

4 Forests on rolling hills

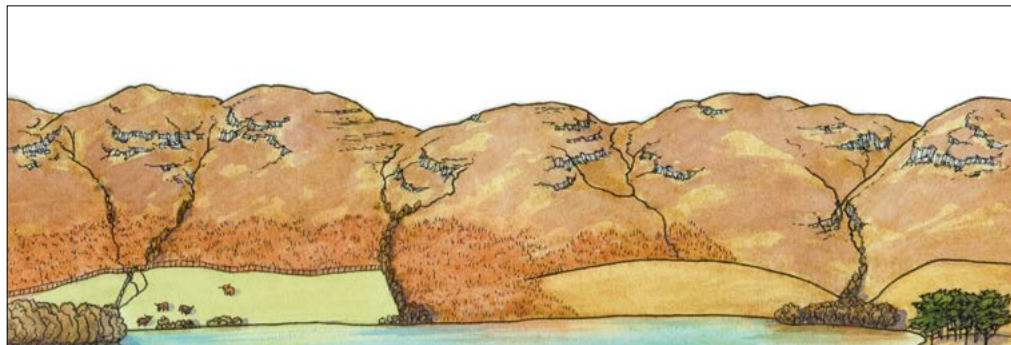
4.1 A medium-scale new mixed conifer and broadleaved forest on a prominent slope and mainly stable soils

This example is part of a private estate typical of the central Scottish Highlands, where the landscape has been mainly used for sheep and deer management. The soils are mineral and peat with bracken, heather and blueberry. The valley bottom has some fields used for raising beef cattle, with some small patches of grazed oak/birch woodland along the margins of fields and up into some deep gullies in the steeper slopes. The estate wishes to develop the area as woodland capable of producing timber while also satisfying other objectives. The landscape is sensitive as the area is seen from a tourist route and it is used for some walking and other informal recreation. Biodiversity is moderately important, with opportunities to improve the management of the remnant native woodlands. The area needs to be fenced against red deer.

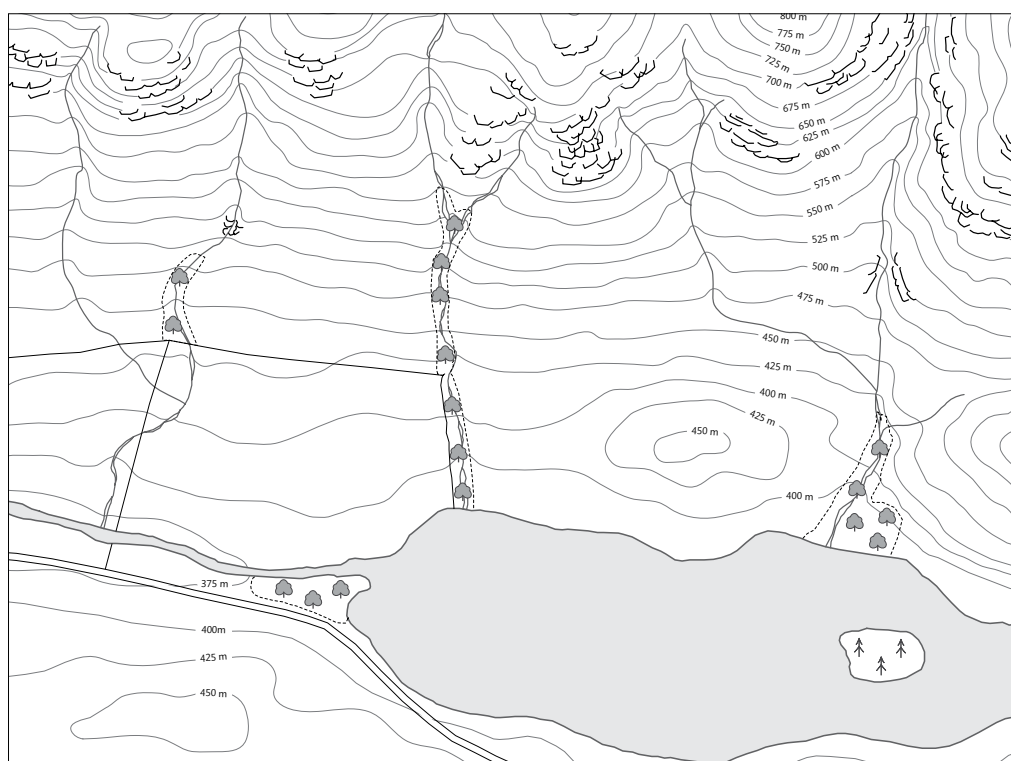
Objectives

Resource	Objective	Indicator of objective being met
Timber	To produce the maximum yield of timber within the limits imposed by the site and environment	Productive species suited to the site are used at planting while also achieving species diversity Sites unsuitable for productive species or timber extraction are avoided
Financial	To maintain a positive cash flow	Grants are maximised to establish the forest; management operations implemented to deliver revenues from thinnings
Landscape	To ensure that the character of the landscape is reflected in the forest design and layout	Shapes of felling coupes and species fit landform Diversity of textures and colours reflects those found in the wider landscape
Biodiversity	To enhance the value of the forest for biodiversity	Open-ground habitat to be created Streams to be protected by riparian woodland Broadleaves are planted and old/veteran tree patches protected
Historic environment	To protect identified archaeological sites	Unscheduled sites will be opened
Public access and recreation	To maintain public access	Rights of way to the hills to be retained and path experience enhanced Viewpoints to be kept unobscured

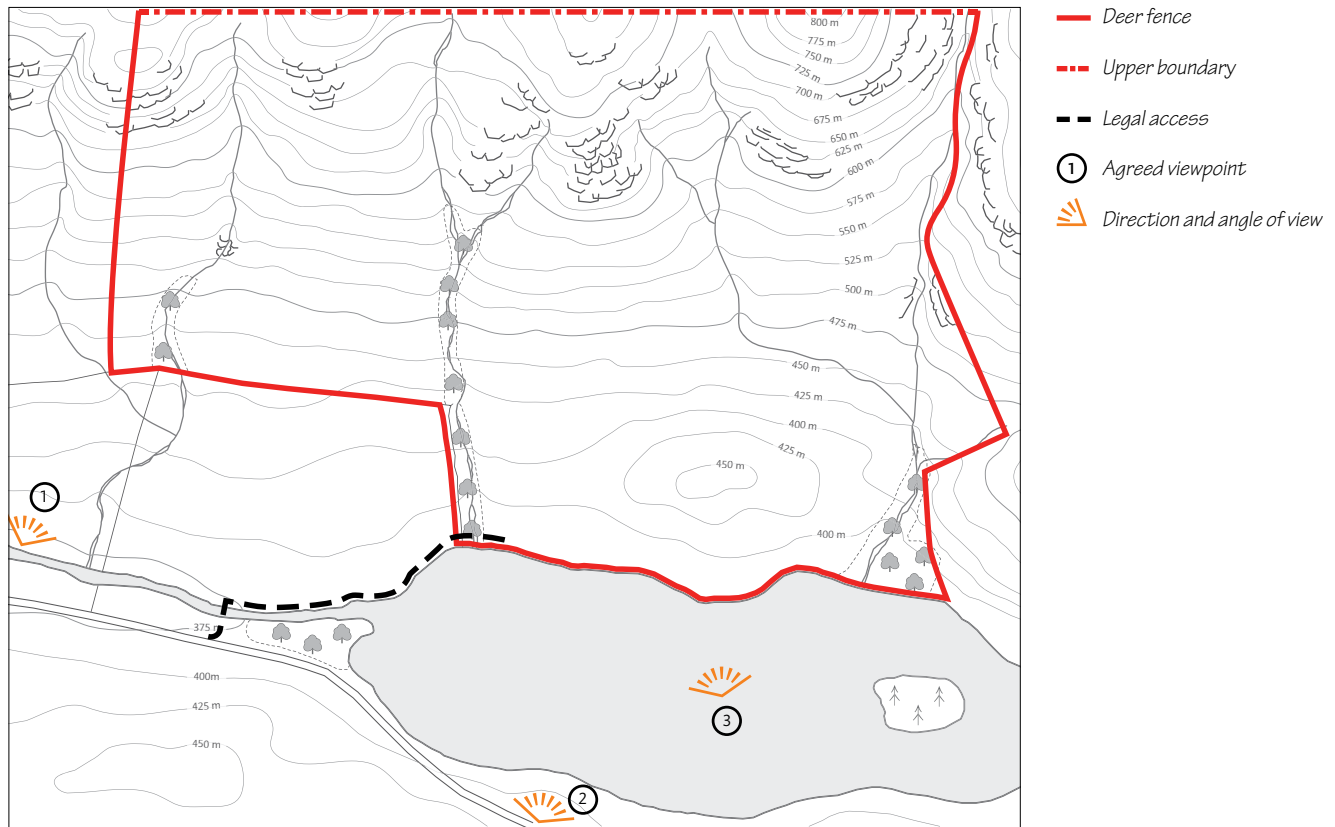
Base - perspective



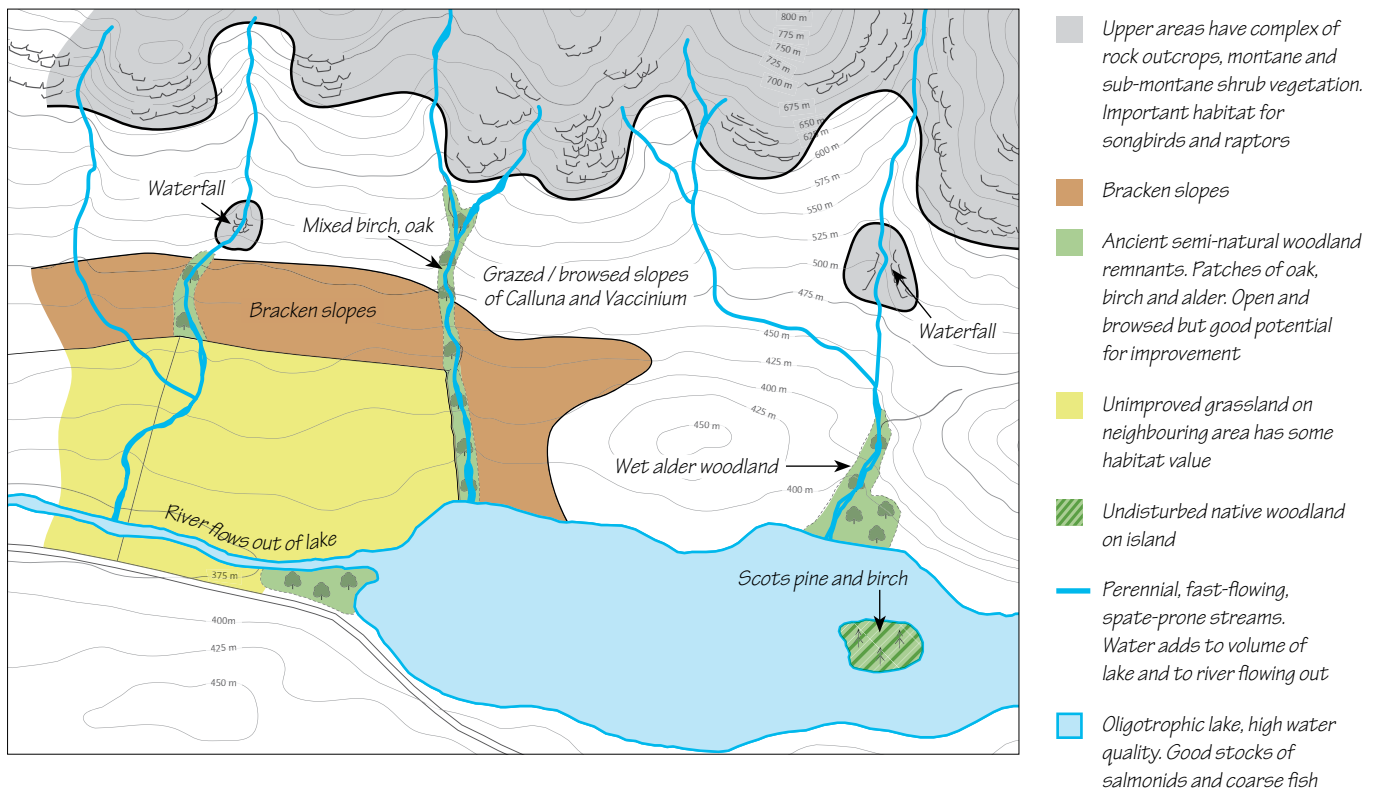
Base - plan



Location and landscape context



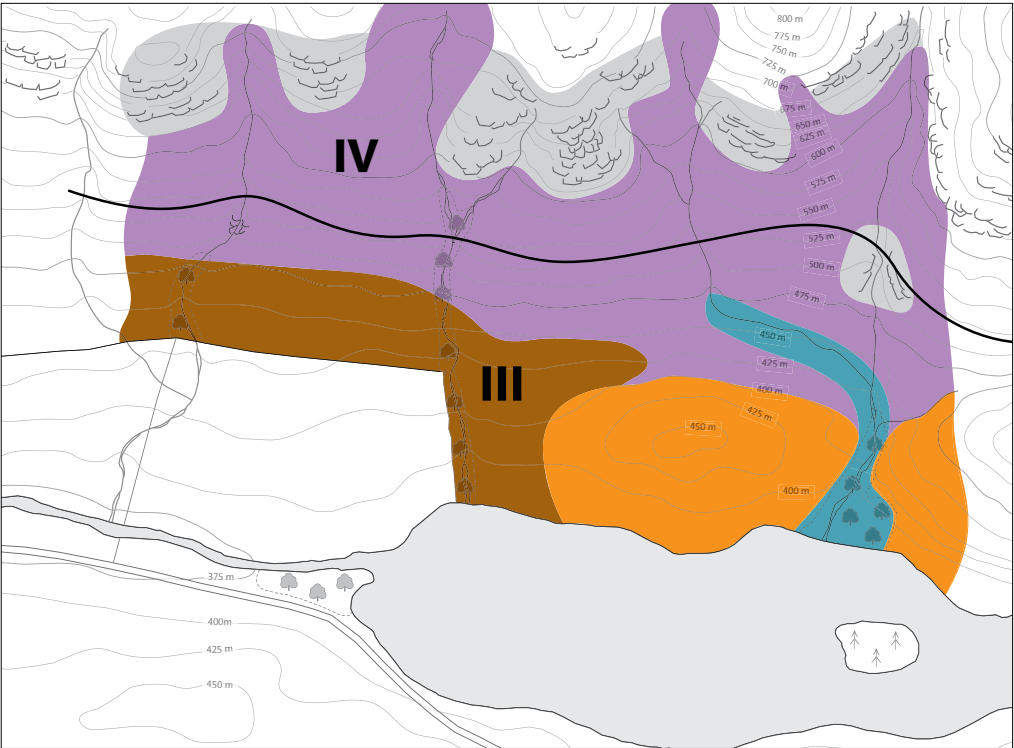
Hydrology and ecology



The whole area is grazed/browsed by red and roe deer, numbers being high enough to prevent woodland regeneration. Any new woodland planting will need to be fenced. There are no blackgame or capercaillie that could be affected by new fence lines.

Soils

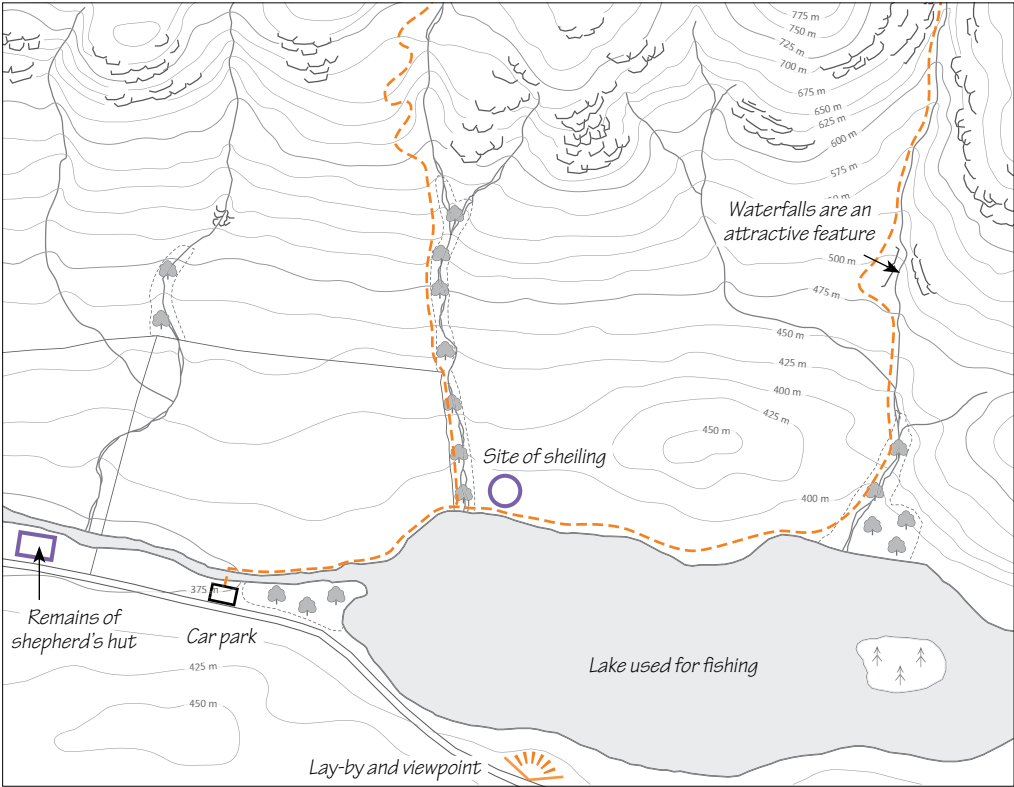
- Rock and rankers
- Shallow peat over podzol
- Podzol
- Upland brown earth
- Surface water gley
- Mid-slope boundary
- IV Windthrow hazard class



Geology is metamorphic: schists and gneiss, exposed in the upper areas and covered by mixed glacial deposits and moraines, especially along the lakeshore where the deposits may be free draining. The rock parent material generally leads to acidic conditions.

Access and historic environment

- Hill tracks used by mountaineers
- Unscheduled monument



This area has no settlements of a permanent nature. The fields were enclosed and cultivated in Victorian times as part of the estate improvement. These changes resulted in there being no need for summer grazing so the sheiling fell out of use and was abandoned.

The survey is presented as several layers of combined factors which are then evaluated in the constraints and opportunities analysis. This focuses on the limitations presented by the higher elevation sections, which also provide opportunities for landscape protection and biodiversity enhancement.

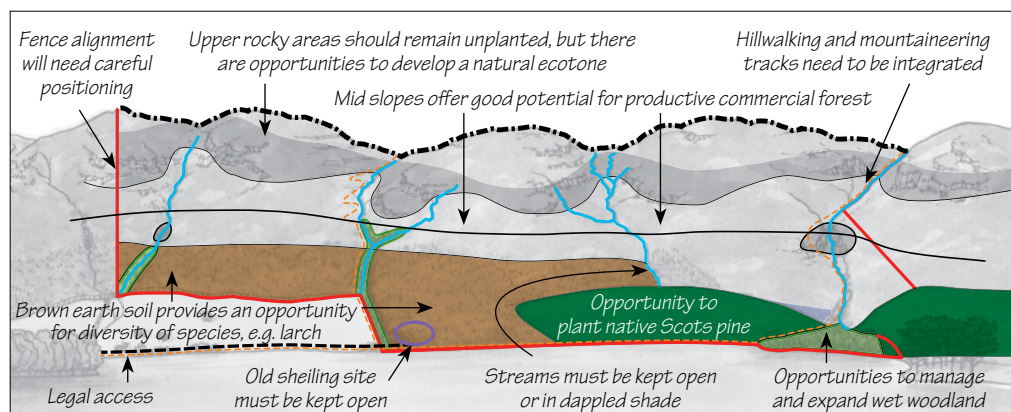
Constraints and opportunities analysis

Factor	Constraint	Opportunity
Soils	Upper elevation areas have thin and infertile soils	The better soils allow for more species choice at lower elevations
Windthrow hazard	Upper elevations have potentially higher windthrow hazard and may be uneconomic to plant with productive species	In areas of higher wind hazard class either retain as open ground or in appropriate conditions establish native woodland
Historic environment	Sites must be identified and kept clear	To protect and incorporate them into the open space network of the design
Trails and paths	They may be disrupted by woodland management activities Where they cross the deer fence these areas will be vulnerable to deer incursion	To maintain trails and paths through both open space and through the forest to enhance and diversify the user experience
Deer management	Deer numbers and current management practices mean that a deer fence is needed The visual impact of the fence must be accounted for	To develop and maintain the open areas within the fence as ungrazed habitat
Water	The many streams must be kept open Stream crossings by roads may be a problem	To create valuable riparian habitats

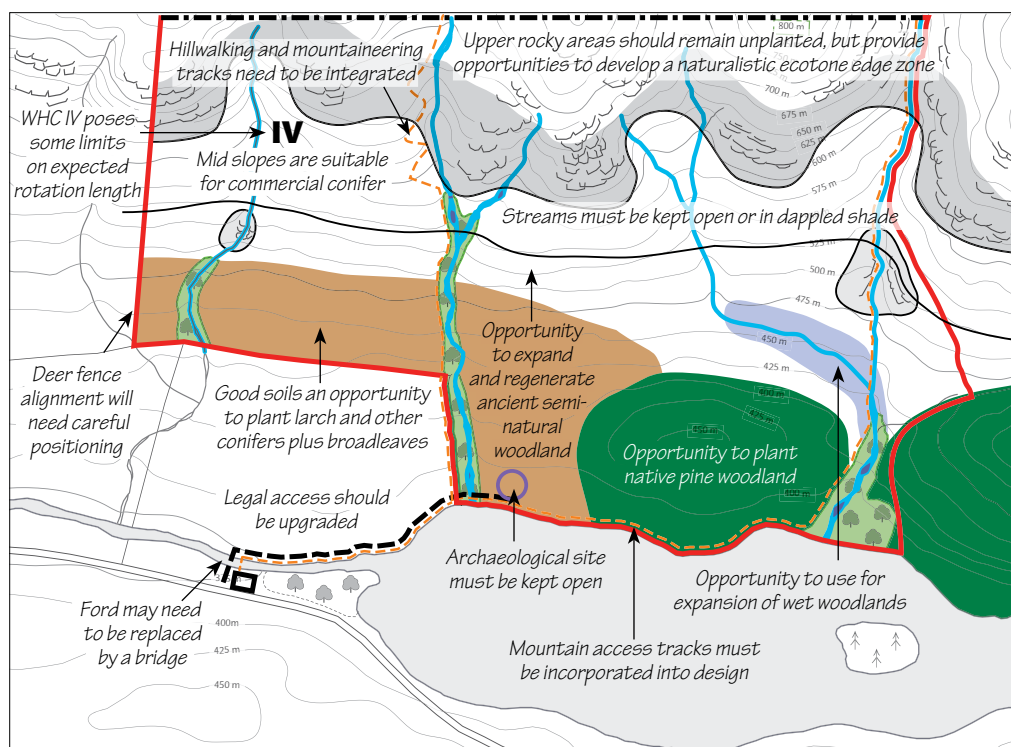
The landscape character is very strong in this area, with powerful rocky hills and deep gullies, lower moraine landforms and a loch which reflects the scenery above when it is calm. Bracken and other semi-natural vegetation currently contributes texture and colour, visual cues that could be incorporated into the design.

The design strategy/concept envisages three main zones – the upper forest/montane zone which is kept open and where an ecotone between the forest and rocky upper areas is to be developed, the mid-slopes with a focus on timber production and the lower areas where more diversity should be concentrated. This is reflected in the design, which maintains a strong relationship to the landscape character and presents a diversity of species which reflect those found there at present. The deer fence has been aligned to minimise straight stretches where grazing differences either side of the fence line could emphasise it.

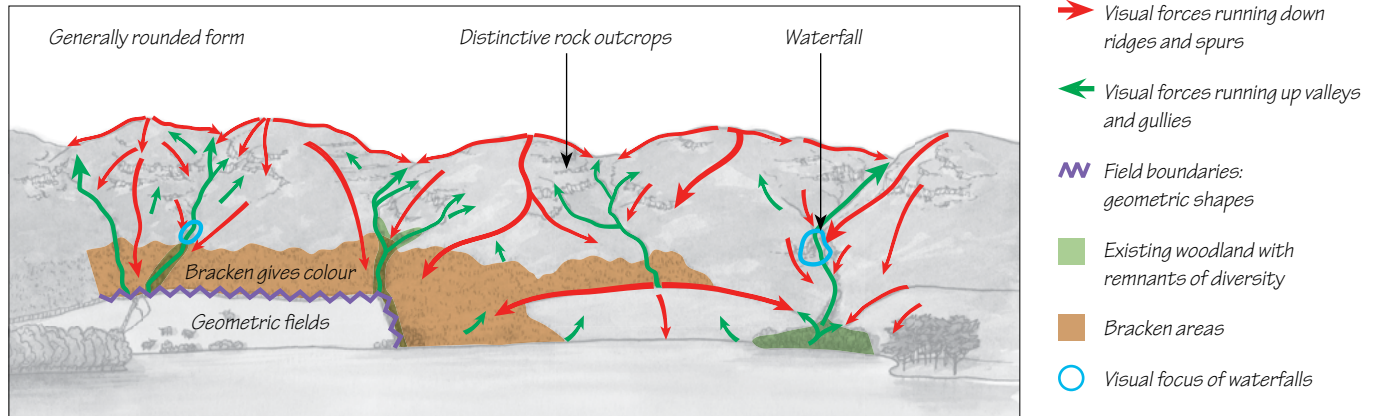
Constraints and opportunities – perspective



Constraints and opportunities – plan

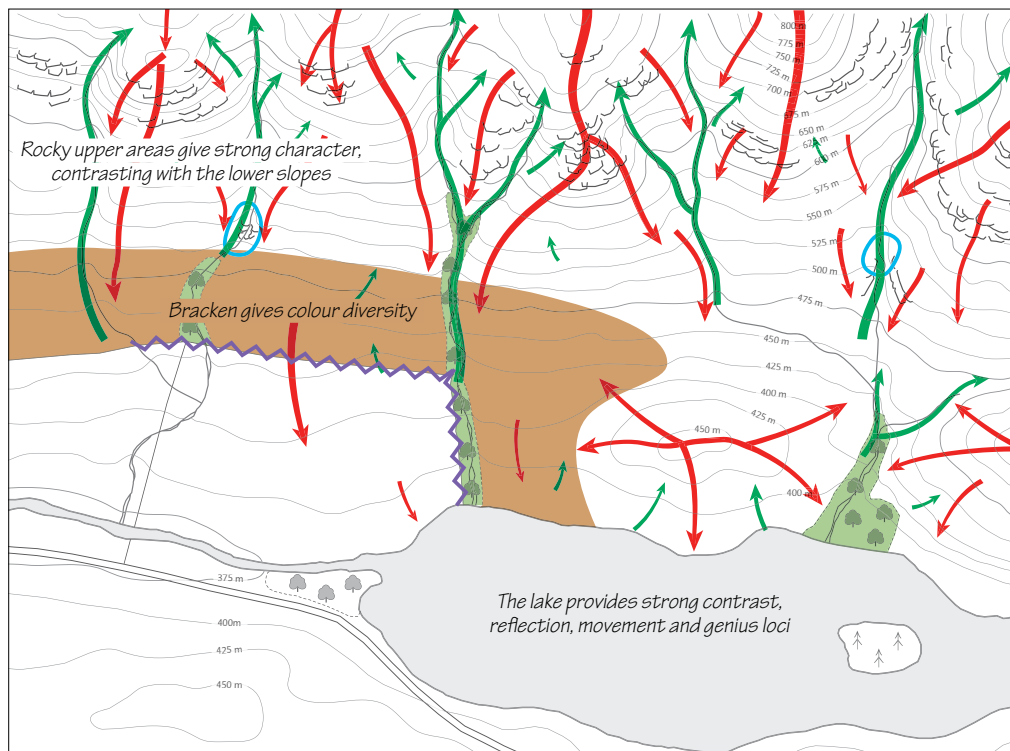


Landscape character analysis – perspective



A medium to large-scale rugged landscape. The mountains are generally rounded in shape, but due to hard rock they exhibit stony outcrops which give a distinct texture and colour and add to the diversity. The lower slopes are smoother and contain different vegetation and some agricultural fields. Rounded, smoother moraines also feature. The lake offsets the rugged slopes with its plain surface, offering reflection, movement and space. Two waterfalls present dynamic elements when in spate.

Landscape character analysis – plan



This area is part of the 'rugged mountains and valleys' character type. Key aspects include dramatic rocky peaks, moraines and moraine-dammed lakes in glaciated valleys with diversity of vegetation, colour and texture.

Design strategy – perspective

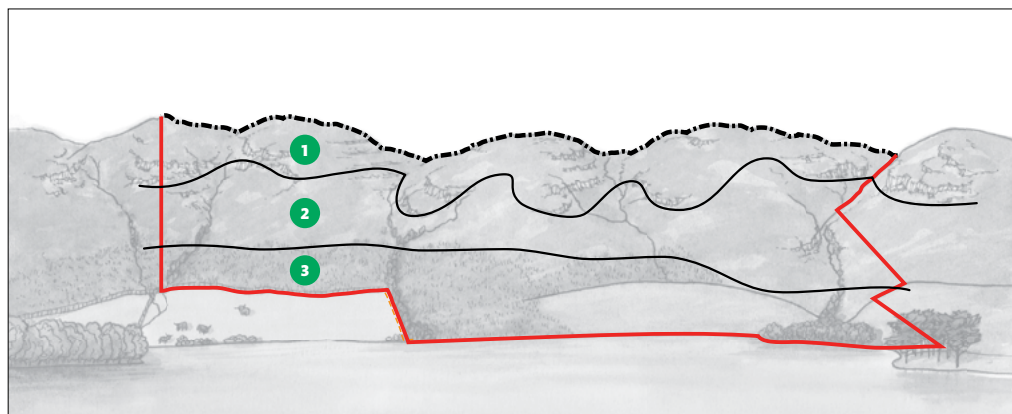
— Deer fence

--- Upper boundary

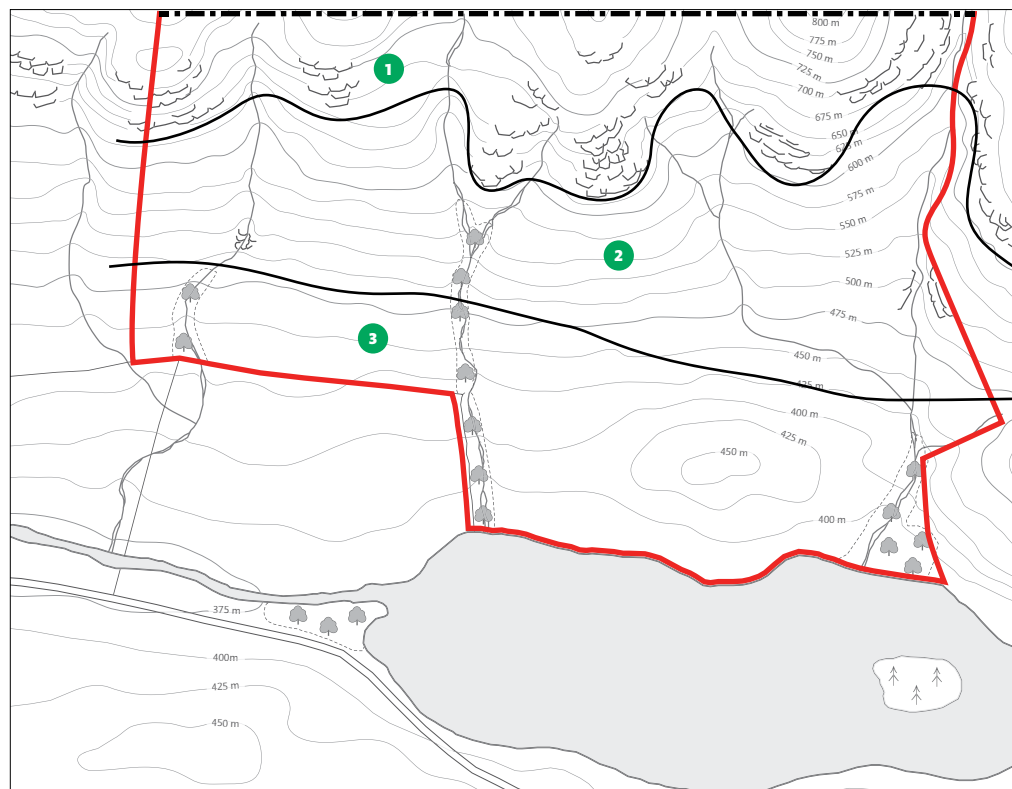
1 Upper montane zone
Keep mainly open but develop natural upper tree line. This will enhance biodiversity and keep an attractive part of the landscape open. Scale and shape will be important.

2 Productive conifer zone
Will produce most timber. Should be diversified by open space to streams and rocky outcrops.

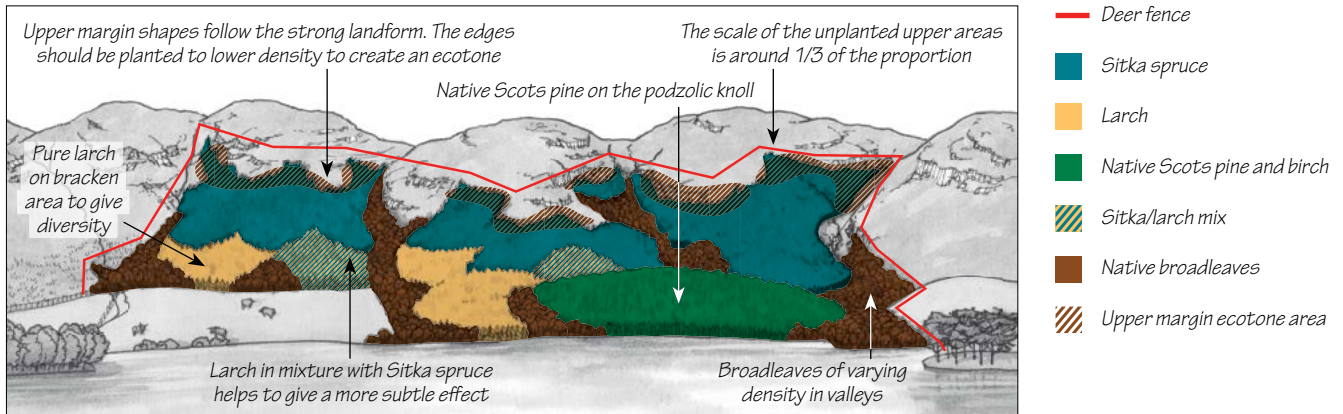
3 Lower valley zone
More opportunities to diversify species and to incorporate native woodland elements while also producing timber. Scale of the elements will need to be considered. Biodiversity can be enhanced significantly.



Design strategy – plan



Planting – perspective



Planting – plan



4.2 A medium-scale predominantly coniferous forest on a prominent slope and mainly stable soils approaching the time of felling and replanting

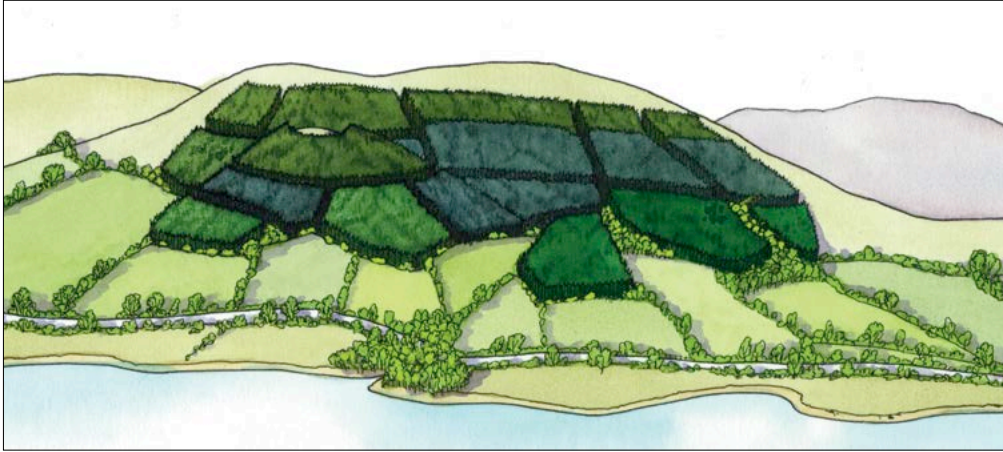
This example is a significant piece of 1950s afforestation on the steeper slopes of a rounded hill typical of parts of Wales, the Lake District, central and highland Scotland or the Mountains of Mourne. It could be part of a private estate or be publicly owned. The land was originally low-quality sheep grazing lying above enclosed fields. Grass, bracken and heather were the original vegetation cover types. The forest is now coming to maturity and presents opportunities to enhance diversity and improve the way it fits into the landscape as well as to produce timber. The main objective is timber production but landscape and biodiversity enhancement come a close second while recreation also takes place, mainly along established routes. Archaeological features are also present in the area.

Objectives

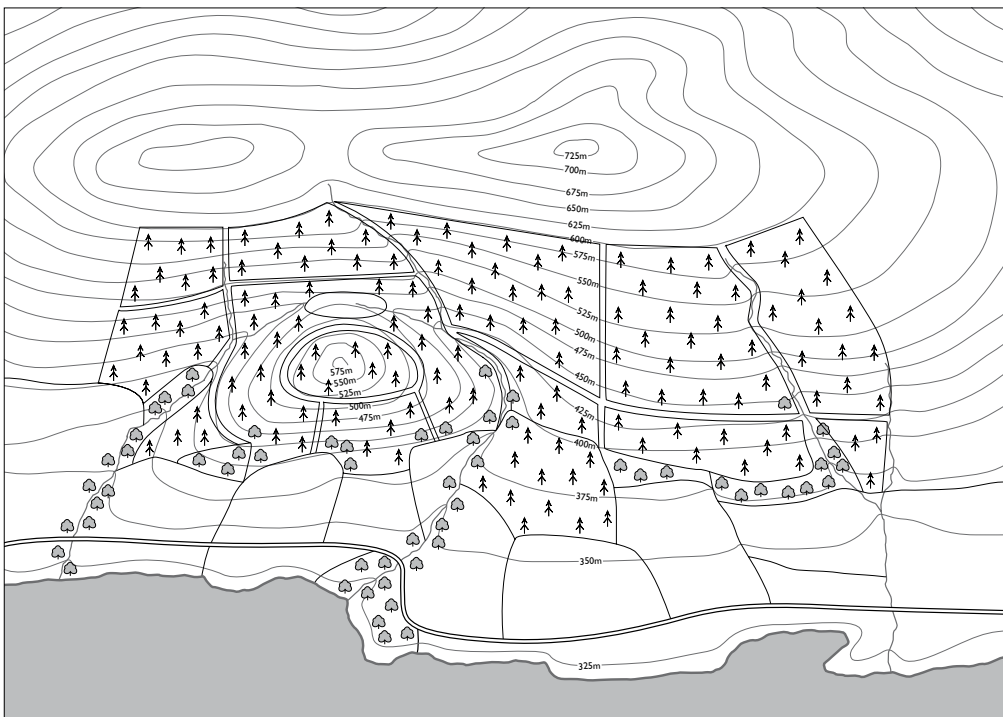
Resource	Objective	Indicator of objective being met
Timber	To produce the maximum yield of timber within the limits imposed by the site and environment	Timber volumes relate to maximum MAI* and yield a large proportion of saleable logs Productive species suited to the site are used at restocking Sites unsuitable for productive species are avoided
Financial	To maintain a positive cash flow	Revenue from timber is gained every year of the plan and exceeds costs Grants are maximised
Landscape	To improve the appearance of the forest in the landscape	Angular geometric shapes are removed by felling and replanting to more organic shapes that reflect the locale
Biodiversity	To enhance the value of the forest for biodiversity	Species diversity reflects that of the surrounding landscape Open-ground habitat to be created and maintained Streams to be kept open New native woodland planted to extend and connect patches of ASNW** Age class diversity to be increased Old forest to be developed on lower slopes and better soils
Historic environment	To protect archaeological sites of value	Scheduled sites will be kept open and secured under an approved management plan Unscheduled sites will be protected and maintained in managed open space
Public access and recreation	To maintain public access	Rights of way will be kept open and maintained Viewpoint will be kept unobscured

*Mean annual increment; **Ancient semi-natural woodland

Base – perspective

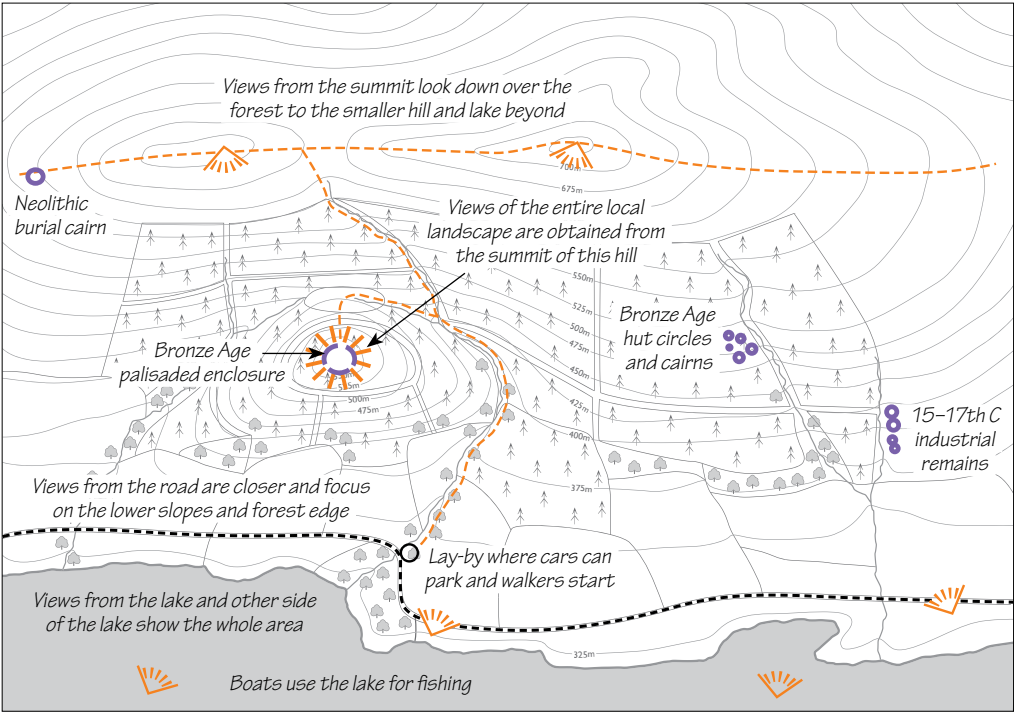


Base – plan



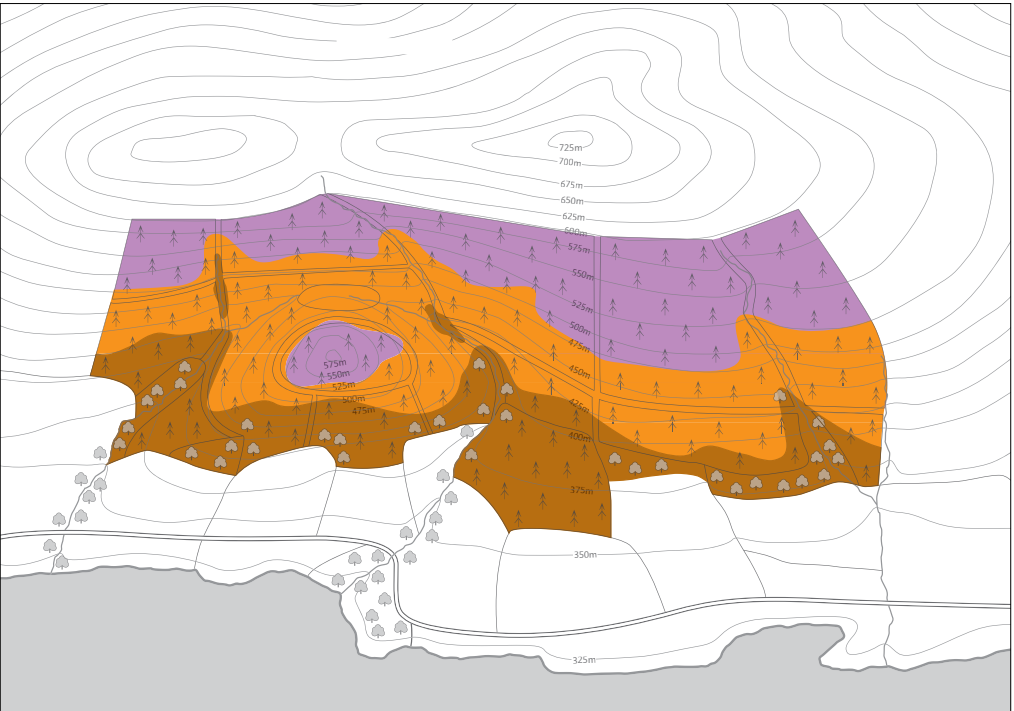
Access, historic environment and landscape context

- Public road: tourist route
- Public footpath
- Viewpoint direction and angle

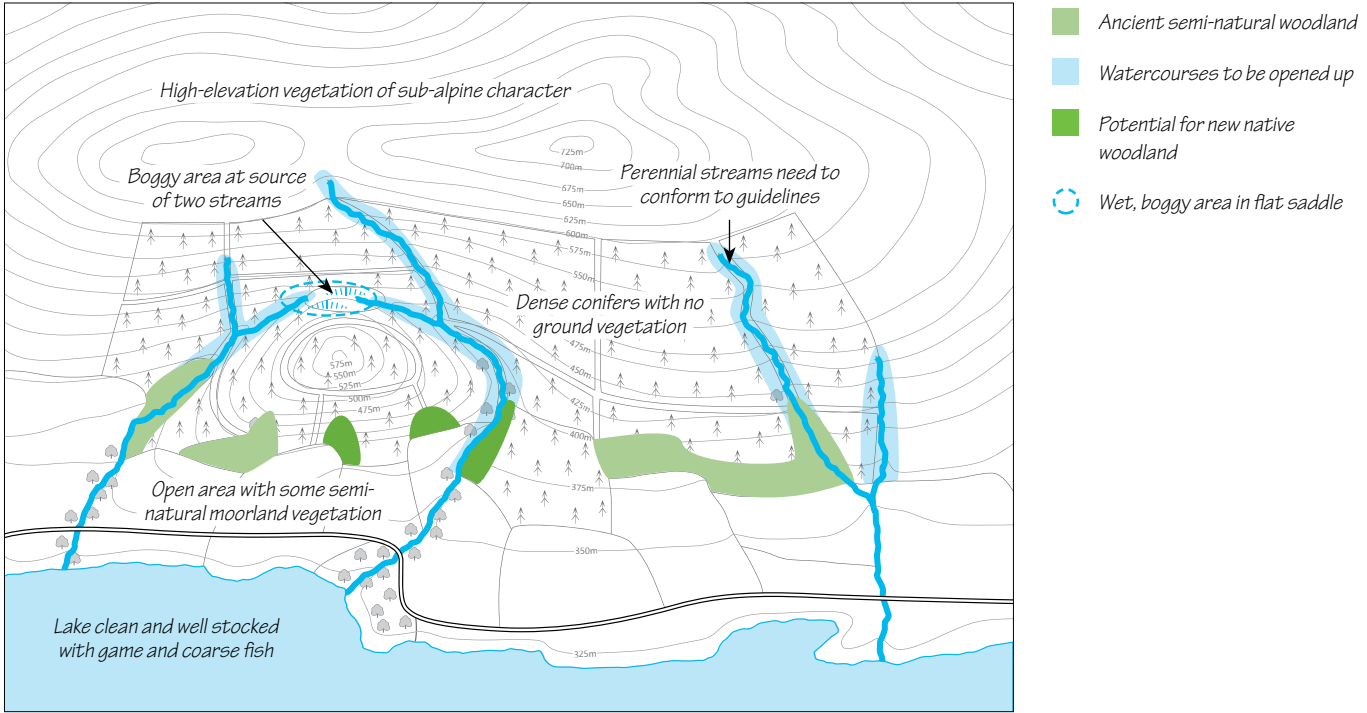


Soils

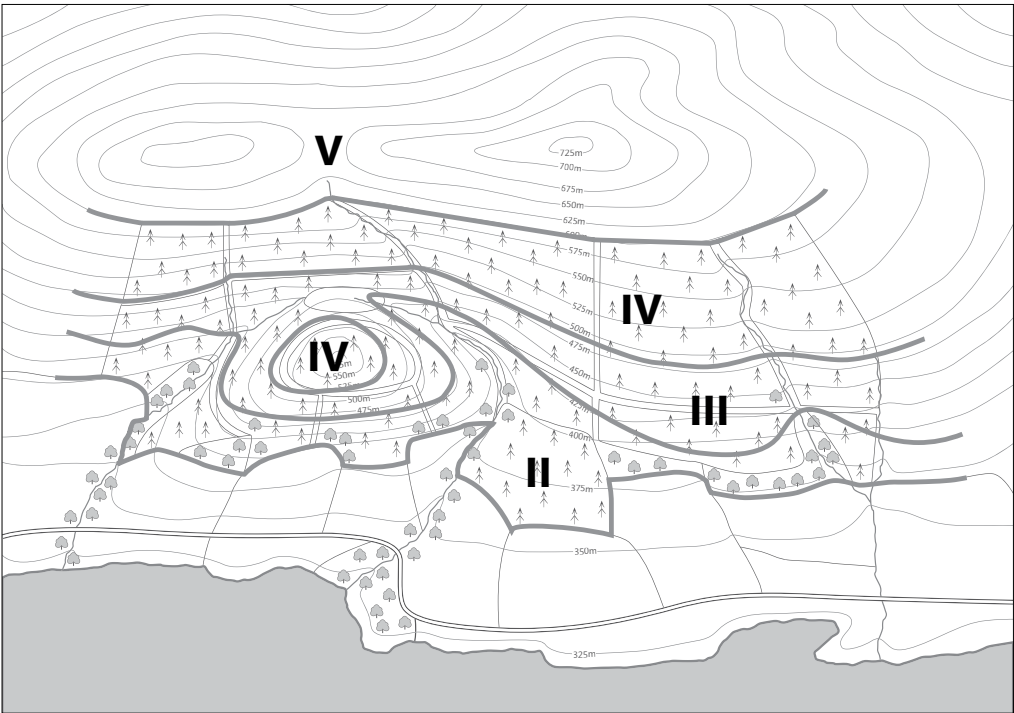
- Shallow peat over podzol
- Podzol
- Upland brown earth



Water and ecology

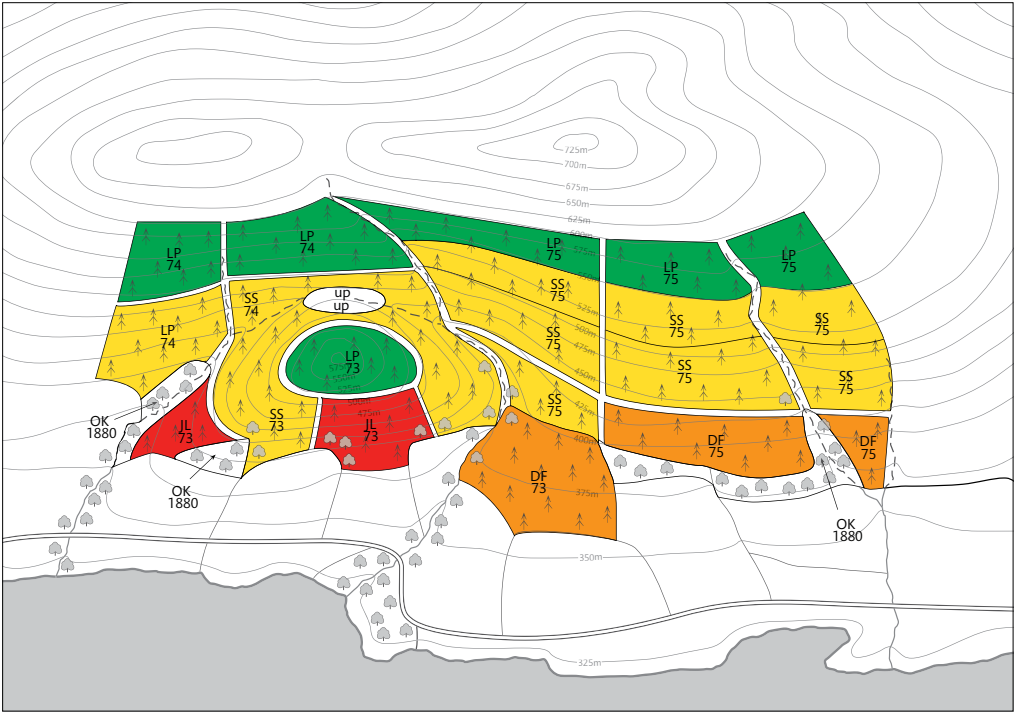


Windthrow hazard classification



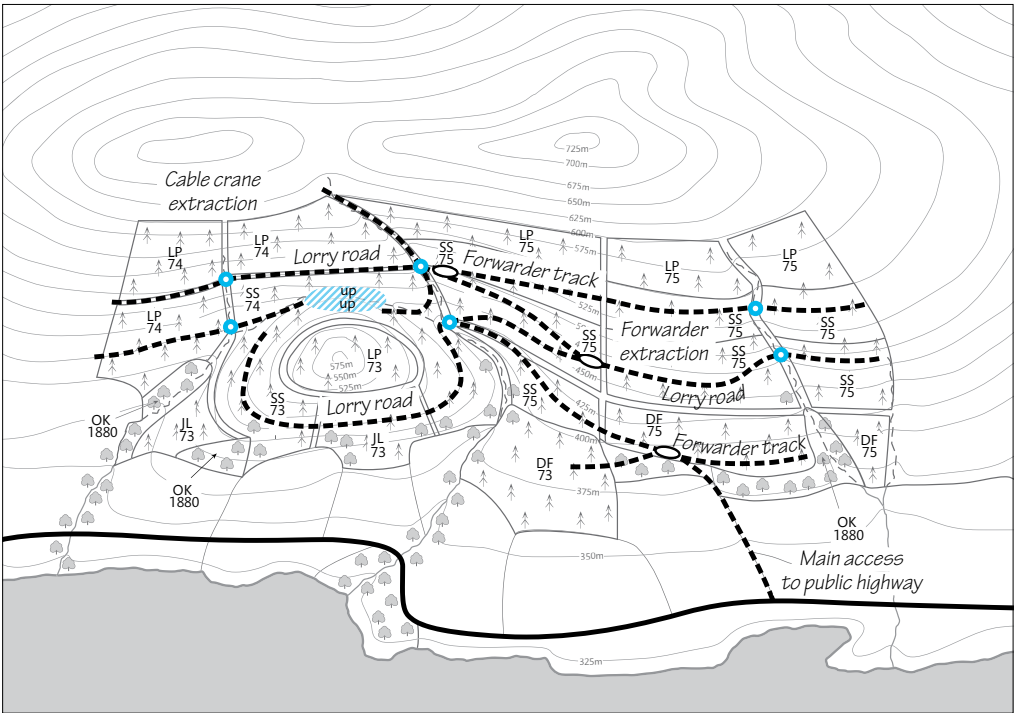
Stock map and economic felling ages

- 2014–19
- 2019–24
- 2024–29
- 2029–34



Roads and harvesting

- Public road: tourist route
- Existing forest roads
- Culverts
- Landings
- Difficult terrain (boggy)



The survey is built up in several layers. The constraints and opportunities analysis identifies many aspects which need to be taken into account in the development of the plan. The constraints and opportunities focuses on the need to diversify and restructure the forest and the issues affecting this.

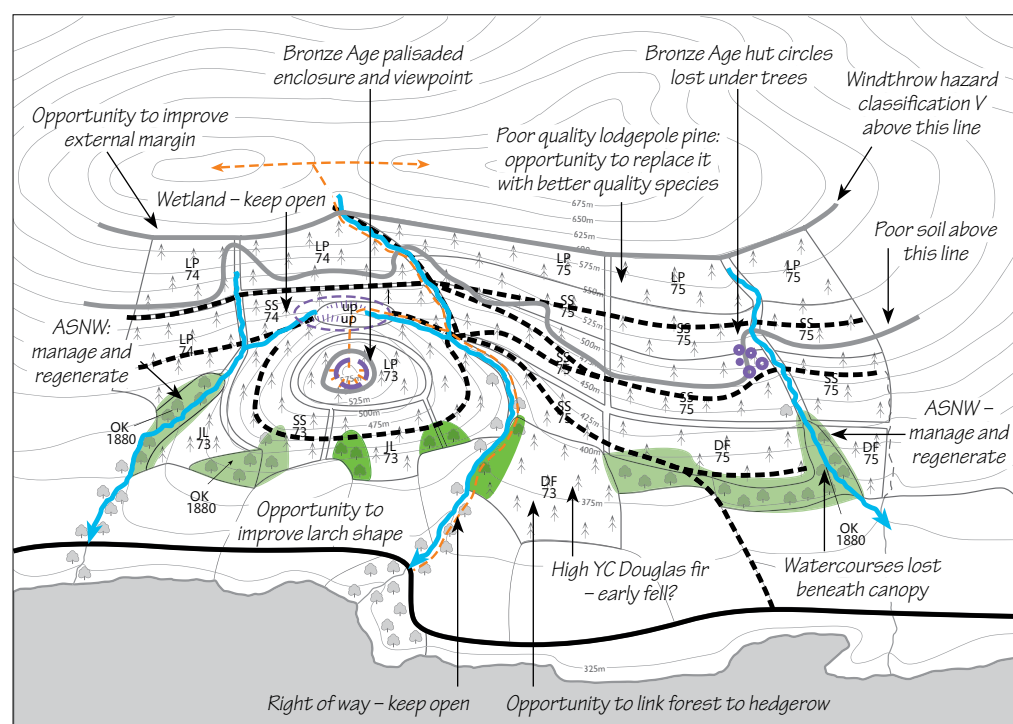
Constraints and opportunities analysis

Factor	Constraint	Opportunity
Ownership boundary	The planting extends up to the angular ownership boundary so that there will be losses of productive forest if areas are retained as open space at restocking	To minimise the area of managed open ground following restocking by realigning the fence
Age class of existing forest	Spreading felling over an extended period of time will incur a financial penalty	To minimise financial penalties by delaying low YC* crops and by felling as close to max. NPV** as possible
Ancient semi-natural woodland (ANSW)	Low potential for timber production and expensive to manage	To increase natural diversity and extend new native woodland next to ASNW To restore native woodland currently planted with conifers to link ASNW remnants
Soils	Poor soils at the upper slopes limit species choice	To leave poorest soils un-restocked with little loss of productivity To vary range of species on better soils
Rights of way	Paths run right through the forest so will be difficult to avoid work near to them	To improve their character and visitor experience as the restructured forest develops
Harvesting systems	Slopes are at the extraction limits for wheeled or tracked vehicles and this may affect design of coupe shapes	To use the roads and ground equipment to best advantage in felling well-designed shapes
Historic environment	Some sites are currently under trees and may suffer damage during extraction operations	To use low-impact felling systems around archaeology features To open them up and link them to other open spaces

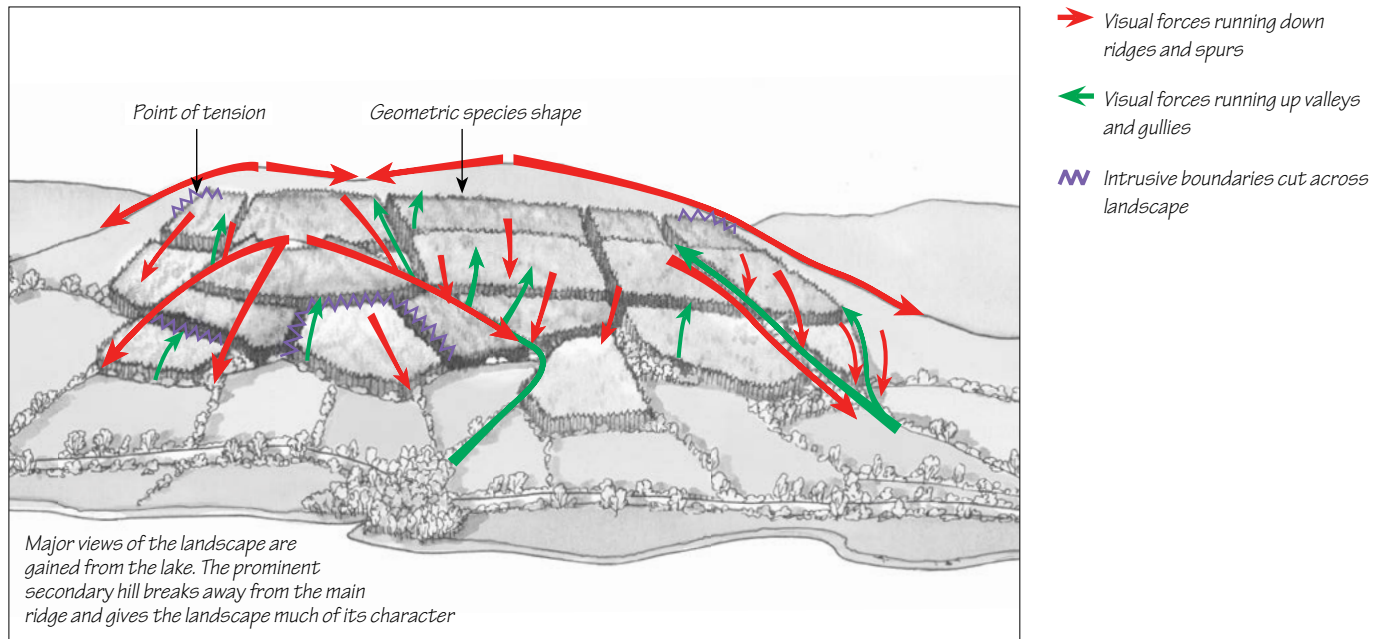
*Yield class **Net present value

The landscape character is an important factor here as the existing layout is not sympathetic to the landscape and it needs much redesign to meet the *UKFS Guideline on Forests and Landscape* standard. The design concept identifies several main elements which will affect the practicality and environmental possibilities of the design, breaking the area down into the upper parts where landform is dominant and many practical factors are constraints, down to the lower slopes where field patterns and greater potential for diversification exist. This is developed in the sketch design, which incorporates substantial redesign of the external margin at restocking but also manages to maintain practical and economic felling coupes. The selected time series shows how the forest will develop and improve over time.

Constraints and opportunities – plan

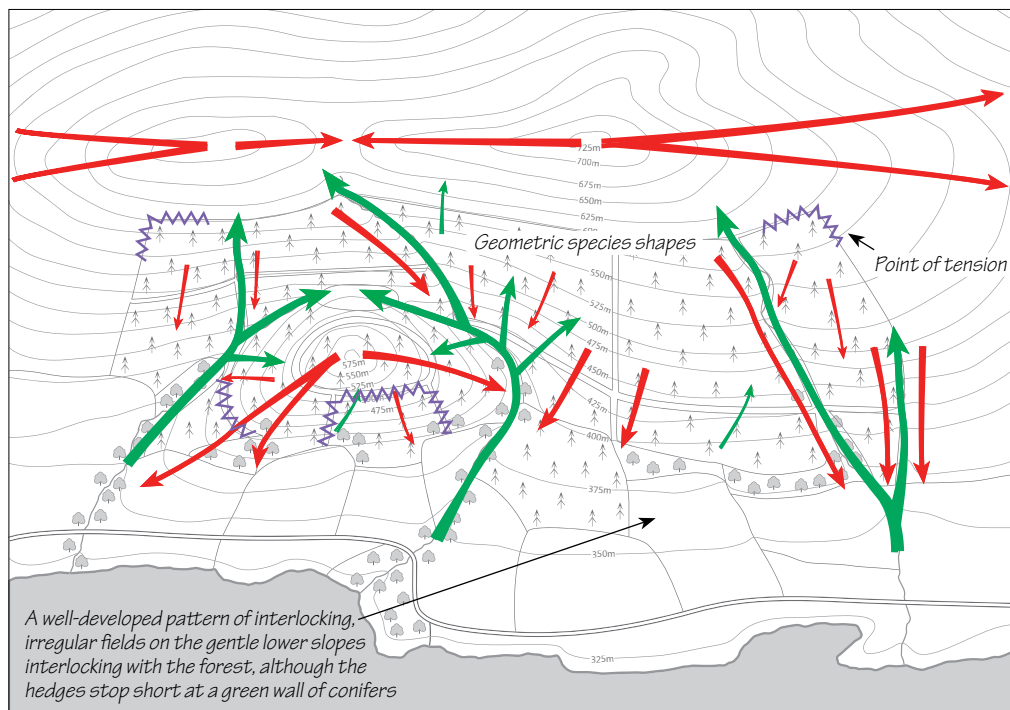


Landscape character analysis – perspective

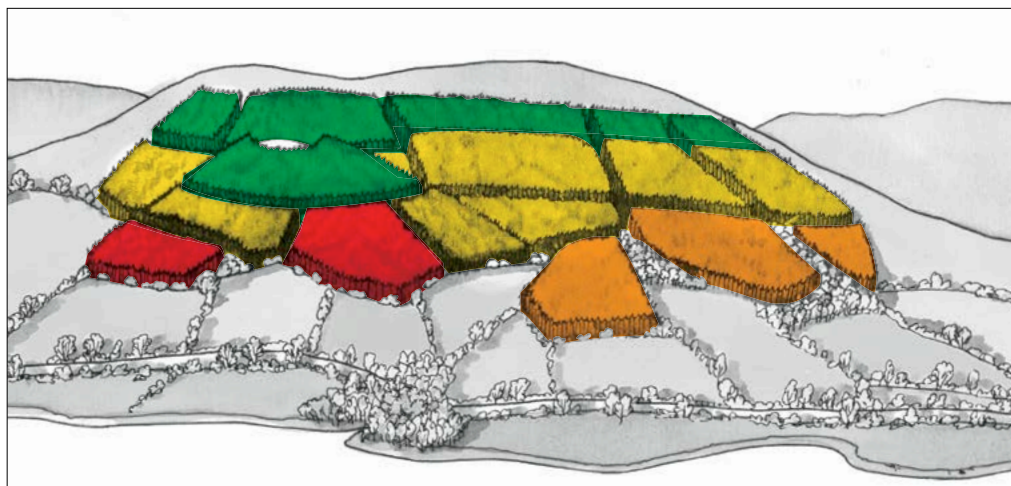


A medium-scale landscape of rounded convex landforms, smooth and fine textured. The transition zone between open hill and agricultural land was formerly broadleaved woodland. The forest is a geometric, dark green, fine-textured addition that sits uncomfortably on the hillside. Internal angular shapes of species and rides add to its artificial character.

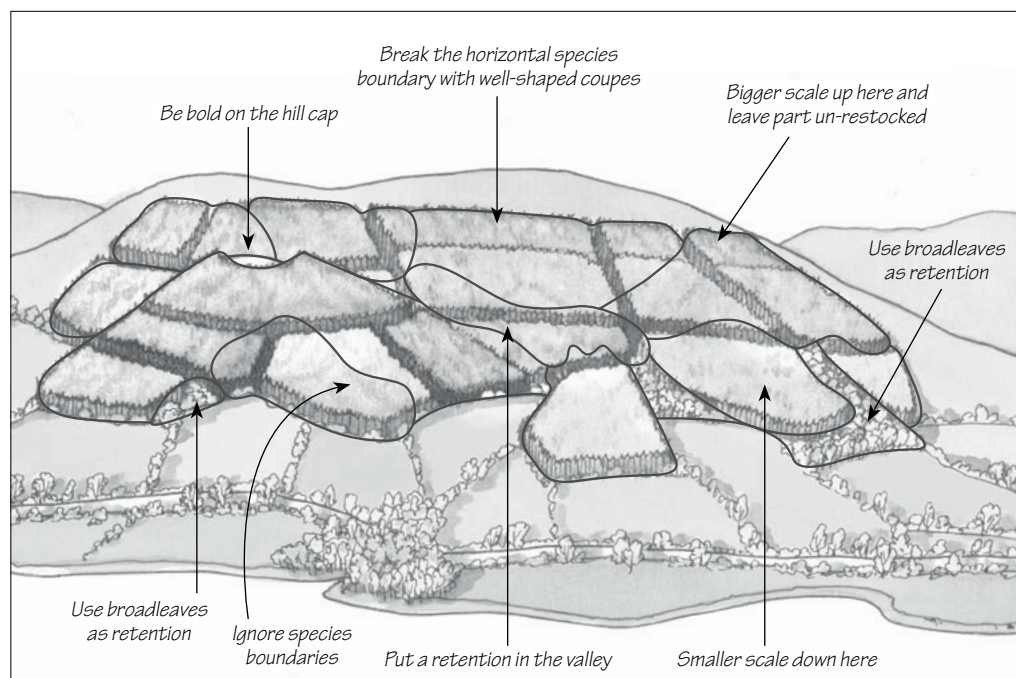
Landscape character analysis – plan



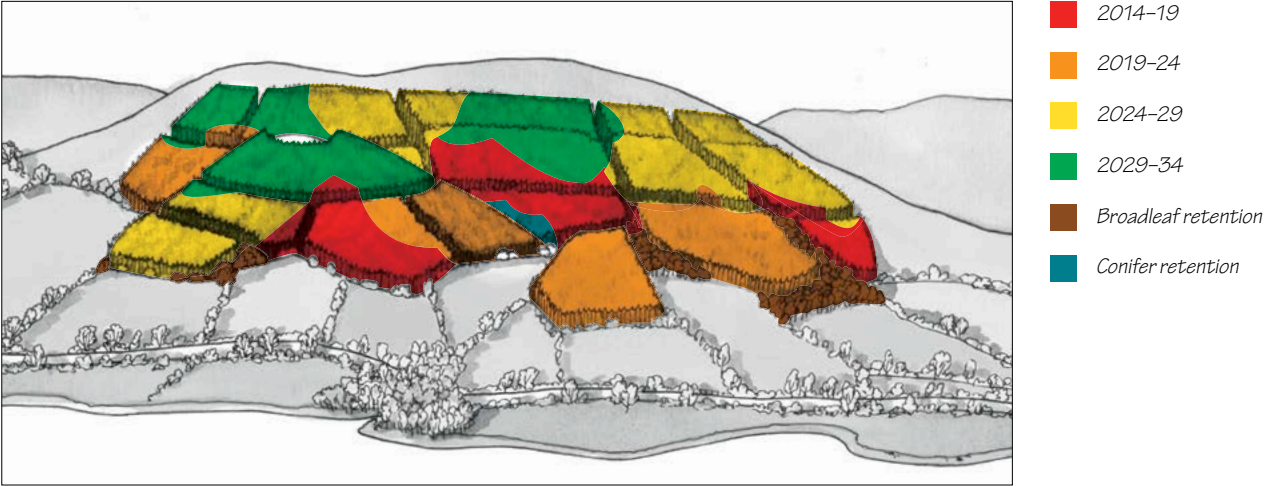
Economic felling ages – perspective



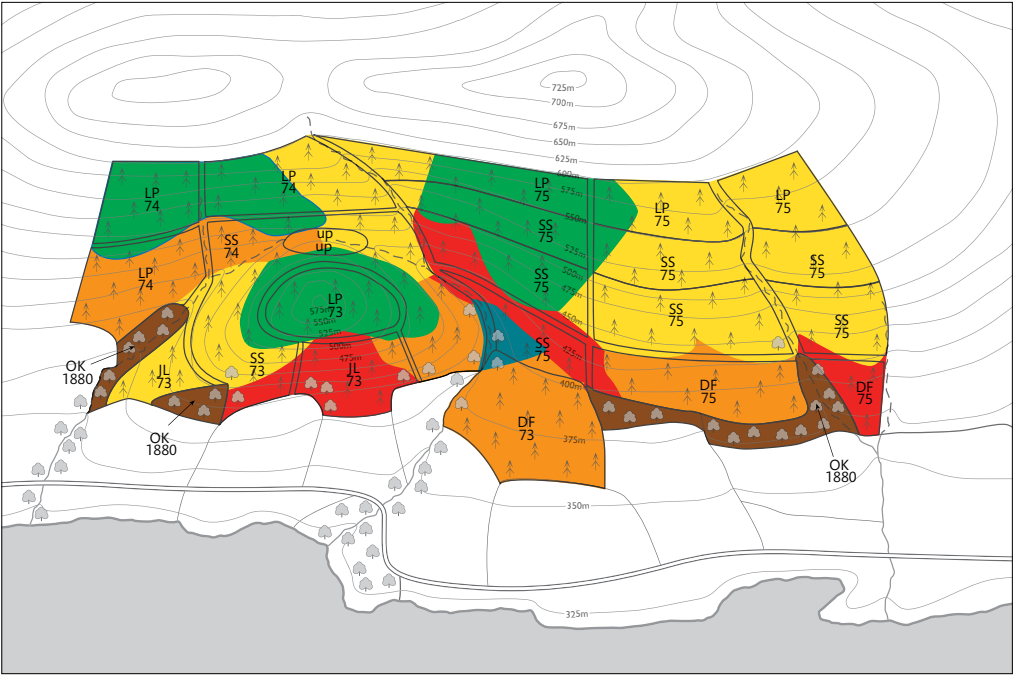
Design strategy



Felling design – perspective

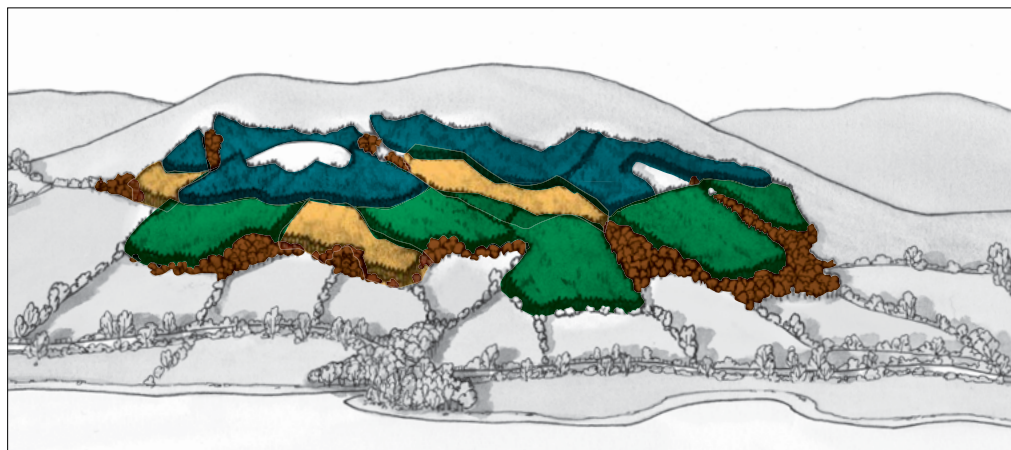


Felling design – plan

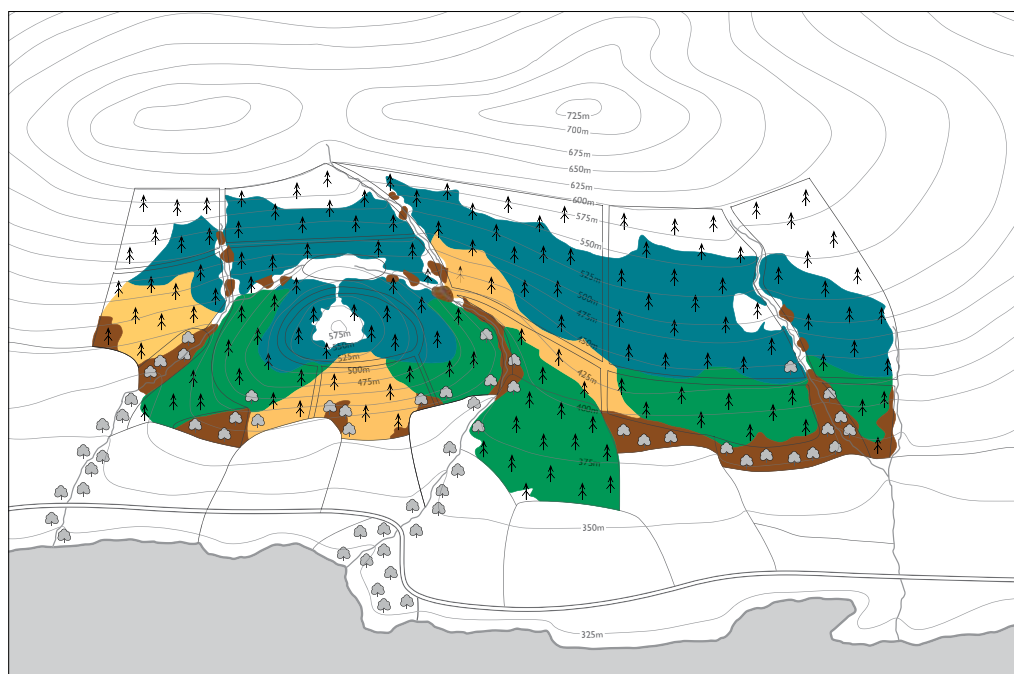


Restocking – perspective

- Sitka spruce*
- Douglas fir*
- Japanese larch*
- Broadleaves*

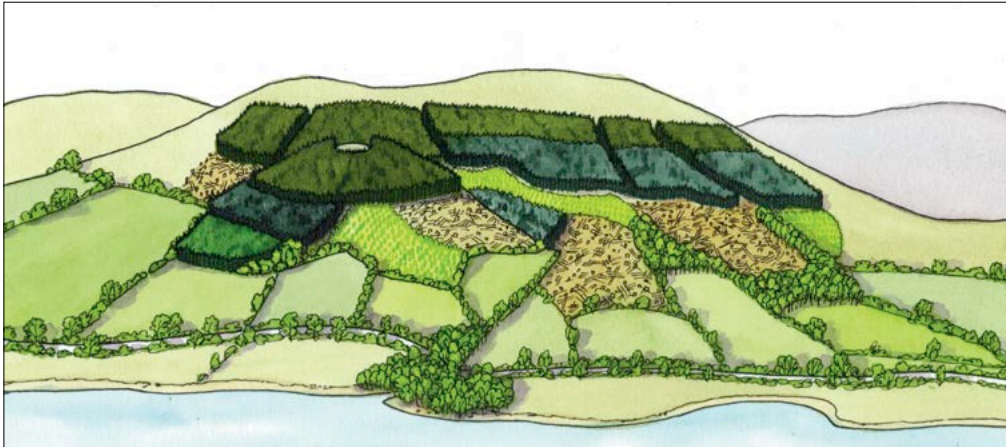


Restocking – plan



Sketch design – projection (Phase 2)

The first felling has been replanted and the second phase felled. The remainder of the forest is intact.



Sketch design – projection (10 years after the final coupe has been felled)

