of Deer Management Plan commitments.*

4.2.5 Social Factors

4.2.5.1 Recreation

There are no new proposals in the plan area. Existing facilities will be maintained. The Interactive Visitor Zone will be managed to improve visit experience through selective thinning, increased use of open space and species diversification, in conjunction with forest operations in adjoining areas.

*National theme - **Treasured -** delivery through improvements to Visitor Zones.*

4.2.5.2 Community

No major drivers or concerns.

4.2.5.3 Heritage

Settings have been improved where possible through species diversification and increase in open space. Best practice is contained in the district's Cultural Heritage Strategy and UKFS guide 'Forest and the Historic Environment', which will be adhered to.

National theme - **Cared for** - protection and enhancement of cultural assets.

4.2.6 Statutory and legal requirements and key external policies

FCS will work with SNH to implement the management plan for Glen Creran Woods.
FCS will work with SSE should any requests for powerline resilience felling be made.
FCS will continue to restore PAWS with the intention of full restoration for the plan area.
FCS will implement agreed management actions with HER regarding the two scheduled sites.

***All national themes** - we will comply with UKWAS, the UKFS and all other policy documents and legal obligations.*

Table 4.1 - Analysis of Opportunities and Constraints (see maps 4.2 & 4.3)

Factor	Opportunities	Constraints	Concept development
Water quality	Forest restructuring can help protect water quality. Use of increased open and native woodland buffers will benefit watercourses, including those serving water supplies and SSF.	Private water supplies are not fully identified. Restructuring and implementation of buffers will take some time to achieve.	Give riparian corridors with adequate buffers. Introduce broadleaves into riparian areas where possible. Adhere to the Forest and Water guidelines. Identify private water supplies at Work Plan stage. Liaise with water users ahead of operations.
Species choice	Current plans need to be updated to reflect current policies and aspirations in the face of climate change and known tree diseases. Species choice can reflect historic species selection behind Barcaldine House.	Soils data is incomplete. *Dothistroma* is present in west Barcaldine.	Increase diversity where conditions permit. Focus on high landscape and amenity areas. Join up native woodland habitat networks where possible. Do not plant disease-risk species. Maintain enhanced status of Sutherland's Grove.
Native woodland regeneration	PAWS restoration through felling and natural regeneration can be included in the plan.	There are few native woodland seed sources in some areas. Planting is costly compared to natural regeneration. Exotic regeneration is a problem in some areas.	Favour use of natural regeneration on PAWS sites, riparian areas and steep slopes. Minimise the use of deer fencing. Accept some conifer regeneration, allowing more time for conversion.
Thinning	Lower areas offer potential for thinning, with associated amenity benefits.	Confidence in crop stability is dependent on accurate soils and crop data. Requires market and contractor equipment to achieve. Issues with windblow in late thinning.	Thin where reasonably confident that crop will remain stable and markets have been identified.
Coupe size, roading & legal boundary	Opportunity to change coupe size. Increasing coupe size will reduce roading costs. Legal boundary changes could help improve upper edges in the landscape.	Cost of roading increases with decreasing coupe size. Changes to the legal boundary could be costly and may not be welcomed by neighbours.	Focus on smaller coupe size where associated with views and walks. Fit size to scale elsewhere. Avoid the need for spur roads where possible. Explore opportunities to modify legal boundaries, preferably by excambion.
Steep ground	Highly visible faces would benefit from conversion to native woodland, and would enhance forest walks.	Steep ground working above Benderloch is loss-making. Access is an issue.	Convert to native woodland and manage under LISS.
Public access/amenity/ recreation	Opportunity to increase planned species diversity for amenity. Implementation of Visitor Zone Management policies can improve forest edges.	No funds available for new facilities.	Maintain existing facilities. Consider opportunities that may arise with new roads/tracks. Visitor Zone edge management will be undertaken with adjoining operations.
Open land	Opportunity to feather /scallop edges to improve transition from commercial forest to open hill.	Open space is a cost to commercial forestry. Designed open space may infill with regeneration and prove too costly to maintain.	Improve upper edges with scalloped design and/or use of feathering/native woodland. Adopt realistic policies for open space within the plan.

5.0 Management Proposals

5.1 Forest stand management (see map 5.1)

5.1.1 Commercial areas

- **Clearfelling**

Some felling included for approval was previously approved in the old FDP for Barcaldine. Consequently, approval is being renewed for these areas. These areas include forest immediately above Benderloch village. Here felling was approved to deal with windblow affecting the forest walk and potential disturbance of loose rocks above the A828. The worst areas of windblow have been dealt with, but the remaining area has been left for a couple of years as a public relations exercise, allowing public access via the car park again. A coupe north of Benderloch has been delayed due to access issues that are addressed in the new plan.

Several additional coupes have been felled by amendment, largely as a result of windblow. A number of coupes have been felled and await restocking. Of these three are planned for natural regeneration, the timescales for which go beyond the expiry of the current plan. In west Barcaldine, felling of coupe 43318 is intended to remove a skyline fringe and deal with existing windblow in Phase 1. This coupe will require amalgamating with 43129 to prevent the skyline issue reoccurring. Coupe 43248 above Mill Farm is intended to deal with windblow, aid PAWS restoration and remove skyline edges. Coupe 43535 contains over 30% windblow, the felling of which has been delayed due to adjacency issues to the east. This area will be split into two coupes again after restocking. Coupe 43790 requires access off the B845 and would be sensible to work with the adjoining coupe in east Barcaldine, 42967. Coupe 43305 is designed to deal with windblow arising after thinning. Coupe 43882 is already approved for felling due to windblow damage and risk to the A828. In addition, coupe 43417 now poses the same problem and will also be felled either by amendment or under this plan's approval. Felling coupe 43403 in Phase 2 will remove the skyline fringe above Achnacreebeag. A number of coupes are planned in Phase 2 in east Barcaldine, intended to restructure the steep face below Beinn Bhreac. These coupes are selected to target areas of better growth and pockets of windblow. Some road upgrading will be required in association with these coupes. Coupe 42993 is particularly large so as to encompass the prominent ridge descending down Beinn Bhreac's northern flank. Larger coupes are used where this fits the landscape. Smaller coupe sizes are employed in proximity to recreation routes and viewpoints.

Table 5.1 - Felling Areas Analysis (Conifers)

	PHASE									
	1	2	3	4	5	6	7+	LISS	Open & Other	**SUM**
AREA	272.7	172.1	178.8	80.6	164.6	65.1	681.9	379.3	638.6	2633.8
%	10	7	7	3	6	3	26	14	24	100

No more than 25% shall be felled in any 5 - year period (See UKWAS 3.4.2).

Table 5.2 - Felling and thinning volumes (Conifers)

Average Annual Felling volumes by phase	Clearfelling (Km3)	Thinning (Km3)
2017-2021	23.1	1.7
2022-2026	10.7	1.8
2027-2031	2.8	1.8
2032-2036	10.5	1.6

Production profile smoothing is an FD objective to which this LMP contributes. More sheltered sites within the plan area offer greater potential for delayed felling, especially where road infrastructure is already in place. Forest Gales 2.5 has been used to test potential coupes and felling years extended where practical. Felling dates have been revised where opportunities to delay felling have been identified.

Table 5.3 - Forest Operations Area Statement - Phase 1 felling

FELLING COUPE AREA (HA)		RESTOCK AREA (HA)	
Conifer	= 272.7	Conifer	= 149.7
Open space	= 29.4	Open space	= 44.8
		Broadleaves by natural regeneration (net area)	= 70.2
Broadleaves to be felled	= 0	Broadleaves by planting (net area)	= 26.8
Broadleaves (not to be felled but within coupe area)	= 29.6	Existing Broadleaves	= 29.6
TOTAL	**= 331.7**	**TOTAL**	**= 331.7**

Table 5.4 - Productive Forest Area Statement (Phase 2 felling)

FELLING COUPE AREA (HA)		RESTOCK AREA (HA)	
Conifer	= 172.1	Conifer	= 103.7
Open space	= 19.7	Open space	= 43.6

	Broadleaves by natural regeneration (net area) = 18.2
Broadleaves to be felled = 0	Native broadleaves by planting (net area) = 36.9
Broadleaves (not to be felled but within coupe area) = 5.7	Existing Broadleaves = 5.7
TOTAL = 197.5	**TOTAL = 197.5**

Conifers will be restocked to a minimum density of 2500/ha net plantable area. Broadleaves will be established through natural regeneration to achieve a minimum stocking of 1100/ha over a 5 to 10 year period, and 2500/ha if planted. Assessment of regeneration areas in this plan will be made 5 and 10 years after felling. Full establishment will be achieved by year 15, planting when necessary to supplement natural regeneration (see Map 5.9 Proposed areas for natural regeneration).

♦ **Thinning**

About half the forest had been or is programmed to be thinned. Some areas have been lost recently due to windblow after thinning. However, much of this area has missed the thinning window and hence will not now be thinned. Thinning is mostly focused on the eastern half of the forest, which is more sheltered and has a higher recreation usage. Thinning of beech and possibly other hardwoods is in hand. Removal of beech in most areas forms part of PAWS restoration or condition improvement to the Glen Creran Woods SSSI. Elsewhere it will have amenity benefits, beech being seen as part of the historic landscape associated with Barcaldine House policy woodland planting.

♦ **Continuous cover forestry**

Conifer CCF has been scaled back in this plan based on concerns about crop stability following on from thinning. Two areas have been identified for CCF, Sutherland's Grove and a small area east of Mill Farm opposite the pottery. Sutherland's Grove will be managed for amenity, with a range of species compatible with the character of the area, with Douglas fir the primary conifer species. Other areas may be added if they prove sufficiently stable. Some Ancient Woodland sites may also be managed under ATC where thinning will add amenity value to the area. Steep ground is excluded owing to high operational costs.

♦ **Long-term Retentions**

Proposed long-term retentions comprise stable stands of mature or over-mature conifers which have not been thinned, hence are unsuitable for conversion to ATC. All have landscape and amenity values associated with them.

5.1.2 Non-commercial areas

♦ **Natural Reserves**

The core area of the Glen Creran Woods SSSI is classed as a Natural Reserve. Management practices are as agreed with SNH.

An area of mixed conifers containing some old growth Norway spruce and Mountain pine, south of Sutherland's Grove, has been set aside. Some buffer areas have also been earmarked for CCF around the periphery.

One stand of old growth Noble fir and mixed broadleaves is also included, lying just south of Barcaldine House. It represents an area of estate planting on a sheltered site and links with similar planting within the Barcaldine House policies.

♦ **Minimum Intervention**

Areas of restored Ancient Woodland sites will be managed in this way where there are overriding conservation values or high operational costs that outweigh values associated with thinning. Further areas may be added in the future, such as those parts of the Glen Creran Woods SSSI currently requiring interventions to remove conifers and beech. Areas of native woodland allocated to Minimum Intervention will be kept under review as they develop, in case opportunities arise to thin them.

Table 5.5 - Current Area Summary – Low Impact Systems

TYPE	AREA (HA)	%
Continuous Cover Areas	177.0	7
Natural Reserves	73.7	3
Minimum Intervention Areas	128.6	5
Long Term Retentions	20.8	1

5.2 Future habitats and species (see map)

♦ **Species rationale**

Conifer species choice is orientated towards SS in low sensitivity areas as the main commercial species that is suitable on most sites. Most pines cannot be planted due to *Dothistroma* risk. No pines will be Alaskan LP will be used in self-thinning mixtures with SS on low nutrient sites. Scots pine is used in mixture with broadleaves around the periphery of Ancient Woodland sites, including for strengthening of native woodland habitat network linkages and for amenity. Macedonian pine provides a useful alternative and may perform better than Scots pine on wetter sites, if it is available. Sitka spruce will therefore increase as Lodgepole pine is reduced by self-thinning. Lodgepole pine used in self-thinning mixtures is included under the figures for Sitka spruce, as it is assumed it will

disappear over time. Local provenance of Caledonian pine will be used if this is planted, but there are no proposals in this plan to do so.

Use of minor conifer species and mixtures is supported as a measure to build in resilience against climate change. Minor conifer species are also used for amenity. Soils and exposure limit the choice of minor species in some areas. Larch was previously used for texture, contrast and amenity, but is currently prohibited due to *Phytophthora ramorum.* The percentage of minor conifer species increases in order to diversify the forest, but larch decreases as it is not replaced. Some use of broadleaves in mixture with conifers has been made to substitute larch on visible faces and to create graded transitions between conifers and broadleaves. Planting of Western hemlock will be restricted to areas where potential regeneration will not impact on any sites of conservation value. Mixtures with SS are used in some less sensitive areas. EMIS suggests Douglas fir is moderately suited to Brown earth, iron pan and podzolic soils within the forest, but ESC suggests soils may be too low on nutrients for DF in most situations, so it is used with caution. Pacific Red Fir has potential in some areas if available. Use in mixture with SS is used where suitable for diversity in west Barcaldine. European Silver fir is also used in mixtures in east Barcaldine where other firs are unsuitable. Other minor conifer species such as Coast Redwood and Grand fir may be used for grandeur in the landscape on a limited basis. Norway spruce is used more extensively due to the need to buffer native woodland areas from seeding. Western red cedar is largely unsuitable due to soil nutrient requirements. Omorika spruce is moderately suitable in some places, but only achieves a modest yield class (typically 10). This is the case with the existing mature stand beside the B845. The species has a distinctive tapered form and is therefore useful as a feature tree in prominent sites.

Broadleaves are typically planted in mixture for amenity. Commercial broadleaved planting is planned for some sites. This includes some PAWS sites where there is a shortage of seed sources. Native broadleaves, either by natural regeneration or planting, are envisaged for most of the plan area. However, beech and sycamore may be used on non-Ancient Woodland sites. Ash is also no longer available due to Ash Dieback disease, *Chalara fraxinea.* The figures below show a significant increase in the area of broadleaves, mainly due to native woodland expansion through restoration of Ancient Woodland sites. Ancient Woodland sites are, where suitable, buffered with minor conifer species that are less likely to seed into the native woodland areas in the future. Internal open space increases with further roading and development of coupe buffers. Sitka spruce area falls as a result of these changes.

Table 5.6 - LMP Species Distribution

WOODED AREAS	2006		2017		2027		2100	
SPECIES	**AREA**	**%**	**AREA**	**%**	**AREA**	**%**	**AREA**	**%**
	(ha)		**(ha)**		**(ha)**		**(ha)**	
Sitka spruce	1467.3	58	1252.5	52	1160.4	47	686.2	28
Norway spruce	-	-	68.0	3	109.0	4	188.5	8
Omorika spruce	-	-	20.7	1	23.6	1	6.7	-
Larches	-	-	155.6	6	112.1	5	-	-
Lodgepole pine	-	-	133.2	6	64.5	3	-	-
Scots pine	-	-	26.9	1	43.5	2	50.3	2
Douglas fir	-	-	34.6	1	45.0	2	61.6	3
Western hemlock	-	-	1.8	-	20.7	1	36.4	1
European Silver fir	-	-	-	-	3.2	-	6.3	-
Noble fir	-	-	12.3	1	11.9	1	13.5	1
Macedonian pine	-	-	-	-	4.6	-	42.4	2
Pacific fir	-	-	-	-	17.3	1	57.1	2
Other conifers	520.0	20	32.2	1	24.5	1	26.6	1
Mixed broadleaves	242.3	10	105.2	4	97.0	4	-	-
Native Broadleaves	-	-	182.1	7	428.7	17	873.3	36
Non-native broadleaves	-	-	29.0	1	31.5	1	7.4	-
Felled	36.5	1	190.0	8	-	-	-	-
Failed	-	-	20.2	1	-	-	-	-
Internal open space	281.2	11	184.7	7	251.5	10	392.8	16
SUB-TOTALS	**2547.3**	**100**	**2449.0**	**100**	**2449.0**	**100**	**2449.0**	**100**
Open hilltops, coastline	86.6		120.8		120.8		120.8	
Agriculture	-	-	11.0		11.0		11.0	
Water	-	-	53.0		53.0		53.0	
TOTALS	**2633.9**		**2633.8**		**2633.8**		**2633.8**	

Open and broadleaved areas contribute more than the UKWAS & UKFS target of 15% of the woodland area being managed with conservation and biodiversity objectives. Table 5.5 lists other woodland areas contributing to

the area (See UKWAS 6.3.1). The following table lists primary woodland areas contributing to the 15% target:-

Table 5.7 Conservation and biodiversity areas analysis

Forest management type	Area (ha)	% of plan
Ancient Woodland sites (restored or awaiting restoration)	559	21
Natural reserves (non-PAWS)	32	1
Coastal strips	64	2
Open hilltops and bogs	83	3
Native woodland (non-PAWS)	70	3
Total	**808**	**30**

Species distribution will move towards the future goal in 2100 in one rotation for clearfell coupes, but much more slowly where LISS management is undertaken.

The above species breakout in Table 5.6 is UKFS compliant, as per the following table:-

Table 5.8 - Forest Land Use

Land Use	Threshold limits	Plan outturns
SS	>75	28
Other conifers	<10	20
Native Broadleaves	<5	36
Open space	<10	16
Total	**100**	**100**

- **Habitat networks**

The Habitat Networks map (see map 3.7) identifies the main habitat networks, both open, native woodland and riparian. Map 5.7 illustrates future habitat networks. Native woodland can be expected to regenerate in lower riparian corridors. PAWS restoration will strengthen the native woodland linkages. Native woodland habitat networks will also contribute to the deadwood resource, providing a deadwood habitat network as a consequence.

5.3 Restructuring

Restructuring can largely been achieved in one rotation, despite uniformity in age classes in some areas. Development of a well-balanced age structure will take several rotations (see section 5.5). No fallow management is currently planned within the forest. Excessive weed growth tends to limit use of fallow or delayed restocking. The process of restructuring has a cost implication in terms of forgone revenue through not adopting economic rotation lengths. Restructuring will alos be affected by desires to store volume, particularly in east Barcaldine, which will delay the process.

5.4 Future management

- **Invasive species**

The FD's program of eradication will deal with these as they arise.

- **Monitoring**

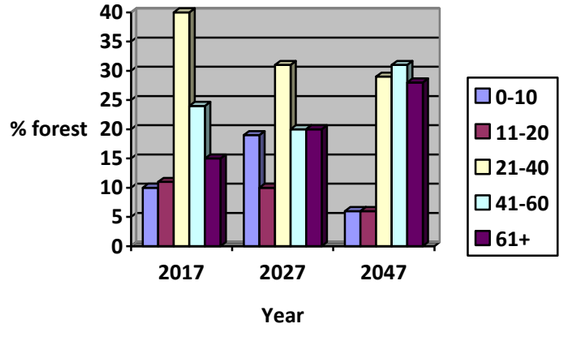
Monitoring of outputs within the plan area are handled in accordance with the district's Monitoring Plan. Subjects are grouped under Key Themes from the Strategic Plan. Specific methodologies are detailed under separate guidance documents. Responsibilities for undertaking, recording and responding to the results of ongoing monitoring are also detailed in these documents. Any relevant to LMP delivery will be reviewed at the mid-term review stage. Monitoring within the Glen Creran Woods SSSI is undertaken by SNH.

5.5 Age structure

Table 5.9 – Future forest structure

Age of Trees (Years)	Successional Stage	Percentage of Forest over Year			
		2006	**2017**	**2027**	**2047**
0 - 10	Establishment	9	10	19	6
11 - 20	Scrub & Early Thicket	22	11	10	6
21 - 40	Thicket & Pole Stage	39	40	31	29
41 - 60	Mature High Forest	22	24	20	31
61+	Old Forest	7	15	20	28
TOTALS		**100**	**100**	**100**	**100**

Chart 1 - Future Forest Structure



The process of restructuring shall continue through successive rotations to achieve a minimum 2m height growth difference between adjacent coupes, based on a minimum of 7 years between felling dates, as per the UK Forestry Standard.

Old growth forest is expected to increase over time, particularly through the development of new and existing native woodland. Extending some crop rotations and use of slower growing minor conifer species will also increase the proportions of mature high forest and old growth. Use of more LISS in the next rotation would also increase the proportion of older age classes. However, higher yield classes from improved species provenances and cultivation techniques may shorten rotation lengths in the future.

5.6 PAWS restoration

All the areas on the NCCS inventory that are classed as 'Ancient Woodland Sites' or 'Long-Established Semi-natural origin' will be restored to native woodland in the future in the plan area, except those in the vicinity of Sutherland's Grove, which will be enhanced, and those deemed suspect non-PAWS from survey where replanting with conifers outweighs any environmental reasons for not doing so. The enhancement area will encourage a presence of existing conifer species and beech that contribute to the historic character of the area. All areas identified by the FD from the 1st Edition Ordnance Survey mapping will also be restored, unless subsequent survey demonstrates that they are not Ancient Woodland sites. Natural regeneration will be the preferred method of broadleaved establishment. The success of regeneration will be monitored. Restoration will be initiated on all sites through clearfelling, although thinning may potentially encourage some regeneration or release existing broadleaved remnants. No halo thinning projects have currently been identified.

5.7 Management of open land

No change in management is envisaged for the agricultural fields at Barcaldine. Existing open hill tops and open edges will be retained, although some broadleaved regeneration will be accepted where this does not conflict with other environmental values. Upland heathland is the most likely priority habitat to benefit from their retention. Some also contribute to the landscaped upper edge to the forest. SSE will be expected to control woody growth on open wayleaves through the forest. Management of 'lost' land outside the FCS fence is unlikely to change unless fences are realigned.

No peat restoration projects are proposed in the plan. However, the area of checked spruce above the Achnacreebeg racing circuit contains an area of suspected deep peat. This area will be converted to 'edge woodland' with a minimum 25% broadleaved stocking density. The FCS document 'Deciding future management options for afforested deep peatland' will be followed; Deep peat practice guide launched - Forestry Commission Scotland. Excess woody growth will be removed.

The quaking bog at Beinn Lora requires control of woody growth on it. When initially identified, it was agreed that this could only be safely undertaken when the site was sufficiently frozen in winter to allow access. A full risk assessment would need to be approved and alternative techniques considered.

The previous plan made a commitment to maintaining certain types of open land free from conifer regeneration, at the request of SNH. These focused on open land associated with recreation routes and viewpoints, and also riparian corridors. The new plan also supports these commitments.

Powerline corridors, notably up Glen Salach and west of Achacha, will benefit from native woodland regeneration along their edges in most places. None of the corridors are particularly prominent in the landscape.

5.8 Deer Management

Deer stalking will be the preferred method of deer control, in line with the FD's Deer Management Strategy. Deer management will comply with SNH's 'Code of Practice on Deer Management'; Code of deer management - Scottish Natural Heritage Deer fencing will comply with the Joint Agency Fencing guidance; Deer fencing guidance - Scottish Natural Heritage. Deer management will focus on protecting restock sites.

5.9 Access (see map 5.8)

All roads will be built from material won from local borrow pits and one quarry in west Barcaldine. None of the proposed roads have any significant impact on the landscape or environmental sensitivities. Road construction will be UK Forest Standard compliant and will follow the Forest and Water Guidelines 5th Edition. Stream crossings will be processed under the SEPA CAR Regulations in advance of construction. The design will conform to the Timber Transport Forum document 'The design and use of the structural pavement of unsealed roads, 2014';
http://timbertransportforum.org.uk/attachments/article/12/TTF%20The%20design%20and%20use%20of%20the%20structural%20pavement%20of%20unsealed%20roads%202014.pdf
It will also conform to SNH's 'Constructed tracks in the Scottish Uplands' revised September 2015;
http://www.snh.org.uk/pdfs/publications/heritagemanagement/Constructedtracks.pdf
The proposed new forest road in Phase 1 above Mill Farm (NM93474030) is 840m in length. A turning place will be required at the end and intermediate turning points if side slope permits. Passing places every 200m will also be required. A 30m micro-siting corridor either side of the centre line should suffice. Material will come from rock won on the line and from borrow pits, which will be reinstated after use. The roadline will be visible for a short section from the area of Barcaldine Castle and the A828, but mature native woodland obstructs much of the view from the A828. The roadline needs to climb the face in order to reach the plateau beyond. Over time, the native woodland below the road will hide it from view.

One timber handling facility will be required off the B845 at NM97003948, immediately north of the road bridge over the Dearg Abhainn. This is to allow access to harvest a small area of conifers, access to which is otherwise hindered by the watercourse on the east side and by a wide powerline corridor on the west side. This will require planning consent and Prior Notification.

The forwarder track for winch access north of Benderloch will be 700m in length (NM91413860). It will be built from material won along the route and will subsequently be hagged for forwarder use. It will be linked onto a short spur road, required for timber handling, 125m in length. This road will not be visible in the landscape. A 30m micro-siting corridor either side of the centre line should suffice for this road. The forwarder tracks for winch access south of Benderloch will aim to reach areas left after wheeled machinery has worked as much of the area as possible. The precise arrangement of tracks will only be determined at this time. An indicative 600m of tracks is shown. Any borrow pits opened up will be reinstated after use.

One spur road is required in the second 5 years of the plan above Achnacreebeag (NM93553824). EIA determination and Prior Notification approval will be sought nearer the time. This road will not be visible in views from the other side of Loch Etive.

In addition to the above, road maintenance of the existing main access roads will be required, in agreement with other users where appropriate.

The existing quarry in west Barcaldine will supply stone for roading projects where not otherwise won along roadlines. This quarry will not exceed the threshold 1ha above which an EIA determination would be required.

Haulage will adhere to the following protocols 'The ATTG Protocol for Timber Haulage in Argyll and Bute'; http://www.argyll-bute.gov.uk/sites/default/files/ATTG%20Protocol%20for%20Timber%20Haulage%20in%20Argyll%20and%20Bute%20-%20Updated%20April%202012.pdf
And with the 'Protocol for Timber Transport Operations (Appendix 1)';http://www.argyll-bute.gov.uk/sites/default/files/ATTG%20Timber%20Haulage%20Protocols%20for%20Argyll%20%20and%20Bute%20Appendix%201_0.pdf

Haulage is either directly onto the A828 or onto the B845 heading north to join the A828. This section is a Consultation Route. Argyll & Bute Council will be consulted on any proposed use of this road when harvesting is due.

5.10 Critical success factors

The following outcomes are required:-

- Timber production requires completion of felling (446.1ha) and restocking (406.8ha), within 10 years of felling. (see section 5.1 Forest Operations area statements)
- Roading – construction of 0.965Km and plus forwarder tracks of 1.3Km required to facilitate felling of Phase 1 coupes. Associated felling of timber is covered under the associated coupes. Roading in phase 2 amounts to 0.4Km.
- Timber production 28.9Km^3 in Phase 1 and 19.9Km^3 in Phase 2 - requires completion of felling and thinning program.
- PAWS restoration over the next 10 years requires 98.6ha of conifer removal.
- Improvement to Visitor Zones through thinning.
- Landscape enhancement through implementation of designed felling and restocking.
- Protection of public and private water supplies, including implementation of agreement with SSF; adherence to the Forest and Water Guidelines.

(At present, there are no critical success factors associated with removal of trees affected by *Phythophthora ramorum* or due to windblow).

Appendix I: Forest Design Plan Consultation/Scoping Record

Statutory Consultee	Date contacted	Date response received	Issue raised	Forest District Response
Argyll & Bute Council				
SNH				
Neighbours	Date contacted	Date response received	Issue raised	Forest District Response
Whitton, Achinreir				
Scottish Sea Farms Ltd	21/09/2016 & 02/11/2016	Meeting on 02/11/2016	Renewal of management agreement, reservoir management, flooding (raised by FCS), species rationale for the catchment (broadleaves or open space preferable), avoidance of solids and organisms entering water supply through forest operations, water sampling, timescales for construction and commissioning of new hatchery, communications protocols and desirability of regular meetings.	Implement Forests and Water Guidelines, SFS/SG guidance, support regular liaison and establishment communications protocols.
Achacha - kennels				
Glen Creran Estate				
Barcaldine Caravan Park				
Sealife Centre				
Culcharron Farm				
Tralee holiday park				
Barcaldine House				
North Ledaig caravan park				
Ardchattan Estate				
Creran Marine				
Beaver Timber Co.				
Jim Mackay, Lianag, Barcaldine (he owns areas around Barcaldine Lodge including site with TPO's)	11/16	15/11/16	Request to be added to neighbour consultation list for LMP and wanted information on rhododendron control. Wanted to know whether felling was planned and what would be replanted beside his property.	Env. Team sent details of rhododendron control policy. Link sent to website LMP consultation page. No felling planned. Natural regen preferred option for area.
Community Groups	Date contacted	Date response received	Issue raised	Forest District Response
Ardchattan Community Council				
Others	Date contacted	Date response received	Issue raised	Forest District Response
SEPA				
RSPB				
SSE				
Confor				

Appendix II: Tolerance Table

Tolerance Table for West Argyll Forest District

Area or Zone	Action required	Adjustment to coupe boundaries (to a limit of 20% of coupe area)	Timing of restocking (years after felling)	Changes to species (in excess of 25% change)	Windblow clearance (ha>40% blown)	Changes to roadlines (m from centre line)
Native woodland areas	Exchange of letters	1.5ha	5 yrs	No threshold	0.5ha native species. 5ha conifer	50m*
	Plan amendment	3.0ha	10yrs**	No threshold	10ha conifer	100m
Landscape sensitive areas***	Exchange of letters	0.5ha	3 yrs	Between evergreen and deciduous conifer species. No threshold for native species.	2ha conifer	50m
	Plan amendment	1.5ha	5 yrs	Between evergreen and deciduous conifer species. No threshold for native species.	5ha conifer	100m
Low sensitivity areas****	Exchange of letters	3.0ha	4 yrs	Between evergreen and deciduous conifer species. No threshold for native species.	5ha conifer	200m
	Plan amendment	5.0ha	7 yrs	Between evergreen and deciduous conifer species. No threshold for native species.	10ha conifer	400m

* Any impact on existing ancient woodland will be agreed with no threshold

** Due to preference for natural regeneration

*** Includes all landscape designation areas, e.g. NSA's, designed landscapes, plus WIAT, community woodlands and FD Strategic Planning Landscape Zone

**** All other areas not included in other zones. Localised environmental sensitivities within the zone will be covered under existing management plans. Consultation on these sites will be undertaken as part of the normal approval process and methods detailed in work plans.

Note: Any increase in open space will be subject to EIA thresholds for deforestation unless part of normal process of forest restructuring

Appendix III: LMP Brief and Introductory Information for Initial Stakeholder Meeting

(*Outcomes from Initial Stakeholder meeting to be added in italics)*

Introduction

Barcaldine Forest covers 2633.8ha.

Progress and issues (previous FDP)

A number of general issues and events have arisen within the plan. These include:-

- Forest resilience to climate change would encourage further species diversification.
- Plant health issues have resulted in bans on planting larch, ash and Lodgepole pine (with the exception of Alaskan provenance in mixture with spruce).
- New policy guidance relating to the conservation of deep peat may impact on the existing proposals to restock areas of low yield class Sitka spruce.
- National policy is now to restore about 85% of Ancient Woodland sites. The former Forest Design Plan (FDP) future species map was updated to reflect this change. Non-native species arising on some sites is an issue. Planting of Scots pine an option?
- New policy to replace SS > YC20 with other species due to loss of structural quality of fast-grown SS.
- The former FDP is being replaced by a Land Management Plan (LMP), which seeks to look more widely at subjects both within and without the plan area.
- Some proposed CCF areas have blown down and been cleared; others have not been thinned and need to be reconsidered. Windblow above Benderloch posed risks to the footpath and potential issues of disturbed material falling onto the A828, requiring intervention. Felling above Benderloch is still to be completed. Windblow by Achanreir was raised as a concern by SSE posing a threat to a powerline, which was subsequently dealt with. Several approved felling coupes either await felling shortly or are currently being felled, including two beside the A828 near the Sealife centre where risk to the road is a concern. One coupe north-east of Benderloch has not been felled due to steep ground access issues.
- The management agreement with Marine Resource Centre (MRC) expires in 2019. It requires FCS to produce quinquennial catchment management plans to advise MRC of planned operations. The last quinquennial plan expired in 2014 and was renewed earlier this year.

The Mid-term review for the plan in 2010 concluded that the plan remained fit for purpose, but with the need for and having been subject to several amendments for felling and road construction. Attention was drawn to the loss of landscape design intent to vary the upper planting boundary above Eas na Circe, due to infilling of designed open space largely with broadleaved regeneration. This area is an Ancient Woodland site, the upper edge of which coincides with the march fenceline. There is little evidence of broadleaved regeneration above the fenceline.

Two proposed mountain bike tracks were also discussed - Sutherland's Grove to Glen Creran, and connecting the NACC track to Am Maoilean, neither of which had been implemented and no funding was available.

Use of small felling coupes in LISS areas was also discussed in the review, as a means for encouraging broadleaved regeneration on PAWS sites. This has not been taken forward, although clearance of some windblown pockets has achieved this suggestion in consequence.

The Mid-term review also noted the increase in rhododendron infestation. A district strategy was to be drawn up (national strategy now in place). The current status of infestation is unclear.

Landscape enhancement was given a high priority under objectives in the previous plan. Two areas addressed in the plan, the southern forest edge by Beinn Lora and the forest edge at the head of Glen Salach, were redesigned as per the plan. Most other objectives were only to be achieved over a longer timescale, including restructuring, PAWS restoration, and reduction of acidification of the Abhainn Teithil through conifer removal.

Plan Objectives

The role of Scotland's National Forest Estate focuses on 6 key themes:-

- ***Healthy*** - achieving good environmental and silvicultural condition in a changing climate
- ***Productive*** - providing sustainable economic benefits from the land
- ***Treasured***- as a multi-purpose resource that sustains livelihoods, improves quality of life, and offers involvement and enjoyment
- ***Accessible*** - local woodlands and national treasures that are well promoted, welcoming and open for all
- ***Cared for*** - working with nature and respecting landscapes, natural and cultural heritage
- ***Good value*** - exemplary, effective and efficient delivery of public benefits

The plan will deliver on these themes in the following ways:-

Productive

- Timber production – conifers and hardwoods, including thinning.
- Productive broadleaved planting at various locations
- Road construction - contribution to the 75Km target in the Strategic Plan - only a couple of spurs required in west Barcaldine.

Cared for

- Enhancement and protection of habitats.
- Follow management plan for Glen Creran Woods SSSI.
- Landscape improvement that responds to landform and respects natural features.
- Protection and enhancement of cultural heritage assets in accordance with UKFS guidance in 'Forests and Historic environment'.
- PAWS restoration.
- Development of habitat networks.

Treasured

- Improvements to Visitor Zones.
- Landscape improvements through species diversification and restructuring.
- ATC management of Sutherland's Grove

Healthy

- Increase resilience to Climate Change through species diversification, remove diseased trees and plant alternatives.
- Implementation of Deer Management Plans.
- Area managed under LISS will be increased (mainly restored PAWS sites).

All themes:-

- To comply with UKWAS guidance for certification.
- To comply with UKFS.
- To comply with all other relevant guidance and policies, FD Strategic Plan and overarching FCS plans.

Critical Success Factors

The following outcomes are required:-

- Commercial timber production requires completion of felling of 437.0ha over the first 10 years of the plan and 400.6ha of restocking.
- Roading – construction of 0.91Km of new roading and one forwarder track of 0.7Km required to facilitate felling of the Phase 1 coupes, and 0.4Km in Phase 2.
- Timber production from felling yielding 26.0Km^3 in Phase 1 and 28.9Km^3 in Phase 2.
- PAWS restoration (98.6ha) requires completion of the felling program.

Barcaldine Community Association holds a couple of events in the forest each year. Barcaldine Primary School undertakes forest based projects and activities. North Lorne Orienteering Club uses the forest although there is no official course. North Argyll Cycle Club holds events. There is a Visitor Experience Plan, aimed at making improvements to the forest.

Scottish Sea Farms Ltd has taken over the Marine Resource Centre. Plan should consider opportunities for rural development, accessed off the main road. Other points to consider; renewables, community, peatland, commercial recreation, Scottish Water, Benderloch community, cyclist groups, & PAWS. Achacha will have a private water supply. Red and roe deer are present. There is a strategic deer fence with the Ardchattan Estate. Thicket is proving a problem for deer control. A desire for larger coupes (40ha+) noted. Fences in mixed condition, current fences layer needs updating. Thinning interventions proposed to remove SS regen from AW sites. Discussed possibility of moving upper boundary fence to fence out areas where open space was needed for landscaping reasons. Open vistas around the reservoir were no longer essential as path has been deleted. High cost of maintaining the trails was noted. Micro-design for sea-eagle site will be needed. Visitor Zones need to be adjusted to reflect new trail layout. Potential starter farm for Achanreir. Boundary of Landscape Zone along coast should be moved inland. Fish hatchery at SSF. Approval needed for forwarder tracks.

Stakeholder consultation

In addition to the FD's statutory stakeholder's (SNH & Argyll & Bute Council), SEPA is routinely consulted. Scottish Water will be consulted in relation to the public water supplies. The RSPB, Confor and SSE have also asked to be routinely consulted. The Ardchattan Community Council will be consulted. Neighbours, where identifiable, will also be consulted, but residents around Barcaldine and Benderloch will not be mailed directly due to the complexities of identifying them. Suggested neighbours for contact identified so far: Argyll Pottery, Sealife Centre, Barcaldine Caravan Park, North Ledaig Caravan Park, Marine Resource Centre, Glen Creran Estate, Achinrier and Achacha. Other possibilities are; Home Farm, Mill Farm and other adjoining estates if owners can be identified. A drop-in public consultation exercise will be held when draft proposals have been prepared. Information will be posted on line on the FCS website at various stages of the plan development, with the approved plan eventually being made available here.

Appendix IV: Glossary

ASNW	Ancient Semi-natural Woodland
ATC	Alternative to clearfell management
BAP	Biodiversity action plan
CCF	Continuous cover forestry
EMIS	Establishment Management Information System
FCS	Forestry Commission Scotland
FD	Forest District
FDP	Forest design plan
FE	Forest Enterprise
HAP	Habitat action plan
HER	Historic Environment Scotland
LIFE	Financial Instrument for the Environment
LISS	Low Impact Silvicultural System
LMP	Land Management Plan
LP	Lodgepole pine
NSA	National Scenic Area
PAWS	Plantation on Ancient Woodland Sites
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SAM	Scheduled Ancient Monument
SNH	Scottish Natural Heritage
SDA	Stocking Density Assessment
SPA	Special Protection Area
SS	Sitka spruce
SSSI	Site of Special Scientific Interest
WAFD	West Argyll Forest District
WoSAS	West of Scotland Archaeology Service
YC	Yield Class

Appendix V: Supplementary Information

Available for inspection at:

West Argyll Forest District
Whitegates
Lochgilphead
Argyll
PA31 8RS Tel: 01546 - 602518

Documentation includes:-

- Roadline surveys
- Production Forecast 2016
- Sub-compartment database
- Conservation plan
- Landscape Character Assessment by SNH
- Aerial photos
- Forestry Guidelines
- Recreation Plan
- Strategic Forest Design Plan
- Forestry Commission approval procedures
- Scheduled Ancient Monument Plans
- Inventory of Ancient, long-established and semi-natural woodland, Argyll & Bute District (NCCS)
- Economic felling ages
- Soil surveys
- Crop survey

Appendix VI: Provenance guidance chart

West Argyll FD LMP provenance guidance chart

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