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## 4 Introduction

### 4.1 Existing Landholding (see **Map 1 & Section 7** for further detail)

#### Land use

The current land use structure within the West Sutherland LMP area shows that the majority of the LMP area is dedicated to productive forestry (just above 62%) with other land uses taking over 37% (like unproductive, open, agricultural, open water, built-up areas). In the afforested category there are both existing crops (nearly 49%) in various age classes (see the 'Age structure' paragraph below) and land currently awaiting restocking (just below 14%). The former North Highland FD adopted an average 5 year fallow to minimise possible damage to newly planted trees caused by *Hylobius abietis*, accounting for slightly longer periods of felled areas being unplanted.

#### Current Forest Species

Sitka spruce (*Picea sitchensis* – SS) is a predominant conifer in the productive high forest at almost 39% of the stocked area, Lodgepole pine (*Pinus contorta* – LP) has the largest share at 41%. Scots pine (*Pinus silvestris* – SP) covers nearly 7% of the afforested area. Hybrid larch (*Larix x eurolepis* – HL), European larch (*Larix decidua* – EL), and Japanese larch (*Larix kaempferi* – JL) cover about 2%, while other conifer species, such as Norway spruce (*Picea abies* – NS), Douglas fir (*Pseudotsuga menziensis* – DF), Grand fir (*Abies grandis* – GF), Mountain pine (*Pinus uncinata* – MOP), Western Hemlock (*Tsuga hererophylla* – WH) and Serbian spruce (*Picea omorica*) are planted in varied mixtures across the LMP area, and together they cover 1% of the stocked area. Broadleaf species are reasonably well-represented within the LMP area, at 10%, thanks to significant areas of native woodland on PAWS. Downy birch (*Betula pubescens*) and Silver birch (*Betula pendula*) are main species, with Oak (*Quercus robur* & *Quercus petraea*) Common Alder (*Alnus glutinosa*), Ash (*Fraxinus excelsior*), Aspen (*Populus tremula*), Common beech (*Fagus sylvatica*), Common hazel (*Corylus avellana*), European holly (*Ilex aquifolium*), Common hawthorn (*Crataegus monogyna*), Rowan (*Sorbus aucuparia*), willows (*Salix* species) also present.

#### Current Forest Age Structure

The age structure of the forests within the West Sutherland LMP show significant areas of mature crops (at just above 69% of afforested area), with a noticeably lower area of crops between the ages of 0 and 30 years. The young (0 to 5 years) and established (6 to 15 years) classes cover respectively 9% and 9.7 % of the LMP area, while the 'Thicket and pole' age class (16 - 30 years) has the representation of nearly 12%. The mature age class (31 – 60 years) has by far the biggest representation, showing the legacy of big-scale forest establishment in the 60's, 70's and 80's. These crops are now reaching their terminal height and suffer from wind damage – impacting the LMP harvesting proposal.

The old age class (61 years and over) covers 0.1% of the LMP afforested area and will increase in the future, as veteran trees develop within the native woodland and riparian woodland zones.

#### Yield Class (see Map 7)

Yield classes found within West Sutherland LMP area are typical for the species and site types encountered – 41% of the forest area lies in the 6 - 8 range, just above 23% within 2 - 4 range, 20% in 10 - 12 range cover. Higher yield classes (14- 16, 18 - 20 and 22 and above) cover respectively 5.7%, 6.3% and 2.2%. It is anticipated that the yield class can be improved during the coming rotations by improved use of silviculture techniques and more appropriate site selection for species, however it is accepted that some areas will only be capable of producing biomass. The poorest sites have undergone analysis to assess suitability for productive forestry and this has informed the future habitat proposals.

#### Neighbouring Land Use

The land use across the landscape adjacent to the West Sutherland LMP area helps to reinforce the landscape character detailed in **Appendix 9 – Landscape Appraisal**.

It is currently an expansive and remote feeling area dominated by large land holdings managed for shooting, stalking and fishing and these are important economic stimulants in this part of Sutherland. In addition, land is managed for commercial forestry using non-native conifer crops and for livestock agriculture (primarily sheep production).

Although tourism has had a significant and positive local economic effect in Sutherland for decades recent developments have seen its importance increase further, although it's not clear that land is being managed specifically to cater for this sector.

In the lower lying areas of Strath Oykel, but visible from the eastern plan area, renewable energy developments (wind turbines) have been commissioned on private ground since the last plan revision.

### 4.2 Setting and Context – Key Features

#### Geology, Soils & Landform (see **Maps 4, 5a & 5b**)

West Sutherland LMP is located in a geologically important area known as the Moine Thrust. Volcanic Lewisian rocks (the oldest type of rock to be found in Scotland c. 3 billion years old) were covered approximately 1 bln years ago by river deposits, forming Torridonian sandstone. The sandstone has eroded over time through glaciation and weathering - exposing the older Lewisian rocks in places. Today hills such as Suilven and Ben More are examples of Torridonian sandstone perched on top of Lewisian rocks, creating what is sometimes called an 'exhumed landscape'.

The majority of the plan area falls within the North West Highland UNESCO Geopark, one of 68 Geoparks across Europe and 120 across the world, established to protect important geodiversity sites, to promote geological heritage and support economic development around geological tourism. The area is frequently visited by university and college groups studying the unique geology of the area.

There are five significant designated geological sites within the plan area and specific detail on these can be found in **Appendix 12 – Designated Sites Plan**. The sites are as follows:

- The Loch Borralan Intrusion Geological Conservation Review Site
- The Loch Ailsh Intrusion Geological Conservation Review Site
- The Allt na Cailliche Geological Conservation Review Site
- Oykel Gorge Site of Special Scientific Interest
- The Ben More Assynt Site of Special Scientific Interest

The **soils** are dominated by mires, covering over 54% of the LMP area, with blanket bog being the dominant type at just below 27%, *molinia* bog at below 17%, and *sphagnum* bog & eroded bogs covering about 5% each. The single dominant soil type is peaty surface-water gley, covering nearly 31% of the LMP area. Small areas of podzols, ironpan soils and upland brown earths are also present, amounting to about 6% of the LMP area. Soil fertility ranges from medium fertility and good nitrogen availability, to very poor, where deep peat is predominant. Implications of the underlying lithology on the establishment of second rotation crops are referred to further throughout the LMP text.

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). This plan area has a wide range of soil types, which fall mainly into the following categories:

Brown earth	FC Group 1
Podzolic soils	FC Group 3
Ironpan soils	FC Group 4
Ground water gleys	FC Group 5
Peaty surface water gleys	FC Group 6
Typical surface water gleys	FC Group 7
Juncus bog	FC Group 8
Molinia bog	FC Group 9
Unflushed blanket bog	FC Group 11
Rankers	FC Group 13
Eroded bogs	FC Group 14

Detailed, reliable soil maps are currently available for the majority of the LMP area, with only Einig & Caplich blocks covered by larger scale James Hutton Institute soils data to 250k scale.

The extent and nature of the soils can be identified where open ground exists, however as Pyatt & Brown 1982 state:

*"Due to profound changes in the vegetation which take place after afforestation, which in many places involves its 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 will only be defined once clearfell has allowed Forest Management staff to accurately identify soil types on a coupe by coupe basis. The correct prescription can then be matched to site type, ensuring best silvicultural practice.

#### Site Capability (see Map 8)

The James Hutton Institute led the development of the Land Capability for Forestry (LCF) classification - a series of maps with accompanying handbooks at 1:250 000 scale, published in 1988. The classification and guidelines (Towers and Futton, 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 LCF 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
- Draughtiness – 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 the table 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 LCF guidance suggests varied flexibility for the growth and management of tree crops, from moderate (River Oykel and River Einig banks in north-eastern corner of Craggan forest), through limited (lower slopes on River Einig banks in Craggan and Einig forests) to very limited (majority of Benmore and Craggan, about half of Einig and all of Caplich) and unsuitable (higher elevations in Benmore and Craggan). The choice of species for a significant part of the LMP area is therefore restricted to those capable of growing in wet and exposed locations with poor nutrient regimes. 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.

Consequently – and as explained above (Climate and DAMS Analysis) - site capability and tree species suitability is assessed on a coupe by coupe basis to ensure that correct species and establishment techniques are matched to each site.

#### Climate and DAMS Analysis (see **Map 14**)

Understanding that climate is a key factor in determining the correct choice of species is fundamental to interpreting the prescriptions given in this plan. Although prescriptions for native woodland – both riparian and across the wider forest are based on the National Vegetation Classification, it's important to acknowledge that limitations on accuracy are created because NVC based prescriptions in guideline documents don't account for climate variances. In all circumstances the local Forester will make a judgement on any potential effect of climate on the recommended woodland type and if appropriate adjust it to reflect site conditions.

When choosing the correct productive species for a site the climate guidance contained in Pyatt, Ray and Fletcher's Ecological Site Classification (2001) will be an essential determining factor for species or woodland type choice. 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 detailed species proposals for restocking are made on a coupe by coupe basis, following a site visit by Planning, Environment and Operations staff, who use site assessment, climate data, soil nutrient regime and soil moisture regime datasets. 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.

The climate for this plan area in common with much of the northern Highlands is predominantly 'cool-moist' moving to 'cool-wet' higher up the hill. There are very localised areas where the climate is 'warm-moist' due to shelter. As a result forests in this plan area benefit from a relatively long growing season and local climate suitable for both commercial timber production and the establishment of a wide variety (and extent) of native woodland types.

DAMS scores of between 14 – 20 dominate the LMP area, with quite significant differences across the forest blocks (e.g. Benmore forest DAMS scores vary between 12 and 22 or above). The

areas with high DAMS scores (18 and above) are restricted to higher elevations, exposed to north-westerly winds. Lower DAMS score areas are located mainly on lower slopes within the sheltered glens, with DAMS scores falling to 10 in places.

Rainfall stations are situated at Einig Wood and Loch Ailsh and recorded annual (2018) rainfall figures between 1000 and 1500mm.

Ecosystem-based climate change adaptations such as wetland restoration and riparian woodland buffer establishment are a key feature of this plan.

#### Hydrology and Catchment Management

**Map 2a - Key Features: Water** and **Appendix 2 - Forestry, Water and Catchment Management** detail the importance of freshwater and wetland habitats and features across the LMP area. Enhancement of catchment hydrology and conservation of globally important freshwater species are key aims of the management across the LMP area.

#### Community

The LMP area lies within the North, West & Central Sutherland ward of the Highland Council Region, and is represented by the following Community Councils (CCs):

- Assynt CC
- Ardgay & District CC
- Creich CC

FLS North Region included the community councils in the scoping and consultation process and the replies, where received, are recorded in **Appendix 1 – External Stakeholder Log**. In addition, North Region is keen to work with local interest groups to help to develop projects aimed at benefitting local communities and the Kyle of Sutherland Development Trust have been a key consultee.

The nearest settlements are Amat, Craggie, Corriemulzie, Oykel Bridge, Altnacealgach and the farms at Caplich, Langwell and Loubcroy.

#### Recreation and Access (see also **Appendix 11 – Recreation, Tourism and Access & Map 15 – Visitor Zones and Facilities**)

There are no formal FLS recreation facilities on the LMP area. However tourism is important across the region and full details of the impact on West Sutherland LMP are contained in Appendix 11 and Map 15.

The Highland Council (HC) is reviewing the core path network in Sutherland. The core path network aims to satisfy the basic need of local people and visitors for general access and recreation. It is designed to provide links to the wider path network throughout the HC area. The network comprises existing paths and new ones. That range from tracks worn into natural ground (desire lines) to paths constructed to a high specification. The core paths cater for all types of users – walkers, cyclist, horse riders, and people with disabilities, and are a key part of outdoor access provision.