



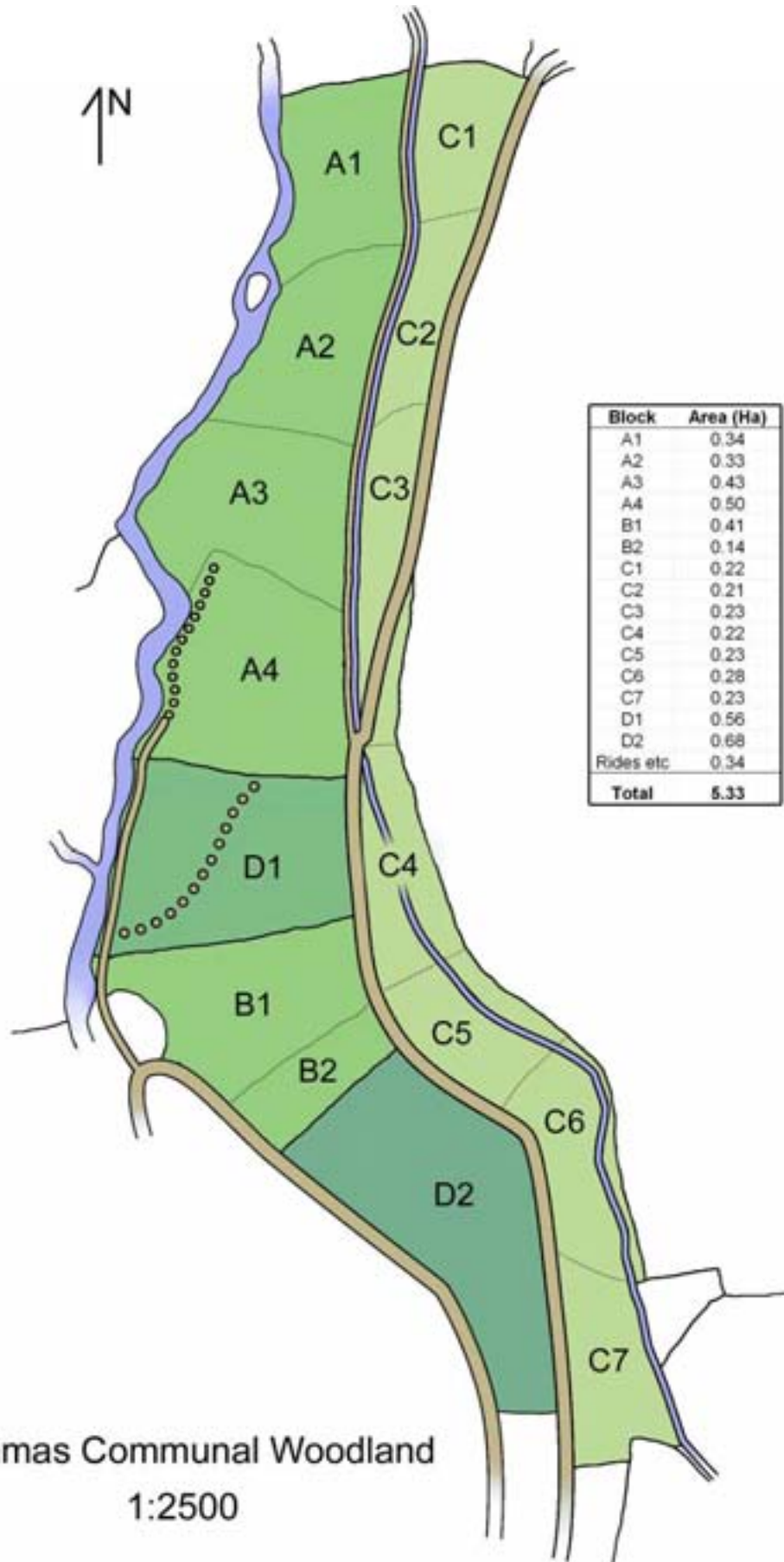
Woodland Management Plan

Last updated

February 2008

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1. Illustrative plan of woodland:



Lammas Communal Woodland
1:2500

2. Introduction

This document is a woodland management plan for the communally owned woodland in the Lammas project at Pont y Gafel. It is a strategy which aims to make the most of the woodland management that has come before and the woodland as it is today. The results of the management suggested here will not be fully realised for some decades and the plan must look at least this far into the future. As such it is an important document but one that will remain open to revision and improvement.

As is true for the whole Lammas project, this woodland management plan is led by permaculture ethics and design principles.

3. Aims

Identified aims of the woodland's management are as follows, in order of priority (i.e. an aim can only be pursued in ways which do not compromise higher priority aims):

1. **Ecological management.** To protect and improve the biodiversity and habitat value of the woodland.
2. **Amenity and deep ecological education value.** Woodlands are inspirational places that can have profound effects on people. These sorts of experiences are an important part of individual's routes to adopting more ecologically sound lives.
3. **Foraging.** Allowing the common law right to forage the 'Four Fs'; Fruit, Foliage, Fungi or Flowers - assuming that none of them are protected specifically.
4. **Timber production.** The woodland will provide a sustainable supply of materials for residents. Important uses will be for building homes and as raw materials for making craft and other produce.
5. **Firewood.** Whilst the woodland will not be managed to provide fuel, the management of the woodland will provide fuel as a by-product.

4. Survey

4.1. General Observations

4.1.1. Access and Rides

Access to the woodland is by two main routes. The lower track follows the west boundary of the woods from the south until the boundary meets the river. Up to this point the track is used by the neighbouring fishery and is an excellently kept un-metalled track. Beyond the point at which it meets the river and doubles back to the fishery, a levelled but un-surfaced track continues past the quarry for another 50m or so, after this it turns to a path and shortly afterwards peters out.

The upper track runs from the south, through the centre of the woodland until it crosses the leat and continues up to the north east corner. This track has been surfaced at various points but to a lower standard. It would currently be passable to a 4 wheel drive vehicle for most, or all of the year. Where the upper track crosses the leat, an unsurfaced path continues to follow the leat to and beyond the northern boundary of the woodland.

The rides along the upper tack and the leat path are valuable assets from an ecological point of view. They remain for the most part fairly open and support a wide range of flora and fauna including trees and shrubs not common elsewhere such as willow, hawthorn, rowan, birch and gorse.

4.1.2. Invasive species

Much of the woodland has been taken over by sycamore (*Acer pseudoplatanus*). This is a non native species which is alleopathic to, and supports less biodiversity than, the other native species such as the oaks.

Whilst it does not yet exist in this area of woodland, a prolific patch of Japanese Knotweed exists metres beyond the north east corner of the woodland. This is a serious invasive weed which must be controlled. For more information see ecological report 7.74-7.83.

4.1.3. Grazing

All of the woodland has been severely affected by grazing sheep from surrounding fields. Over some number of years this has removed nearly all ground cover and stopped any new saplings from growing.

4.1.4. Slope

Throughout, the woodland slopes down to the river on the west. The shallowest slopes, down to 10°, are in the north east (C1,C2). In the south west (D2) the slope is as steep as 40°.

4.2. Compartment A

This is an area that probably used to be managed as hazel coppice with oak standards.

Overstood hazel stools remain in places, the best examples being alongside the leat at the east of A3 and A4. A few oaks remain, although ash and sycamore have become the dominant species.

These trees are quite crowded and many are around 30-40cm (diameter at breast height; dbh). A central patch of ash and sycamore have at some point been harvested and they now have coppice regrowth to an average size of 20-30cm (dbh).



At the north end, in block A1, the ground is very wet with large amounts of water running over the surface in winter. This water mostly comes from the area of springs to the north east of the woodland. This is an unusual area that has not been strongly affected by grazing and retains a stronger groundcover of brambles, ferns and young trees. Alder is abundant here amongst some ash.

The largest oak trees (up to 60cm dbh) are to the south, in A4. They stand amongst a few larger sycamore and holly trees. The density here is much lower with more open space.



See also ecological report, target note 6.

4.3. Compartment B

The woodland in B1 is similar to that in A4, on the other side of the plantation D1. This is the most mature area of the woodland, although like the rest of the woodland, the groundcover is deficient. The notable trees are some 20 or so large oaks, half of which are between 50 and 90cm. There are a few large ash and sycamore. The mature trees are well spaced and there is a healthy understorey of predominantly holly and hazel.



To the south, an old stone wall separates B2. This area contains an unusually dense thicket of small holly and hazel. This thicket fades into the larch plantation D2 to the south.



4.4. Compartment C

This area contains the best condition hazel coppice in the woodland. Overstood hazel and a small amount of coppiced ash is present throughout. Their density varies in patches with C1 C2 and C3 being the best and C4 and C5 the worst. A good number of standards remain, mostly ash but also oak and sycamore. There is some natural regeneration taking place.



C3 includes some open, light areas with bracken, gorse and mixed regeneration. C5 includes a small holly thicket. The north half of C7 is under an area of larch plantation with a small amount of ash and hazel regeneration beneath.

4.5. Compartment D

This is two large plantation blocks of Japanese larch. D1 seems to be a slightly later planting, about 30 years ago. Tree diameters in D1 average 18cm, with a few up to 30cm, depending on position, specimen etc. Average height was measured at 15m. The planting pattern is a very regular 2m spacing. There is an old track cut into the hillside running diagonally across the plantation.



D2 is a little older with trees mostly 20-25cm diameter and 20m height. The spacing is less regular and the ground much steeper, up to 40°. There are a number of trees with pronounced swept butts. There are also some occasional ash, holly and hazel amongst the conifers.



It is estimated D1 and D2 together contain approximately 1200 trees.

5. Analysis

Referring to the aims as stated above:

5.1. Ecological management

The ecological assessment report makes the following relevant recommendations:

7.40 (ecological assessment report) ...it is recommended that the woodlands within the development footprint are managed in an appropriate way to enhance the species and structural diversity of the site whilst at the same time serving the need for wood for the settlement. The long-term aim should be to achieve a balanced age-structure within each wood and treatments should aim to 1) maintain a continuous supply of young growth through regular felling and 2) protect and enhance mature features, such as large trees and dead wood. The aim of the management of the woodland should be to sustain all the species now present within the wood. (with the exception of Japanese knotweed). Maintenance of each species at its present level of abundance is not necessary, provided that all native species are retained.

7.41 (ecological assessment report) At the current site the best way to achieve these aims would be through the re-introduction of hazel rotation coppicing, ensuring a good mix of ages of tree, not being too tidy and leaving fallen trees to lie. Rotation coppicing enhances the biodiversity of woodlands as the system means that there is a range across the whole woodland of trees of different ages and heights. This variety of habitat structure leads to a high diversity of dependent species each adapted to different stages of coppice growth. Coppiced woodland allows more light through to the woodland floor than non-coppiced woodland. This, in turn, allows a diverse ground flora to flourish. Coppice woodland is typified by a continuity of open space and vigorous ground vegetation. For nature conservation purposes it is important to maintain large areas of coppice of all ages and aim to leave not more than 15 large standards (crown diameter exceeding 10m) per hectare.

7.42 (ecological assessment report) It is recommended that care is taken to avoid damaging mature oaks during forestry operations.

7.43 The existing conifer plantations within the development site are of low ecological value. They are species poor and structurally uniform, all trees being of the same age and height.

7.44 (ecological assessment report) It is highly likely that many of the conifers will be felled to provide timber for the construction of self-build houses.

7.45 (ecological assessment report) This felling provides an opportunity to enhance the nature conservation value of these areas by diversifying tree species through re-planting with native broadleaved trees of local provenance in the gaps left after felling. It is recommended that the felling is undertaken so as to create an interwoven mosaic of conifers and broadleaved trees unlike the regimented squares and rectangles of plantation that currently exist on the site.

7.46 (ecological assessment report) In order to diversify the age range of the trees it is recommended that some conifers are retained to provide large mature trees and ultimately the provision of dead wood.

Regarding the suggestion of restarting coppicing (7.41 (ecological assessment report)) and the importance of structural diversity (7.40 (ecological assessment report)). A lot of the woodland has now progressed a long way past its previously maintained state of coppice with standards, towards a more mature high forest. Whilst the high forest state alone would not support the biodiversity of coppiced woodland, a combination of the two would give a greater net structural diversity and hence biodiversity. This is providing that the area given over to coppicing was sufficiently large to have a continuous cycle of adequately sized cants.

It is also noted that maintenance of rides is an important part of ecological management contributing to the maintenance of structural diversity as mentioned in 7.40(ecological assessment report) above:

“Rides and open glades within woodland often develop a unique flora and fauna very different from the rest of the woodland. Rides create corridors through the woodland where sunlight can penetrate and naturally species selection evolves differently... To enhance rides, a system of cutting an ascending profile into the woodland allows more

light to the grassy paths, and creates a shrub layer between the ride and the main woodland. Scalloping can also be used to break down the linear effect of straight rides and reduce the wind tunnel effect that can sometimes occur” (Ben Law: The Woodland Way, 2001)

An important priority is to repair or replace-fencing around the entire woodland to stop grazing sheep from neighbouring fields. Grazing is the serious threat to the woodland ecosystem and stopping it would have a near instant positive effect. This must also be achieved before any coppice work can be started.

The dominance of sycamore in the woodland is worth serious consideration, as unchecked it will probably increase with time. Whilst eradication of the species is probably neither necessary nor practical, control by preferential thinning and singling would be worthwhile.

5.2. Amenity and deep ecological education value.

Amenity use of the woodland is to be expected and encouraged. To minimise detrimental effects on the ecology, paths and facilities can be provided. The existing tracks are a good starting point for this. In addition a couple of extra footpaths and picnic areas could be added. Maintenance of the facilities would discourage the uncontrolled use of woodland and associated erosion etc. This is especially relevant to the river bank as a particularly beautiful and sensitive area.

The woodland's diversity is an important for its amenity and educational value. Preserving and enhancing this diversity by combining high forest with coppice and retaining some conifers, will benefit both ecological and amenity values.

Permaculture suggests that part of any designed area should be left as a wilderness zone. This is not strictly justifiable on the grounds of biodiversity, when considered in isolation, as the area would sustain less biodiversity than if it were managed, for example in a coppice rotation. However considering the net biodiversity and habitat diversity it may make a useful contribution. Also in terms of the deep ecological and amenity value of the woodland it may be a useful thing to incorporate. It is noted that even in a designated wilderness area there may be cases where

intervention would be desirable or even a statutory duty (eg dangerous trees, invasive species etc)

Given the above and considering the whole woodland management, it is suggested that two areas are considered partial wilderness zones. Firstly compartment B, which because it contains the most mature oak trees, should not be disturbed. This zone, which has good access from the settlement, could be a good amenity venue, where people could enjoy the undisturbed woodland and be out of the way of any woodland management operations or sensitive zones. A path running through this area could be part of connecting the settlement with the river. A seating area on this route could be a designated destination for picnics, celebrations etc. Secondly, the north west corner of the woodland, in block A1 is by its nature relatively wild and inaccessible. Whilst this area would be under high forest management, it will be a difficult corner for management and particularly for extraction. It is likely that this area will remain a partial wilderness.

5.3. Foraging.

This is not a large or particularly consequential use of the woodland, but as part of our common law and heritage it is important and should be remembered. In terms of woodland management, foraging value should be considered when restocking and thinning. Hazel and blackthorn are important species, which are adequately represented. Other less common species which could be encouraged include elder, birch, rowan, lime, mulberry, sweet chestnut and walnut. There are also a large number of herbaceous and ground cover plants for culinary and medicinal uses that could be given preference. Naturally occurring fungi are another important food source and should be noted and protected during other woodland management work.

5.4. Timber production.

The woodland will provide valuable timber firstly for building residents dwellings and working facilities and secondly as a raw material for the production of livelihood produce. Given the ecological considerations above, the timber extracted will be of the three following types:

5.4.1. Larch

An initial thinning of the larch plantations will provide a good supply of building materials for the creation of the settlement whilst beginning the regeneration of these areas to native deciduous woodland. Rather than the conventional thinning, removing the smallest trees to accelerate the crop, a 'fattening' operation to remove the largest trees would provide more useful materials at all stages and a greater net yield.

5.4.2. Coppiced hardwoods

The best condition areas of overstood coppice are in compartment C. Whilst other areas (particularly A3, A4 and B1) do contain some reasonable coppice stools, they are generally less well stocked and closer to becoming high forest. Given these considerations and the idea of combining some coppice areas with others of high forest, it seems sensible to use the areas to the east of the track and leat (compartment C) for coppicing. This would give 7 cants of approximately 0.2 Ha each, allowing a continuous rotation with one cant of hazel being cut each year. This continuity of habitat is important for the ecological benefits of coppicing to niche fauna. This cant size of 0.2ha is also sufficient for ecological benefits.

Coppiced hazel on a standard seven year rotation would provide small diameter rods suitable for a range of traditional produce such as bent hazel furniture, hurdles, thatching spars and hazel plastering lath. Considered in a historical perspective, things like hazel lath and thatching spars used to be things for which there was constant demand for large quantities. Whilst there are still niche markets for many of these products, investing in these products by restocking hazel coppice should be questioned.

Amongst the existing hazel coppice there are an appreciable amount of ash trees. Many of these trees have already been coppiced. Also, ash is likely to be the more common re-growth in cleared coppice areas. Coppiced ash, on a longer rotation would yield material more suitable for the production of craft items with higher intrinsic and added value such as turned items, traditional chairs etc.

For these reasons it is suggested that in the inevitable restocking of coppiced areas, ash is combined with hazel, aiming for a mix of one third ash and two thirds hazel. The ash could then be cut at every other cutting of the hazel, on a fourteen year rotation. Ash has a particularly late leaf growth and sparse leaf cover. This means that, at this stocking density, sufficient sunlight will still be allowed to ensure good re-growth of the hazel and ground flora, ensuring the ecological benefits of coppicing are not compromised. This effect could be further enhanced by stocking the ash toward the western, woodland side of the cants and the hazel towards the eastern, field side which is naturally lighter.

5.4.3. Timber hardwoods

As suggested above, the woodland produce which will be most useful to Lammas project residents and future users of the woodland, is that which suits the production of high value and value added items. In terms of a valuable resource to woodworkers, little could compare to a continuous supply of large and varied hardwoods. This is what will be yielded from the management of areas of high forest, suggested as desirable by the analysis of ecological and amenity management options above. Whilst the yield by weight of high forest is less than that of coppiced woodland, the actual value considering options for adding value is probably much higher.

Continuous cover management of high forest in compartments C and later D will involve singling and thinning to encourage healthy growth of timber trees in the canopy and allow light to the under storey as well as creating and maintaining a diversity of species. This will provide a regular crop of usable timber up to millable sizes. The majority of this would be sycamore and ash.

Some appreciable amount of timber would also be removed in the re-establishing of coppice areas, particularly where standards are too closely spaced.

6. Management Objectives

Objectives identified in the analysis above, in no particular order:

Establish a mixed ash and hazel coppice rotation in compartment C.

Restore larch plantations to native broadleaf woodland.

Manage compartment A and later D as a high forest, for ecology, species diversity and quality timber.

Allow compartment B to evolve without intervention except that required to:

Provide paths and designated areas for amenity use.

Protect and prefer edible and useful foragable plants in clearance and restocking.

Manage rides for ecological diversity

7. Management Prescription

This section prescribes the actions requires to achieve the objectives outlined above:

7.1. Mixed ash and hazel coppice

7.1.1. First cut

Over the first seven years the coppice cants will receive their first cut. Everything in the cant will be cut to the ground, including any anomalous species but excepting existing and identified future standards. Standards will be selected to give an even 10% canopy cover.

At the first cut, individual stools will be tested for spiral grain by cleaving one rod. The straightest grained stools will be marked for use as parents in the restocking of the cant The stools selected will be those with the straightest grain in more densely stocked areas where layering is impractical.

7.1.2. Restocking

Restocking will be carried out the following year. The restocking will aim for 1/3rd ash and 2/3 hazel at 2m spacings. New ash and hazel stocking will be divided into two distinct areas, to admit light and for ease of cutting. The two areas will be arranged to allow maximum light to the hazel. This probably means ash to the west and hazel to the east.

Anomalous species which respond well to coppicing can be allowed to remain, being cut with the hazel on a seven year rotation.

Layering will be the preferred method of restocking. Where the density is too low for layering, selected stools will be earthed up in the spring following the first cut and used for stooling, For an explanation of layering and stooling see Ben Law: The Woodland Way (2001).

7.1.3. Second cut

The second cut will be made three years after the restocking. All stools will be cut.

7.1.4. Rotation

Following the second cut, the hazel will be cut once every seven years and the ash once every fourteen years. In exception to this, a clear block of half the ash in each cant should be cut at the first seven year cut of the hazel in the same cant. This means that an ash crop will be harvested every year rather than every year for seven years and then a seven year break.

7.1.5. Coppicing timetable

	C1	C2	C3	C4	C5	C6	C7
Year 1							First cut
Year 2						First cut	Restocking
Year 3					First cut	Restocking	
Year 4				First cut	Restocking		
Year 5			First cut	Restocking			Second cut
Year 6		First cut	Restocking			Second cut	
Year 7	First cut	Restocking			Second cut		
Year 8	Restocking			Second cut			
Year 9			Second cut				
Year 10		Second cut					
Year 11	Second cut						
Year 12							Cut hazel & half ash
Year 13						Cut hazel & half ash	
Year 14					Cut hazel & half ash		
Year 15				Cut hazel & half ash			
Year 16			Cut hazel & half ash				
Year 17		Cut hazel & half ash					
Year 18	Cut hazel & half ash						
Year 19							Cut hazel & half ash
Year 20						Cut hazel & half ash	

7.1.6. Yield

Calculations from mensuration data suggest that **during the first eleven years of thinning the yield of hazel would be 140-360 quality rods** (length 2.1m, basal diameter 1.5-5cm) suitable for riving and hurdles etc. as well as around ten times this volume in mis-shapen hazel rods and other timbers. **Following this period, the yields should rise to something between 500 and 2000 quality hazel rods p.a. and 150-250, 5-10cm dbh ash poles every other year.**

7.2. Larch Plantations

Plantation areas D1 and D2 will be thinned in the first year. A second thinning should happen around 3-5 years later. Each thinning should remove 1/3 of the trees, preferring the largest. The first thinning should attempt to leave small glades and lobular edges to the plantation to assist in the regeneration of the areas. The second thinning will leave a more even cover of conifers as nurse trees for regeneration beneath.

Coppice area C7 includes a small stand of larch plantation surrounding one or two slightly strangled broadleaf standards. The larch should be cleared completely in the first year as part of the first cut of the coppice.

Replanting will be used as and if necessary, selecting species for diversity and foraging value.

The yield from each thinning will be approximately 500 poles.

In addition approximately 100 poles will be cleared from coppice block C7 in year 1.

7.3. High forest

There is no hurry to start management activities in compartment A. During the early years time and energy will be taken up with the coppice establishment and larch thinning not to mention the establishing of the settlement itself. This should be a time for familiarisation and observation of the compartment. As throughout, records should be kept and the management plan refined.

As time, energy and inclination become available, management of the high forest can begin. Most of the work will be thinning, particularly of the sycamore, and mostly by singling. Accurate, ongoing assessments of the woodland must be made to avoid over-harvesting. This will be achieved by setting annual quotas of timber to be removed. These quotas must be based on observation and mensuration as there is no theoretical framework available.

*"There are no British yield models, and few in other countries, designed for the more complex stand structures which are one of the goals of continuous cover forestry."
(Mason, Kerr & Simpson : Forestry Commission 1999)*

Calculations based on mensuration data and a Bradford-Hutt plan of a 150 rotation with three 6x6m areas cleared each year suggests that 4.0-8.8m³ would be harvested each year from area A.

In light of the above, the yield from the high forest is estimated to be around 4 m³ /Ha.yr. or 6.4 m³ /yr from area A

7.4. Wilderness Areas

Areas B and A1. No management is required except where there is danger to people or trees. Any such dangers should be removed in the least intrusive manner possible.

7.5. Amenity Use

A design should be made for designated amenity areas and facilities. As with the high forest management, there are benefits in delaying this task. As these facilities should serve the settlement and its visitors, the residents should be involved in the design, and possibly creation of the facilities.

A starting suggestion is to link a footpath from the settlement to the SW corner of the woodland in block C7. A path and steps could come directly down the hill to the upper track. Alternatively a flat path could follow the leat and cut across to the upper track further north. This would lead people to another path connecting the upper track to the river through block B1. At this centre of this block could be a picnicing / celebration area with benches and a fire pit. The option of some covered space could be considered.

7.6. Foraging

Where replanting takes place, for example after larch thinning, preference should be given to species with high foraging value. Similarly these species should be noted and encouraged in any thinning in the high forest, ride edges and hedgerows.

7.7. Rides

Ride edges should be kept open with an ascending profile and a scalloped or lobular edge. Existing diversity here should be carefully protected and encouraged.

7.8. Additional notes

At all stages, observations, actions and plans should be well recorded and kept along with the woodland management plan. These should include maps and details areas of special interest for ecology and foraging as well as notable trees and timber harvesting plans.

8. Implementation

All woodland management work must be carried out in accordance with the aims of this plan. This includes taking maximum possible care to protect all aspects of the ecosystem, include root and soil health. This precludes the use of heavy machinery and it is imagined that most extraction will be carried out by a combination of hand, horse and winch power.

The majority of this work will be carried out by residents. The notable exception is the thinning and extraction of the larch. This will subcontracted and paid for by those using the timber. This timber will be divided equally between the plots with the option to opt out or take a smaller amount. The estimated cost of each thinning and extraction is £3500, giving a final price of £8/pole

The rest of the timber harvested from the woodland will be done by those residents who wish to use it. It is suggested that it is dealt with in the following way.

1. The areas to be harvested in the year are worked out from the management plan.
2. These are divided equally between plots.
3. Where plot holders do not wish to harvest their timber allocation themselves, their allocations are auctioned to other residents as a standing crop.
4. In the event of nobody wanting to take on the work, the auction moves into 'negative figures' i.e. someone is paid to do the work.
5. Whilst the auction is based on the timber crop, other woodland management duties are divided proportionally between those harvesting standing timber.
6. The individual with the largest share of the harvest has the right and responsibility to act as the woodland manager for the year.
7. All woodland management activities must be arranged with and authorised by the acting woodland manager.
8. The woodland manager has a duty to make sure that the woodland management plan is followed.
9. Changes to the plan can only be ratified by the consensus of the residents.

9. Monitoring and Review

Two reports a year are to be made by the woodland manager each year. The first should be a mid year report, in February. This report should include an evaluation of the progress of the year's work and future plans. The second would be an end of year report, in late summer, and should show the completion of the year's work along with the details and quotas for the following year's work. Both of these reports should be brought to a meeting of all interested residents. The end of year meeting will ideally double up with the auction of the following years crop and the possible hand over to a new woodland manager.

10. Summary of timber yields

Total timber yield estimates:

Crop	Year 1	Year 2	Year 3	Year 4	Year 5
Larch	500 poles				400 poles
Coppiced Hazel	190 rods	230 rods	140 rods	130 rods	320 rods
High forest timber	6.4m ³	6.4m ³	6.4m ³	6.4m ³	6.4m ³

Per household timber resources:

Crop	Year 1	Year 2	Year 3	Year 4	Year 5
Larch	55 poles				44 poles
Coppiced Hazel	21 rods	26 rods	16 rods	14 rods	36 rods
High forest timber	0.71m ³	0.71m ³	0.71m ³	0.71m ³	0.71m ³