Forestry Commission Scotland
Coimisean na Coilltearachd Alba

Inverness Ross & Skye Forest District

Fort Augustus Forest Design Plan 2014 – 2024

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FSC

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Summary of Proposals

Executive Summary
Fort Augustus Forest Design Plan has been prepared in line with the UK Forestry Standard (2011), UKWAS guidelines (2012), the Scottish Forestry Strategy (2006) and The role of Scotland's National Forest Estate and strategic directions (2013) *here after referred to in this plan as The National Strategic Directions*. The draft IRS Forest District Strategic Plan has been used to give local context to The National Strategic Directions and inform the plan brief along with the A82 Management Strategy. Forestry Commission Scotland's long term planning is aligned to Scottish Government Scotland Performs objectives and the Scottish Government Land Use Strategy.

Vision
To restore native woodland at a landscape scale, and in the long term, to restore natural processes throughout the native woodland and open habitat from Glen Moriston to Fort Augustus. This will be achieved by working in partnership with Trees for Life and other native woodland owners to deliver a common vision for native woodlands in the wider landscape.

Fort Augustus Forest Design Plan objectives;

- The restoration of native woodland at a landscape scale over the next 50 years.
- To minimise risk posed to people and the A82 trunk road through good design and practice.
- To protect and enhance the water quality of the Ness catchment.
- To promote resilience of the forest to the future challenges of climate change.
- To strengthen ties with the local community and enhance the landscape of the Great Glen and Loch Ness.
- Sustainable timber production within Inchnacardoch and the productive native woodland zones.

Appendix 4 – The Forest Design Plan brief details how this plan will contribute towards the commitments of the IRS Forest District Strategic Plan. In addition it provides details of how the Forest District will monitor the delivery of these commitments and which member of the Forest District team will be responsible for that monitoring.

Proposals for the future management of the forests in this plan area are made in accordance with all current industry best practice guidelines and have been prepared following full consultation with the relevant agencies, community representatives and external stakeholders. Operations arising from the approval of this plan will also comply with all current FCS guidance and any subsequent revisions published during the plan approval period.

1.0 Introduction

1.1 Setting and context

The management of Forestry Commission Scotland's national forest estate is guided by The Role of National Forest Estate and strategic directions (2013), which identifies six aspirations that the National Forest estate is:

- **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, respecting landscapes, natural and cultural heritage.
- **Good Value**, exemplary, efficient and effective delivery of public benefits.

Drawing on these key themes Inverness, Ross and Skye Forest District (IRSFD) prepared a three year Strategic Plan in 2014, currently in draft format. This plan establishes links with the National Strategic Directions document and sets out the district vision, priorities and objectives under which IRSFD plans will be prepared. The IRSFD Strategic Plan ensures that land management activities compliment and enhance the local economic, social and ecological individuality of each design plan area.

The key themes were used as the basis for the development of this Forest Design Plan (FDP) and key objectives were grouped under these themes. This plan aims to provide local context for the overarching key themes and objectives.

Appendix 1 – The Forest Planning Framework in Scotland gives context to the purpose and scope of this Forest Design Plan. In compliance with UKFS this is a strategic indicative plan intended to state the objectives of management and how sustainable forest management will be achieved by signposting the relevant guidance and best practice and spatially identifying management aspirations. This plan also provides a means to communicate our proposals to the neighbouring communities and stakeholders and serves as an agreed statement of intent against which implementation can be checked and monitored (see Appendix 4 – FDP Brief for details of the monitoring proposed).
Appendix 1 indicates the levels of operational plans that sit below, and are informed by this FDP. In compliance with UKFS the operational plans detail specific implementation detail including:

- Potential hazards to workers and forest users
- Operational detail specific to machine use
- Safeguards and mitigation measures to protect the immediate site and, by association, the wider forest
- Detail of post operations planning including the treatment of any waste materials identified.
- Contingency planning

Stakeholders requiring this level of information should contact the Inverness Ross and Skye Forest District Operations Team following approval of this plan.

Appendix 2 – Key Policies and Guidance details the external policy drivers for the proposals in this plan. Current industry and FC guidance will be complied with during any operations associated with this plan, including any subsequent guidance revisions published during the plan's ten year approval period.

1.2 History of the forest

The production of this Fort Augustus Forest Design Plan is the merger and full ten year revision of the following documents:

- Inchnacardoch Forest Design Plan
- Moriston Forest Design Plan

In view of the similarity of issues and objectives, geographical proximity, and the desire to capture the IRS FD section of the A82 corridor within one FDP, the decision was taken to combine the two FDP areas in the production of the Fort Augustus FDP.

The plan area is situated on the Northern shore of Loch Ness and sits directly north of the village of Fort Augustus (see Map 1 Location & Context) and includes the forests of; Inchnacardoch, Moriston, Achlain, Port Clair, Dalcataig, Creag nan Eun, Balnacarn, Torgoyle, Balintombuie and Bhlaraidh. The forests within the plan area from part of the wider A82 corridor and serve as the backdrop along the West coast low road– the A87.

These forests are owned by Forestry Commission Scotland and cover 9887 Ha of which approximately 5557Ha is recorded as productive forest; this includes large areas of Plantation on Ancient Woodland Site (PAWS) (around 40% of the forest) that, although largely under non-native conifer cover, currently adds significantly to the potential of the area to accommodate species diversity. There is also 53Ha of Forest Research plots and seed stands, all of planted origin. The fallow land bank within the forest is at 461ha. The majority of the remaining area, totalling around 3868 Ha is open habitat, internal open space and land under other management.

Scots pine (Pinus sylvestris – SP), european larch (Larix decidua - EL), japanese larch (Larix kaempferi - JL) , douglas fir (Pseudotsuga menziesii - DF) planted in varying mixtures on drier soils and norway spruce (Picea abies – NS) on richer flushes, but by far the most predominant conifer in the productive high forest is sitka spruce (Picea sitchensis – SS). This forms significant elements of the crop on wetter and poorer soils, generally in pure stands but also in mixture with lodgepole pine (Pinus contorta - LP). On the higher slopes of Inchnacardoch, Moriston and Balnacarn Forest, where large areas of peats and gleys are found LP was planted in pure crops. Common juniper (Juniperus communis) is found throughout the plan area, in both open and forested land, there are notable populations recorded in Bhlaraidh and Inverwick.

Broadleaf species found include common alder (Alnus glutinosa), ash (Fraxinus excelisor), goat willow (Salix caprea), eared willow (Salix aurita), mainly in the riparian corridors, silver and downy birch (Betula pubescens & Betula pendula) rowan (Sorbus aucuparia), aspen (Populus tremula), hazel (Corylus avellana) and some sessile oak (Quercus petraea) and english oak (Quercus robur). The oak is comprised largely of veteran remnants established before commercial afforestation. On the high ground above the previous rotation's treeline at Port Clair and Dalcataig surveyors have recorded dwarf birch (Betula nana) and common Juniper.

In general broadleaf species are mainly confined to the riparian corridors, freely draining upper margins above commercial plantation and also within areas of historic native woodland restoration (Inverwick and Bhlaraidh). There is also a significant birch population within the wider Glen Moriston and this in turn creates a robust seed capacity leading to profuse natural regeneration where browsing is controlled. The areas of native broadleaves add much to the aesthetics of the landscape and to provide an element of biological diversity, with significant benefits for riparian habitat quality.

Significant areas of PAWS are recorded within the plan, spanning from Allt na Criche to Achlain and eastwards along slopes above Loch Ness. Historically much of the woodland on the south facing slopes is thought to have been largely oak and birch dominated, with pinewood predominating on the north facing slopes.

2.0 Analysis of previous plans

The objectives and management prescriptions within the former Inchnacardoch and Moriston Forest Design Plans were influenced by the rationales of the Fort Augustus Forest District Strategic Plan; this separated the district into distinct zones of landscape and landuse and guided the direction of future management. The following zones were applicable to Inchnacardoch & Moriston;

- *Native woodland zone: These woodlands will be safeguarded, restored and expanded. Management will be to prioritise restoration, where resources allow expansion into primarily open space above the forest will be encouraged.*

- *Steep visible slopes: Generally steep glaciated landscape, carrying main tourist routes and where forest landscape is particularly sensitive. Soils are generally fertile and many of the earliest plantings are on these sites, emphasis on these slopes will be for small scale fellings and or Alternative to clearfell (ATC) management.*

- *Moderate, Less visible slopes: (Inchnacardoch only)Forests on these slopes are visually less sensitive with a variety of soil types and fertility. Management in this zone will be of more conventional forestry nature, following accepted UK silvicultural practices.*

Being contiguous forest, of a comparable nature, the objectives of each plan are broadly similar. The main emphasis of both plans was environmental restoration and protection, landscape, community engagement and the provision and promotion of recreation; with timber production highlighted as a medium objective. The following paragraphs analyse performance against collective objectives of the plans.

Environment (*Biological diversity, Water, Soil*)
The enhancement and protection of biological diversity was a key objective of the previous plans. This was primarily to be achieved through regeneration and expansion of core native woodland areas, establishment and protection of riparian zones and use of good site planning to preserve water quality. An increase in the population of rare or endangered species (Black grouse) and no loss of existing protected species were also sighted as key objectives.

The removal of unnecessary internal fencing to reduce the risk of bird strikes was undertaken within the plan area. Restructuring works in the upper margins of Creag nan Eun and Moriston hill were undertaken to benefit Black grouse and joint surveying has continued (between RSPB & FCS) to monitor the local population. The restructuring has created an improved treeline habitat for Black grouse and although the relative scale of the works in comparison with the wider available habitat was relatively small the population numbers remain stable. Targeted riparian felling was undertaken within Glen Moriston in order to open up over shaded watercourses and allow natural regeneration, contributing to water objectives. The future habitat and species proposals of the previous plans lacked detail, information and ambition to achieve native woodland expansion on a wider scale, but the felling and restoration works undertaken have improved the condition of localised areas. The both plans highlighted the need for further surveying of native woodland and this has now been undertaken through a baseline PAWS survey and monitoring programme; this information will be used to guide the native woodland restoration proposals of the revised Fort Augustus FDP. Due to a prioritisation of resources and a lack of suitable seed source woodland expansion onto open hill ground has been limited; this will continue as a long term aspiration and appropriate areas have been identified for new planting in the revised FDP.

Social Issues (*Landscape, Community, Recreation, Archaeology*)
Landscape and improved forest design were major objectives within each plan, both areas being highly visible from tourist routes (A887 & A882) and destinations (Loch Ness, Fort Augustus, Caledonian Canal). The need to continue engagement and build strong links with local communities was identified as a high priority; with recreation provision and promotion also sighted as key objective along the Great Glen Way and at facilities of Allt na Criche and the River Oich. The preservation of important archaeological features, Torr Dhuin Fort and Wades military road, rightly feature as a high priority.

Felling coupes were designed in collaboration with landscape architects, in accordance with landscape guidelines. Felling on the prominent knoll of Creag an larlain in Inchnacardoch has made a positive contribution to the landscape and the areas of native woodland restoration have added visual and structural diversity to the forests. Limited felling activity within Allt Saigh has, however, hampered progression towards landscape improvements detailed in the visual analysis. Small scale works along the GGW have improved the visitor experience, opening up views onto Loch Ness where possible. Continued collaboration with GGW Rangers has sustained the route as ever a popular long distance walk, ensuring forest operations and access continued in a safe manner. Links to local community have been developed through positive consultation and involvement at community council meetings where appropriate. Works to restore the Wades bridges at Achlain and control of vegetation on Torr Dhuin have preserved these culturally significant features into the future.

Economic
Timber production was identified as a medium priority of both plans. The need to maximise income and reduce expenditure by only felling marketable timber was a major theme given the relative distances to the nearest markets of Inverness and Fort William. The wider adoption of alternative to clearfell (ATC) systems was a feature used to maintain forest cover on steep slopes, add structural diversity to the forest and to smooth production volumes over the long term. The need to develop niche markets for large diameter timber was also an important objective, influenced by the stands of post war Douglas fir of Dalcataig and Allt na Criche.

The felling and proposals of Inchnacardoch and Western Moriston were largely achieved as stated in both plans, but with major amendments required (Inchnacardoch) due to the discovery of Dothistroma Needle Blight on Lodge pole pine. The new Beauly- Denny power line and associated corridor necessitated alterations to felling proposals approved through the planning system. Within the steep ground of the A82 corridor the adoption of Alternative To Clearfell systems, through single tree and group selection, was not implemented due to a number of factors; lack of specialist resources for steep ground working, unfeasibility of ATC timber felling and extraction on extreme terrain and high associated costs during a depressed timber market. The revision of these management prescriptions will be undertaken within the Fort Augustus Design Plan in alignment with the A82 Project. Niche markets were developed for large diameter timber allowing thinning of Iconic Douglas fir stands promoting future stability and forest aesthetics.

3.0 Background Description

3.1 Physical site factors

3.1.1 Geology and Soils

Fort Augustus FDP area is situated primarily on an underlying solid geology of Moine quartz-feldspar-granulite (BGS code 10) and in the southern plan area Granitic gneiss (BGS code 12), contributing to a general lack of fertility. The notable exception being along the Creag na Eun forest where the underlying lithology is Lower Old Red Sandstone (BGS code 75), resulting in soils of higher fertility. The drift geology is largely located in the lower margins of the plan area and is a mix of glacial and alluvial sand and gravel deposits with diamicton till also found in western Moriston and Creag nan Eun.

The implications of the underlying lithology on the establishment of second rotation crops are referred to further in section 3.3.2 Site Capability.

Detailed Soils surveying and mapping has been carried out within the Inchnacardoch block and has been used to determine future habitat and species prescriptions within this plan. For the remainder of the plan area the James Hutton Institute soils data 1: 250k had been used. It is acknowledged that the 1:250k soils data does not offer sufficient detail to predict the soils type for each coupe and as Pyatt & Brown 1982 state;

"Due to profound changes in the vegetation which take place after afforestation, which in many places involves it's complete suppression by the tree canopy, it is implicit that identification of site types cannot be…precise in the established forest".

The implication for this plan is that exact species boundaries for productive conifer and native woodland types will only be defined once clearfell has allowed Forest Management staff to accurately identify soil types on a coupe by coupe basis. The prescriptions for the Future Habitat and Species proposals have therefore been designed to allow an element of flexibility, ensuring best Silvicultural practice, but still achieving the underlying management objectives.

From the information sources mentioned above, the soils within the plan area are predominately unflushed peats, peaty gleys and podzols. There are also significant areas of skeletal rankers in the upper margins and brown earths found on the lower, south facing slopes. A summary of the soils data is shown in the opposite table 1.

The silvicultural prescriptions and assumptions made in this plan are largely specific to soil types referred to in the Forestry Commission soils classification system described in The Identification of Soils for Forest Management (Kennedy, 2002). Soils present in this plan area fall mainly into the following categories:

- Brown earths FC Group 1
- Podzols FC Group 3
- Ironpan soils FC Group 4
- Peaty surface water gleys FC Group 6
- Surface water gleys FC Group 7
- Molinia bogs (Flushed blanket bogs) FC Group 9
- Unflushed blanket bogs FC Group 11
- Surface water gleys FC Group 7
- Molinia bogs (Flushed blanket bogs) FC Group 9
- Unflushed blanket bogs FC Group 11

Table 1. Soils

Soil Type	Soil group	Total Ha
1	Brown earths	538
10,11	Sphagnum and blanket bogs	1858
14	Eroded bogs	80
13	Rankers and skeletals	945
3	Podzols	2571
4	Ironpan	772
5	Ground water gleys	41
6	Peaty gleys	2772
7	Surface-water gleys	114
8	Juncus bogs	1
9	Flushed blanket bogs	239
Valley complex		18
Total		9949

3.1.2 Water

The Scottish Environmental Protection Agency (SEPA) is implementing the Water Framework Directive (WFD) in Scotland. This is a legal framework for the protection, improvement and sustainable use of all water bodies in the environment across Europe. All water bodies across Scotland have been assessed for ecological and chemical status and catchment plans have been drawn up to ensure water bodies are brought up to an acceptable level. IRSFD lies entirely within the Scotland River Basin Management Plan Area and the FDP area is located within the Ness catchment.

Inverness, Ross and Skye Forest District are aware that it is therefore important that the proposed forest restructuring, felling, restocking etc, including the proposed road construction within this FDP, does not lead to any deterioration of the water bodies or water dependant areas within the forest plan area and any of the neighbouring water bodies. The existing status, and pressures, of the water bodies covered by this FDP are summarised in the opposite table 2.

The main pressures on watercourses within the plan area are largely associated with abstraction and water flow regulation caused by pre-existing hydro renewable energy production. The potential impact of future run of river hydro proposals will be assessed through individual planning applications submitted by the developer and are not included as part of the FDP. The forestry pressure on the River Moriston is related to former forestry practices degrading the riparian habitat, inappropriate buffer zones, intensive cultivation and drainage, this will be addressed through future proposals, outlined **in section 5 Forest Design Plan Proposals,** for the establishment and enhancement of riparian woodland and wider adoption of less intensive management on a significant area of the river catchment.

It is understood that Invasive non native species (INNS) can have a detrimental impact on the condition of areas protected under the Habitats Directive for species or habitats important at a European scale and those nationally important for biodiversity. They are identified as significant risk to the water environment in the River Basin Management Plan for the Scotland River Basin district and in the North Highland area management plan. To date there a no known recordings of INNS on the National Forest Estate, within this plan area. However, routine survey work will continue throughout the plan period and any occurrence dealt with complying fully with best practice guidance.

Work programmes are currently being delivered to reduce rhododendron (*Rhododendron ponticum*) and will continue during the coming plan period.

As standard all forestry and associated Civil Engineering operations must comply with the Forest and Water Guidelines 2011 and The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR).

Table 2 -Summary of water bodies, status & pressures

Waterbody ID	Waterbody Name	Type	Overall Ecological status	Pressures
23381	River Moriston: Loch Ness to Dundreggan dam	River	Moderate	Abstraction: Renewable energy Flow regulation: Renewable energy Morphological Alterations: Forestry improvement of riparian zones.
23382	River Moriston: Dundreggan dam – Bun Loyne	River	Good	Abstraction: Renewable energy Flow regulation: Renewable energy Morphological Alterations: Forestry improvement of riparian zones.
20286	Allt na Muic	River	Good	Abstraction: Renewable energy Flow regulation: Renewable energy
20284	Allt Phocaichain	River	Good	No pressures
20285	Allt Baile nan Carn	River	Good	No pressures
20293	Invervigar Burn	River	High	No pressures
20282	Allt Bhlaraidh	River	Poor	Abstraction: Renewable energy
20283	Allt Larairidh	River	Moderate	Abstraction: Renewable energy
20278	Allt Saigh	River	Bad	Abstraction: Renewable energy
20252	River Oich	River	Good	No pressures
100156	Loch Ness	Lake	Good	No pressures
150334	Loch Ness bedrock localised sand and gravel aquifers	Groundwater	Good	No pressures

Opportunities for internal wetland and peatland habitat restoration are largely only revealed after felling, when landform is clear and hydrology can be accurately assessed. Therefore site level proposals of this nature are agreed at work plan stage with the Open Habitat Ecologist and the FD Environment team. Larger scale peatland restoration proposals are outlined in **Maps 5.1 & 5.2 Future Habitat & Species**

Branches and tree tops (lop and top) produced by felling and thinning operations are not considered as waste in terms of this plan, because the material will be incorporated in the brash mat to aid machine traction and flotation thus protecting fragile soils. Additionally material will be retained on site to achieve deadwood objectives. Other branches and material left after harvesting contribute to the functional ecology of the woodland and are an important feature of nutrient recycling that will increase biodiversity and may assist future productive woodland establishment. Where the felling to recycle of non native species occurs the arisings have subsequent use including protecting vulnerable native tree regeneration from grazing mammals and again, contributing to the functional ecology of the woodland. On steep ground sites where whole tree harvesting systems are implemented techniques for the utilisation of residues are currently being explored through the A82 Project.

3.1.3 Climate

An understanding of climate is a key factor in determining the correct choice of future species and appropriate silvicultural management. When choosing the correct productive species and or native woodland type for a site the climate guidance contained in Pyatt, Ray and Fletcher's Ecological Site Classification (2001) will be an essential determining factor. The ESC uses measures of warmth, wetness, continentality and windiness to make species recommendations based on national statistics (calculated from Met Office data for the recording period 1961 – 1991). Local site factors including soil and vegetation are then combined with the national figures.

The climate for this plan area ranges from Warm & Moist and Cool & Moist on lower south facing slopes along Loch Ness and Moriston river valley, progressing to Cool & Wet as you increases in altitude towards the tree line. The plateau of open hill ground reaches Sub alpine at the highest point. As a result, the forests in this plan area benefit from a potential growing season and local climate suitable for commercial forestry and the establishment of a good variety of native woodland types.

Windiness is assessed using the Detailed Aspect Method of Scoring (DAMS) developed by Quine and White (1993, 1994) which analysed tatter flag data to produce models that would predict the speed and frequency of strong winds.

A significant proportion of the forest scores in range 6-14 which is regarded as very suitable for commercial forestry with opportunities to adopt Continuous Cover Forestry (CCF) and extended rotations where appropriate. The upper margins of Inchnacardoch, Balnacarn and Moriston range from 15 to 19 (at the most exposed point), this will influence rotation length, tree form and management of existing commercial crops and a critical factor behind long term proposals to reduce the commercial tree line.

3.2 Biodiversity and Heritage Features

The Fort Augustus FDP area is overlapped by the following European designated site;

- **River Moriston Special Area of Conservation (SAC)**

The FDP also directly borders the following nationally designated site;

- **Levishie Wood Site of Special Scientific Interest (SSSI)**

An Appropriate Assessment regarding potential impact of the FDP upon the Moriston SAC is shown in **Appendix 5 Appropriate Assessment**. As part of the work plan process a detailed, site specific, Appropriate Assessment will be undertaken prior to any operations within sensitive areas (adjacent to or within the SAC).

Part of the Fort Augustus Geological conservation review (GCR) site lies within the southern area of the FDP, largely under forest, however some areas have been historically developed. Though this GCR is not designated as a SSSI it is a nationally important feature and recognised for the glacial landform and deposits. There is no invasive forestry operations (quarrying, new road construction etc) proposed in this plan within the GCR area.

Table 3 below provides further details on the designated sites

Site	Qualifying interest / natural feature	Extent	Objective	Consideration for FDP
River Moriston SAC	• Fresh water pearl mussel *Margaritifera margaritifera* • Atlantic Salmon *Salmo salar*	194.53Ha 2.4Ha on FCS Land	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features	Compliance with Forest & Water Guidelines 2011 and The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). Gradual restoration & enhancement of riparian woodland along River Moriston and tributaries.
Levishie Wood SSSI	• Semi natural Upland birchwood	180.27Ha 0.Ha on FCS Land	Promote the natural processes and structural development of the native woodland towards favourable condition Ensure that grazing is at such a level that seedlings and saplings are growing through at a sufficient density to maintain the canopy density.	Opportunity to link native habitat through native woodland restoration. Continued Liaison required through Moriston Deer Management Group to achieve holistic land management objectives.

Full details of all the designated sites can be found at the following;

http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/sitelink/

3.2.1 Ancient Woodland

The National Forest Estate (NFE) in Scotland currently accounts for 28,707 ha of PAWS and in response to the SFS mandate, Forestry Commission Scotland (FCS) has made commitments to restore over 85% of these, while continuing to protect veterans, enhance and expand ancient woodland remnants.

The area of ancient woodland in this plan as defined under the SNH Ancient Woodland Inventory is almost 40% (2,444ha) of the wooded area, categorised as PAWS. The area of PAWS is comprised of remnants of Caledonian pinewood, Upland Birchwood, Upland Oakwood and Wet woodland types along riparian corridors and flushes. The condition and features of the PAWS varies widely from areas of high ecological potential such as Bhlaraidh, that have an assemblage of veteran remnants, deadwood, native woodland regeneration and ancient woodland flora, to areas of lower ecological potential where the majority of native woodland features have either been lost or significantly altered, with the slopes of Dalcataig being a prime example. A further 185Ha of woodland is defined as Long –established woodlands of plantation origin (LEPO): most LEPO is located in Achnaconeran, the upper margins of Creag nan Eun and the lower section of Bhlaraidh. Historical native woodland restoration has been successfully undertaken at Inverwick and the area subsequently boasts a rich structural and ecological diversity, with intricate mix remnant veterans, open space and a cohort of regenerated birch and pine. See **Map 8 Ancient Woodland.** Further details on restoration proposals are identified **in section 5 FDP Proposals.**

3.2.2 Caledonian Pinewood Inventory

The Caledonian Pinewood Inventory (Forestry Commission 1998) lists 84 sites, covering 180km2, which are believed to be directly descended from the original Caledonian pinewood. Within the FC and neighbouring Trees for Life land holding in Glen Moriston three areas are identified as Core Pinewood;

- Dundreggan
- Achlain
- Achnaconeran

This is essentially the "heart of the pinewood" where there is a sufficient density of remnant trees to support natural regeneration and meeting the following criteria;

- a minimum density of 4 pine trees per hectare, excluding trees less

than 2 metres in height, or at least 50 pine trees per hectare where sites have been extensively underplanted but are deemed capable of restoration to a more natural state;
- a minimum of 30 individual trees, unless the wood has historical, aesthetic or biological significance;
- vegetation which is characteristic of native pinewood, although possibly of a depleted diversity;
- a semi-natural soil profile, but accepting also sites with superficial cultivation such as shallow ploughing or scarification with some widely spaced drains.

The wider forest area surrounding the core pinewood up to 100m is notionally identified as the regeneration zone where there is believed to be capacity for further regenerative expansion. A buffer zone of 600m from the core pinewood area is applied in order to positively influence surrounding management choices for the pinewood.

The extent and rich diversity of native woodland within the plan area creates unique opportunity for native woodland restoration at landscape scale, with the potential to link fragmented populations and create an extensive and robust habitat network.

3.2.3 Open Habitat

The plan area comprises 3721Ha of open habitat, largely concentrated on the open hill adjoining Inchnacardoch and Moriston and the summit of Meall na Sroine, with internal open space within the forest making up a smaller percentage of the overall area.

Within the open land of the Fort Augustus plan area a UK Biodiversity Action Plan (BAP) habitat survey was undertaken in 2007, the results are displayed in **Map 7.1 & 7.2 Open Habitat**. The survey results recorded several lowland and upland open ground habitats of European importance as listed within the UKBAP priority habitat types. These include alpine and subalpine heaths, mountain scrub, upland heathland, blanket bog, upland and lowland flushes, fens and swamps and oligotrophic and dystrophic lochs.

Upland heathland and blanket bogs largely dominate the open ground habitats within this Forest Plan. Within the plateaux of Inverwick Forest populations of mountain scrub, dominated by dwarf birch (*Betula nana),* is either found in relatively large population size or as scattered within the upland areas among blanket bog and/or upland heath habitats. Common Juniper (*Juniperus communis)* is also found as large populations and scattered within the lowland and upland dry or wet heath habitats and occasionally on blanket bogs. In localised areas the uncommon Dwarf Juniper has also been recorded. Alpine plants are generally restricted to crevices on acid rocks at the highest elevations. Within the forested areas mosaics of blanket bog, dry and wet heath habitats have also been recorded.

This information has been utilised to inform future management proposals contained in section **5 .6 Management of open land** for management of the open habitat and long and short term forest expansion.

3.2.4 Species

The Forestry Commission has a clear commitment to the conservation of biodiversity and this is incorporated in the FC's policy statements on sustainable forest management and in the UKFS. Management should aim to conserve priority species and that successful application of Forestry Strategy should be measured as progress towards the UK Biodiversity Action Plan (UKBAP) targets.

The forest and open land within plan area provides a range of habitats for a diverse array of species; three of the six FCS priority species (listed below) are recorded within the plan area;

- Red Squirrel
- Black Grouse
- Juniper

Further survey work is being undertaken to establish the presence and distribution of Pearl bordered fritillary. Along with the aforementioned species the following notable species have also been recorded within the plan area;

- Scottish Wildcat
- Water vole
- Otter
- Pine Marten
- Fresh Water Pearl mussel
- Wood ant
- Hen harrier
- Peregrine falcon
- Merlin
- Goshawk

Due consideration has been given to the requirements of protected species within the development of this FDP and best practice followed in the development of all proposals. Specific management proposals for several of the key species are outlined further in **section 5.6.**

Juniper growing as a component of pinewood.

3.2.5 Heritage
Important historic environment features are surveyed, recorded, mapped and monitored to ensure and demonstrate Forestry Commission Scotland compliance with the UK Forestry Standard.

There are two scheduled ancient monuments within the plan area, see further details table 4 below. Torr Dhuin is a focal point of the Auchterawe area, being highly visible and key feature of the forest path network. Forest design proposals have been drawn up in consultation with the FCS Landscape Architect to improve the visual aesthetics of this treasured feature and surrounding area, whilst maintaining the overall forest character. The two original military bridges along Wades Road in Achlain have recently undergone restoration works.

Table 4 – Scheduled Ancient Monuments

Site Name	Description	Grid Reference	Hyperlink
Torr Dhuin	Remains of a vitrified, Iron age fort	NH348069	http://canmore.rcahms.gov.uk/en/site/12212/details/torr+dhuin/
Wades Military Road	Military road from Benera to Fort Augustus with two Stone bridges, of military construction, over Wades Road	Linear feature NH278123 – NH371094	http://canmore.rcahms.gov.uk/en/site/143168/details/fort+augustus+bernera+military+road+strath+cluanie+and+glen+moriston/

Dedicated FCS management plans for scheduled sites are included in **Appendix 6.1 & 6.2 SAM Plans.**

There are total of fifty undesignated heritage sites within the plan area, notable features include; building remains of several old townships, sheilings and remains of the Invervigar sanatorium.

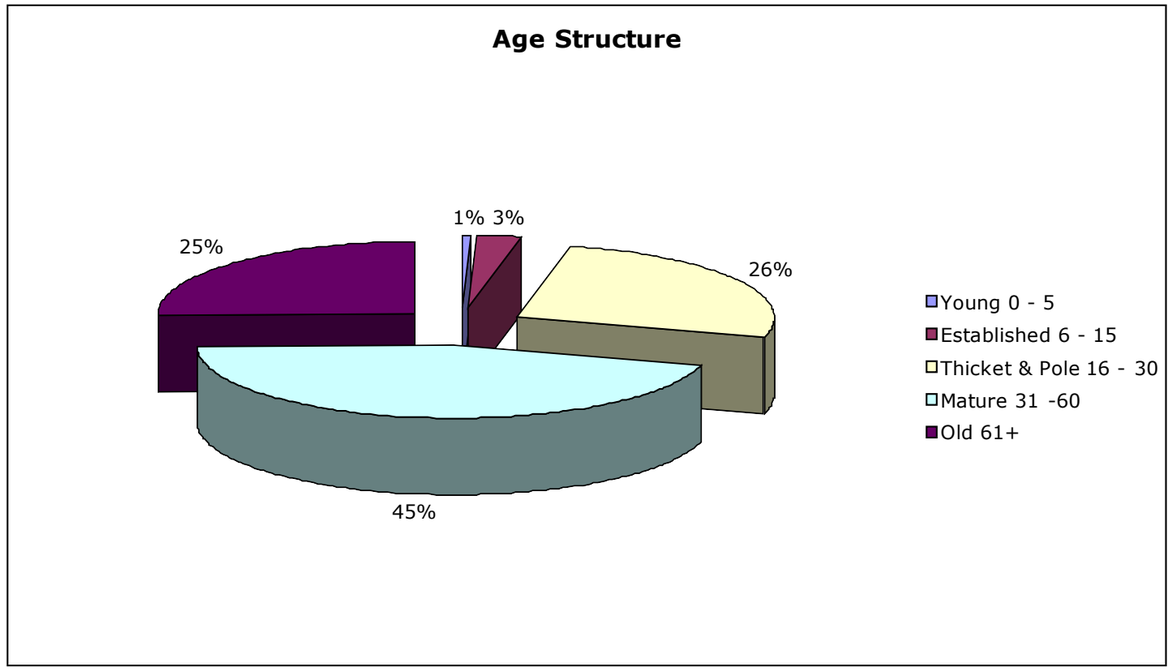
3.2.6 Forest Heritage
Fort Augustus forest are rich in heritage with the first land the Forestry Commission bought within the plan area. There is also a major research area called Lon Mor in the South of Inchnacardoch. Lon Mor (Gaelic for 'big waste' or 'bog') is an area of about 48 ha to the west, of Fort Augustus where the soils are dominated by flushed and unflushed peats, interspersed with moraines and rocky ridges with peaty gley and/or ranker soils.

This area was an experimental reserve where considerable research was carried out in the pre- and immediate post-war eras to examine methods of establishing trees on nutrient poor soils in northern Scotland. Aspects investigated include species choice, cultivation methods, and fertiliser inputs. Results from the trial area featured in Zehetmayr's comprehensive review (1954) of forestry on peat soils – the Lon Mor is the

only one of the peatland reserves described in that publication which still survives. This historical aspect is one of the values of this site for current and future foresters and scientists.

Much of the reserve is composed of series of experiments and trials, interspersed with patches of open ground. From a scientific point of view, the individual trials and experiments are generally too small and/or with unreplicated treatments to allow proper statistical analysis. However, because of the age of some of the trees (>80 years) and the range of species (>20) that have been trialled, the reserve has considerable demonstration value when considered in its entirety.

The lack of road access within the site plus the risks of windthrow mean that the most sensible future management option for the reserve is as a Long Term Retention. This option also offers the potential opportunity to use the reserve to monitor the long-term dynamics of a range of tree species on peatlands in northern Scotland – a course of action that was recommended by Dr. George Peterken when he visited the site in 1994.



3.3 The Existing Forest

3.3.1 Age structure, species & yield class

Age Structure

The age structure of the forest within the Fort August Plan area is predominantly mature and old forest; with a notably small percentage of young forest. This top weighted age structure reflects the relatively low level of felling over the last two decades and the "old" figure clearly represents the stands of extended rotations on difficult terrain, primarily along the A82 corridor.

Increased age diversification through restructuring will be a key theme of this FDP. The plant health objective to remove lodge pole pine over the next twenty years will also facilitate a more balanced age structure through a justifiable increase in harvesting activity over the plan period.

Species

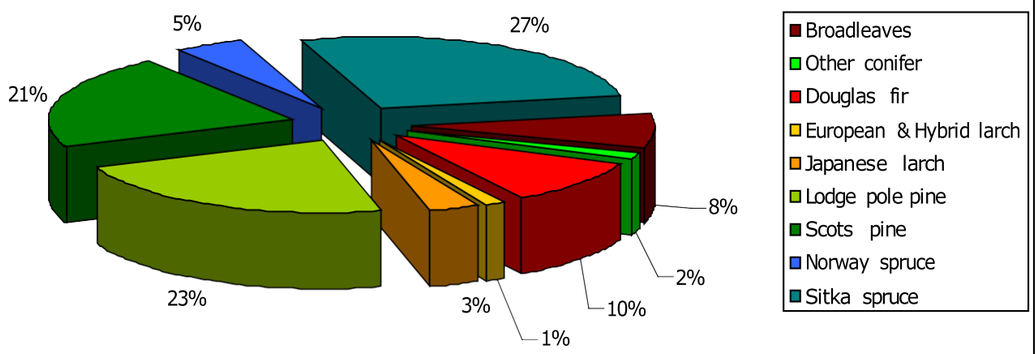
The chart below illustrates the species composition of the forest. In common with many upland forests, Sitka spruce is the largest component followed by Lodge pole pine and Scots pine. Sitka spruce is frequently found in intimate and block mixtures with Lodge pole, characteristic of upper Moriston and Inchnacardoch. Douglas fir, European larch and Norway spruce is generally restricted to the lower margins on the more fertile soil types. The broadleaf element is focussed in riparian zones, fragmented areas of unplanted steep ground and recent areas of native woodland restoration.

There is considerable scope to diversify the species composition in the lower margins of the forests, and given the influence of PAWS and native woodland restoration potential extension of the broadleaf and Scots pine cover would be anticipated.

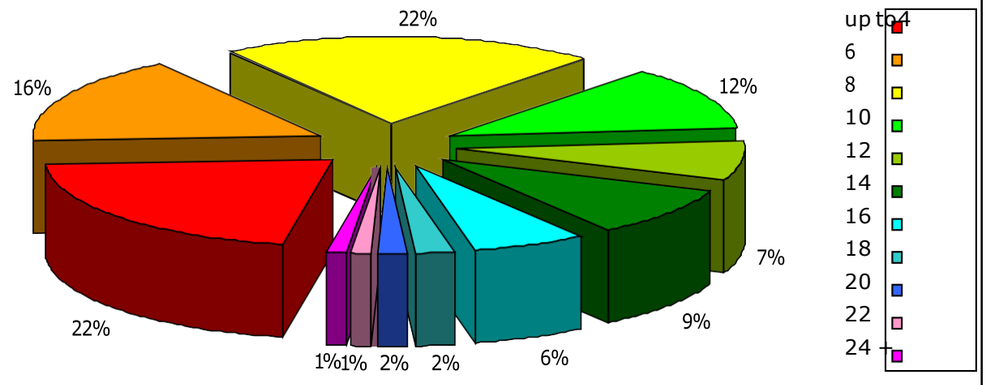
Yield class

The diagram below illustrates the current yield class (YC) composition within the forest. Around half of the forest falls within the range of YC 8 – YC 14, typical of forests within this district. The large area of YC 0 - YC4 is accounted for by significant areas of non commercial native woodland restoration, and to a lesser extent naturalised broadleaf woodland and nutritionally challenged second rotation crops. The Yield class 6 category is predominated by Lodgepole pine crops, largely on the poorest soils and most exposed areas. Prescriptions to reduce the commercial tree line to a more sustainable level on the upper slopes will be outlined in the future habitat and species proposals. The areas of higher yield class YC16+ are located on the lower margins, on the richest soils.

Species as % of forest



Yield class as % of forest area



3.3.2 Land Capability

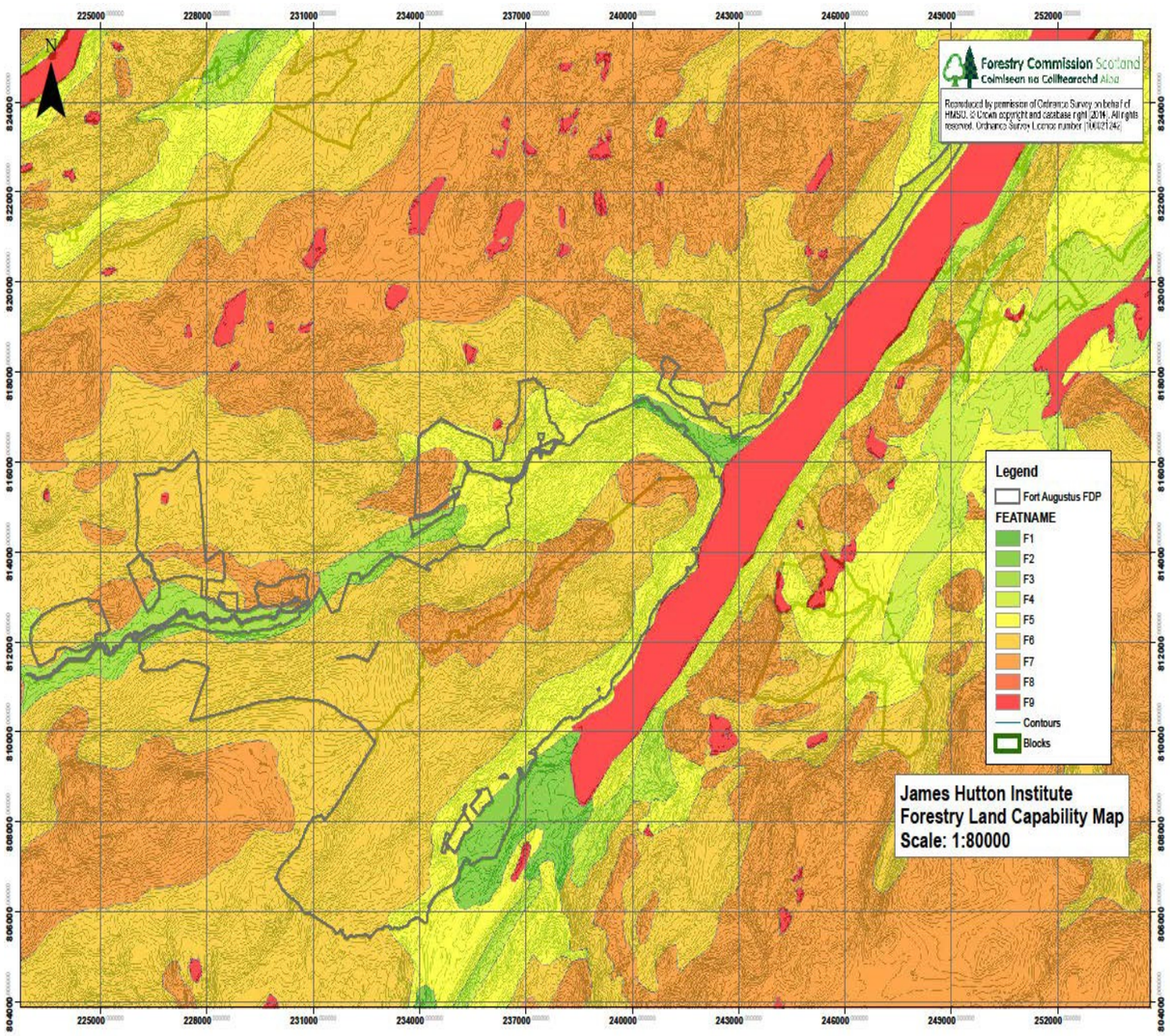
The James Hutton Institute led the development of the Land Capability for Forestry classification - a series of maps with accompanying handbooks at 1:250 000 scale, published in 1988. The classification and guidelines (Towers and Futty, 1989) allows planning to be undertaken based on an assessment of the factors influencing tree growth, notably climate, soils and topography. Silvicultural practices are also considered and developments in this area since 1989 mean that some local interpretation of the Classification is required. The Land Classification for Forestry is based on an assessment of the degree of limitation imposed by the following factors (in relation to productive forestry and not including establishment or enhancement of native woodlands):

Climate – accumulated temperature and exposure
Windthrow – the risk of wind damage based on climate data
Nutrients – assessing base geology and volume of organic/mineral soils
Topography – giving an indication of the likely limitations on forest operations
Droughtiness – assessing soil moisture and relating it to tree growth potential
Wetness – water table movements and the effect on rooting depths
Soil – relating to basic soil types and assessing effects of any modification

The Land Classification uses the descriptions in table 5 below:

Class	Description
F1	Land with excellent flexibility for the growth and management of tree crops
F2	Land with very good flexibility for the growth and management of tree crops
F3	Land with good flexibility for the growth and management of tree crops
F4	Land with moderate flexibility for the growth and management of tree crops
F5	Land with limited flexibility for the growth and management of tree crops
F6	Land with very limited flexibility for the growth and management of tree crops
F7	Land unsuitable for the producing tree crops

The Land Capability for Forestry guidance suggests that the majority of the plan area should be capable of growing a range of conifers and a restricted range of broadleaves, with classifications in the range F3 to F6. The higher areas are classed as F7 and could only be considered suitable for montane scrub woodland. A map showing the distribution of classifications is shown opposite. The capability of the forests within this plan area to sustain productive forestry is dictated to a large extent by the local climate and equally significantly by geology, soils and the consequent nutrient availability. Site capability is assessed on a coupe by coupe basis to ensure that the correct species is matched to the site.



3.3.3 Access
The Fort Augustus plan area is largely well serviced by a fairly extensive road network, with the only exceptions being in the west of Inchnacardoch, Balnacarn and Eastern Bhlaraidh. The most recent investments have been focussed Inchnacardoch in order to facilitate recent DNB felling works.

Within the plan period the following road extensions required are illustrated in **Maps 6.1 & 6.2 CSM6 Felling Maps** and listed below;

- Inchnacardoch spur 1206m NH3208
- Bhlaraidh east spur 544m NH3615
- Achlain east 438m NH2818

The following forwarder track is proposed;

- Bhlaraidh 219m NH3416

The Following new extractive site is proposed

- Lon mor 0.5Ha NH32715 07067

Upgrading of existing infrastructure, to a category 1a standard**,** will be required prior to harvesting operations within the Creag nan Eun, Achlain and Inchnacardoch forests. Long term proposals (out with the plan period) for roading extensions, along with existing roads and extractive sites are illustrated for information in **Maps 4.1 & 4.2 Management map.**

3.3.4 Continuous Cover Forestry (CCF) Potential
CCF potential within the Dalcataig and Creag nan Eun forest is largely constrained by steep terrain that restricts working methods to skyline and winch extraction, making thinning operations uneconomical and smaller intricate felling coupes unpractical. High DAMS scores, past stand management and wet, organic soils limit CCF potential in the remaining plan area to the lower sheltered ground along the Moriston and Oich river valleys. The following stands, a gross area of 410ha, have been assessed as suitable for conversion to CCF;

- The Muir
- Invervigar
- Bhlaraidh 1,2,3,4
- Bhlaraidh by River
- Balintombie & Torgoyle
- Lower Dalcataig
- Moriston West

Young stands within the Thinning Zone (see section 5.1.2) will undergo an attribute survey, prior to first thin age, which will subsequently identify future CCF sites.

3.4 Landscape and Land Use

3.4.1 Landscape character and value –

The forests covered by the Fort Augustus plan are located on the western side of the Great Glen and either side of the side valley of Glen Moriston. Comprising many individual forest areas (Portclair Forest, Creag nan Eun Forest, Inverwick forest and Inchnacardoch) it extends across an area 9887ha. Given this geographical extent of the forest, it is logical that the character of the landscape changes across it.

The Loch Ness corridor is designated in the Highland Structure Plan as a Special Landscape Area, formally an Area of Great Landscape Value. Beyond Loch Ness the forest extends to the west along the sides of the valley of Glen Moriston and the side slopes to the south west of Fort Augustus. The accompanying map identifies the key landscape character areas which are based on the classification carried out by SNH (1999) and modified following site work.

Descriptions of the key landscape character areas:
Broad steep sided glen with loch:
The Great Glen with Loch Ness filling its base is described in landscape character as 'Broad, steep sided glen' in the SNH Inverness District Landscape Character Assessment (1999, Richards) and attributed as the area's most significant feature. The Loch Ness and Duntelchaig SLA citation identifies as notable 'the vast linear expanse of Loch Ness within its dramatic landform trench, flanked by steep towering wooded slopes. It refers to the:

- dramatic sequence of landscape elements along its length;
- a horizontal water surface and adjacent steep slopes which create a simple distinctive profile of contrasting planes and edges;
- a generally horizontal skyline; and
- long vistas of grand proportion, where the scale of Loch Ness dwarfs man-made elements on and around it.

Qualities of note include the strong sense of linear enclosure and even skyline and the visual movement along the glen or across the water.

At intervals along its length are small low lying pasture associated with settlements which nestle beside mouths of rivers flowing into Loch Ness, such as Invermoriston and Foyers. There is a strong contrast between northern and southern slopes in terms of access, activity and settlement which is more extensive on the north. The southern side of the loch retains a wilder feel, being away from the busy A82 trunk road. From the A82, on the northern side steep loch side slopes with exposed rock faces and steep vegetated slopes, near vertical in places, create an alpine quality.

Across much of the Great Glen it is difficult to scale the landscape due to lack of scale indicators. The Landscape experienced for most people (from key roads, the forest and the loch) is from an oblique angle.

Woodlands within this landscape character area:
The glen is characterised by it's steep sided landform, broadly forested, with rocky outcrops, creating variety and dramatic effect. The forest cover has influenced the landscape character as it alters the patterns of vegetation. Broadleaved woodland and coniferous plantations grow over much of the sides of the loch, interspersed with pasture and settlements wherever flatter, more open ground is available. The southern shores have a mixture of broadleaved woodland and coniferous blocks, whilst forests on the northern side tend to have a higher concentration of conifers.

The older sections of plantation, with mature Douglas fir, provide a strong sense of place that is dramatic. The stands of tall trees create punctuation along the A82 trunk road, offering diversity and markers to travellers along the road. Younger, even aged spruce or dense young birch, for example near Allt Sigh lacks diversity and forms an even cover over the landform.

Restructuring over the past rotation has increased age and species diversity. Upper and internal margins and species shapes do not always relate well with the underlying characteristics, creating a pattern with no real rationale away from adding species and visual diversity, neither of which enforce landscape character. Felling coupe shapes have been perpetuated and regularly exaggerated by planting shapes.

The SLA citation identifies potential for landscape enhancement through mitigation of the incongruity of some forest edges which are clearly apparent when viewing between opposite sides of glen.

Although there will be compromises due to the limitations of extraction on steep terrain, to reinforce the character of the area the design of future restructuring (fell coupes, future upper margin and restocking species) will take account of the landscape characteristics, underlying ground conditions and landform to ensure the forest is unified with the rest of the landscape wherever possible.

Internal woodland design is likely to be important in areas where access is encouraged, for example along the new and old routes of the Great Glen Way.

View of Creag nan Eun from Foyers

View of lower Creag nan Eun from A82

Gentle Sided Strath (around Fort Augustus)
To the south west, the steep sides of the glen reduce in gradient and the glen floor widens at Fort Augustus, altering the landscape character to a broad open strath with undulating sides. Being more open, it lacks the drama of the glen to the north. Conifer plantations cover much of the undulating, gently dipping side slopes, whilst across the strath bottom is a mix of open agricultural land and small woodlands, the open water of the Caledonian Canal and settlement which add diversity to the flat alluvial plains at the base of the glen. Roads and a large substation with associated tall pylon towers and powerlines increase the visible level of development.

Woodlands within this landscape character area:
The forests are largely located on the side slopes. Mostly visible in part from across the strath, they drape over the landform. Restructuring has altered the internal margins which in general relate to the underlying landform and increased age and species diversity. The recent expansion of pylons in the area has increased the extent and visibility of the wayleave which dissects the forest vertically downslope, fragmenting the forest in two.

There are no intrusively shaped margins which need to be tackled in the re design of the forest in this area. Future woodland restructuring in the area should reflect the diversity of scale, increasing from small and intricate on the valley bottom (for example around Torr Dhuin), to medium size on the mid slopes and finally larger on the higher elevations.

The relationship with the rugged massif hilltop should be explored to ensure the upper margin relates to the scale of the hillside. There should be sufficient open hill above the forest in proportion with the planted expanse.

Internal woodland design is likely to be important in areas where access is encouraged, for example around Torr Dhuin shown below.

Steep sided Wooded Glen
The northern side of the Great Glen is interrupted by Glen Moriston – a narrow, steep sided glen with sizeable river at base, narrow bottomed, with woodland filling the majority of the glen. Beyond Invermoriston, located where it joins the Great Glen, this narrow glen is almost entirely wooded with a diverse range of conifers and broadleaves including stands of tall, straight birch covering the slopes. Visual movement remains within the glen, due to limited opportunity to see anything beyond.

Woodlands within this landscape character area:
Despite woodlands dominating this glen, there is diversity along its length, determined by the age and species make up such as even aged spruce and larch, native broadleaves, and mixed Douglas fir forest
Over the past forest design plan period much of the side slopes have been managed through continuous cover forestry
avoiding large areas of clear fells. Where these have occurred they have related to landform so there are no intrusively shaped margins which need to redesigned in this area. Over much of the glen away from the settlement of Invermoriston visibility of the slopes is limited due to tree cover at the base of the glen. The steep slopes around Invermoriston determine the method of extraction, limiting it to skyline techniques which leave straight edges. Coupes here are aligned with this in mind whilst working with the landform and scale of the hillsides

Looking east onto Bhlaraidh forest from A887

Wooded Glen
To the west the glen is wider, with more gently undulating side slopes and a flat valley bottom on which are open pasture and scattered properties. There remains a high proportion of woodland, mostly conifer plantation though it is less dominant than further downstream.

The landscape increases in scale in the upper reaches of Glen Morison as the glen opens out as visibility increases extending to the open moorland and hilltops beyond the forest.

Woodlands within this landscape character area:
There are intrusively shaped species margins and external boundaries particularly located at Dalchreichart, in the upper sections of Glen Moriston. A powerline wayleave along the southern hill cuts through the forest running parallel with the road. With the forests in these areas now reaching maturity, fell shapes and restocking should be designed to rectify current failings, relating felling coupes to landform and landscape scale, ensuring interlock and unity. Scale should reduce from broad in the upper reaches to small (of field scale) nearer the settlement at the base of the glen.

The aim should be to create more graded naturalistic transitions between both forest margins and surrounding landscapes ensuring species blocks are of the appropriate scale and shape relative to their setting.

Looking north east from A887 onto Forests of Balnacarn Forest

Rocky Moorland Plateau / Rugged Massif/ Rolling Uplands
Above and beyond the forested sides, is moorland which is expansive and open. The specific character of this varies depending on the bedrock which influences its character. To the north it is a more rocky upland plateau with some distinct peaks. The finger between Glen Moriston and the Great Glen shows characteristics of the rugged massif that extends from here to the west to the Cloutie ridge. To the south and east the upland is gentler in character with less rocky outcrops and more rounded slopes that lack distinctive landmark features. These are high, remote areas where the dominant landcover is open moor, montane heath, and bog. Windfarms and transmission masts are located on these areas and pylon lines cross it.

Woodlands relationship with this landscape character area:
In general, woodland cover is limited within these landscape character areas, being of higher elevation where management and elevation limit tree growth. As such forest upper margins are mostly located in the transition between these landscape character areas and those of the glens below. The alignment of the forest upper margins, related to landform, and character of the woodland cover have a strong influence over appearance in the landscape, colour difference and height, shape and density.

Mostly these forests are plantations, limited in species and age structure. Height and colour contrast with upland vegetation which draws the eye.
Several upper margins and species boundaries could benefit from realignment in the next rotation, most particularly in the areas to the north of Glen Moriston, so they relate to the landform. In areas, such as the upper reaches of Inchnacardoch Forest and the Great Glen, a more graded naturalistic transitions between upper edges of forest margin and surrounding landscapes would be beneficial, where achievable.

The Beauly Denny Powerline wayleave through Inchnacardoch Forest is of a considerable scale, intrusively dissecting the forest. To reduce the linearity of the powerline, the uneven edge, either side of this, should be retained into the future, of appropriate scale, with species changed towards a more graded naturalistic transition from conifer wood to open space.

The landscape scale of these upland areas is extensive. Management coupes and upper margin alignments should wherever possible be designed to reflect the irregularity of the landform and the broad scale of the moorland.

Recent and proposed fellings to address tree pathogen issues are considerable in size, but given the broad scale of the landscape these are appropriate. Being an expansive forest on a wide relatively even slope, interlock and coalescence should be used to increase unity across it.

Internal woodland design is likely to be important in areas where access is encouraged, for example along the new and old routes of the Great Glen Way and around Torr Dhuin.

Looking south along the wayleave of Beauly Denny and associated powerlines as it descends through Inchnacardoch Forest.

Visibility and Views

The forest is widely visible as it dominates the Great Glen and Glenmoriston. Being so extensive the whole forest is not visible from any one viewpoint, however notable popular locations are:

- Upper Foyers Falls viewpoint and Lower Foyers lochside campsite offering views across Loch Ness to forests on the steep lochside below Meall Fuar-mhonaidh;
- Intermittent views from the B852 between Inverfarigaig and Foyers, with intermittent views to steep forested slopes above A82;
- Upper margins above Loch Ness and Inchnacardoch forest are visible from B862 viewpoint at Suidhe Chulmein and visitor walks from there;
- From A82, as it passes along the northern shore of Loch Ness from Fort Augustus to opposite Foyers, offering mostly close up views but also some more distant ones;
- From Loch Ness, including seasonal tourist boats, cruises, kayaks and canoes and other boating traffic;
- From the new and former routes of the Great Glen way which passes above and through much of Portclair and Creag nan Eun Forest, presenting views of Inchnacardoch Forest and the upper margin around Creag Dhearg and Meall na Sroine;
- Invermoriston village, which is almost entirely encircled by the forest;
- From Fort Augustus, for which Inchnacardoch forms its backdrop;
- the Caledonian Canal as it passes between Loch Oich and Loch Ness beside Inchnacardoch forest with views of Torr Dhuin;
- From A887, Glen Moriston where views are mostly of small sections of the forest visible for short periods of time between roadside vegetation; and
- From other local hills and summits

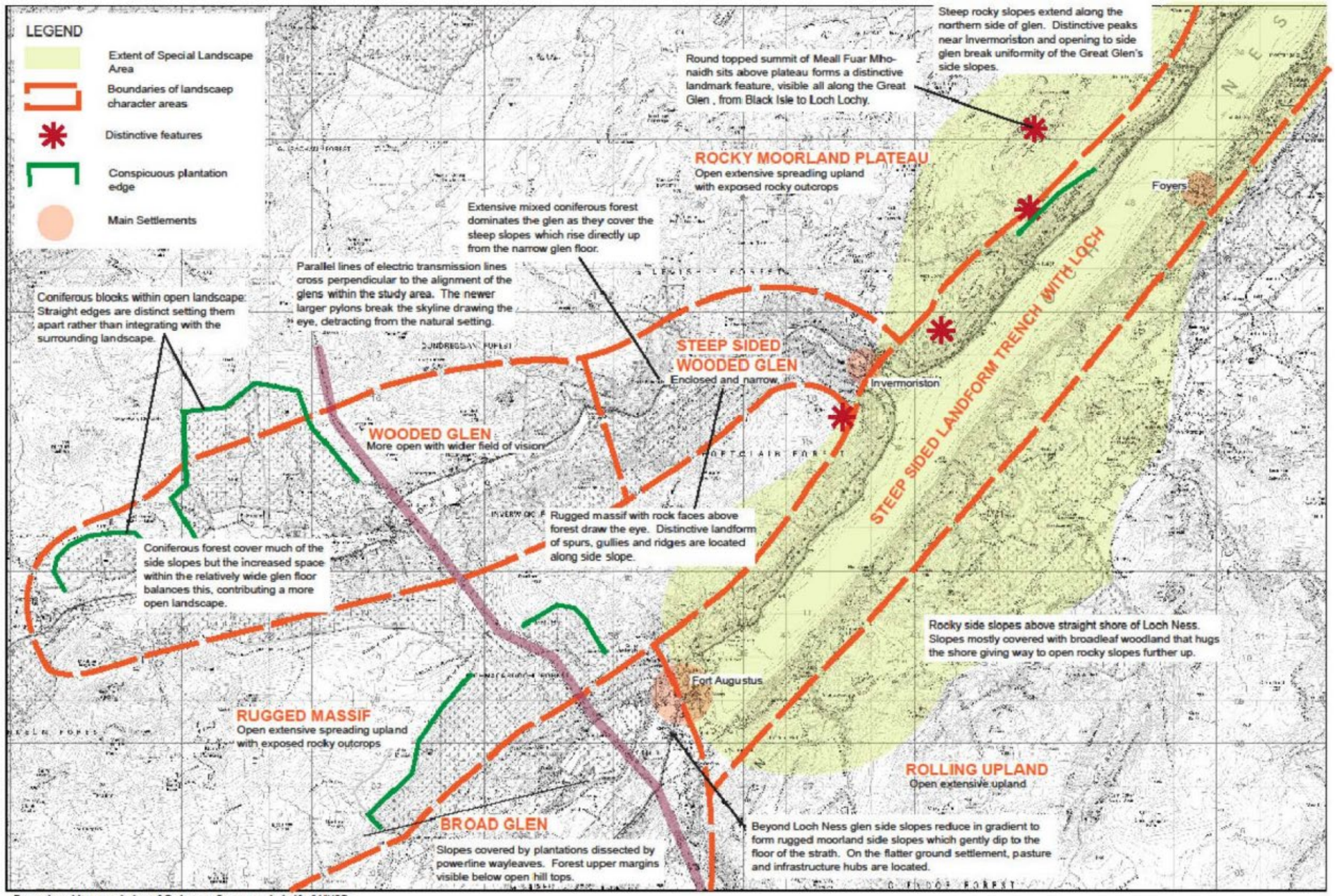
Although the A82 passes along the length of much of the forest in the main views of the woodland are limited due to the steepness of the slope rising up from the road. Only glimpses of the woodland are visible. The towering Douglas Firs and tall European larch where visible create an imposing sense of place creating punctuation along the A82 trunk road.

The more expansive glen experience to the west, along Glen Moriston, offers opportunity for greater appreciation of the forest forms, although visual experience is mainly directed to the road itself, due to enclosure of the wooded glens, with occasional broader views, particularly where distant mountain lead the eye to the horizon.

Ten viewpoints have been used to illustrate the felling and restocking proposals in the FDP. These were selected on the basis of amount of visibility and significance of the views.

These viewpoints are:
Boleskin cemetery,
Upper Foyers Falls viewpoint,
Knockie boathouse
Torran Daraich near Fort Augustus
Bridge of Oich
Torr Dhuin Fort Augustus
Invermoriston Riverside Park
Invermoriston community centre car park,
Redburn Café near Dundreggan and
A887 layby near Tomchrasky

Landform Analysis map



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3.4.2 Neighbouring land use

The Northern plan area is bordered by several traditional sporting estates, Glen Moriston, Balmacaan and Achlain; these are managed primarily for sporting interests such as deer stalking, field sports and fishing on River Moriston and surrounding hill lochs. Glen Moriston estate owns an area of commercial forest to the East of Bhlaraidh and another area south of the Dundreaggan reservoir. Achlain estate also owns an adjoining block of commercial forest south of the FC Achlain land holding.

Trees for life (TFL), an award winning conservation charity, manage the Dundreggan estate, located between the FCS Bhlaraidh and Balnacarn forest blocks. TFL are working to restore native woodland to their landholding and the wider area "*Our vision is to restore a wild forest, which is there for its own sake, as a home for wildlife and to fulfil the ecological functions necessary for the wellbeing of the land itself" Trees for life website 2014*.

Historically Trees for Life and IRS FD have worked closely on conservation projects within Glen Moriston and also Glen Affric, utilising volunteer resource, sharing expertise and knowledge and in sourcing local provenance planting stock.

Along with TFL landholding at Dundreggan, there has been a significant area of native woodland creation in last decade. Private new planting schemes have been undertaken at Achlain, Tomchrasky, Dalchreichart, along the River Moriston, Levishie and Allt Saigh. When considering the scale of native woodland creation and ancient woodland sites, particularly within Glen Moriston, there is considerable potential for native woodland restoration at a landscape scale. **The Future Habitat & Species Map 5.1 & 5.2** shows areas of new woodland creation in relation to the FDP area.

The Western plan area is bordered by the operational Millennium Windfarm located on Aberchalder and Achlain estate and consisting of a total of 26 turbines.

The Southern and Eastern area is bordered by the settlements of Fort Augustus and Invermoriston. Tourism is a vital component of the local economy, with the attractions of Loch Ness, the Caledonian Canal and Great Glen Way bring a steady flow of people through the spring and summer months. With the forests of Fort Augustus adding a backdrop to these important tourist attractions this further emphasizes the importance of good landscape design.

3.4.3 Renewable Energy

The table opposite details all of the existing and proposed renewable energy schemes within the plan area.

Table 6 – Renewable energy developments & proposals

Name	Grid reference	Description
Existing schemes		
Balnacarn	NH274 144 – NH273 131	800Kw run of river hydro scheme, commissioned in 2013. Ownership split across two other land owners. Managed by Dulas
Schemes under development		
Allt Phocachain	NH324111 – NH 323 133	500Kw run of river hydro scheme. Planning consent granted. Partnership between FCS & Green Highland Renewables.
Allt Lairairidh	NH347 163 – NH353 157	500Kw run of river hydro scheme. Planning consent granted. Partnership between FCS & Green Highland Renewables
Allt na Muic	NH259 164 – NH260 144	Run of river hydro scheme proposed by neighbour and Dulas, currently in early planning stages. FCS part land owner.
Moriston Wind Farm	Inverwick Plateau	A 50MW+ wind farm proposal. Planning application due to be submitted in 2014. Joint partnership between E.on & FCS.

FCS recently run a residual renewable energy offer which closed in March 2014; this was to allow communities and the industry the opportunity to identify and develop planning proposals for potential small scale renewable energy schemes on the National Forest Estate.

FCS are now processing the applications through the residual offer to determine suitability and will respond to applicants by December 2014.

Potential implications on forest design and management, as a result of renewable energy developments, will be addressed through the respective developers planning application and where required amendments to the Forest Design Plan.

Further information on the development of renewable energy schemes is provided via the link below;

http://scotland.forestry.gov.uk/managing/work-on-scotlands-national-forest-estate/renewable-energy

3.5 Social factors

3.5.1 Recreation
The Great Glen Way passes through the plan area from Grotaig to Allt na Criche. This long distance walking route attracts around thirty thousand users each year and is of considerable benefit to local communities along the route. The walk is maintained by the Great Glen Way Rangers who work in partnership with IRS FD within the FCS landholding. Work has been undertaken over the past year to create a revised route (GGW 2) and this is due to be completed by the summer of 2014. The new route has been designed to benefit both visitors and forest operations by largely following the upper boundary of Creag Nan Eun forest and going through the open hill ground of Portclair. This will allow panoramic views over loch Ness and minimise interactions between forest operations and visitor use.

Other formal visitor facilities, sign posted walks, car parking and picnic facilities are located at Allt na Criche, River Oich and Torr Dhuin. There are proposal for future works are detailed in **section 5.9 Recreation management.** Wades Military Road is used as a long distance walk from Glen Moriston to Fort Augustus and this is citied as feature to be promoted within the IRS Strategic Plan.

A network of Core Paths and designated rights of way feature heavily within the plan area. The Core Paths aim to satisfy the basic needs of local people and visitors for general access and recreation and provide links to the wider path network throughout the Highland Council area. The Core Paths cater for all types of users - walkers, cyclists, horse riders, people with disabilities, etc. and are a key part of outdoor access provision.
Maps of the full network can be viewed at:

http://www.highland.gov.uk/leisureandtourism/what-to-see/countrysideaccess/corepathplans.htm

3.5.2 Community
The FDP area falls within the Aird and Loch Ness Ward of the Highland Council Region and is represented by Fort Augustus Community Council and Dalcreichart Area Residents Association (DARA).

IRSFD included the community councils and DARA in the consultation process along with a open drop In session in Invermoriston and the replies, where received, are contained in **Appendix 3 – Consultation Record External**.

3.6 Statutory Requirements and Key external policies

This Forest Design Plan has been drafted to ensure that planning and operations functions will comply with the complex raft of legislation and policies that govern the Scottish Environment. **Appendices 1 & 2** contain further information on many of the guiding documents.

4.0 Analysis and Concept

4.1 Analysis of opportunities

The analysis and concept table in the following section is a culmination of the analysis of the key features within the plan area, identified on the Key Features Map **(Map 2)** and displayed spatially on the Analysis and Concept maps (**Maps 3.1 & 3.2**). The analysis of the constraints and opportunities will focus on delivering IRS Forest District commitments towards the six key themes of Scotland's National Forest Estate and strategic directions 2013 – 2016 and fulfilling the Plan Brief (**Appendix 4**) In respect of:

- Healthy
- Productive
- Treasured
- Accessible
- Cared for
- Good Value

4.2 Concept development

The design concept forms the broad spatial framework for the forest that guides the detailed design of management coupes and future habitat and species proposals.

Upon analysing the key features and opportunities and constraints, presented within the plan area, against the targets of IRSFD Strategic plan and the National Strategic Directions the following key aims for this FDP have been identified;

- The restoration of native woodland at a landscape scale over the next 50 years.
- To minimise risk posed to people and the A82 trunk road through good design and practice.
- To protect and enhance the water quality of the Ness catchment.
- To promote resilience of the forest to the future challenges of climate change.
- To strengthen ties with the local community and enhance the landscape of the Great Glen and Loch Ness.

• Sustainable timber production within Inchnacardoch and the productive native woodland zones.

4.3 Analysis & Concept table

Factor	Opportunity	Constraint	Concept Development
Mature conifer plantation approaching terminal height (largely PAWS) on extremely steep, unstable slopes adjacent to A82.	Fell mature forest and remove threat of wind blow to forest road. -establish with lower growing native species that will not pose similar threat in the future.	Extremely difficult terrain requiring motor manual felling specialist skyline / winch extraction. Impact on A82 road users from felling operations. Landscape impact. Risk of enhanced water run-off and associated land slip.	Felling to be delivered through A82 Project, targeting the highest risk stands for felling within first two phases. Good communication and targeted working seasons and hours to minimise impact to road users. Design coupes to wind firm edges, fitting land form within confines of operational capability. Address unavoidable landscape implications through sympathetic restocking.
Re-establishment of A82 Sites.	Establish a protection forest, of native species, along A82 corridor that minimises future risk to the trunk route.	Steep terrain prevents cultivation. Terrain and proximity to road limits opportunity for deer control and fencing. Soil cohesion provided by rooting structure of felled crop diminishes over 5 years. Fertile soils will rapidly vegetate with competing weeds.	Re-establish Low input native woodland on steep unstable slopes, with browsing tolerant native species matched to site type. Establish a protection corridor up to 30m from the trunk road with low stature native scrub species. Mange future low input native woodland under minimum intervention, allowing restoration of natural processes and maximising water regulatory and soil cohesion benefits of forest cover.
Pests and Disease	Diversification of species will result in forest more resilient to future threats posed by climate change.	Dothistroma needle blight is present within plan area and posing a threat to core pinewood areas. Lack of forest infrastructure in Inchnacardoch west & Balnacarn restricting access for harvesting. Climatic conditions and poor soil types limit potential for species diversity in upland zones.	Aim for overall removal of susceptible Lodge pole pine stands in twenty years. Undertake routine plant health monitoring. Target DNB infected stands, with existing infrastructure for felling within first two phases. Post felling there will be no commercial restocking on soils of very poor – very wet ESC status. Restore blanket bog where this has good ecological potential. Reduce productive tree line to better soils in areas of lower exposure. Favour silvicultural nursing mixtures on weakly flushed soils. Increase area of native broadleaves (productive & unproductive). Promote diverse species choice where soil and site condition allow.
Native Woodland	Restore native woodland at a landscape scale. Linking PAWS and fragmented ancient woodland remnants.	Increased area of native woodland will reduce timber production. Increased use of "soft" species will require enhanced deer control and protection.	Continue following best practice deer management, engaging with Moriston Deer Management Group. Maintain critical boundary fences. Use internal enclosures where scale and terrain allows, ensuring adherence with best practice. Promote native timber production on accessible terrain (within harvester forwarder capability) with appropriate soil types. Work in partnership with neighbours TFL to share best practice and achieve larger scale restoration.
Soils,Terrain & Climate	Identification of soils capable of supporting productive crops will allow improved silviculture in the next rotation.	PAWS will restrict the species available at restock to native tree species.	Use site soil and climate conditions at coupe level to indicate future management prescription and species choice at a scale

	Stratification of sites based on growing potential will allow biomass crops to be targeted to more marginal sites and higher silvicultural inputs to be concentrated in areas of higher potential.	The exposed nature of much of Inchnacardoch and Western Glen Moriston will limit species choice and less fertile, organic soils will limit the establishment of productive woodland. Continued intensive forest management , during the next rotation, on steep, unstable slopes may exacerbate risks of landslip and soil erosion.	which is silviculturally appropriate and meets FDP objectives. Use the Ecological Site Classification Support System to assist in correct species choice/management prescriptions. Continue to introduce site improving species such as Birch as an element of productive conifer sites. On slopes most at risk of land slip, promote restoration of native woodland managed under minimal intervention.
Hydrology	Remove riparian conifer in a gradual manner and slow down run-off by restoring a mosaic of riparian woodland/open space and adopting low impact ground preparation techniques. Adopt current silvicultural best practice using nursing mixtures where possible to reduce reliance on fertilisers and ensure fertiliser applications in other areas follow best practice. Avoid intensive drainage regimes on the organic soils of the upper forest margins.	Forestry is one factor that could contribute to an increase in phosphorous levels and siltation, in addition to the effects of natural processes. Inappropriate cultivation of currently unplanted organic soils could cause deterioration in hydrology that will lead to oxidation of peat, with consequent carbon release.	Follow best practice, adopt riparian woodland buffer zone widths as per forest and water guidelines, and avoid unnecessary fertiliser applications. Promote silvicultural nurse mixtures. Plant riparian native woodland where regen is unlikely and manage under minimal intervention to restore natural process.
Recreation & Access	Improve visual aesthetics and visitor experience along recreation routes. Maintain open access along Great Glen Way, Public rights of way and Core paths.	Funding and resources will inevitably create a constraint to further development of facilities. Forest operations have potential to disrupt provision of access.	Work in partnership with Great Glen Way Rangers to maintain quality visitor experience along GGW. Target visitor zone works to existing facilities at Torr Dhuin, River Oich and Allt na Criche. Work with Landscape Architect on intricate forest design around Torr Dhuin Fort. Plan forest operations with consideration for forest users, provide diversions where required to maintain access. Complete construction of GGW 2.
Landscape	Opportunity to enhance landscape quality of the area through optimal forest design. The long term establishment of treeline woodlands will lead to a more natural transition from high forest to open hill habitats.	Steep terrain will restrict coupe shapes to straight edges along wind firm boundaries. Forest health issues may mean coupe shapes are re-designed to remove pathogens rather than improve landscape. Deer pressure may restrict development of tree line woodland.	Work with landscape architect to develop forest design proposals. A pragmatic approach to coupe shapes will be taken if disease dictates early felling. Address unavoidable geometric felling edges (skyline/ winch coupes) through sensitively designed restocking. Continue following best practice deer management. Routinely monitor deer populations and invest in tree line woodland expansion when populations are at a suitable density.

Forest structure	Diversify age structure to increase young woodland component.	Forest infrastructure and local communities will be impacted by substantial peaks in felling. Windblow may be induced in areas of exposure with wet, organic soils. Forest health felling may inadvertently create adjacency issues.	Use production forecast system to systematically plan felling coupes, avoiding large fluctuations in production levels each year. Design fell coupes to wind firm features within the forest. Plan coupes to avoid adjacency where possible, stagger restocking to promote age diversification in the next rotation.
Designated sites and species	Sustain and enhance the quality of habitat to encourage species and sites noted in this plan. Opportunity to demonstrate exemplar management of a diverse range of habitats.	Competing priorities could over complicate objectives, negatively affecting delivery. Risk of unwanted conifer regeneration on open habitat and restored Ancient woodland sites.	Prioritise objectives – taking a strategic approach within this plan. Increase native habitat connectivity to benefit species diversity Ensure adequate species / habitat surveying and monitoring is undertaken and input into the work planning process.
Community	Opportunity to build strong links with local community and a highly valued public resource.	Community may be indirectly / directly impacted by forest operations. Time and resource restrictions may limit ability to engage and respond.	Engage with community throughout production and implementation of the FDP. Hold a public Drop in Session to inform and develop management proposals and increase awareness and understanding. Introduce local Community Liaison Champions to act as point of contact for the general public. Minimise timber haulage impact by upgrading of infrastructure and use of internal haul routes where possible.

5.0 Forest Design Plan Proposals

5.1 Forest stand management

See **Maps 4.1 & 4.2 – Management** for a spatial representation of all management coupes within the plan, **Maps 6.1, 6.2 6.3 & 6.4 - CSM6 Maps** for a spatial reference to all felling and restocking within the ten year period. **Appendix 9 for the Coupe Summary.**

See **Appendix 8 for 3d visualisation** showing future felling and restocking from selected viewpoints.

5.1.1 Clear felling

Due to combination of soils, exposure and climate, clearfelling is the dominant silvicultural system applied to the management of forest within the FDP. The primary driver for felling programme over the next ten years is dictated by forest health, the removal of Lodge pole pine, and the requirement to reduce risk to A82 and restore native woodland. Due to the top weighted age structure of the forest and the large volume of Lodge pole pine forest it is anticipated that felling levels will rise within the plan period, peaking in phase 2, before reducing in phase 3 to relatively consistent level thereafter.

Phase	Estimated annual average volume (m3)
Phase 1 2015 – 2019	26790
Phase 2 2020 - 2024	40353

Felling will also aim to fulfil several other objectives, including habitat restoration, enhancing visitor experience around facilities and wind blow clearance. Timber production from the plan area will consist of a wide variety of timber grades from Lodgepole pine crops, suitable for wood fuel and chip to green sawlogs crops and niche market large diameter timber. Maximising production will be balanced with the need to protect the soils and hydrology on sensitive sites.

Clearfell will be undertaken using harvester – forwarder systems on accessible terrain and winch / skyline systems on the steep, unstable slopes. Prior to operations being undertaken on unstable slopes a professional geotechnical assessment will be undertaken and recommendations will be incorporated into the site planning and management.

In the initial phases the technically challenging sites will be delivered through direct production and the remainder focussed on a mix of standing sales and direct production.

5.1.2 A82 Coupes

Due to the complex nature of the steep ground working, appropriate consideration has been given to availability of skilled resource and impact onto the A82 in the timing and sequencing of clearfell coupes within the A82 corridor.

Greater flexibility on timing is required in the undertaking of the A82 felling coupes and due to the relative unknowns of productivity, when working under such extreme conditions and restrictions, it is anticipated that certain coupes, such as the eastern face of Creag Nan Eun, may take several years to complete and programme movement between phase 1 & phase 2 coupes may be required.

Areas targeted as long term retentions within the A82 clearfell coupes will be subject to site assessment to determine tree stability and associated risk, trees deemed as unstable or of high risk will be incorporated into the adjacent felling.

Please see the following link to the FCS A82 Management Strategy:

A82ManagementStrategy-Final[1].pdf

5.1.3 Thinning

Site analysis and desk based studies (using DAMS and terrain model) have been undertaken to produce a thinning zones where exposure and terrain allow conventional thinning practice this is shown on **Map 9 – Thinning Zones.**
Within the thinning zones previously thinned stands (gross area of 550ha), of good stability, will be targeted for future interventions and young stands within and approaching the conventional first thin window (as per Thinning Control FC Field book 2) will undergo a year attribute survey to determine basal area, stocking, top height and yield class. Where threshold basal area is achieved in young stands and this meets management objectives they will be incorporated into the thinning programme.

Thinning will largely be Intermediate (selective) at a rate not exceeding marginal thinning intensity. Where the opportunity exists for early transition to a CCF system crown thinning will be applied.

It is anticipated that due to the high cost and limited contract resource that skyline thinning will not be undertaken within the plan period. Where threatened veteran remnant trees are present on PAWS sites, and this does not pose a health and safety risk or constraint to future operations, non commercial hallow thinning to recycle will be considered.

5.1.4 CCF
The following stands, covering an area of 417ha, have been assessed through site visits and desk based studies as suitable for conversion and or management under CCF:

Late transformation stands:

- The Muir
- Bhlaraidh 1 & 3
- Bhlaraidh by River
- Balintombuie & Torgoyle

Young stands:

- Invervigar
- Bhlaraidh 2 & 4
- Lower Dalcataig
- Moriston West

A map showing CCF areas contained in **Map 10- CCF Overview Map**. Further detailed prescriptions for the CCF management proposals are available within IRS District.

Due to the largely light demanding nature of desirable species within the forest, shelterwood systems, where felling interventions will be of a sufficient size (0.25ha – 2ha) to allow light penetration to ground layer, will be favoured. Thinning combined with group felling will be undertaken in the late transformation stands and the young stands will be programmed for respacing of natural regeneration at top height of 1.5m – 6m.

With the dynamic nature of forests it is necessary to reappraise CCF proposals at the mid term and full review of this plan, with a principal focus being on stand stability (in the late transformation stands) and recruitment of natural regeneration.

As mentioned above, recruitment of new sites for management under CCF will follow the year attribute survey prior to first thin age.

5.2 Future habitat and species

With the complex mosaic of soil types, hydrology and climatic conditions across the plan area the future habitat and species prescriptions have been developed to meet overriding objectives, but retain an element of flexibility to allow for silvicultural finesse on a site by site basis. The future habitat and species prescription have been designed in relation to the FDP aims and developed through analysis and concept process.

Using desk and field analysis (soil mapping, ESC programme, DAMS, terrain modelling) the prescriptions shown in table 7 have been applied spatially in the **Maps 5.1 & 5.2 - Future Habitat and Species.**

Table 7 – Future species prescriptions

Prescription	Species	Establishment	Density	Management objective
Low Input Mixed woodland	Native species: Scots pine, Downy birch, Eared willow. Supplemented by exotic conifer regeneration: Sitka spruce, Lodge pole pine, Japanese larch	Planting supplemented by natural regeneration	Low / Variable density. Up to 60% open space. 1200 – 1600 per ha	Primarily for landscape and bio-diversity. Managed under minimal intervention post establishment.
Low Input Native Woodland	Native species matched to NVC site type. Scots pine, Sessile oak, English oak, Silver birch, Downy birch, Hazel, Rowan, Goat willow, Eared willow, Grey Willow, Common Juniper, Holly, Blackthorn, Bird cherry, Gean, Alder, Aspen.	Planting & or natural regeneration	Low / Variable density. 1200 – 1600 per ha	Primarily for bio-diversity, soil and water management. Native woodland restoration, managed under minimal intervention post establishment.
Productive Conifer	Conifer species matched to site type; Sitka spruce, Norway spruce, Douglas fir,	Planting Supplemented by natural regeneration	High density 2500 per ha	Timber production

	Grand fir Lodge pole pine, Scots pine, Western hemlock, Western red cedar etc. with an element of native broadleaf regeneration			
Productive Pinewood	Scots pine, with element of native broadleaves (Birch, Eared willow, Goat Willow, Rowan, Oak, and Hazel etc). Norway spruce as component on non PAWS sites.	Planting Supplemented by natural regeneration	High Density 2500 per ha	Combined timber production and native (including non commercial) woodland restoration.
Productive Native Broadleaves	Native broadleaves matched to site type: Silver and Downy Birch. Sessile and English oak, and Gean.	Planting Supplemented by natural regeneration	High Density 3000 – 5000 per ha	Combined timber production and native (including non commercial) woodland restoration.
Riparian Woodland	Native woodland matched to NVC site type. Primarily Alder, Aspen, Birch cherry, Silver & Downy Birch , Scots pine, and Willow spp.	Natural regeneration & enrichment planting	Low Density 600 – 1200 per ha Up to 40% open space	Primarily for bio-diversity, soil and water management. Managed under minimal intervention post establishment.

Internal open space will form a component of each prescription, located where it provides most ecological value along watercourses, flushes and un-plantable, rocky outcrops.

Given the large extent of PAWS, ancient woodland remnants and surrounding native woodland expansion the decision was taken to capitalise on the opportunity for landscape scale native woodland restoration. The land holding from Allt na criche in the South east of the plan area to Achlain in the Northwest and all of Creag nan Eun forest are to be restored to native woodland over the next 50 years. This will be a mosaic of oakwood, upland birch wood and wet woodland on the more fertile soils of the Moriston river valley and south facing slopes, progressing into pinewood in the upper margins and predominantly pinewood along the North facing slopes. The weakly flushed, peaty soils of poorer drainage will be dominated by Downy birch. Over time this will link PAWS, Core Pinewood areas and the designated Levishie SSSI creating a robust native habitat network, with substantial benefits for associated species.

Along with the native woodland restoration the expansion of Low input native woodland will serve the dual objective of reducing future risk along the A82 corridor; a mixture of species will be favoured to ensure varied rooting depths and the initial wider spacing will be designed to promote root and crown development (ensuring more wind firm trees that are less prone to catastrophic wind blow events). A corridor of low stature native trees and shrubs will be established adjacent to the A82. This will further build resilience along the trunk road by limiting tree size in the immediate corridor, whilst providing the cohesive benefits to the soil of tree / shrub rooting. Within the A82 corridor the future management of Low Input Native Woodland (post establishment) will be minimal intervention, however active management will be will be undertaken where there is a health & safety imperative.

The opportunity to maximise native timber production will be undertaken on accessible terrain that can be adequately protected from browsing. Productive pinewood will be located on freely draining soils of low nutritional status and Productive native broadleaves on the fertile soils on accessible terrain. In order to maintain and enhance the ecological value of PAWS sites appropriate buffer zones, for productive planting, will be applied to all remnant veteran trees and watercourses. Ecological diversity will be encouraged by accepting regeneration of native species within productive zones.

Low input mixed woodland has been applied to the upper margins of Inchnacardoch which in accordance with Forestry on peatland habitats: Supplementary guidance to support the FC Forests and Peatland Habitats Guideline Note (2000) (currently in draft) the soil type and climatic and site conditions do not support commercial restocking or peatland habitat restoration. The objective is to achieve a transitional forest edge leading onto the open hill. The creation of this forest edge will provide landscape benefits by removing the current geometric boundary, provide a suitable habitat for moorland edge species such as Black grouse and maintain woodland cover without intensive forestry practice resulting in potential net carbon loss. As there is no imperative for purely native species within this area an element of non native conifer regeneration will be accepted as a component.

Low input native woodland planting operations will be aimed at encouraging a suitable National Vegetation Classification (NVC) woodland type appropriate to the soils and indicator vegetation encountered on site and in the vicinity. This will be identified subsequent to harvesting operations. **Appendix 9: Management prescriptions on the National Forest Estate – Native Woodland** details the appropriate native woodland and open habitat types for each site type encountered across the FDP area.

On suitable sites, Productive conifer utilising exotic species will be restocked. Silvicultural mixtures will be the preferred option and there will be an emphasis on

species diversification where soil types allow. Due to the underlying lithology it is anticipated that pure stands of more demanding species (spruces etc.) will encounter nutrient deficiency on the poorer soil types; as such on nutritionally poor soils nurse mixtures of Lodge pole pine (Alaskan provenance) with Sitka spruce will be utilised and an element of site improving species (Birch sp) will be accepted as a component of the forest. Due to the extent of PAWS Productive conifer will be largely confined to the Southwest of the plan area in Inchnacardoch. **Appendix 10:Management prescriptions on the National Forest Estate –Productive Forestry** details the appropriate species for each site type identified across the productive areas of the plan (*Productive conifer, Productive pinewood, Productive native broadleaves*) and this will form the basis for discussion at each coupe 75% meeting.

Due to plant health issues the following restrictions will be applied to restocking;

- Phytophthora ramorum: no planting of Larch species.
- Dothistroma needle blight: Lodge pole pine restricted to Alaskan provenance in silvicultural nurse mixtures. No planting of Scots pine within the CPI buffer zone unless stock is guaranteed DNB free.
- Chalara fraxinea: no planting of Ash.

The above restrictions on species choice and planting will be continually reviewed throughout the plan period in accordance with the development of Forestry Commission Plant Health guidance.

The restoration of riparian woodland will increase internal open space, fragmenting homogenous productive blocks, increasing forest edge habitat and allowing a windfirm network of permanent habitat corridors to develop. This in turn will allow greater age class diversity in future rotations by providing a 'framework' within which reduced coupe sizes can be managed. Current climate change predictions under all climate change scenarios indicate that freshwater ecosystems may become threatened by increases in summer temperatures and altered river flows resulting from increased precipitation. Salmonids in particular are susceptible to temperature changes (Broadmeadow, 2002).

In addition soil erosion may be exacerbated by increased flood and drought cycles. The increase in dappled shade and soil stability provided by broadleaf riparian woodland will help to protect river ecosystems from the predicted temperature fluctuations predicted to result from climate change.

Forest of highest ecological value within the plan area will be designated and managed as a natural reserve: managed in perpetuity under minimum intervention. This will be applied to area of restored pinewood at Inverwick and wet woodland along the River Oich. It is envisaged that the natural reserves will act as stronghold for more sedentary woodland flora and fauna and foundation for the expansion of more mobile species.

5.3 Restructuring

Forest restructuring will be led by the restoration of PAWS, forest health issues and requirement to reduce risk of windblow within the A82 corridor.

Forest restructuring in general will be subject to 3- 5 year fallow period between felling and restocking, to allow a natural reduction in Hylobius populations and minimise requirement for insecticide treatment. However, high risk steep sites will be hot planted, as soon as possible, following completion of felling. Hot planting (restocking in the immediate planting season post felling) will maximise the cohesive benefits of trees on soil and minimise impact of competing vegetation.

Stands adjacent to felled areas will be retained until the restocking of the first coupe has reached a minimum height of 2m except where windblow or disease mean felling must be brought forward. In these circumstances, restocking will be delayed to achieve the required age diversity

The overall area of productive woodland will be reduced during the life of the plan and rationalised to a more sustainable level. Restocking in productive areas will aim to maximise the productive capacity of the forest, the brief guidelines below will be followed to ensure adequate restocking:

- To obtain maximum benefits from restructuring, restocking areas will not be less than 3ha per individual shape or exceed 50ha out with CCF areas unless forest health issues dictate otherwise.
- Within CCF areas coupes will not exceed 2 Ha.
- Restock coupes adjacent to the forest road network should be restocked to within a short distance of the forest road for at least 30% of the coupe frontage for future access.
- Non - productive broadleaf elements within productive coupes should be located where they will be of greatest benefit; in riparian zones, adjacent to open ground, other broadleaf woodland or around archaeological features to enhance the setting.
- On accessible terrain where SP is not appropriate to site type (within PAWS coupes), commercial density broadleaves will be planted.
- Restocking will not be undertaken on protected open habitats and a suitable buffer zone will applied to protect these features.
- Productive restocking will not be undertaken on soil types 9e, 10b, 11b, 11c, 11d, 14, 14h and 14w due to the intensive drainage regimes and high fertiliser inputs required.

5.4 Future Management

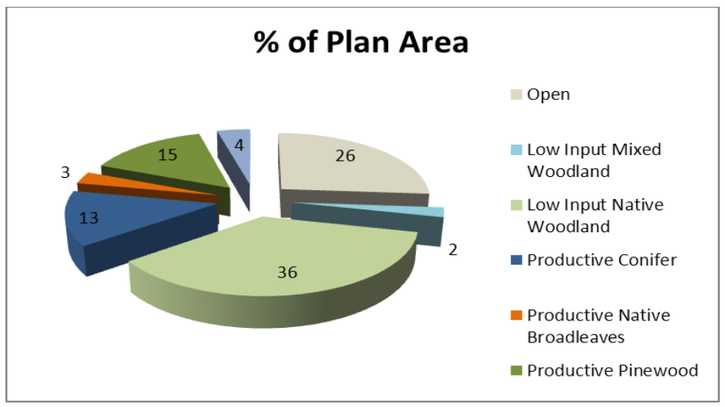
Future management is illustrated on the Management map and Future habitat and species map, as standard, proposals out with the 10 year plan period will be subject to review on full revision of the FDP.

The vision and aims of the FDP are largely long term and this plan is for many a stating point in the process. It is anticipated that the native woodland restoration proposals will take 50 years to implement, given the scale of proposal and current age diversity of conifer plantation. The vision to revert the whole area of native woodland to natural processes, following restoration, at an ecologically appropriate time will be an ongoing consideration of future revisions.

The removal of Lodge pole pine is expected to be undertaken over 20 years, but this will be subject to revision following plant health monitoring.

Productive second rotation crops will be monitored from establishment until canopy closure for nutrient deficiency. Foliar analysis will be used to determine necessary use of fertiliser and application rates. Fertilising will only be undertaken on appropriate sites, with adequate buffers from sensitive features and in accordance with Forest Fertilisation in Britain (Taylor, C.M.A. 1991) and the UK Forestry Standard Forests and Water Guidelines.

The following table illustrates the future composition of the forest on full implementation of the Future Habitat and Species proposals.



5.5 Deadwood Management

The management of deadwood within the Forest Plan area will be carried out using the principles contained in the document Deadwood Management, Summary Guidance for FES (K Kortland).

Deadwood Ecological Potential Classes are assigned to a Forest Design Plan area as shown on **Map 11 Deadwood Ecological potential**. Levels of deadwood retained on site are tailored to the ecological potential of the area, with due consideration for potential health and safety implications. The overall objective is to attain the UKWAS target of 20m3 /ha, unevenly distributed, across the FDP area.

5.6 Management of open land

The management objectives for open land are outlined below;

- To ensure that there is a representative network of open habitats of European and national importance such as blanket bog, dry and wet heaths and mountain scrub as functional ecosystems within the area of the plan. Ensuring that their ecological value is preserved and enhanced through appropriate management practice.

Proposals for management of open habitat are outlined in **Appendix 11 Open Habitat Management Prescriptions.**

5.7 PAWS Restoration

Ancient woodland currently recorded across the FDP area is noted in background information section 3.2 (Biodiversity and Heritage Features) and has been taken into account in the production of the Future habitat and species proposals as indicated in section 5.2.
Using site visits, assessing the forest and terrain, in conjunction with the PAWS restoration management flow chart in 'FES PAWS Guidance' (Thompson, 2009) the optimum method of restoration management has been matched to the site-specific conditions of the PAWS. Due to the complexity of terrain and the extent of native remnants clearfelling, retaining native seed trees where appropriate, and re-establishment of native woodland through a combination of restocking and natural regeneration will be the most common approach. However, where conditions are favourable a gradual restoration through CCF will be applied as stated in section 5.1.3.

Due to the competing objectives within the plan area and the large scale of PAWS, the restoration through clearfelling undertaken within this FDP is balanced with other priorities of Lodge pole pine removal, and the A82 works. Where there is no critical threat to remnants commercial conifer rotations will be matched to the Maximum Mean Annual Increment.

A gross figure of 264Ha full PAWS coupes and 140Ha of partial PAWS coupes are programmed for restoration through clearfelling and re-establishment within the period of this plan.

Post clear felling, removal of non-native regeneration on PAWS will be programmed through PAWS monitoring work.

5.8 Flora and Fauna Species

Due consideration has been given to the nature and distribution of priority species within the plan area and detailed measures for management are outlined below in table 8.

Table 8: Designated sites & protected species

FCS Scottish Forestry Strategy - Special Focus Species and/or SNH – Species Action Framework relevant to the FDP area	**Objective**	**Actions supported by FDP**
Black Grouse	Enhance population capacity through habitat management.	Maintain annual lek survey. Retain some larch trees near leks as long as possible to provide supplementary food source for the black grouse and maintain woodland continuity while woodland cover is restored. Manage woodland fringes near leks. Restructure upper forest margins, feather woodland edge to create transitional woodland – open habitat. New fences and existing fences, particularly in important black grouse areas, e.g. near leks, will be marked. Redundant fences will be dismantled as soon as possible. Ensure that near the lek sites that a mosaic of wet/dry heath is retained as a food source for respectively the chicks and adults. Ensure that tall dry heath is retained as a breeding site and shelter.
Red Squirrel	Manage the pine forest to provide optimum habitat conditions for red squirrels. Instigate appropriate surveys to assess levels of activity within Inchnacardoch and Moriston Forests.	Current plan indicates large scale restoration of native woodland over the next 50 years. Retain some Norway Spruce as long as possible to provide supplementary food source for the red squirrel. Maintain woodland continuity while woodland cover is restored (CCF over 417ha)/ gradual programmed forest restructuring.
Scottish Wildcat (also EPS)	Survey/ monitor for species within suitable habitat. Presence/absence surveys during work plan assessments.	FDP provides good habitat opportunities within Inverwick Forest.
Fresh Water pearl mussel (also EPS)	Monitor areas where surveys have been undertaken within potential breeding habitats.	Ensure no siltation within burns and tributaries of the River Moriston SAC for Fresh Water Pearl Mussel. Enhancement and expansion of Riparian woodland along key tributaries of the River Moriston.
Water vole	Species & habitat protection & enhancement. Determine distribution in order to inform conservation management.	Species present in FDP area. Sustainable deer management to control grazing pressures in open habitat, providing improved conditions for water vole.
Juniper	Expansion of species on suitable site types.	Protect existing bushes by undertaking halo thinning of plantation forest around bushes. Provide opportunities for juniper to increase within the FDP area on suitable site types by planting and or encouraging natural regeneration.
Pearl-bordered Fritillary	Consolidation & enhancement of species. Determine distribution in order to inform conservation management.	Maintain open space and variety of wooded habitats within the FDP area. Management of woodland edge flora as a potential food source
Round leaved wintergreen	Assess and monitor for species. Presence/absence surveys	Maintain open habitat where the species occur through control of tree regeneration.
Habitat Priorities	**Objective**	**Actions supported by FDP**
Caledonian pine forest	Protect & enhance habitat	Large scale expansion of native woodland through planting and natural regeneration, using local provenance species. Native woodland expansion will link currently fragmented habitat benefiting associated flora & fauna. Management of areas of high ecological value under Natural reserve.
Blanket bog	Protect & enhance habitat	See Appendix 12
Montane	Protect & enhance habitat	See Appendix 12
Wet & dry heath	Protect & enhance habitat	See Appendix 12
Local BAP Opportunities (Those are some of the opportunities but the list is not exhaustive)	**Objective**	**Actions supported by FDP**
Otter (also EPS)	Protect & enhance habitat.	Manage and enhance the riparian corridors to provide better foraging and access routes to hill loch habitat. Restoration of riparian woodland through restructuring, natural regeneration & enrichment planting.
Aspen	Expand species on suitable site types.	The improvement of native woodland types allows for enrichment with appropriate native species. Aspen will be included within planting schemes.
Salmonids Brown / Sea Trout Atlantic Salmon	Protect & enhance habitat.	Restoration of riparian woodland along spawning habitat (tributaries of the River Oich, Moriston& Loch Ness. Protection of water quality through compliance with Forest & Water

		Guidelines. Larger implementation of less intensive silviculture within the Ness catchment.
Bats (also EPS)	Record, Protect & enhance roost sites.	Protection and management of ancient trees. Management of old bridges, buildings such as at Achlain and at Fort Augustus. Enhancement and expansion of riparian woodland.
Wood ant	Monitor for species. Protect	Management of woodland and of trees. Use of CCF to maintain woodland cover where possible.
Peregrine (also Annex 1 species)	Survey, Monitor for species. Protect	Integrate protection during woodland management.
White-tailed- eagle (also Annex I species)	Record	
Golden eagle (also Annex I, species)	Record	
Merlin (also Annex I species)	Record	Leave open areas with standing dead wood as potential perches).
Hen Harrier	Record	Leave open areas within woodlands and plantations.

Management prescriptions for Invasive non native species are also detailed below in Table 9

Table 9: Non-native Invasive Species

The forest district will concentrate management activity on the following list of species:

Non-native Invasive Species	Threat	Management response
Rhododendron *(Rhododendron ponticum & hybrids)*	Spread of plants mostly within Localised area of Inchnacardoch and along the Great Glen Way.	Survey & quantify spread of plants. Initiate a control programme to remove rhododendron from FCS estate.
Mink	Direct negative impact on native species, such as water vole. Indirect impact on to other species such as otter through competition within habitat.	Survey, monitor & initiate targeted control as required.

5.9 Deer Management

Wild deer on the National Forest Estate (NFE) are managed in accordance with the Scottish Government's strategy "Scotland's Wild Deer a National Approach" and under the auspices of the Code of Practice on Deer Management. All proposals and operations are tested against the criteria contained in the Joint Agency Statement on Deer 2004. The strategy and Code of Practice takes recognition of the fact that Wild deer are an asset, an integral part of Scotland's biodiversity and provide healthy food and recreational opportunities. The challenge of managing wild deer originates in a need to balance the environmental, economic and deer welfare objectives of the Scottish nation with the objectives of private landowners for forestry, agriculture, sporting and other forms of land use.

The principal legislation governing the management of deer in Scotland and hence on the NFE is the Deer (Scotland) Act 1996.

Forestry Commission Scotland's (FCS's) policy recognises that deer are capable of causing significant damage to forests and woodlands, mainly through browsing and bark stripping and can also adversely affect biodiversity through over-grazing of ground flora and the suppression of natural woodland regeneration. They are, however a natural component of woodland ecosystems, they can provide recreational sporting opportunities; venison as a high quality food. The presence of deer can enhance the experience of visitors to the forest. It is therefore FCS deer policy to:

- Prevent adverse deer impacts on commercial tree crops and the wider habitat. In doing so carry out deer culling in an exemplary and humane way and maintain an effective network of external deer fences where they are required.

- Work closely with relevant organisations and neighbours to make sure that there are integrated deer management plans which seek to recognise the interests of all parties.

- Take opportunities to optimise income from venison from sporting where this does not conflict with our primary objective of maintaining deer impacts at an acceptable level, in line with Quality Meat Scotland accreditation in the form of The Scottish Quality Wild Venison (SQWV) Assurance Scheme

- Take all practicable steps to slow down the expansion of non-native deer species into areas where they are not currently present.

The Fort Augustus FDP area is covered under the Moriston Deer Management Unit and a copy of the Deer Management Unit Plan is in **Appendix 12 .**

The deer population across the FDP area comprises red (*Cervus elaphus)*, sika (*Cervus Nippon)* and roe (*Capreolus capreolus)*, Red being the predominant species. Deer numbers are being managed to ensure that restocked coupes are successfully established and the wider forest habitats protected.

Existing external deer fences will be maintained and proposals for internal enclosure will be made on site by site basis in accordance with best practice. Low grazing pressure will be tolerated, in particular around areas considered to 'buffer' the wider forest. These buffer areas may consist of either managed open space (deer 'lawn' areas) or planted woodland near existing forest edge where browsing damage will be accepted.

Development of a proportionate zone of browsed vegetation in these areas – either commercial density conifers or broadleaved species capable of coppice growth - also carries wider biodiversity benefits and is accepted as a consequence of efforts to manage deer populations without resorting to extensive fencing.

As the forest plan progresses the focus on deer management will change to ensure favourable conditions are present for the establishment of native broadleaves. It is believed that a density of 5 deer per 100ha or lower will be required for broadleaf establishment. Operational policies and procedures are held at the Forest District Office.

5.10 Recreation and Access Management

The existing recreational facilities at Allt na Criche, The River Oich and Torr Dhuin will be maintained and improvements are specifically planned for the Torr Dhuin car park along with new interpretation panels for the Iron age fort. The visitor experience of the forests will be enhanced by a programme visitor zone works targeted along the path networks. This work will use small scale silvicultural operations to improve internal forest design. The Wades road will be promoted as long distance walking route and the use of minimal way marking will be considered. Due to the importance of the Military Road SAM routine monitoring will be undertaken to ensure that it is maintained in good condition.

The Great Glen Way will continue to be maintained in partnership with the Great Glen Way Rangers to provide a high quality recreational experience to users.

Access provision will continue in accordance with the Scottish Outdoor Access Code. Following best practice during forest operations and use of planned diversions, access provision will be maintained within the plan area.

5.11 Heritage Management

Detailed proposals for the management of scheduled heritage features are included in **Appendix 6.1 & 6.2 SAM Plans**. In general, all significant archaeological sites are protected and managed following Forestry & Archaeology Guidelines (FC 2011), the FCS policy document Scotland's Woodlands and the Historic Environment (FCS 2008) and the supporting FES Historic Environment Planning Guidelines (available from the FCS Archaeologist). Management coupes, access roads and fence lines are surveyed by Forest District staff prior to any work being undertaken in order to ensure that upstanding historic environment features can be marked and avoided.

5.12 Community

To further strengthen links with the local community we have created the new role of Community Liaison Officer for each geographical beat within the district and will continue to support this function throughout the implementation of the plan. The Community Liaison Officer will act as a consistent point of contact between the community and IRS Forest District and will enable us to more effectively deal with any such requests or queries that may arise.
IRS Forest District will continue to attend Community Council meetings, as and when necessary, and use this as forum to give advanced notice of forest operations that may impact the community.

Throughout implementation of the A82 project it is recognised that good communication is critical. FCS will therefore keep people informed through open and regular communications throughout the life of the project, ensuring that key stakeholders and local communities are kept fully appraised throughout. Communications methods will include;

- Public "drop in" meetings
- Community Council meetings
- Local press and public notices.
- Posting updates on the FCS and our partner's websites, our twitter account
- Local and national radio announcements.

5.13 Critical success factors

In order to evaluate the relative success of the proposals stated in this plan a number of factors have been identified as key for it's implementation. These 'critical success factors' are detailed in **Appendix 4 – FDP Brief**, along with details of how IRSFD will monitor delivery and who amongst FD staff will be responsible for that monitoring.
This plan will be reviewed (mid – term review) after 5 years (2019) and a full revision will be undertaken after nine years (2023) to allow a new plan to be submitted by the expiry date of 2024.