3.0 Background Description

3.1 Physical site factors

3.1.1 Geology Soils and landform

Lael FDP area is situated on an underlying solid geology of moine granulites and mixed schists characteristic of much of the North Central Highlands, which contributes significantly to a general lack of fertility, in particular to low availability of phosphorous. The drift geology is a mix of glacial till derived diamictons and some localised alluvium near significant watercourses.

The implications of the underlying lithology on the establishment of second rotation crops are referred to further in section 3.3.2 Site Capapbility. The soils in this plan area are dominated by brown earths, podzols and surface water gleys. Peaty gleys, unflushed peat bog and ranker complexes are also to be found, generally concentrated on managed open space. Rocky outcrops and screes are also present. Heavily modified soil profiles are common around the civil engineering sites associated with the hydro-electricity developments in the main glen.

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
- 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

Detailed, reliable soil maps are currently being prepared to assist the Operations team in delivering the proposals detailed in this plan. James Hutton Institute soils data to 250k scale is available, but does not offer sufficient detail to predict the soils type for each coupe. 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 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 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 appropriately to site type, ensuring best silvicultural practice.

3.1.2 Water

Scottish Environmental Protection Agency (SEPA) is implementing the Water Framework Directive (WFD) in Scotland which 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. NHFD lies entirely within the Scotland River Basin Management Plan Area.

The two aims of the Water Framework Directive (WFD) are to improve water bodies to good ecological status/potential by 2015 (or later if this is not feasible) and to prevent any deterioration in ecological status/potential. These objectives apply to baseline and non-baseline water bodies. Under WFD, as well as reaching good ecological status/potential, designated protected areas must meet the standards for which they are designated and have the same objective of no deterioration. Operations carried out on the National Forest Estate in North Highland Forest District adhere to the best practice detailed in the Forest and Water Guidelines (FCS, 2011) and the General Binding Rules published by SEPA to support the required ecological protection and improvement.

North Highland Forest District are aware that it is therefore important that the new proposed planting and forest restructuring, felling etc, including the proposed road construction, 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. Appropriate establishment of riparian woodland to maintain buffer strips between commercial conifer plantations and water bodies is a key aim of this plan.

There are five water bodies which have the potential to be affected by operations within this plan area:

Water body ID	**Water body Name**	**Current classification**
20504	River Lael	Bad due to abstraction and impoundment
20547	River Broom	Poor due to morphological modifications
200161	Loch Broom	Good
150375	Assynt bedrock and localised s and and gravel aquifers	Good
20548	Abhainn Droma	Good ecological potential

Wester Ross Fisheries did not respond to a request for comment during the consultation phase of this plan, so detail regarding aquatic habitats has been sought from SEPA and SNH. There is geomorphological interest and significant designated habitat at the southern end of Lael, concentrated around Corrieshalloch Gorge and the River Broom and this is noted in the Biodiversity sections of this plan.

The watercourses in this plan area form part of the Loch Broom system catchment. The ecological status of the system is currently estimated by SEPA as good in Loch Broom with specific issues meaning that The Rivers Lael and Broom are bad and poor respectively. Further to discussions with SEPA it is unlikely that the cause of these poor ratings is attributable to forestry. The current few recorded problems that influence the status of the catchment largely relate to hydro-electricity generation infrastructure as can be seen in the table above. However given the widespread distribution of commercial forestry within the catchment, NHFD acknowledge that appropriate controls on forest operations are vital to maintain or improve the current position.

In addition it is noted that there are four water dependent designated sites with the potential to be affected by forest operations within the plan area. These are:

Water body ID / European code	**Water dependant protected areas**	**Designations**
UK0012897	Beinn Dearg	Water dependant Special Areas of Conservation
150375	Assynt bedrock and localised sand and gravel aquifers	Drinking water protection area - groundwaters
UKS7865922	River Broom	Freshwater Fish Dir. Designated Salmonid Waters
20504	River Lael	Drinking Water Protected Areas Catchments

It is recognised that invasive non-native species (INNS) can have impacts 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 recognised as a 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.

Given the possibility of contamination from riparian INNS from upstream populations, any control efforts will always be undertaken with this in mind, and it is proposed that links will continue to be made with existing projects such as the biosecurity plans which are being produced by the Rivers and Fisheries Trusts Scotland. Japanese Knotweed and Himalayan Balsam populations have been recorded on the National Forest Estate within the plan area.

Work programmes are currently being delivered to reduce these and rhododendron (*Rhododendron ponticum*) control has been undertaken and will continue during the coming plan period. American mink (*Neovison vison*) will continue to be the target of rigorous control.

Water crossings for proposed roads infrastructure will be planned and delivered in accordance with best practice and within the structure of the Controlled Activities Regulations (CAR). It is acknowledged that the storage of oil will be carried out in accordance with the Water Environment (Oil Storage) (Scotland) Regulations 2006.

As a minimum, The Water Environment (Diffuse Pollution) (Scotland) Regulations 2008 General Binding Rules will be followed. These rules cover the storage and application of fertiliser, cultivation of land, discharge of site water, construction of roads and use of pesticides. These are considered operational planning issues and as such mitigation and method are not detailed in this Forest Design Plan, however a robust system of recorded work planning and pre-commencement planning is in place and is available for view as required by stakeholders.

However as a minimum, no land shall be cultivated within 2 metres of any surface water or wetland or 5 metres of any spring that supplies water for human consumption to encourage settlement of silt as the drainage waters flow over the open ground into watercourses. Surface water drains will not discharge directly into the water environment and, where applicable, NHFD seek to address existing drains of this type to avoid siltation problems during and after forestry operations. NHFD will contact SEPA prior to commencing engineering works in, or in the vicinity of, inland surface waters to determine the level of authorisation required.

3.1.3 Climate

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 Operations 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. 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 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.

DAMS scores of between 8 and 14 which are very suitable for commercial forestry are common throughout Lael Forest. The majority of the plan area is suitable for commercial forestry and acceptable for adopting low – impact silvicultural systems (LISS) and longer rotations.

3.2 Biodiversity and Heritage Features

The Lael FDP area includes, or is adjacent to the following designated areas:

- **Beinn Dearg Special Area of Conservation:** located to the east of Lael Forest covering an area of 13849.14 Ha. The Beinn Dearg massif is considered to be the third most botanically diverse mountain system in the British Isles, after the Cairngorms and Ben Lawers and is designated for the following features:

    - Blanket bog
    - Species-rich grassland with mat-grass in upland areas
    - Caledonian forest
    - Wet heathland with cross-leaved heath
    - Dry heaths
    - High-altitude plant communities associated with areas of water seepage
    - Plants in crevices on base-rich rocks
    - Tall herb communities
    - Plants in crevices on acid rocks
    - Acidic scree
    - Alpine and subalpine calcareous grasslands
    - Montane acid grasslands
    - Mountain willow scrub
    - Alpine and subalpine heaths
    - Clear-water lochs with aquatic vegetation and poor to moderate nutrient levels.

The conservation objective for the SAC is to avoid deterioration of the qualifying habitats (listed above) 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.

Further it is a conservation objective that the following are maintained in the long term:

- Extent of habitat on site
- Distribution of habitat on site
- Structure and function of the habitat
- Processes supporting the habitat
- Distribution of typical species of the habitat
- Viability of typical species as components of the habitat
- No significant disturbance of typical species of the habitat

- **Beinn Dearg Special Protection Area:** located to the east of Lael Forest the SPA covers an area of 5567.6 Ha and represents the most northerly hill area in the UK with ground reaching 1070m. The site overlaps with Beinn Dearg SAC. The qualifying species is dotterel (*Charadrius morinellus*), however the Beinn Dearg massif is regarded as exceptional because in addition to the qualifying species it supports a further five species of breeding wader, including golden plover (*Pluvialis apricaria*). The SPA also supports populations of ptarmigan (*Lagopus mutus*), dunlin (*Calidris alpine*), ring ouzel (*Turdus torquatus*) and snow bunting (*Plectrophenax nivalis*).

  The conservation objectives for the SPA are to avoid deterioration of the habitats of the qualifying species (noted above) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and to ensure that the following are maintained in the long term:

  - Population of the species as a viable component of the site
  - Distribution of the species within the site
  - Distribution and extent of habitats supporting the species
  - Structure, function and supporting processes of habitats supporting the species
  - No significant disturbance of the species

- **Beinn Dearg Site of Special Scientific Interest:** located to the east of Lael Forest and contiguous with the boundary of Beinn Dearg SAC, this SSSI is designated for its Quaternary geology, upland plant communities, rare and scarce flowering plants, native pinewood and upland breeding birds.

The nationally scarce and rare flowering plant species found on Beinn Dearg SSSI are:

English name	Latin name	Scarce or rare species
Clustered lady's mantle	*Alchemilla glomerulans*	Scarce
Smooth mountain lady's mantle	*Alchemilla wichurae*	Scarce
Alpine foxtail	*Alopecurus borealis*	Scarce
Northern rock-cress	*Arabis petraea*	Scarce
Alpine bearberry	*Arctostaphylos alpinus*	Scarce
Norwegian mugwort	*Artemisia norvegica*	Rare
Forked spleenwort	*Asplenium septentrionale*	Scarce
Alpine lady fern	*Athyrium distentifolium*	Scarce
Dwarf birch	*Betula nana*	Scarce
Black alpine sedge	*Carex atrata*	Scarce
Hair Sedge	*Carex capillaris*	Scarce
Russet sedge	*Carex saxatilis*	Scarce
Sheathed sedge	*Carex vaginata*	Scarce
Alpine mouse-ear	*Cerastium alpinum*	Scarce
Arctic mouse-ear	*Cerastium arcticum*	Scarce
Starwort mouse-ear	*Cerastium cerastoides*	Scarce
Rock whitlowgrass	*Draba norvegica*	Scarce
Mountain avens	*Dryas octopetala*	Scarce
Shady Horsetail	*Equisetum pratense*	Scarce
Highland cudweed	*Gnaphalium norvegicum*	Scarce
Two-flowered rush	*Juncus biglumis*	Scarce
Chestnut rush	*Juncus castaneus*	Scarce
Stiff clubmoss	*Lycopodium annotinum*	Scarce
Cyphel	*Minuartia sedoides*	Scarce
Alpine cat's tail	*Phleum alpinum*	Scarce
Alpine meadow-grass	*Poa alpina*	Scarce
Glaucous meadow-grass	*Poa glauca*	Scarce
Alpine cinquefoil	*Potentilla crantzii*	Scarce
Downy willow	*Salix lapponum*	Scarce
Net-leaved willow	*Salix reticulata*	Scarce
Tufted saxifrage	*Saxifraga cespitosa*	Rare
Alpine saxifrage	*Saxifraga nivalis*	Scarce
Highland saxifrage	*Saxifraga rivularis*	Rare
Sibbaldia	*Sibbaldia procumbens*	Scarce

The Beinn Dearg SSSI management statement lists the following objectives:

- To maintain the structure and visibility of the moraines
- To enhance the condition and maintain the extent and distribution of the upland plant communities
- To enhance the condition of the native pinewood
- To increase populations of the rare and scarce vascular plants on the site
- To maintain populations of birds within the breeding bird assemblage
- To maintain the water levels, water quality, extent and distribution of the clear water lochs
- To maintain water quality of the River Oykel SAC for the benefit of the Altlantic salmon and freshwater pearl mussel populations

- **Fannich Special Area of Conservation:** this SAC lies to the south of Lael Forest and covers 9638 Ha. The designated area contains geological, landform and biological features of national importance. The site is noted to have close affinities with the Beinn Dearg SAC to the north and Lael Forest lies directly between the two designated sites. It is designated for the following features:

    - Acidic scree
    - Alpine and subalpine heaths
    - Blanket bog
    - Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels
    - Dry heaths
    - Montane acid grasslands
    - Plants in crevices on acid rocks
    - Wet heathland with cross-leaved heath

The conservation objective for the SAC is to avoid deterioration of the qualifying habitats (listed above) 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.

Further it is a conservation objective that the following are maintained in the long term:

- Extent of habitat on site
- Distribution of habitat on site
- Structure and function of the habitat
- Processes supporting the habitat
- Distribution of typical species of the habitat
- Viability of typical species as components of the habitat
- No significant disturbance of typical species of the habitat

- **Fannich Hills Site of Special Scientific Interest:** located to the south of Lael Forest, covering an area of 10906.85 Ha, this SSSI is largely contiguous with Fannich Hills SAC. The notified features are as follows:
    - Quaternary geology and geomorphology
    - Structural and metamorphic geology of the Moine
    - Upland habitats: Upland assemblage
    - Invertebrates: Beetles
    - Invertebrates: Flies

  The four primary conservation objectives noted in the SSSI management statement are as follows:
    - To maintain and enhance the extent, condition and diversity of the upland habitats
    - To maintain the condition of the oligotrophic loch and the species-richness and distribution of important vascular plants
    - To maintain the current status and distribution of flies and beetles
    - To maintain the geology and geomorphology interest of the site.

  The site is considered to be of great importance for research into Moine geology.

- **Corrieshalloch Gorge Site of Special Scientific Interest:** This designated site is adjacent to the Braemore area of Lael Forest and covers 6.93 Ha. The site is also designated as a National Nature Reserve. A number of watercourses run from Lael Forest into the site and as such activity in the Braemore area has a significant risk of impacting on the designated features. These features are:
    - Upland birch woodland
    - Geomorphology: Fluvial geomorphology of Scotland
    - Quaternary geology: Quaternary of Scotland
    - Invertebrates: Cranefly (*Lipsothrix ecucullata*)

  The management objectives stated in the management statement are:
    - To maintain the condition, distribution and extent of the upland birch woodland
    - To maintain/increase populations of the cranefly (*Lipsothrix encucullata*)
    - To maintain visibility of the geological features

Clearly many of the features of these designated sites are outwith Lael Forest however environmental deterioration caused by inappropriate operational activity could have a potential impact and therefore operations will be planned and undertaken with the protection of these features in mind. In addition Lael lies between two very significant upland areas – Beinn Dearg and the Fannichs – and has open ground of similar habitat types.

There are three distinct ancient woodland types recorded within the Lael FDP area:

- **Gearr Choille** Ancient Semi-Natural Woodland – Type 2a PAWS. This site has been clearfelled during the previous plan period but is regenerating prolifically with non-native conifers from a nearby stand. The site extends to approximately 12 Ha.
- **Braemore Wood** Ancient Semi-Natural Woodland – Type 1a PAWS. This site extends to approximately 35 Ha north of Braemore Junction and is currently stocked with non-native conifers, with limited areas of native and non-native broadleaves.
- **Braemore Wood** Long-established Woodlands of Plantation Origin – Type 2b) LEPO. This is the most widespread area of ancient woodland extending to approximately 274 Ha and covering most of the long narrow wood between the main glen and Braemore, known locally as the 'Panhandle'. It is largely stocked with conifers – both non-native and Scots pine.

The implications for management are that pre – operational surveys are geared to detecting relevant species and that the potential to restore PAWS or create natural reserves may be greater in these areas.

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, enhance and expand veterans and ancient woodland remnants.

The management of PAWS in NHFD is coordinated through the Forest Design Plan process. The two main options for PAWS are;

Full restoration – restoring to 90% site native species, achieved through low impact silvicultural systems (LISS) or clearfell
(NB Alternative to Clearfell (ATC) should be used wherever possible to maintain the woodland conditions which remnants depend upon. Other restoration methods include clearfell)
Enhance – develop any ancient woodland remnants and features and create a matrix between of native and non-native species. (NB chosen if the site/remnant has high landscape, biodiversity or community benefit, or there are concerns with authenticity or slope stability).

Each design plan will indicate general aims and for PAWS in the FDP area based on the following key indicators;

Ecological potential

- High – contains frequent ancient woodland and other valuable components
- Medium – occasional woodland remnants and fragmented network of adjoining native woodland
- Low – minimal/no obvious ancient woodland remnants, however some often develop following the creation of gaps in the canopy

Threats to remnants

- Critical – urgent action (1-2 years) needed to secure ancient remnants
- Threatened – longer-term intervention required to secure condition of site/remnant in decline
- Secure – Condition of site/remnant should remain stable (or improve) for 10 years in current conditions

A forest design plan will identify the key objective (primary reason for managing the site; timber/biodiversity) and set the long-term goals for treatment. This will be used to create and manage the appropriate work plan for intervention.

Monitoring and operational data will subsequently be utilised to review these aims and objectives.

Using the PAWS restoration management flow chart in 'FES PAWS Guidance' will help determine which method of restoration management is best suited to the site-specific conditions of the PAWS .

- The extent and locations of ancient woodland areas where restoration is proposed is detailed in **Map 2 – Key Features**. Full restoration to be undertaken on these sites will comply with current guidelines.

The Highland Historic Environment Record has been consulted during the preparation of this plan. Following *FES Historic Environment Planning Guidance*, this Forest Design Plan describes and considers the historic environment relevant to the design plan area. **Appendix 5 – Archaeology** section of this Forest Design Plan includes details of all relevant scheduled monuments, listed buildings, designed landscapes and the most significant undesignated features. Important historic environment features are surveyed, recorded, mapped and monitored to ensure and demonstrate Forestry Commission Scotland compliance with the UK Forestry Standard.

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. At restocking, work prescriptions remove relevant historic environment features from ground disturbing operations and replanting. Opportunities to enhance the setting of important sites are considered on a case-by-case basis (such as the views to and from a designated site).

Any recent archaeological surveys that have been undertaken on behalf of FCS have been incorporated into our spatial GIS database - and any new archaeological surveys required (in unimproved upland areas for example, or areas within which the archaeological record is unusually rich) will be undertaken to the standards laid out in *FES Historic Environment Planning Guidelines.* This will ensure that undiscovered historic environment features are mapped and recorded prior to forestry establishment and management operations - and will ensure the continued comprehensive protection of the known archaeological resource.

All scheduled monuments on the NFE in North Highland Forest District are inspected on a five yearly cycle with Historic Scotland, prior to preparation of a dedicated management plan for each site. These plans give detailed prescriptions for the management of each individual monument. There are no scheduled monuments within this FDP area.

It is common when planning forest operations to discover new sites of archaeological interest. All sites are subject to rigorous pre-operations planning and inspection and staff will refer to the guidance of Ritchie and Wordsworth (2010) when completeing pre-operations surveys. Advice will be sought from the FCS archaeologist on the significance of new sites and Highland Council and Historic Scotland consulted as appropriate.

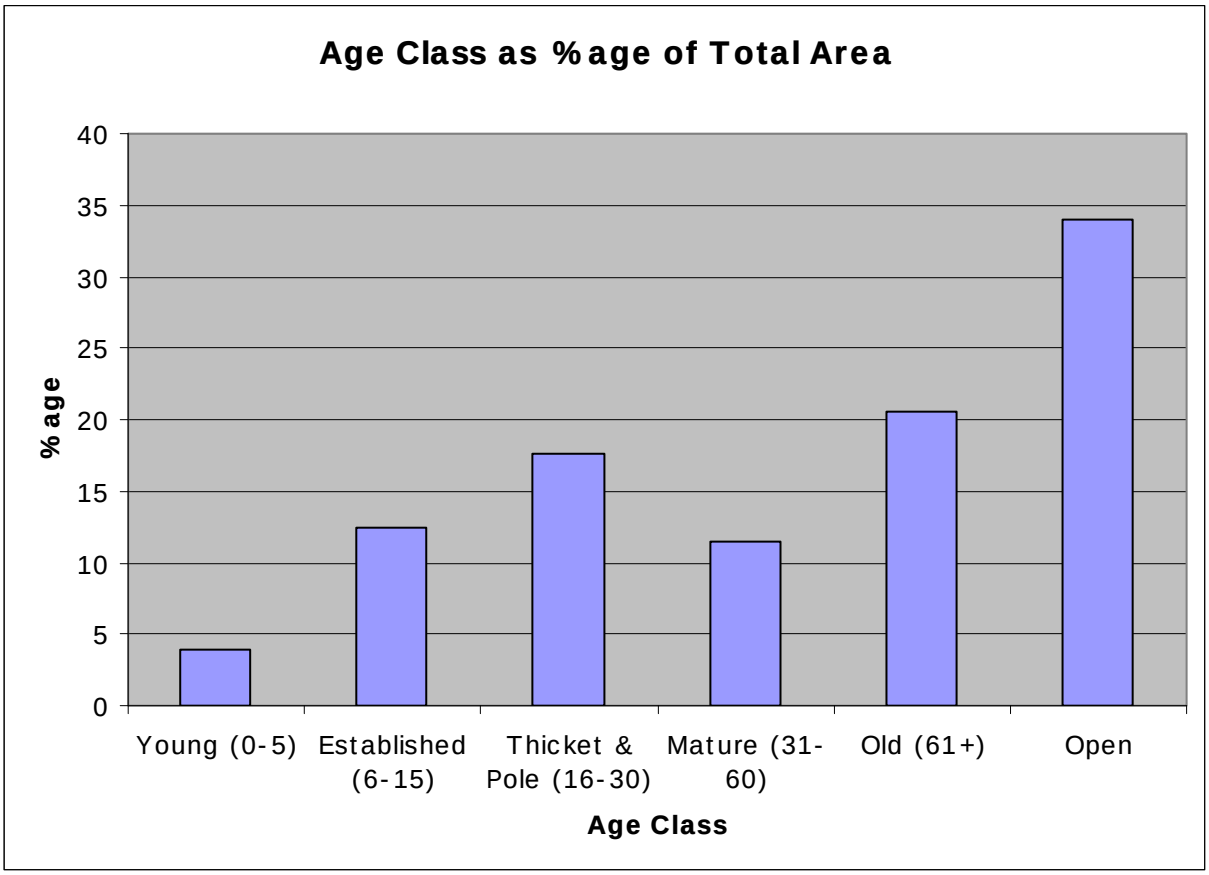
3.3 The existing forest

3.3.1 Age structure, species and yield class

Age Structure

The age structure of the forests within the Lael FDP area is already diverse. This is a consequence of the windfirmness of the forest and the early restructuring operations.

A figure of just over 34% of the National Forest Estate is open ground – previously in agriculture, managed open space or felled awaiting restock.

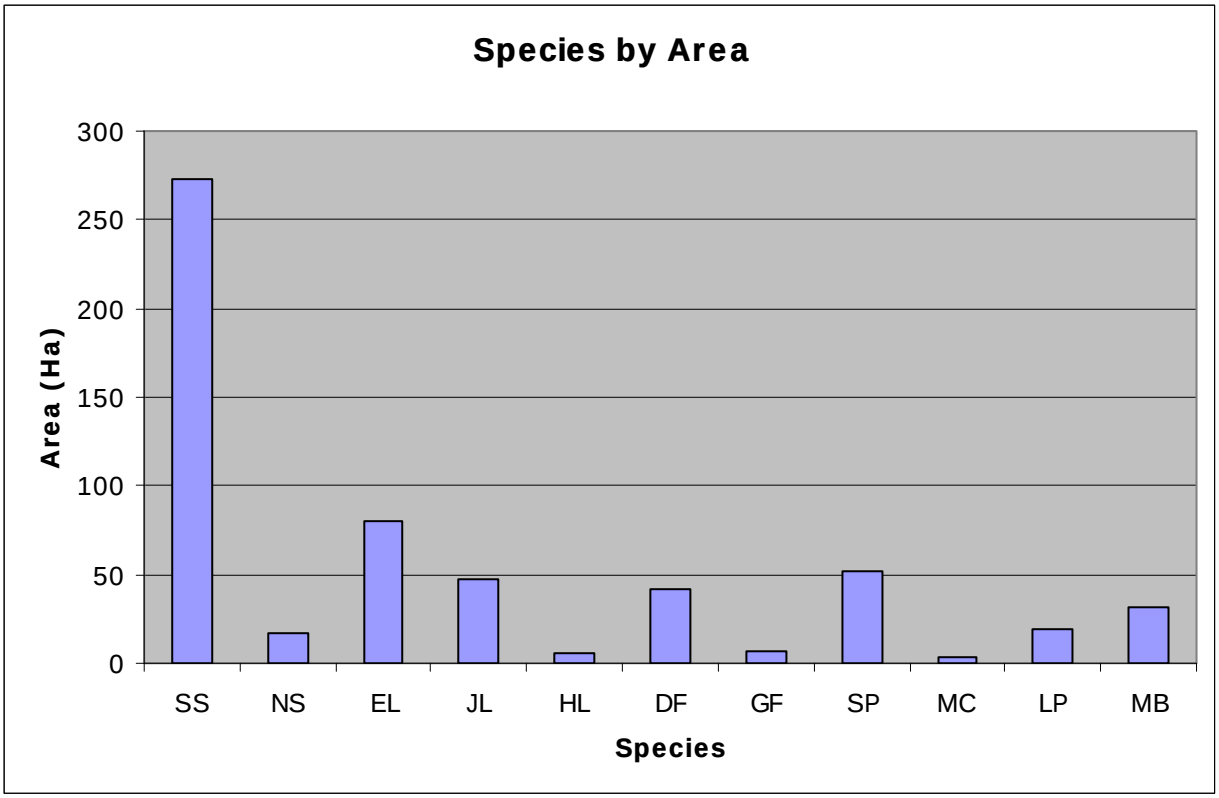


Species

The chart below illustrates the species range across the FDP area. Sitka spruce (SS) predominates due to past management objectives and decisions. The species range outwith sitka is evenly spread amongst a predictable range of commercial conifer crops.

Douglas fir and larches have been planted where localised improvements in soils and climate were previously identified, however the species diversity does not truly reflect the site conditions and a much wider range of species could be reasonably expected to thrive.

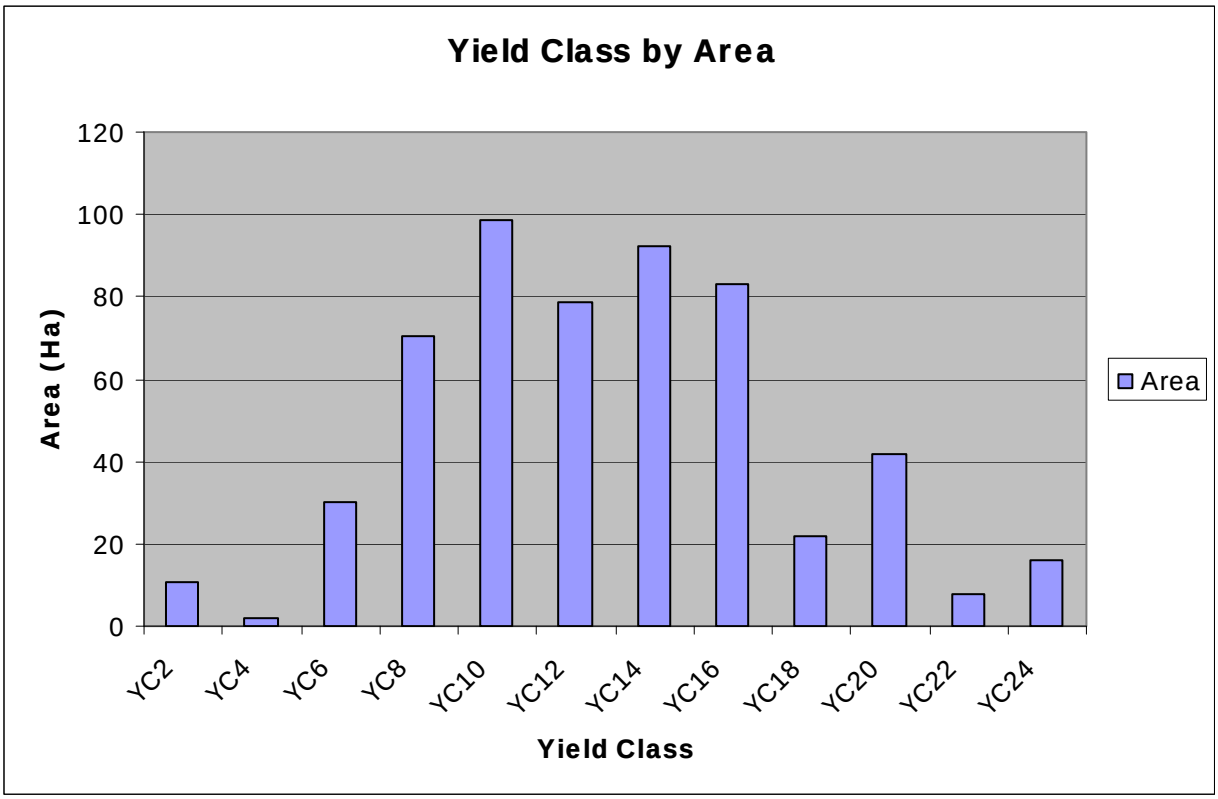
The broadleaf element is largely related to native woodland at the Braemore (southern) end of the forest.



Yield Class

Yield classes found in the Lael Forests are typical for this type of site and species. 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. The continued reliance on pure sitka crops on inappropriate sites is impacting on yield and restocking proposals within this plan will seek to address this issue.

It is acknowledged that lower yield classes, particularly in SP and broadleaf crops, can lead to higher quality timber and it is important that silvicultural treatments are designed that will achieve this.



3.3.2 Site Capability

Laell Site Capability

The Macaulay Institute (now 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 (Bibby et al. 1988) allows planning to be undertaken from knowledge of the factors influencing tree growth, notably climate, soils and topography.

The Macaulay Institute Land Classification for Forestry classifies the FDP area between F2 (Land with very good flexibility for the growth and management of tree crops) and F4 (Land with moderate flexibility for the growth and management of tree crops), with much of the area in class F3 (Land with good flexibility for the growth and management of tree crops). In the context of North Highland Forest District these classifications indicate that Lael should be one of the district's most productive sites.

F3 classification consists primarily of mineral and flushed gleys with upland brown earths – adequately describing much of the FDP area. The implications noted for future management are that the site should be relatively windfirm, but that slope and site drainage may be limiting factors and that the intimate mixture of soil types may make species choices more challenging.

The Land Capability for Forestry guidance suggests that the forest should be capable of growing a wide range of conifers and a restricted range of broadleaves.

The capability of the forests within this plan area to sustain productive forestry is dictated to a large extent by the local climate (rainfall, temperature and exposure) and equally significantly by geology, soils and the consequent nutrient availability. It is of utmost importance that site capability is assessed to ensure that the correct species is matched to the site.

A desk exercise was conducted using the Ecological Site Classification Decision Support System (Pyatt, Ray and Fletcher, 2001) to assess each individual compartment and these were classified by Soil Moisture Regime (SMR) and Soil Nutrient Regime (SNR).

The following site types were identified:

Moist & Medium

Areas confined largely to the brown earths near riparian areas. Typically the following vegetation can be identified in these areas:

- Bramble *Rubus fruticosus*
- Creeping soft grass *Holcus mollis*
- Yorkshire fog *Holcus lanatus*
- Foxglove *Digitalis purpurea*

Suitable for SS in pure crop or a mixture with LP (if available) JL or EL. SP will be appropriate where brown earths have become podzolised. DF likely to be suitable where climate and exposure do not limit it's potential. In addition much of the PAWS area falls within this category – native broadleaf species will be appropriate eg ash (Fraxinus excelsior).

Moist & Poor

Primarily areas on middle slopes. Indicator vegetation for these areas includes:

- Wood sorrel *Oxalis acetosella*
- Hard fern *Blechnum spicant*
- Heath bedstraw *Galium saxatile*

Suitable sites for SS in a nutritional mixture with LP or JL.

Moist & Very Poor

Typical of podzols, forming significant areas of the plan area, characterised by:

- Blaeberry *Vaccinium myrtillus*
- Heather *Erica cinerea/Calluna vulgaris*
- Green ribbed sedge *Carex binervis*

SP and native broadleaved trees are appropriate on these sites.

Wet & Poor

Some areas of the forest fall into this site type, with the following vegetation recorded:

- Purple moor grass *Molinia caerulea*
- Rush spp *Juncus spp*

SS in silvicultural mixtures with LP, MP or JL will predominate. On drier soils within this site type Scots pine will feature. This is a restricted site type at Lael only found towards the upper margins of the main glen.

Wet & Very Poor

A proportion of Lael FDP area comes under this classification and the choice of productive species that can be established here is minimal. In general this site type is strongly influenced by the exposed nature of the site and the fertility

characteristic of the soils and geology. The indicator species that indicate the 'very poor' Soil Nutrient Regime are:

- Purple moor grass
- Cotton grass
- Cross-leaved heath
- Deer grass
- Lousewort

The very poor Soil Nutrient Regime is the biggest limiting factor for productive forestry and as such Sitka spruce and Lodgepole pine are the only species that have the potential to be grown commercially. To achieve acceptable yield classes standard fertiliser prescriptions (Taylor, 1991) would be required. The very top margins of the forest fall within this category

Very Wet & Very Poor

Very limited site type that is largely restricted to the highest ground above the main glen, currently open ground.

- Bog myrtle
- Cotton grass
- Deer grass
- Reindeer mosses
- Bog asphodel

The combination of very poor drainage, exposure, peat depth and very low fertility makes this site type unsuitable for productive woodland establishment and the prescription for sites of this type would be to enhance existing peatland habitats or encourage montane treeline to improve biodiversity. The proximity of designated montane habitats will influence provenance here. There is no woodland habitat climax vegetation community on this site type:

3.3.3 Access

The forest road network provides excellent access to the main glen area. Ongoing investment in infrastructure has largely been concentrated on providing access to steep ground sites and post harvesting repair. General upgrading across the plan area was undertaken. Further roading is proposed to facilitate harvesting of coupes on steep ground in the Braemore area, particularly where long extraction distances would lead to unacceptable levels of soil damage and siltation.

Roads currently used for forest management access will need to be upgraded to Cat 1A to take timber traffic once harvesting starts. The following planned roads are currently noted:

- Strone nea extension 251 metres NH 1867 8490
- Inverbroom spur 668 metres NH 1841 8449
- Foich Extension 536 metres NH 1884 8291
- Corrieshalloch Spur 194 metres NH 1980 7876

3.3.4 Low Impact Silvicultural Systems (LISS) Potential

The productive forest of Lael has both high environmental potential (PAWS, LEPO, diverse species interest and adjacency to designated sites) and significant landscape and recreational value. With low DAMS, suitable fertility, improving access infrastructure and multiple objectives driving management, targeted areas of the FDP are being managed toward LISS. The most significant implication for management is that there is a presumption against clearfelling coupes greater in size than 2.0 Ha within these areas. The areas affected are currently small coupes adjacent to Braemore and the Lael Forest Garden. The most significant factor prohibiting expansion of LISS at Lael is terrain, with steep slopes presenting a considerable challenge to economic thinning.

3.4 Landscape and Land Use

3.4.1 Landscape character and value

A site landscape appraisal has been undertaken by FD staff to assess the likely impact of future management and identify current constraints and opportunities to enhance the landscape. The FCS Landscape Architect visited the site with NHFD planning staff on 14th June 2012 and advice was received on the design of prominent coupes. Following that meeting the Landscape Architect took responsibility for design of the coupes around the prominent feature of Strone nea.

The plan area is located in the glacial feature of Strathmore Valley leading to Loch Broom. Landscape sensitivity – both in terms of views from long range and the visual impact adjacent to the A835 road corridor – is high.

The Scottish Natural Heritage Ross and Cromarty Landscape Character Assessment (McIlveen, 1999) indicates the landscape in the plan area as being of the 'rocky moorland' character. The LCA notes that restructuring of conifer plantations will necessarily be a long term operation but suggests good coupe design – generally smaller in size, linkages to other woodland, increased species and age diversity and open space. These requirements will be satisfied by using design provided by a qualified landscape architect, the increasing diversity of species proposed at restocking and the establishment of native woodland.

Small scale hydro electric infrastructure is visible in the landscape in the main glen, however the impact is low and will continue to decrease as groundworks associated with the developments grow over. Panorama landscape photographs taken from the most significant viewpoints are contained within the supporting documents at the end of the plan and visualisations have been produced.

3.4.2 Visibility

The landscape sensitivity of the FDP area is high, viewed from distant points such as Ullapool and the Dundonnell road. However travelling on the A835 from Inverness to Ullapool, between Braemore and Inverlael, the landscape impact is also quite significant. The woodlands of Lael also provide the setting that defines the Lael Forest Garden's character.

The broadleaf woodlands that fringe Foich also add to the character of the area and extending native broadleaf species in this area has been a key objective in the past, to enhance this popular tourist route to the far north.

The forest can be viewed from routes onto the Beinn Dearg massif which is very popular with walkers and mountaineers and can also be seen clearly from the most north easterly Fannich Hills, again very popular with walkers and climbers.

3.4.3 Neighbouring Land Use

Managed largely for deer stalking and conservation, the land to the east, north and south of the forest is largely moorland slopes leading to significant mountain ranges. Land to the west is composed of mixed farms and crofts with a strong field pattern, leading in turn to steep valley sides and moorland beyond. Tourism contributes significantly to employment in the area and deer-stalking is important. Corrieshalloch Gorge National Nature Reserve is situated nearby to the FDP area and many visitors use the National Trust paths for recreation.

3.5 Social factors

3.5.1 Recreation and Access

Recreation across this area of Rossshire has a high profile. Tourists are passing through on the way to the far north, the Outer Hebrides and the west coast. In addition many visitors come to climb the munro mountains of the Beinn Dearg and Fannich ranges and enjoy the challenging hill walking available in Assynt.

The National Forest Estate plays it's part by seeking to provide an appropriate backdrop, but also has the following facilities:

- Lael Forest Garden trails
- Beinn Dearg hill access trail
- Main Glen Trails provided by the Hydro developers

All sites have dedicated car parking facilities. The wider road network provides excellent opportunities for longer walks, cycling, horse riding and cross country skiing.

Details of all sites are regularly updated at the following FCS internet page:

- http://www.forestry.gov.uk/website/recreation.nsf/LUWebDocsByKey/ScotlandHighlandNoForestLaelForest

The Planning and Environment Committee of Highland Council agreed to adopt the Highland Council Core Paths Plan on 21st September 2011, formalising the network that had been proposed following a three year consultation period.

Under the Land Reform (Scotland) Act 2003, Highland Council, as the Access Authority that operates across NHFD, has a statutory requirement to produce a Core Path Plan to cover its 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.

These Core Paths comprise a mixture of existing paths with some new paths and are close to where people live. They range from tracks worn into natural ground (desire lines) to high-specification constructed paths. NHFD are committed to ensuring that operations do not interfere with access across the Core Path Network and aim to enhance the forest in close proximity to paths to enhance the user's visit.

The Core Paths cater for all types of users - walkers, cyclists, horse riders, canoeists, 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

This FDP area includes the following Core Paths:

- RC49.07 Beinn Dearg path
- RC49.06 Inverlael Forest paths

3.5.2 Community

The Lael FDP area falls within the Wester Ross, Strathpeffer and Lochalsh Ward of the Highland Council Region and is represented by Lochbroom Community Council.

NHFD included the community councils in the consultation process and the replies are contained in **Appendix 1 – Consultation Record External**.

The nearby village of Ullapool has an active Community Trust that is currently working to establish a local woodfuel business using local timber and a small scale hydro scheme on the National Forest Estate at Lael.

All local facilities are used regularly by Communities, Recreation and Tourism staff for education visits and events for Ross-shire schools – both primary and secondary. A variety of volunteer events have also been run for local community groups.

Beinn Dearg Massif from open ground on the National Forest Estate. Courtesy Neil McInnes

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 following legislation and policies:

Biodiversity

- Conservation (Natural Habitats) Ammendment (Scotland) Regulations 2007
- Nature Conservation (Scotland) Act 2004
- Wildife and Natural Environment (Scotland) Act 2011
- Land Reform (Scotland) Act 2003
- The Water Environment and Water Services (Scotland) Act 2003
- Water Environment (Controlled Activities)(Scotland) Regulations 2011
- UK Woodland Assurance Standard 2008
- UK Forestry Standard 2004

Climate Change

- The United Nations Framework Convention on Climate Change
- The Kyoto Protocol
- EC Directive 2003/87/EC
- Climate Change (Scotland) Act 2009

Historic Environment

- Ancient Monuments and Archaeological Areas Act 1979
- Planning (Listed Buildings and Conservation Areas)(Scotland) Act 1997
- Treasure Trove Scotland
- UNESCO World Heritage Convention
- European Convention on the Protection of the Archaeological Heritage Valetta 1992

Forests & People

- Control of Substances Hazardous to Health Regulations 2002
- Employers Liability (Compulsory Insurance) Act 1969
- Equality Act 2010
- Gangmasters (Licensing) Act 2004
- Health and Safety at Work Act 1974
- Management of Health and Safety at Work Regulations 1999
- Occupiers' Liability (Scotland) Act 1960
- Provision and Use of Work Equipment Regulations 1998
- Reporting of Injuries, Diseases and Dangerous Occurences Regulations 1995
- The Highways Act 1980

Soils

- Control of Pesticides Regulations 1986
- The Waste Management Licensing Regulations 1994
- European Soil Charter