4.0 Analysis and Concept

4.1 Analysis

The Lael Forest Design Plan has been produced in accordance with the UK Woodland Assurance Scheme (UKWAS) guidelines and the UK Forestry Standard.

The analysis and concept table in the following section is a culmination of the analysis of the key features identified in the previous sections and highlighted on the Key Features Map (Map 2). The analysis of the constraints and opportunities will focus on delivering those of the Scottish Forestry Strategy's 7 key themes highlighted by the NHFD Strategic Plan and fulfilling the Plan Brief (Appendix 4) in respect of:

- Climate Change SFS key theme 1
- Timber SFS key theme 2
- Business Development SFS key theme 3
- Community Development SFS key theme 4
- Access & Health SFS key theme 5
- Environmental Quality SFS key theme 6
- Biodiversity SFS key theme 7

The analysis and concept table identifies the relevant opportunities and constraints that are likely to be encountered during the implementation period of this plan and in the longer term. The key areas of this plan will be:

- To continue the long term restructuring of the forest with sensitively designed coupes, achieving the objectives of improved landscape, environmental and water quality.
- To manage the productive areas of the forest to produce high quality timber.
- To maximise the diversity of species in areas affected by Heterobasidion annosum to provide good quality, disease free timber.
- To enhance the silvicultural significance and recreation potential of Lael Forest Garden, in partnership with National Tree Collections of Scotland, maintaining high quality recreation facilities centred around the current network of forest trails. In addition, maintain the forest garden's place in the Forestry Commission Tree Collection and continue with it's participation in the International Conifer Conservation Project.
- Safeguard and improve PAWS by the phased removal of non-native conifer plantation and thereafter establishing commercial density native woodland to act as a productive forest comprising native species of broadleaf and conifer.
- Improve the environmental quality of the local water bodies by establishing a network of native broadleaves and open space in and around riparian areas through forest restructuring, planting and natural regeneration, thereby

protecting and enhancing the conservation potential of the downstream designated sites.

- To maximise the productive capacity of the forest by restocking with species appropriate to site and climate.

4.2 Concept Development

The design concept forms the broad spatial framework for the forest that will guide the detailed design (see Map 3 Analysis and Concept).

The overall aim of the plan is to create a forest that meets the priorities set out in the district strategic plan and addresses the localised issues identified in the design plan brief.

On full implementation of the plan around one half of the forest will be managed for commercial timber production, from local firewood production to providing sawlog material for processors through long term contracts. The production of high quality hardwood for selected markets is a long term goal, reflecting the more fertile soils of this forest.

Restoring key areas back to productive native woodland and natural reserve from conifer plantation and enhancing the condition of existing open and riparian habitats will improve the forest's ability to adapt to climate change. Erosion is a threat in the southern half of the forest and it is a long term goal of the plan to reduce the risk of landslip and major disruptive events.

The need to establish transitional habitats between open habitats and plantation edge will be key in developing a more diverse forest structure and will improve the visual quality of the forest, also enhancing the habitat on the edge of the Beinn Dearg SPA/SAC.

The plan proposes woodland removal on specified soil types and as this is associated with internal re-design of the woodland to meet environmental criteria it does not fall within the scope of woodland removal policy guidance (Forestry Commission Scotland, 2009).

It is neither the intention nor the purpose of this plan to visualise detailed prescriptions of species boundaries or internal open space. This is in line with CSM6 (February 2005) which states:

"In certain circumstances (e.g. poor soil map coverage, archaeological sites, where access to the forest is difficult) it is impractical to draw up detailed restock proposals with exact boundaries. In such circumstances, indicative restocking

proposals may be produced subject to agreement between FC/FE. Detailed proposals would be finalised at the coupe planning stage"

The rationale for habitat type is given in the text. Species will be matched to site following detailed soil survey in each compartment, as land form is revealed after clearfell. North Highland FD believes this to be best silvicultural practice and the most suitable way to achieve sustainability in future rotations.

Future habitat management is therefore logically proposed and mapped using a zoning method that indicates where the following habitat types will be concentrated:

- Productive Forestry – species (primarily conifer, but will include broadleaf elements on PAWS) appropriate to local soils and climate to be grown at commercial plantation stocking densities for the production of timber of all grades. 2500 – 3000 stems per hectare or higher where appropriate. A minimum of 1% of conifer plantation will be retained as natural reserve, managed with minimum intervention solely for biodiversity gain. 20% of this area will be preserved as open space and broadleaved component will be approximately 10%

- Native Woodland Expansion – Native tree and shrub species to be established in lower density mosaics reflecting the appropriate NVC woodland type for the local soils and climate. Primarily established with the aim of increasing biodiversity, enhancing recreation and education opportunities and potentially producing low quality timber on long rotation (eg firewood). 800 – 1600 stems per hectare varying across the site.

- Riparian Woodland Expansion – Native tree and shrub species to be established in clusters of high density plantings appropriate to site type and framing other significant habitat (eg water vole grassland). 3000 stems per hectare concentrated in clusters to achieve overall net stocking density of 800 – 1600 stems per hectare (EG 50% of area planted). A minimum of 5% of riparian and native woodland will be managed as natural reserve solely for biodiversity gain, with minimum future intervention.

- Managed Open Land – Land maintained as open habitat, either for biodiversity gain where specific species or habitat types will benefit or where another land management objective exists (eg agriculture – crofting tenure). Within this plan we will retain a significant amount of managed open space to protect archaeological sites.

The extended (generally up to five years) fallow periods that are required at Lael prior to restocking, to allow pine weevil populations to abate, have the negative effect of compounding nutrient deficit because nutrient released from decaying leaf litter will largely have been flushed from site by year five. It is anticipated that post planting applications of fertiliser will be required on the upper margins of the forest and remedial applications may be required in some crops in line with industry best practice (Taylor, 1991), however appropriate choice of silvicultural mixtures and well timed heather control will be preferred to fertiliser.

Felling will generally exceed restocking within any five year period due to the practice of fallow, the inclusion of higher levels of internal open space through restructuring and the restoration of priority open habitats. Improved site to species selection will maintain productivity in future rotations.

Factor	Opportunity	Constraint	Concept Development
Climate and soils	Identification of soils capable of supporting productive crops will allow improved silviculture in the next rotation.	H annosum will restrict diversity of productive conifer species, use of small areas of diverse species may not be economic. PAWS will restrict the species available at restock to native trees.	Use site soil conditions at coupe level to indicate future management prescription and species at a scale which is silviculturally appropriate. Low windthrow risk will create opportunities for longer rotations and a more diverse range of species.
Forest structure	The successful establishment of current restock sites will allow continued improvement of age structure diversity. The development of native woodland on appropriate sites will add to age class diversity.	The restructuring programme is a long term objective so changes in age structure will inevitably only happen over a period in excess of 50 – 100 years. A move to longer rotations could compromise longer term age diversity.	Extend the rotation of SP if RBNB allows, to increase age class structure, while improving timber quality. Identify areas of natural reserve and PAWS restoration that will increase age diversity.
Hydrology	Remove riparian conifer and slow down run-off by restoring riparian woodland 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. Establish productive forestry crops in the Braemore Forests that may be suitable for conversion to	Forestry is one factor that could contribute to an increase in phosphorous levels and siltation, in addition to the effects of natural processes. Steep slope soils such as those found at Braemore, having the potential to erode, can be an issue at harvesting.	Follow best practice, adopt riparian woodland buffer zone widths of up to 40metres and avoid uneccesary fertiliser applications. Promote silvicultural nurse mixtures. Plant riparian native woodland where regen is unlikely and dedicate this as natural reserve. Consider LISS in the long term, to help avoid landslides.

	LISS, thereby aiding slope stability		
Timber recovery	The opportunity to increase timber quality – with particular emphasis on SP on podzols and hardwood on brown earths – can increase productivity and income.	Stability of crops that miss their thinning windows could be compromised. Heterobasidion annosum may restrict conifer restocking choices.	Early intervention harvesting at a scale that remains appropriate to landscape to maximise produce return. Remove crops that are having a negative effect on riparian/PAWS management. Ensure thinning is undertaken on time and that best silvicultural practice is a high priority.
Biodiversity	Opportunity to increase species diversity by introducing native broadleaf species – particularly riparian woodland providing dappled shade - providing a future seed source. Contribute to natural reserve targets by dedicating appropriate areas to minimum intervention management. Contribute to the restoration of PAWS by adopting native species and removing non-native conifers. Provide better linkage with neighbouring designated sites.	Control of largely nocturnal sika deer populations will be key to establishment of sensitive species. Riparian native woodland establishment could have locally negative effects on feature species if done inappropriately (eg water vole and otter). The establishment of transition woodland on upper margins could compromise sensitive heath species if implemented without survey.	Targeted deer management will be employed to assist in establishing sensitive species and native or riparian woodland. Appropriate low impact establishment techniques will be used to establish riparian woodland. Pre ops surveys by environment staff and FES ecologists will inform precise siting of native woodland and transition woodland planting.
Open habitats	To improve the quality of upland wet heath and blanket bog habitats where they are encountered (above the main glen).	Open habitats may be impacted on by regeneration.	Use buffer zones and transition habitat to reduce the risk of regeneration. Avoid silviculturally inappropriate restocking.

	To include open space in native woodland and productive woodland to increase forest structure diversity.		
Native woodland	Opportunity to increase species diversity in riparian zones and develop transition habitats where appropriate. Opportunity to contribute to national targets for natural reserve by the establishment of minimum intervention native woodland.	Planting opportunity will be partially limited due to extent of open ground priority habitats and unsuitable planting ground (exposure). Significant sika deer populations may cause difficulties during the establishment phase.	Continue to follow best practice deer management. Target natural reserves where productive forestry potential is limited and where biodiversity gains will be highest. Adhere to deadwood policy.
Designated Species	Sustain and enhance the quality of habitat to encourage species and sites noted in this plan. Opportunity to work with SNH to benefit all designated sites and demonstrate exemplar management.	Competing priorities could lead to an imbalance in a habitat favourable for all species. Recolonisation of open ground habitats by non native conifers may compromise objectives. Inappropriately managed operations on sensitive soils have the potential to impact on downstream designated sites.	Develop internal structure to allow greater age class diversity in future rotations, providing increased habitat diversity. Increase native habitats to benefit species diversity. Ensure that appropriate survey and monitoring is undertaken. Monitor regen on open ground sites. Consult with SNH as appropriate.
Historic features / archaeology	Opportunity to integrate historical features into the open area habitat network. Opportunity to establish new heritage management practices such as grazing and burning where permission	Improvements are likely to be achieved over the longer term as the forest is restructured or managed with others.	Consider historical features when designing open habitat network and planning restock operations. Refer new finds to the FCS archaeologist. Ensure that all sites are surveyed and results fed into the workplan.

	from Historic Scotland now exists.		
Recreation	Opportunity for formal and low key access. Good infrastructure and facilities for tourists and local users.	Funding and resources will inevitably create a constraint to further development of facilities. Lack of longer trails and marketing budget may constrain user numbers.	Build on established links with local providers, e.g. Highland Rangers to encourage use of the sites. Investigate innovative funding opportunities and working partnerships to build resilience against resource threats and protect the forest garden trail network.
Access	Opportunity to create a wider access network with minimal investment using existing (or easily improved) routes. Ensure the core paths and hill access paths are protected and enhanced.	Funding constrictions may prevent delivery of hill access at Braemore and will certain limit future wider network development.	Work with the Ross-shire Access Officer, the Lochbroom Community Council and local residents/landowners to explore potential access linkage. Continue development of the Forest Garden site.