4.0 Analysis and Concept

4.1 Analysis of Opportunities

The Easter Ross Land Management 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 Maps (**Maps 2 & 3**). The analysis of the constraints and opportunities will focus on delivering those of the Scottish Forestry Strategy's 7 key themes that accord with the Plan Brief (**Appendix 6**) 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 and extensive areas of CCF, achieving the objectives of improved landscape, environmental and water quality.
- To manage the productive areas of the forest to produce high quality timber and to manage more marginally productive areas to produce biomass at an economically viable scale and quantity.
- To maximise the diversity of tree species where climate and soils allow.
- Safeguard and improve designated species and habitats within 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 create habitat suitable for red squirrel and woodland grouse to flourish.

4.2 Concept Development

The design concept forms the broad spatial framework for the forest that will guide the detailed design (**see Map 4 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 local issues identified in the plan brief.

On full implementation of the plan, around two thirds of the forest will be managed for commercial timber production, ranging 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 in the lower margins 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 and provide suitable habitat for important protected animal species.

The need to establish transitional habitats between montane and wetland environments and plantation edge will be key in developing a more diverse forest structure and will improve the visual quality of the forest.

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 **Appendix 5 – Management Prescription Types** 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 each zone will be located.

The extended (generally up to five years) fallow periods that are required 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. The planning system adopted by NHFD to ensure that silviculturally appropriate species are planted is as follows:

Coupe planning visit takes place when felling has reached 75% of area to identify any felling boundary issues, discuss landform, climate and soils and identify suitable species for the next rotation. This meeting is attended by staff from Planning, Operations, Environment, Deer Management and Stewardship and is called the '75% Meeting'. Outcomes are recorded in the coupe workplan.

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Three years prior to restocking the Programme Manager chairs a site objectives meeting with the Planning Manager, Planning Forester, Environment Manager and FM Forester and uses the workplan to create appropriate planting stock orders for the coupe and this order is entered into the FD Business Plan by the FM Forester.

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Once the restocking operation has taken place the Operations Forester passes the coupe restock details to the FD GIS Technician who then updates the Sub Compartment Database. The GIS Technician then informs the Design Planning Forester of completion.

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The FD Design Planning forester then undertakes a site visit to confirm that the restock operation complies with the Forest Design Plan objectives and design prior to review of the plan.

Above: Carriage Drivers in Morangie Forest Photo G Findlay NHFD

4.3 Analysis and Concept Table

Factor	Opportunity	Constraint	Concept Development
Climate and soils	Identification of soils capable of supporting productive crops will allow improved silviculture in the next rotation. 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 on areas of higher potential.	PAWS will restrict the species available at restock to native tree species. The primary productive species will be Scots pine, currently threatened by DNB. The exposed nature of much of Strathrory will limit species choice and less fertile, organic soils will limit the establishment of productive woodland.	Use site soil and climate conditions at coupe level to indicate future management prescription and species at a scale which is silviculturally appropriate. 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. Consider the use of productive broadleaves on lower margins. Continue monitoring tree health and forest condition.
Pests and Diseases	An increase in species diversity will improve the ability of the forest to withstand attack from pathogens now spreading toward or across North Scotland.	The current spread of Dothistroma Needle Blight, the spread of Chalara (Ash Dieback) to the central Highlands and the continued identification of Phytopthera all continue to constrain species choice for planting and may affect felling programmes. Scots pine and larch species are both important productive and conservation species across the area and are particularly vulnerable to current pathogens.	The FD will continue to play a leading role in the development and application of best practice in relation to DNB and will undertake monitoring of tree health routinely in line with FCS policy. In addition local staff will continue to be updated through training events and local communications meetings. We will explore the inclusion of alternative tree species beneficial to woodland grouse.
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 extension of LISS will benefit designated species and forest health generally.	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. The windblow suffered in recent years has compromised the forest structure for the current rotation.	Extend the rotation of coupes where climate and soils allow, to increase age class structure, while improving timber quality. Ensure areas of natural reserve and PAWS restoration are correctly identified to increase age diversity. Plan LISS in accordance with best silvicultural practice to create a permanent forest structure that will benefit designated species.
Hydrology	Remove riparian conifer 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. Opportunity to significantly enhance riparian habitat of benefit to salmon and trout.	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 and methane release.	Follow best practice, adopt riparian woodland buffer zone widths of no less than 30metres from each bank and avoid uneccesary fertiliser applications. Promote silvicultural nurse mixtures. Plant riparian native woodland where regen is unlikely and dedicate this as natural reserve at an appropriate stage. Where LISS is adopted, create the riparian buffers through heavier thinning and planting with native broadleaf species.
Timber recovery	The opportunity to increase timber quality – with particular emphasis on conifers on workable sites and hardwood on brown earths – can increase productivity and income.	Stability of crops that miss their thinning windows could be compromised and the marginal economics of thinning could mean that budget constraints affect programmes.	Early intervention harvesting at a scale that remains appropriate to landscape to maximise produce return in diseased crops.

	The development of a local skyline resource and the increase in steep ground working equipment could help achieve thinning programmes in previously inaccessible coupes. Where current non native species are compromising biodiversity aims remove the crops as early as possible.		Remove crops that are having a negative effect on riparian/PAWS management. Ensure thinning and LISS interventions are undertaken on time and that best silvicultural practice is a high business plan 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 by the establishment of treeline woodland. Protect the designated species and enhance the habitat capable of supporting woodland grouse and red squirrel in particular.	Control of deer populations will be key to the establishment of sensitive broadleaf species and deer fencing will be restricted due to the presence of woodland grouse. Riparian native woodland establishment could have locally negative effects on feature species if done inappropriately (eg water vole and otter). The establishment of treeline woodland on upper margins could compromise sensitive heath species if implemented without survey. Predator species and inappropriate deer fencing may compromise populations of woodland grouse species and species that may encourage or sustain grey squirrel populations could be planted.	Targeted deer culls and the maintenance of strategic external deer fencing will be employed to assist in establishing sensitive species and native or riparian woodland. Deer fencing will be monitored and will be removed where appropriate. We will work closely with neighbours and stakeholders to ensure best practice is adopted and fencelines are planned and managed at a landscape scale appropriate to deer management. 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. Treeline woodlands will enhance biodiversity. We will continue with rigorous predator control programmes to alleviate pressure on woodland grouse and work towards creating a forest structure that provides all types of habitats required for these species to recover. We will plant tree species appropriate to the red squirrel stronghold status.
Open habitats	To improve the quality of upland open, dune system and blanket bog habitats where they are encountered. To include open space in native woodland and productive woodland to increase forest structure diversity.	Open habitats may be impacted on by regeneration. Organic soils may be damaged by inappropriate establishment operations that affect hydrology.	Use buffer zones and transition habitat to reduce the risk of unwanted regeneration. Avoid silviculturally inappropriate restocking practices. Consult with stakeholders and maintain designated site plans to ensure that all operations are appropriate to designated species and habitats, including the geomorphological interest at Strathrory.
Native woodland	Opportunity to increase species diversity in riparian zones and develop treeline habitats where appropriate. Opportunity to contribute to national targets for natural reserve by the establishment of minimum intervention native woodland, primarily at Lamington.	Planting opportunity will be partially limited due to extent of open ground priority habitats and unsuitable planting ground (exposure). Significant sika and red 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. Create native woodland in line with current best practice, ensuring species appropriate to site are used and that structure will benefit designated species.
Designated Habitats and Species	Sustain and enhance the quality of habitat to encourage species and sites noted in this plan.	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.	Develop internal structure to allow greater age class diversity in future rotations, providing increased habitat diversity. Increase native habitat connectivity to benefit

	Opportunity to demonstrate exemplar management of a diverse range of habitats. Opportunity to contribute to maintenance and expansion of woodland grouse and red squirrel populations and to work with neighbouring landowners to ensure that gains are maximised.	Rise in predator populations may compromise conservation efforts. Forest pathogens affecting important tree species such as larch, juniper, ash and scots pine may threaten the habitats of key species. Large scale clearfell or removal of future deadwood may compromise species habitat.	species diversity. Ensure that appropriate survey and monitoring is undertaken. Monitor regen on open ground sites. Monitor forest health and continue to contribute to research and the development of disease management best practice.
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 from Historic Scotland now exists.	Improvements are likely to be achieved over the longer term as the forest is restructured.	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. Ensure that all scheduled monuments have a current SAM plan and that the work suggested is delivered.
Recreation and Access	Opportunity for formal and low key access. Good infrastructure and facilities for tourists and local users. Improve visual diversity and landscape quality at the Aldie Burn Car Park. Opportunity to create a wider network of Fieldfare Trust Spec trails creating access opportunities for all. Opportunity to enhance the landscape around exisiting RoW and Core Path network and review all access points for accessibility. Opportunity to create a wider access network with minimal investment using existing forest roads.	Funding and resources will inevitably create a constraint to further development of facilities. Lack of longer trails and marketing budget may constrain user numbers. Forest operations can create conflict with forest users where sites are closed for Health and Safety reasons. Many access points – formal and informal – exist across this extensive LMP area and some may not be fit for purpose. Antisocial behaviour – motorbike use, litter, dog disturbance and unauthorised trail building will compromise conservation objectives and disturb other forest users.	Build on established links with local providers, e.g. Highland Rangers to encourage use of the sites. Continue to improve existing facilities as resources allow. Continue to audit access points and improve them where necessary. Continue to improve path corridors by appropriate ‘visitor zoning’ operations. Work with the Ross-shire Access Officer, Police Scotland, Community Councils and local residents/landowners to explore potential access linkage, limit anti-social use and encourage access by all.
Landscape	Through well designed coupe shapes and use of a greater diversity of species, the landscape impact of the forest could be significantly improved. The establishment of treeline woodlands will lead to a more organic transition from high forest to open hill habitats. Opportunity for LISS to create an attractive diverse forest.	Deer pressure may limit the successful establishment of treeline woodland and more palatable species. Forest health issues may mean coupe shapes are re-designed to remove pathogens rather than improve landscape. Crops on very sensitive soils may be left after harvesting if operations become uneconomic creating unsightly blocks.	Effective deer control, by a variety of techniques, will be adopted to allow the establishment of sensitive species and treeline woodlands beyond browsing height and will then be reviewed at the end of the plan period. A pragmatic approach to coupe shapes will be taken if disease dictates early felling. Improvements will be achieved by adopting staggered restocking. Accurate stratification of crops before marketing will allow harvesting to achieve full clearance of sites. Appendix XII details the landscape analysis and resulting concepts. This analysis details ‘Landscape Design Focus Areas’ that are significant to the plan area. Appendix 12 contains detailed proposals for these areas.

The analysis and concepts can be viewed spatially in **Map 4** of this plan and detailed landscape analysis is provided at Appendix XII and in the perspective visualisations.