

### Application for Forest Plan Approval

Forest District:	West England
Woodland or property name:	Haywood and Castiard Vale
Nearest town, village or locality:	Cinderford / Longhope / Littledean
OS Grid reference:	Flaxley SO 684 165 Welshbury SO 680 155 Chestnuts Wd SO 678 145 Haywood SO 656 156 Edgehills SO 664 160
Local Authority District/Unitary Authority:	Gloucestershire County Council Forest of Dean District Council

Plan Area:	<b>Haywood:</b> 453Ha <b>Castiard Vale:</b> 387Ha <b>Total Plan area: 840 Ha</b> Containing: - SSSI area of 16.2Ha - SAM area of 11.0 Ha
Conifer Felling:	15.1 Ha
Broadleaved Felling:	7.0 Ha

1. I apply for Forest Plan approval for the property described above and in the enclosed Forest Plan.
2. I confirm that the scoping, carried out and documented in the Consultation Record attached, incorporated those stakeholders that the FC agreed must be included. Where it has not been possible to resolve specific issues associated with the plan to the satisfaction of consultees, this is highlighted in the Consultation Record.
3. I confirm that the proposals contained in this plan comply with the UK Forestry Standard.
4. I undertake to obtain any permissions necessary for the implementation of the approved Plan.

 Signed.....  
 Deputy Surveyor

 Signed.....  
 Regional Director

Date.....

Date of Approval.....

Date Approval Ends.....



## **WEST ENGLAND FOREST DISTRICT East Beat**

### **FOREST PLAN**

# **Haywood & Castiard Vale**

**Plan period 2014 – 2024**

**FCE File Ref: OP10/41**  
**FS File Ref: Haywood: FOD 2/91**  
**Castiard Vale: GL/1/5/2.59**

Haywood & Castiard Vale  
Francis Raymond-Barker  
Planning Forester (North)  
January 2014



Forestry Commission woodlands have been certified in accordance with the rules of the Forest Stewardship Council.



## Forest Plan Plan Period 2014 - 2024

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## PLAN SUMMARY

This plan will begin the process of altering the structure and diversity of the woodland so that over the next few decades it is hoped a healthier and more robust forest will begin to emerge for the future.

This vision will be taken forward in the following ways:

- Species composition will become more diverse through planting of a much wider variety of native broadleaves such as Hazel, Small Leaved Lime, Cherry, Field Maple, Hornbeam, Whitebeam, Wild Service and Wych Elm. Along with the use of natural regeneration where appropriate. This should result in an overall increase of broadleaf coverage in the plan area of around 15% over the 40 year plan period.
- The content of Corsican Pine will gradually reduce in favour of establishing higher proportions of open habitat that will see approximately 60 Ha of newly created open habitat by year 40 of the plan period, giving a total open habitat area equating to some 170 Ha.
- Other conifers such as Scots Pine, Douglas Fir, Coastal Redwood and Red Cedar will also help achieve the objective of adding diversity and resilience for the future.

## PREFACE

The amalgamation of the old Haywood and Flaxley plans make sense when you realise how the easterly slopes of Edgehills play an important and integral part in creating the intimate yet broad landscape that the Castiard Vale enjoys.

The plan will try and perpetuate the unique and individual “sense of place” that each area enjoys such as those experienced in Welshbury within the native Small Leaved Lime areas; but equally in Haywood where a long-term vision for the expansion of open habitats and lowland heath will create a different and more interesting “sense of place” than currently experienced by having a much more open feel that will also add diversity to the woodland users experience.

Secondly the plan looks at the challenging proposition for restoration of native woodland and how best to attain a forest for the future resilient against changes in climate and the constant threats posed by tree diseases new to this country. (see appendix 1)

The plan will try and ensure the woodland becomes more resilient by diversifying the future structure and tree species composition. Some sites will see a faster reversion by use of more conventional clearfelling and restocking methods, whilst other sites will have a slower transition by thinning to benefit broadleaf trees, promote natural regeneration and create gaps during thinning that can be planted with a wide variety of native species. It is hoped this approach will help to:

- ✓ Minimise future risk posed by climate and disease.
- ✓ Protect both cultural and heritage features of the plan area.
- ✓ Enhance the conservation value to both flora and wildlife.
- ✓ Continue to provide a sustainable supply of wood products.

Lastly the plan looks to improve the future quality of landscape, not only internally by the diversity of species, a variable age structure and the amount of open space being proposed, but by also redesigning felling areas (coupes) and in other places restock coupes that both have high visual cues within the wider landscape and currently fall short of good landscaping principals. Two good examples of this are given below:

- The eastern slopes of Flaxley where coupe boundaries in the old plan are currently designed to be perpendicular to the slope, do not engage sympathetically with the landform and are very visible from the A4136 coming from the Longhope direction.
- Looking in a westerly direction into Haywood from Winners Garage, where the landscape is dominated by blocky geometric patterns caused by power lines, forest roads/rides and current boundaries of where species change.

**GENERAL DESCRIPTION**

Topic	Description	Implications for Management	Proposals
<b>Location</b>	<p>In combination, Haywood, Edgehills and the Castiard Vale woodlands that comprise of Flaxley Wood, Welshbury Wood and Chestnuts Wood make up the plan area with the Castiard Vale woodlands being the most easterly woodlands within the Forest of Dean main block.</p> <p>With a mixture of broadleaved, coniferous and mixed woodland along with open habitats the plan area totals 840Ha of which 550 Ha lies within the Statutory Boundary of the Forest of Dean and the remaining 290 Ha lies outside this boundary. (see locational map)</p> <p>The main town of Cinderford and the village of Littledean both lie south of Haywood and Chestnuts Wood, whilst to the north of Haywood can be found the smaller towns of Drybrook and Mitcheldean with the villages of Harrow Hill and Ruardean Hill closer by; to the north of Flaxley Wood on the A4136 lies the village of Longhope.</p>	<p>Haywood has a landform that is highly visible from a wide variety of aspects and distances; whilst the eastern slopes of Edgehills and the three woodlands of the Castiard Vale form a prominent feature in the wider landscape, being very evocative and emotive with the local people.</p> <p>The whole of the plan area is frequently accessed by local people at numerous points around the boundaries of the woodland for informal recreational activities such as dog walking and horse riding and cycling.</p>	<p>Landscaping will be an important objective within the plan:</p> <ul style="list-style-type: none"> <li>• For the eastern slopes of Flaxley where coupe boundaries are currently in conflict with visual cues within the landscape; and is overlooked from the north east by the A4136 and the village of Longhope.</li> <li>• Where statutory felling of <i>Phytophthora ramorum</i> infected Larch on the western slopes of Haywood brings forward opportunities to improve the quality of landscape.</li> <li>• To manage the integrity of Welshbury Hill Fort that has high priority due to threat of wind throw.</li> </ul> <p>Social factors will need prominent consideration too, e.g. scale of clearfell coupes, species choice for restocking and internal landscaping that will all play an important part in promoting a healthy “sense of place” and improve the quality of the visitor / user experience.</p>

<p><b>Tenure &amp; Management Agreements</b></p>	<p>Haywood, Edgehills and the woodlands of Flaxley, Welshbury and Chestnuts are all freehold.</p> <p>Haywood and Chestnuts Wood are within the Statutory Forest of Dean, whilst Flaxley and Welshbury lie outside the statutory boundary.</p> <p>Within Haywood lie two SSSIs, one for bats the other for being geological.</p> <p>Welshbury contains a late Iron Age Hill Fort with an overlying bronze age field system and is designated as a Scheduled Ancient Monument.</p>	<p>Areas within the Statutory Forest give flexibility when restocking.</p> <p>Sheep grazing is much less of an issue since the foot and mouth epidemic in 2001.</p> <p>More of an issue is the increasing pressure that deer presents with an increasing population of muntjac.</p> <p>These lie within areas of woodland with high conservation interest.</p> <p>At somewhere between 170 to 180m at the highest point, damage to the Hill Fort from wind throw is an ever increasing risk as the trees get older and taller.</p>	<p>Group plantings and Natural regeneration will be used alongside clearfelling that will remain a tool for control for plant health issues and landscape re-modelling.</p> <p>Species choice will be varied and diverse and will mean appropriate protection methods* should be employed for establishment purposes where deer pressure may present a risk to establishment of the future crop.</p> <p>*I.e. a mixture of fencing, tree shelters and deer control.</p> <p>Work will be carried out in accordance with SAM plans and SSSI plans following relevant European Protected Species regulations.</p> <p>The area of the SAM in Welshbury contains mainly Small Leaved Lime and Oak, with evidence to suggest that the area may once have been managed under a coppice regime. Coppicing will be reintroduced at an appropriate scale for future management and will be carried out in accordance to the SAM plan drawn up by the County Archaeologist to whom referral will be made during operational planning.</p>
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<b>Tenure &amp; Management Agreements (cont)</b>	<p>Extended from the original Edgehills bog reserve, Edgehills heath is a reserve managed by GWT, valued for being characteristic of lowland heath and is covered by the 2012-2022 concordat with GWT. (see conservation features map)</p> <p>There are several privately owned properties, both within and adjacent to the woodland.</p> <p>A couple of mines and associated surface leases exist within the area. (see mines &amp; quarries map)</p>	<p>Lowland heath habitat on Edge Hills is set to expand into areas with appropriate geology that is consistent with and is showing signs of favourable ground flora.</p> <p>Wet areas around the original reserve area should be encouraged to perpetuate a wetter habitat type.</p> <p>Relatively few and scattered across the whole area.</p> <p>Small scale workings, beginning to yield coal.</p>	<p>Forest operations must recognise the value of this type of habitat and refer to the respective GWT management plans when preparing work in these areas.</p> <p>Opportunities exist to block older drains that will increase the holding capacity of the site slowing the release of surface water during periods of prolonged rainfall. This will include newly proposed sites for heathland restoration.</p> <p>Take into account when drawing up plans for forest operations.</p> <p>Existing activity fits comfortably within management objectives.</p>
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<b>Physical Environment (see soils, geology and landform analysis maps)</b>	<p>The long north-south ridge of Haywood lies to the west of the plan area at an elevation of 160m gently rising to 270m in the east. The terrain then drops away steeply eastward into the more intimate landscape of Castiard Vale consisting of three closely linked but discrete areas of woodland situated on a series of ridges; Chestnut Wood to the south, Welshbury Wood in the middle with Flaxley the most northerly and the</p>	<p>Some elevated sites may be subject to endemic windthrow, with exposure potentially a problem for some species at the top of the highest ridges.</p>	<p>Selection of appropriate species and silvicultural systems at elevated locations with clearfells taken to wind firm boundaries where possible will help minimise the effects of these more exposed sites and help safeguard archaeological interest.</p>
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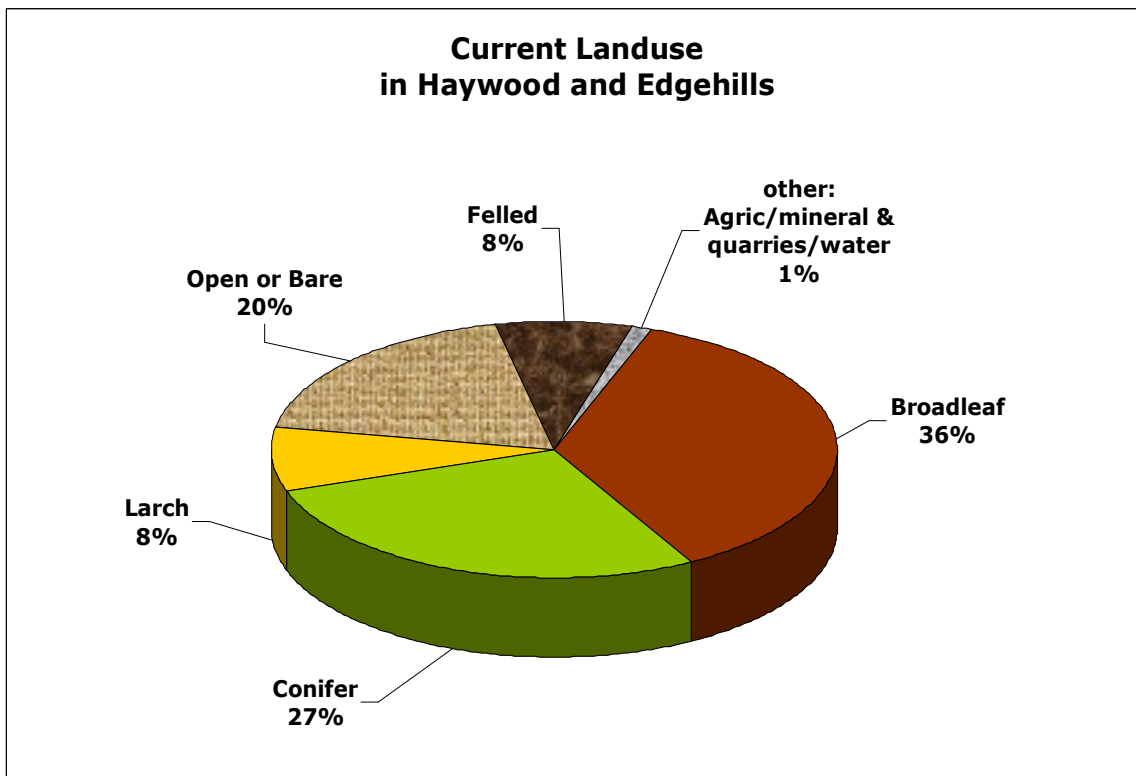
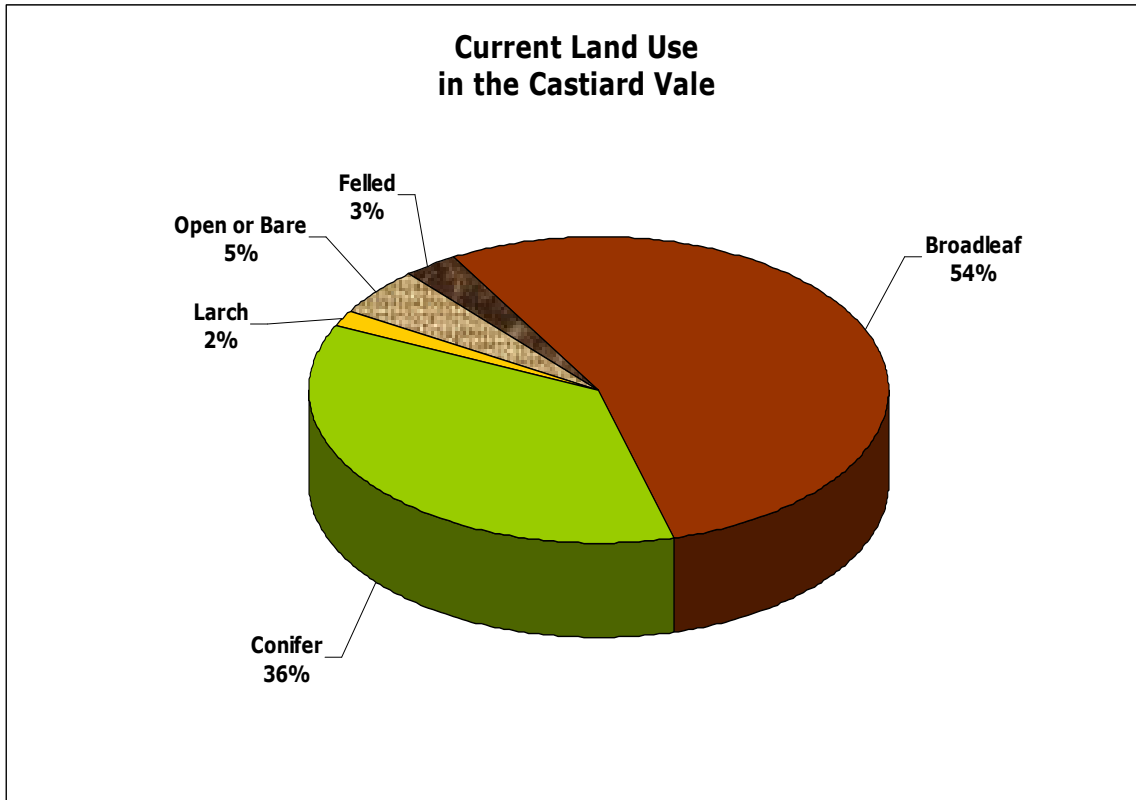
<p><b>Physical Environment (cont.)</b></p>	<p>highest elevation in the plan area being marked in Chestnuts Wood by a trig-point at an elevation of 190m. The eastern side of Castiard Vale generally falls away steeply to around 30m before entering into the river Severn Catchment.</p> <p>Soils vary from surface water gleys on the western slopes of Haywood giving way to podzols along the north-south ridge, with predominantly brown earths on the eastern slopes of Edgehills that stretch across to cover the Woodlands of Castiard Vale.</p> <p>With the poorer soils on the western slopes of Haywood the primary National Vegetation Class (NVC) type is W16 (Oak/birch with wavy hair grass and bilberry). The scarcity of hazel helps to separate W16 from the W10 class (Oak with bracken &amp; bramble) that occurs on the richer soils of the eastern slopes of Edgehills and throughout most of Castiard Vale until one reaches the northern and eastern locale of Flaxley where W10 gives way to NVC W8 (Ash/field Maple &amp; Dogs Mercury). (see NVC map)</p> <p>There is also localised calcareous soil.</p>	<p>Heavy and wet clay soils that may need some drainage in places give way to nutrient poor soils along the Haywood ridge being associated with a belt of Drybrook sandstone as part of the Carboniferous series. The eastern slopes of Edgehills with much richer soils benefit from a more sheltered aspect.</p> <p>Heathland restoration is a major priority for Gloucestershire and was a main feature in the old Biodiversity Action Plan for Gloucestershire.</p> <p>Much of Haywood ridge has been identified as a major site for potential creation of open habitats / lowland heath.</p> <p>Calcareous soil is very localised, usually below the Drybrook sandstone.</p>	<p>Species choice may be limited on the clay soils, but the eastern slopes of Edgehills and the Castiard Vale are suitable for and are capable of supporting a much wider range of tree species.</p> <p>This priority will continue to be recognised in the plan. The scale and extent of potential heathland restoration will be around 50-60 Ha with plans for conversion that should be compatible with the other constraining factors. E.g. Impact on / of timber revenue and tree health issues.</p> <p>In the longer term possibilities exist to create links through the forest north of the plan area with heathland sites further north still, at Wigpool.</p>
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<p><b>Landscape Setting</b></p> <p>(see <b>landform analysis map</b>)</p>	<p>The plan area lies at the very eastern edge of the Forest of Dean, starting at the eastern side: Three prominent wooded ridges in close proximity to each other separated by a network of valleys form an intimate landscape known as the Castiard Vale overlooking and draining into the Severn Vale catchment.</p> <p>Along the western edge of Castiard Vale, the slopes of Edgehills rise steeply giving way to a ridge running north to south before falling gently westward into the wooded slopes of Haywood.</p> <p>Edgehills forms the interface between the Forest and the valleys that feed into the Severn Vale.</p> <p>The plan area is bounded on all sides by numerous Towns, villages and hamlets. (see location)</p> <p><b>Landscape Character Assessment &amp; National Character Area Assessment</b></p> <p>The underlying geology has a major influence on the landscape and landforms in the area whilst the varied soils associated with them lead to a wide range of habitats with their characteristic</p>	<p>Highly visible from a number of locations including the A 48 trunk road, Littledean and Plump Hill. And further afield from the viewpoint at the top of New Fancy.</p> <p>The Haywood / Edgehills ridge is highly visible from the east and from as far away as the Cotswold ridge with the western slopes forming part of a highly coniferous area of woodland bounded to the west by a road and industrial park.</p> <p>Landscape quality of the forest edge will be particularly important close to communities.</p> <p>The variety of topography, aspects, associated geology and soils should favour a wider species choice in future plantings.</p>	<p>Landscape considerations will feature highly in the FDP proposals and should take into account:</p> <ul style="list-style-type: none"> <li>• The mid to long distance views of Flaxley and Edgehills as seen from the northeast and east.</li> <li>• Views from the west, into Haywood particularly from Valley Road, Linear Park and Steam Mills.</li> <li>• Views from the top of New Fancy, which although lying further afield to the southeast is a spot well frequented by the public.</li> </ul> <p>Forest operations will endeavour to enhance and protect both physical and natural features considered to be locally important e.g.</p> <ul style="list-style-type: none"> <li>• Groups or individual trees of significant value.</li> <li>• Features of a heritage or cultural value</li> <li>• Other physical or natural features that contribute to a "sense of place"</li> </ul> <p>Any restocking should take the chance to better match tree species to site type and diversify the species range being planted.</p>
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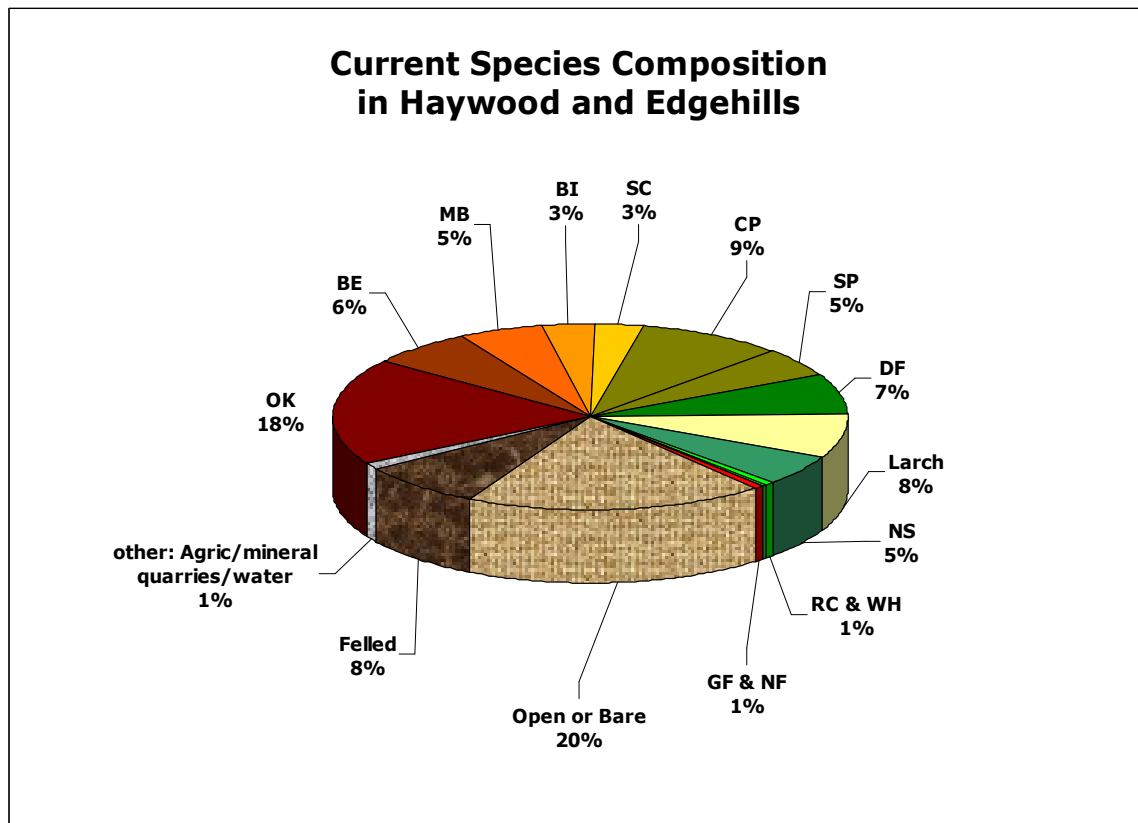
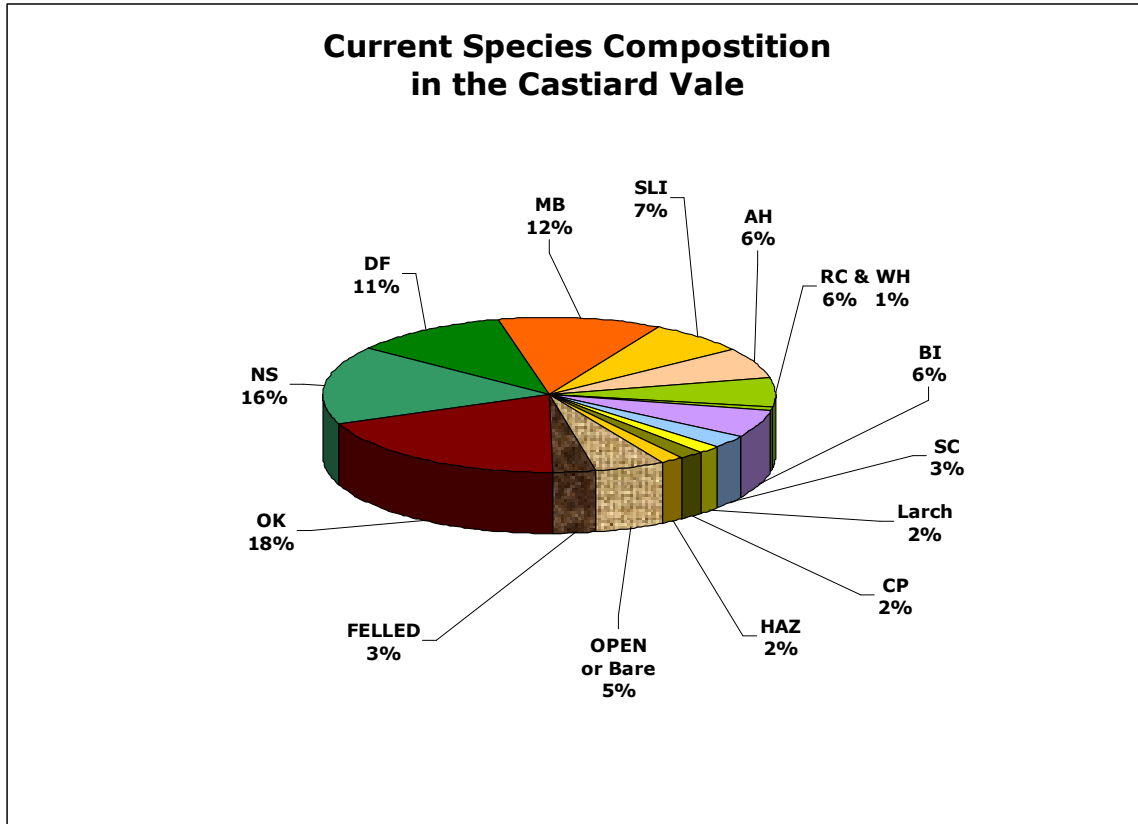
<b>Landscape Setting (cont.)</b>	<p>flora and fauna.</p> <p>The main priority habitats in the Forest of Dean are made up of: upland oak woods, lowland mixed deciduous woodland, and wet woodland, with some small areas of lowland grassland.</p> <p>The varied nature of the woodlands and management regimes adds to the visual diversity of the forest and therefore to their appeal; although the dense tree cover often obscures visible features of these and even dramatic relief features such as slades, valleys and ridges are disguised. Views to and from the surrounding ridges indicate the true nature of the topographic framework.</p>	<p>Opportunities exist to create new areas of lowland heath, taking advantage of the underlying geology and floral composition to help identify them.</p> <p>The “Sense of place” one associates with sensitive sites such as Welshbury Wood and the wider Castiard Vale need careful consideration within future management regimes with intimate landscapes such as these that can be very evocative in creating a sense of emotional attachment to the landscape.</p>	<p>Careful matching and diversification of tree species will make for a more resilient forest in the face of a warming climate and the constant threat of new disease, whilst perpetuating the visual diversity and appeal of the woodlands.</p> <p>These areas will be managed in line with any specific management plans in place and ensure other guidance or best practice is accounted for in the planning of forestry operations through the site planning process.</p> <p>Landscape quality needs to be maintained and be improved in certain areas. Where this is the case careful landscaping of coupe boundaries will ensure a higher quality of landscape is achieved.</p>
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<p><b>Current Woodland Structure</b></p> <p><b>(Fig 1, 2, 3 and 4)</b></p>	<p>A large part of this plan is comprised of ancient replanted woodland with a small amount of ancient semi-natural.</p> <p>Current land use groups are split as such:</p> <table border="0"> <tr> <td>Evergreen</td> <td></td> </tr> <tr> <td>Conifer</td> <td>32%</td> </tr> <tr> <td>Broadleaf</td> <td>43%</td> </tr> <tr> <td>Larch</td> <td>5%</td> </tr> <tr> <td>Open Space</td> <td>13%</td> </tr> <tr> <td>Felled</td> <td>6%</td> </tr> <tr> <td>Other</td> <td>1%</td> </tr> </table>	Evergreen		Conifer	32%	Broadleaf	43%	Larch	5%	Open Space	13%	Felled	6%	Other	1%	<p>Species composition is generally quite diverse across the plan area although species choice on some sites may not have been appropriate to some locales in terms of matching silvicultural requirements of individual species to site type.</p>	<p>The plan will see a modest increase in broadleaves during the life of this plan.</p> <p>Creation of open habitat and the restoration of heathland sites will also be a significant feature; with proposals seeing an increase from the current 111 Ha to around 170 Ha, and whilst only an increase of 8% over the plan area as a whole, will make a significant contribution to biodiversity within Gloucestershire.</p> <p>Focus for this expansion will predominantly be along the podzolic ridge in Haywood.</p> <p>(see map titled 'Indicative future Habitats' and Figure 6)</p>
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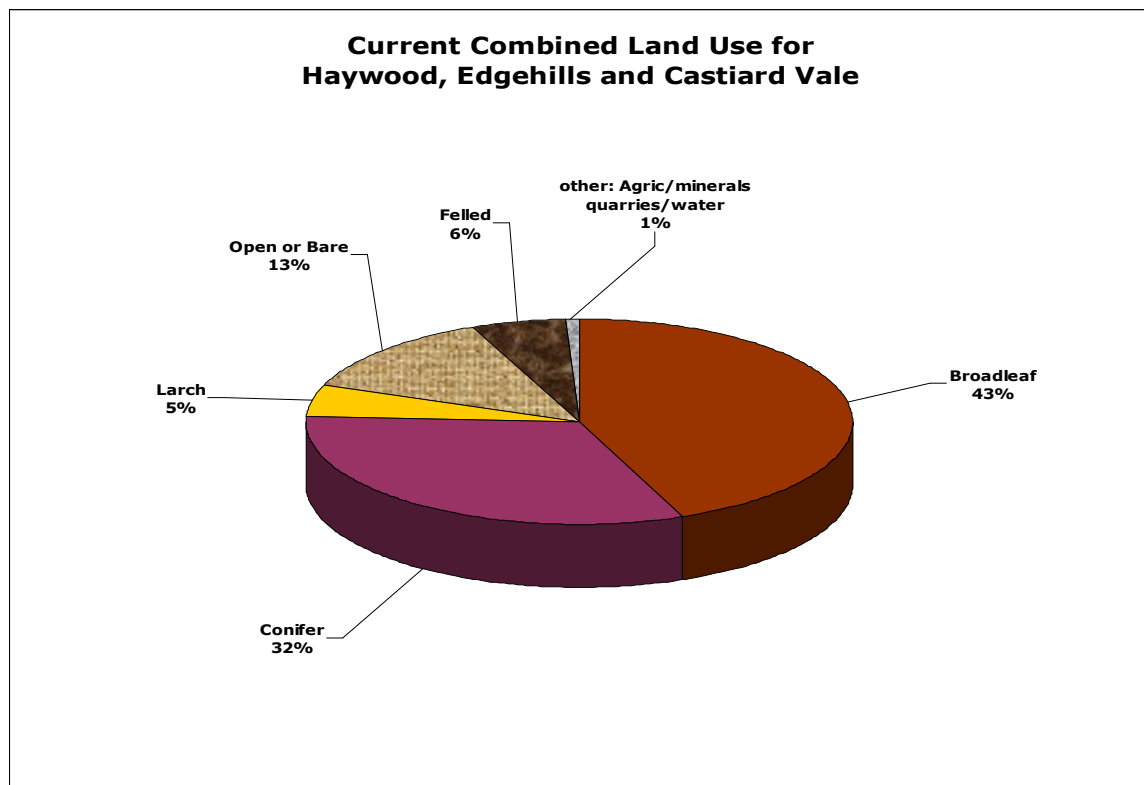
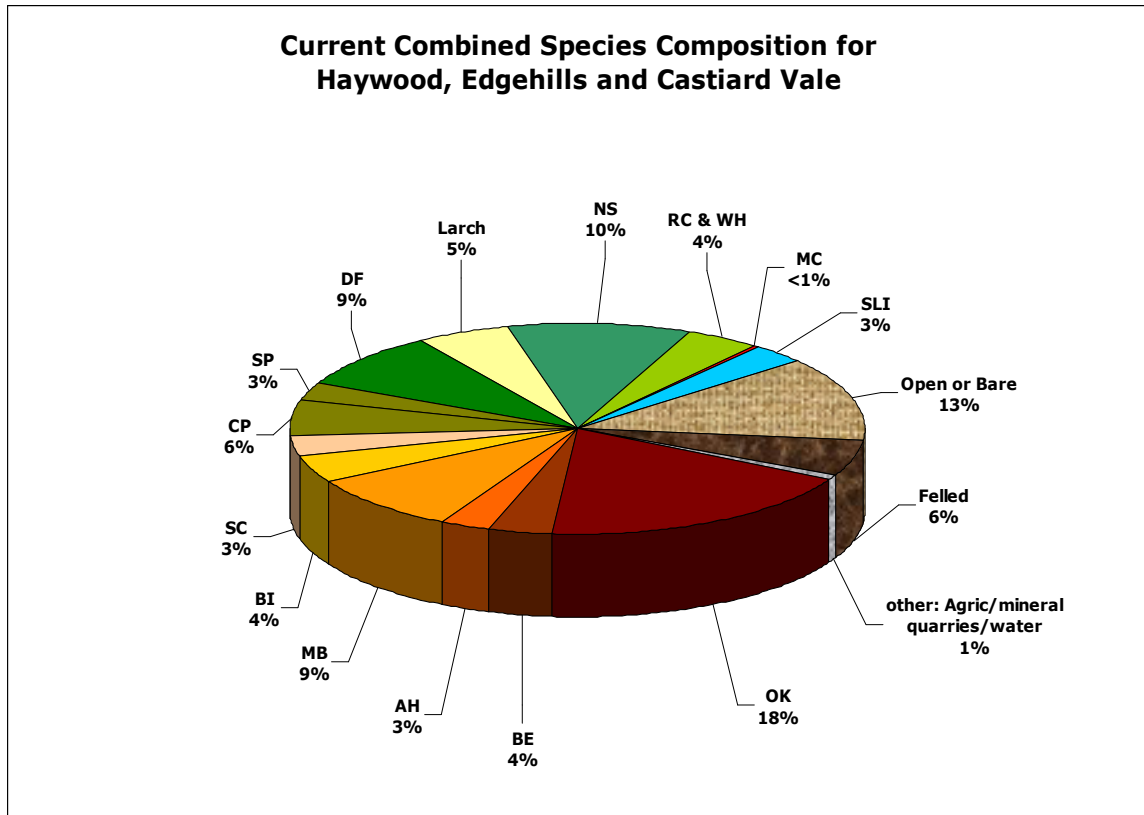
**Figure 1: Current Composition by Forest Block showing Land Use**



**Figure 2: Current Composition by Forest block showing Species**



**Figure 3 Overall plan composition showing current species and Land Use**



<b>Management Objectives</b>	<ul style="list-style-type: none"> <li>❖ <b>Management of the woodland will be to the standards required to maintain FSC and PEFC accreditation.</b></li> <li>❖ <b>Continued production of sustainable marketable woodland products that also allows the delivery of a range of other public benefits and also provides future opportunities for substituting use of fossil fuels and other energy intensive materials and other materials with the use of wood products.</b></li> <li>❖ <b>To undertake management that protects and enhances woodland and open habitats facilitating their resilience and adaptation to projected climate change and threat of disease.</b></li> <li>❖ <b>To conserve the ecological features and geological exposures associated with Westbury Brook SSSI and Edgehills Quarry SSSI respectively.</b></li> <li>❖ <b>To restore ancient woodland in line with the ‘Keepers in Time’ policy (2005) and to protect areas of native broadleaved woodland.</b></li> <li>❖ <b>To enhance and conserve the very visible natural beauty, “sense of place” and character of the landscape.</b></li> <li>❖ <b>To conserve both cultural and heritage features within the plan area notably Welshbury Hill Fort, Saint Antonies Well and Westbury Brook iron mine. Numerous earthworks associated with past management of the wood also exist within the plan area. Ensure any guidance from relevant plans are followed.</b></li> <li>❖ <b>To maintain the area for the benefit of informal recreation.</b></li> </ul>
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## SILVICULTURE

Topic	Description	Implications for Management	Proposals
<b>Silviculture: Species Choice</b>  <b>(Figs 2 &amp; 3, 8 &amp; 9)</b>	<b>Main conifers currently growing:</b> <ul style="list-style-type: none"> <li>• Douglas Fir (DF)</li> <li>• Red Cedar (RC)</li> </ul>	Douglas Fir and Red Cedar both produce good yields on the brown earths found on the eastern slopes of Haywood and throughout the Castiard Vale; having adequate moisture and are generally of a more sheltered nature. Both species are suited well to a warming climate and longer rotations.	Planting of Douglas Fir and Red Cedar will be favoured over Norway Spruce.  Current crops of Douglas Fir and Red Cedar are well suited to longer rotations which aid the restructuring process on the eastern slopes of Flaxley where clearfelling and restocking methods will eventually revert these slopes to



<p><b>Silviculture: Species Choice (cont.)</b></p>	<ul style="list-style-type: none"> <li>Norway Spruce (NS)</li> <li>Larch Japanese larch (JL) European Larch (EL) Hybrid larch (HL)</li> <li>Corsican Pine (CP)</li> </ul>	<p>Most Norway Spruce within the plan area is in mid-rotation with Yield Class being in the range of 18 to 22.</p> <p>The plan area used to contain almost 75Ha of larch. Larch has good tonal variety and being deciduous by nature is a useful species for softening landscapes where evergreen conifers are prevalent; whilst also being a valuable component of a productive forest. However around 35Ha was felled in 2013 due to <i>Phytophthora ramorum</i> leaving 40Ha still standing equating to 8%. It is possible that further felling will be necessary if further infection is found in the future.</p> <p>The plan area contains 48Ha of Corsican Pine which almost solely appears in Haywood. It is much suited to drier poorer soils. The large majority of CP is suffering from <i>Dothistroma Needle Blight</i> or DNB and has the result of reducing growth rates by up to 70% and in worse</p>	<p>broadleaf.</p> <p>Areas of mid rotation NS within Flaxley will revert back to broadleaf through thinning. In areas where no parent crops exist and crops are stable then group felling as part of the thinning process with subsequent group planting will be used in order to diversify the age structure and tree species within the future crop.</p> <p>Larch will not be felled per se unless infection is found and a SPHN is issued by Forest Services, although smaller components of larch maybe removed through more than one thinning if appropriate. In the short term no larch will be planted. Instead a mixture of broadleaf and other conifer species will replace larch on infected sites.</p> <p>The aim with these areas is to increase air flow helping keep the crops alive. Thinning of all CP areas will comply with the District DNB policy thinning to a spacing of:</p> <ul style="list-style-type: none"> <li>3-5m for 1<sup>st</sup> thin</li> <li>5-8m at 2<sup>nd</sup> thin</li> <li>8-12m 3<sup>rd</sup> thin</li> <li>12-15m for 4<sup>th</sup> thin.</li> </ul>
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<p><b>Silviculture: Species Choice (cont.)</b></p>	<p><b>Main broadleaves currently growing:</b></p> <ul style="list-style-type: none"> <li>• Oak (OK)</li> <li>• Small Leaved Lime (SLI)</li> </ul>	<p>case scenarios this can rise to over 80% or even 90%, meaning almost certain mortality for the infected crop during the next growing season.</p> <p>There is a strong cultural and ecological association with Oak in this part of the Dean. It grows poorly on the podzols of the upper ridge in Haywood / Edgehills and a vegetative under storey of a heathy nature can often be found on these types of wooded sites within the Haywood and Edgehills area.</p> <p>Lime is a characteristic component of these woodlands and is of good quality, occurring solely within the Castiard Vale at present and also has value for some rarer Lepidoptera. Eg: <i>Dichomeris ustalella</i> a Micro-moth found in Flaxley 2013 listed as a red data book 1 species.</p>	<p>This will ensure a higher volume of air flow and slow the rate of infection.</p> <p>Most Corsican Pine is in mid-rotation; with 22Ha of CP in Haywood growing on sites that have been identified for the creation of lowland heath and once felled will not be replanted. Instead these areas will be managed to create and maintain a mosaic of lowland heath habitat. Any future plantings will be changed to SP or other suitable conifer.</p> <p>OK should be a primary broadleaf species on appropriate sites although diversity needs to be a key feature of future native woodlands. - See below.</p> <p>Lime will continue to be a key component. Some mature areas are to be managed as coppice in the future. Some new planting of SLI will take place within Haywood and Edgehills to diversify the native component, whilst other areas will continue as broadleaf Shelterwood.</p>
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<p><b>Silviculture: Species Choice (cont.)</b></p>	<ul style="list-style-type: none"> <li>Ash (AH)</li> <li>Sycamore (SYC)</li> <li>Sweet Chestnut (SC)</li> </ul>	<p>AH almost solely occurs within Castiard Vale. Some sites are producing good quality AH. Prolific natural regeneration of AH especially within Flaxley and parts of Welshbury.</p> <p>SYC almost solely occurs within Castiard Vale. SYC not native to this area but is widely naturalised and is also very susceptible to squirrel damage.</p> <p>Chestnut is a naturalised species and has local cultural and historical significance.</p>	<p>Due to the threat of <i>Chalara Fraxinea</i> little to no planting will be done in the short term. Any planting will be with trees grown from seed sources where a possible genetic resistance has been found. Thinning in areas where AH natural regeneration occurs will continue to be of benefit to both parent trees and natural regeneration where appropriate; with natural regeneration being recruited into future crops. Enrichment planting of other species will help diversify future crops and minimise risk of infection from the <i>Chalara Fraxinea</i> disease.</p> <p>Site native broadleaves will be favoured over SYC where there is an option, but due to its invasive character it is likely that it will remain present in some areas, although form is likely to be poor due to squirrel damage.</p> <p>Like Larch, SC is unfortunately susceptible to <i>Phytophthora ramorum</i>. Should <i>Phytophthora</i> return in the future, further removal would be required therefore in the short term planting of SC will be minimised. Areas of SC that are</p>
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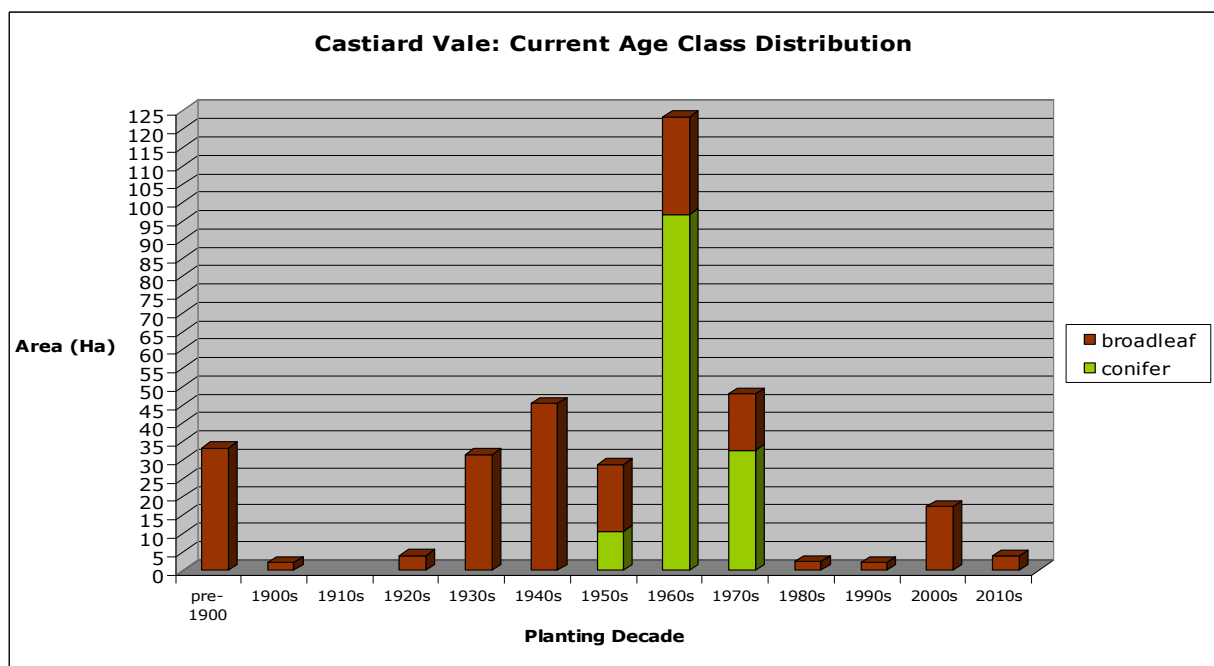
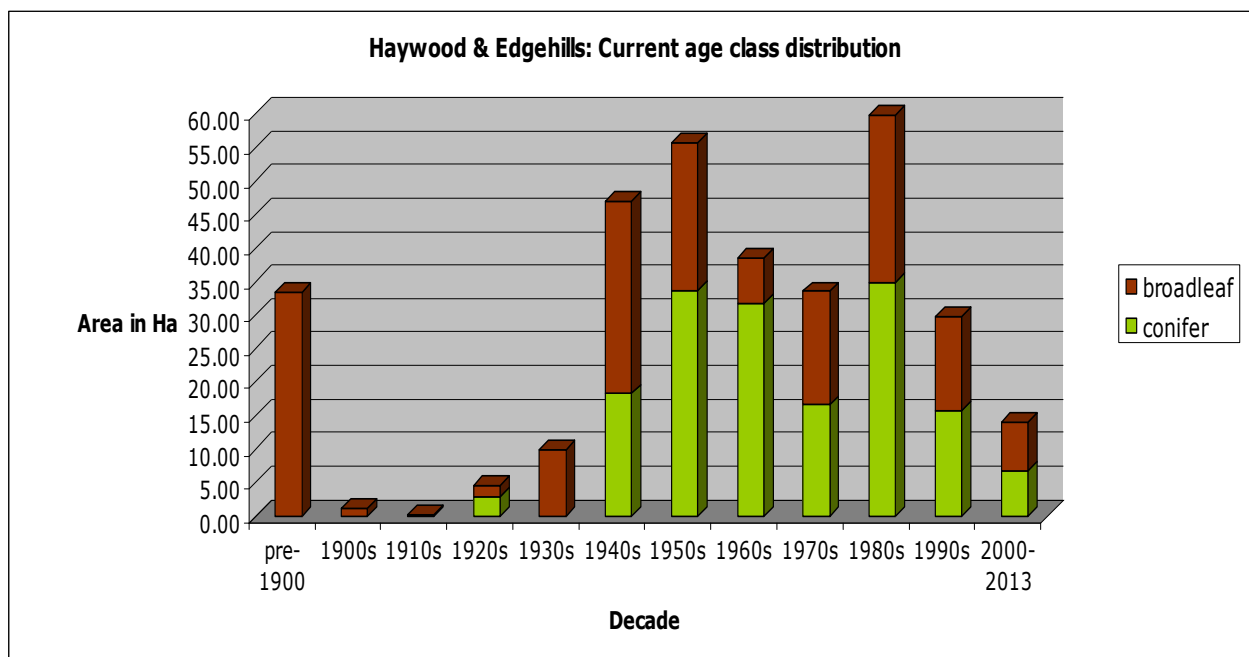
<p><b>Silviculture: Species Choice (cont.)</b></p>	<ul style="list-style-type: none"> <li>Beech (BE)</li> <li>Nothophagus (RON and RAN)</li> </ul>	<p>BE occurs in the Haywood and Edgehills area only with Nothophagus solely in Castiard Vale showing prolific natural regeneration.</p> <p>Older stands and individual specimens of BE greatly add to the "Sense of Place" in certain areas such as St. Antonies Well.</p>	<p>coppicing well following clearance of inflected sites in 2013 will be monitored for signs of reinfection. Some of these sites may benefit from a level of enrichment planting with alternative broadleaf species other than birch affecting a fuller and more diverse stocking to ensure healthy future crop.</p> <p>Timber potential for younger crops is limited due to the potential for squirrel damage. This should not preclude BE in helping to diversify future crops by acceptance of natural regeneration or planting (in mix with other minor species) as there is a healthy market for firewood.</p>
<p><b>Future alternative species for consideration</b></p>	<p><b>Conifer</b></p> <ul style="list-style-type: none"> <li>Douglas Fir (DF)</li> <li>Red Cedar (RC)</li> </ul>	<p>DF is a commercially valuable timber suited well to a warming climate, longer rotations and appropriate for the richer brown earths found within Edgehills. Research tools suggest RC would be well suited for consideration in increasing future resilience to a predicted warmer climate.</p>	<p>Some areas of DF and RC in Flaxley will be temporarily retained on an extended rotation to help resolve landscaping issues. Inside of the Statutory Forest Boundary DF and RC is likely to be planted on suitable sites. Thinning of mature crops is likely to encourage natural regeneration.</p>
	<ul style="list-style-type: none"> <li>Scots Pine (SP)</li> </ul>	<p>Use of SP should continue. Little effect of DNB showing at present. Frost hardy and wind-firm and will do well on the drier more</p>	<p>Where mature stands exist, retain SP for structural diversity and conservation value. This will help with visual</p>

<p><b>Future alternative species for consideration (cont)</b></p>	<ul style="list-style-type: none"> <li>• Oriental Spruce (ORS)</li> <li>• Coastal Redwood (QRS)</li> </ul> <p><b>Broadleaves</b></p> <ul style="list-style-type: none"> <li>• Hazel (HAZ)</li> <li>• Small Leaved Lime (SLI)</li> <li>• Cherry (WHC)</li> <li>• Field Maple (FM) *</li> <li>• Hornbeam (HBM)</li> <li>• Whitebeam (WHI) *</li> <li>• Wild Service (WST) *</li> <li>• Wych Elm (WEM)</li> <li>• Birch (BI)</li> </ul>	<p>fertile sites. Good in later years for visual aesthetics, structural diversity and conservation value.</p> <p>Similar to NS in terms of site requirements tolerant of drier site conditions, and with the timber sharing similar structural properties makes an attractive alternative to NS given the forecast for future climatic conditions.</p> <p>Considered currently as minor species, needing moderately fertile soil with a fresh to moist soil conditions. Shade tolerant, but frost sensitive. Research suggests their suitability for a warming climate within this plan area.</p> <p>All species listed to the left are native with some being almost non-existent if not completely non-existent* within the plan area. Welshbury and Flaxley are outside of the Statutory Forest and in the process of reverting back to native broadleaf. Future native woodland should not just rely on Oak, Ash and Sweet Chestnut. The aim should be to introduce as much variety and diversity as possible into future crops. <b>Hornbeam</b> - a good alternative to Beech and good for Hawfinch; <b>Cherry</b> – good for visual diversity and timber;</p>	<p>aesthetics in areas proposed as future heathland, adding to the creation of a new, more open "Sense of Place".</p> <p>ORS may be planted on some of the drier sites where appropriate, helping with the future resilience of the forest to climatic change.</p> <p>RSQ lends itself well to being considered as a component for under-planting where the overstory affords the shelter required for successful establishment.</p> <p>Although classed as minor broadleaf species, enrichment planting of such species will be encouraged promoting future diversity in terms of conservation value, visual aesthetics and possible cues for future timber interest other than Oak.</p> <p>Along with the incorporation of the inevitable Birch regeneration into the crop, all these species will add the diversity being looked for, making for a future woodland that hopefully has</p>
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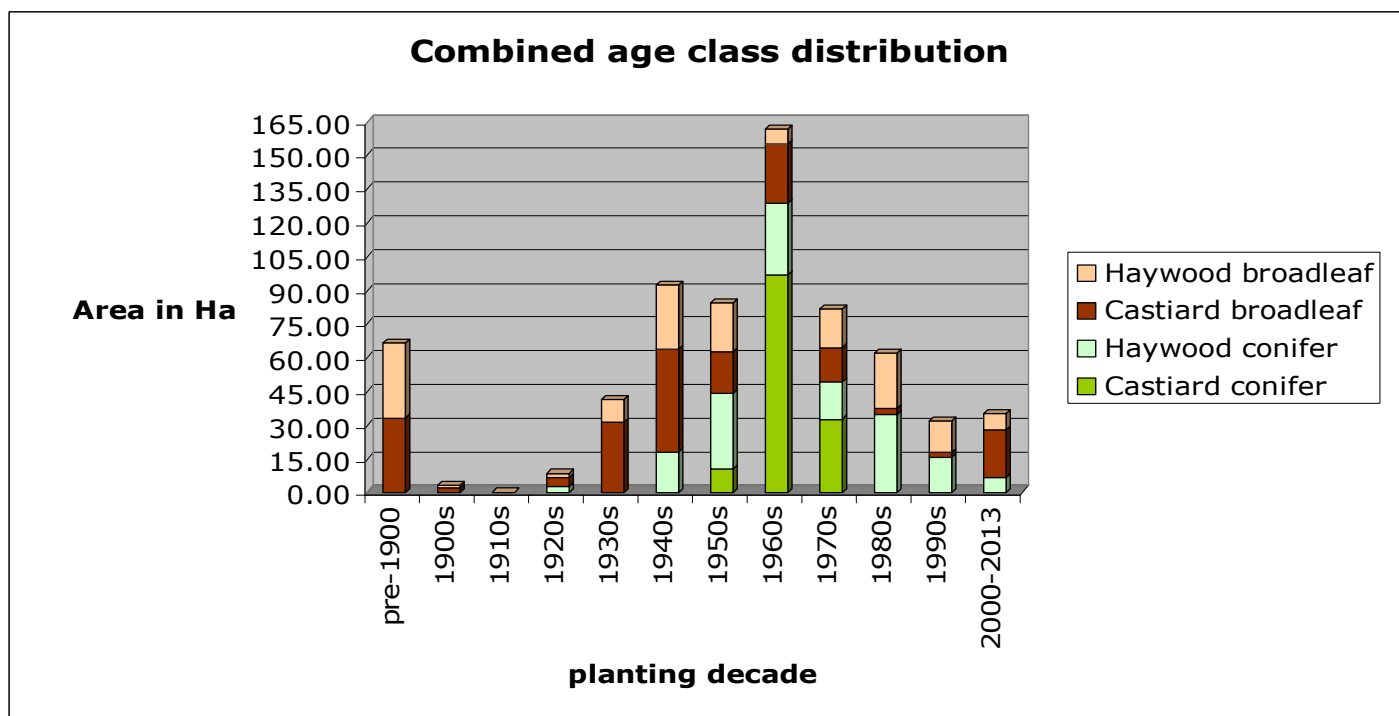
<p><b>Future alternative species for consideration (cont)</b></p>	<ul style="list-style-type: none"> <li>• Shagbark Hickory (COV)</li> </ul>	<p><b>Hazel</b> – good for dormice; <b>Whitebeam, Wild Service &amp; Wych Elm</b> – all currently rare in the plan area and will encourage invertebrate and lepidopteron interest. Large diameter Wild Service being highly valued and sort after for their timber.</p> <p><b>Small Leaved Lime</b> – interesting cultural native with historical significance in The Castiard Vale; <b>Field Maple</b> – native and almost non-existent in FP area; good Autumnal colour although susceptible to squirrel damage.</p> <p>A climax species often associated with oak woodland found on a wide range of site types in east U.S. often found on drier upland soils because of its superior drought tolerance, but preferring deep, moist, rich, well-drained soils with an annual rainfall of 510-1020mm, shade tolerant when young, develops a strong taproot. Being hardy &amp; seldom browsed by deer. As a member of the Walnut family the sweet nuts provide food for wildlife.</p> <p>Its rough bark and jagged branch structure gives a striking winter appearance.</p> <p>Traditionally a useful source of fuel wood and makes good charcoal. Timber properties make it suitable for construction</p>	<p>resilience to a more extreme future climate and to threat of disease.</p> <p>Site conditions within the plan area lend itself well to trialling this species that has few disease related issues and should be well suited to the changing climate. Seed would be sourced from within the UK.</p> <p>The unusual physical characteristics will also lend a degree of visual diversity to the forest.</p> <p>The properties of Hickory suggest good saleability into more traditional trades such as building and construction, along with the potential for the development of new niche markets, including sports equipment and those within the food industry where “green” wood or seasoned but</p>
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		<p>grade timber, furniture, flooring, &amp; tool handles; whilst the tough resilient nature of the wood make it suitable for items subject to impact &amp; stress e.g. ladder rungs, dowels, athletic goods, and gym equipment.</p>	<p>freshly-wetted wood chips are sought after for the smoking of meats, especially pork, with Hickory charcoal being popular with end-users for the smoky flavour it imparts to food.</p>
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**Figure 4: Composition by block showing Age-class Structure of Stands in Haywood, Edgehills and Castiard Vale**



**Figure 4.1: Overall plan composition of age-class structure of stands in Haywood, Edgehills and Castiard Vale**

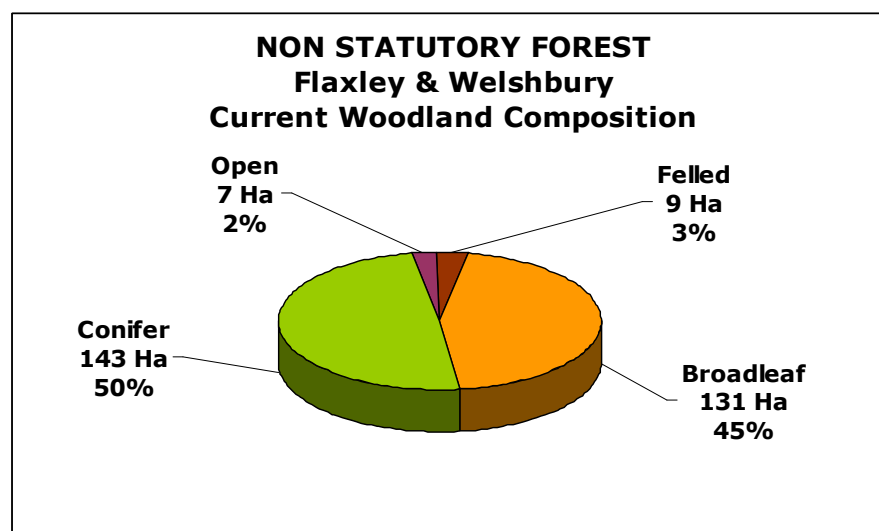
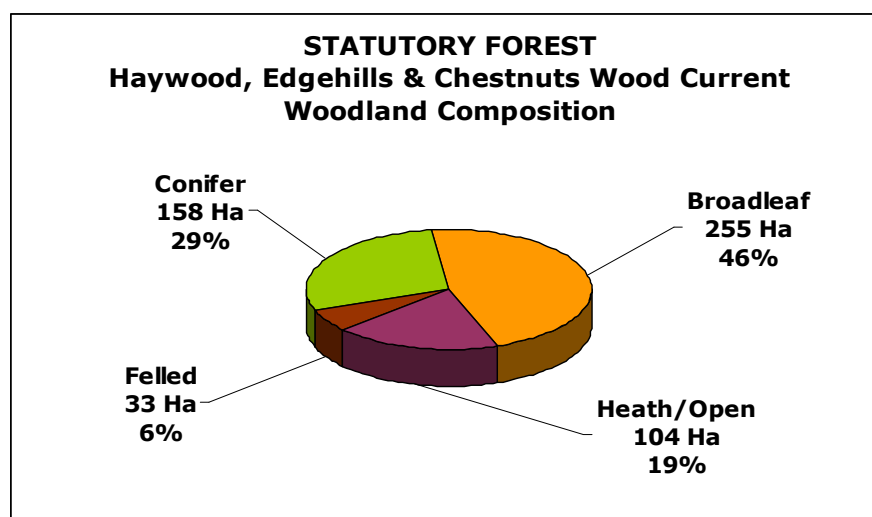


<p><b>Silviculture: Age Class Structure (Fig. 4 &amp; 4.1)</b></p>	<p>Age class structure is fairly diverse overall although locally there are distinct areas of limited structure within Flaxley Wood, containing mostly conifer and Chestnuts Wood with a majority of older broadleaves.</p> <p>Figures 1 &amp; 3 show that overall the plan has a bias of around 10% in favour of broadleaf. In Castiard Vale this bias is 20%</p>	<p>It is mainly within Flaxley that age classes are limited to discrete geographical areas meaning a large proportion of crops will approach maturity and be ready for clearfelling simultaneously.</p> <p>In Haywood and Edgehills this is not a problem as age class structure is relatively diverse with stands ranging from 1940 to the present with each decade being well represented.</p> <p>The largest represented category</p>	<p>Retain older stands as mature habitats. There may be some localised opportunities for natural regeneration, which should be encouraged through thinning with age diversity further enhanced through the planting of young broadleaf stands following group felling or routine clearfelling, or those areas felled under SPHN.</p> <p>Within broadleaf stands age class diversity will be promoted through the use of continuous cover broadleaf shelterwood systems such as coppicing, single tree selection or group felling that will recruit natural regeneration or give rise for opportunities to increase the range of native broadleaves through</p>
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	<p>whilst in Edgehills and Haywood this equates to an even split of 36% if you include the larch with the conifer, but otherwise the bias here would be 10% in favour of broadleaf.</p>	<p>among broadleaves is the 19<sup>th</sup> Century stands of oak. These are found in small pockets around the fringes of the woodland, but also in concentration in the eastern valley around Green Bottom, St Anthony's Well and Chestnuts Wood, with some younger stands dispersed across the plan area as a whole.</p>	<p>enrichment planting. Some of the older stands of conifer may be left as retentions in order to extend the age class range, or in the case of Scots Pine add visual diversity to areas proposed as open habitat.</p>
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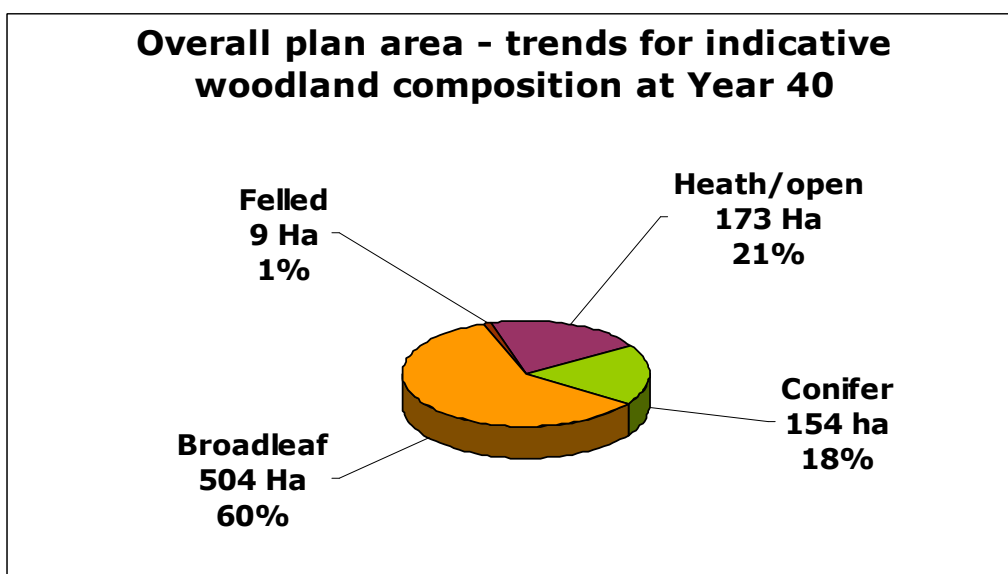
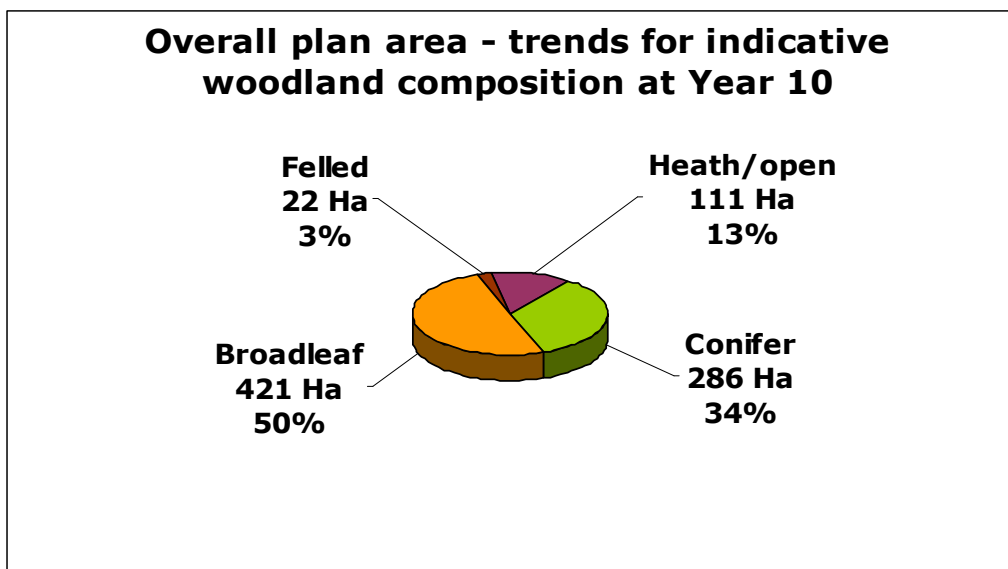
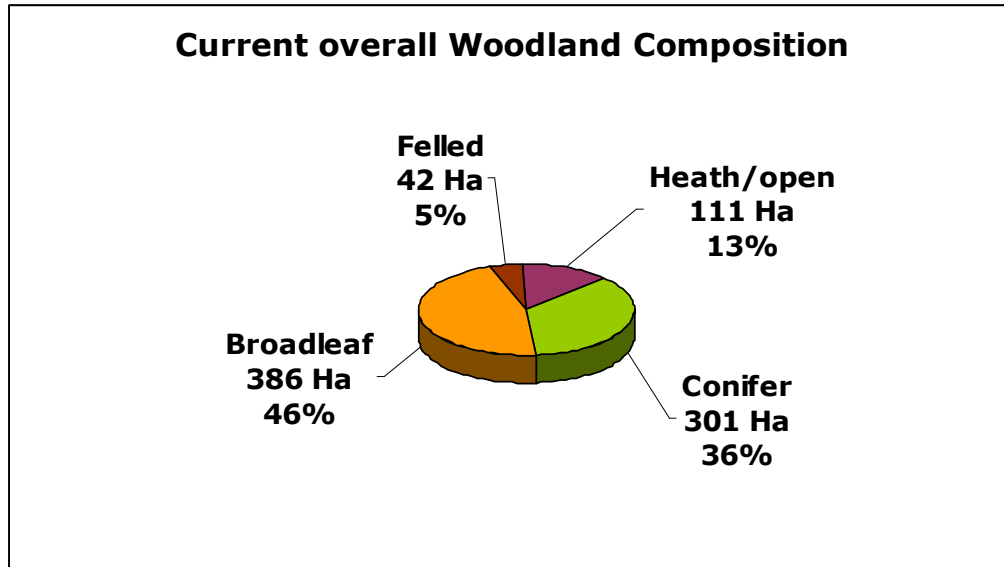
**Figure 5: Statutory Forest vs. Non-Statutory Forest: showing the breakdown of current land use**



<p><b>Silviculture: Thinning &amp; Felling</b></p> <p><b>(Figures 5, 6, 9 and see native woodland management intentions map)</b></p>	<p><b>Native woodland restoration</b></p> <p>Stands that currently consist of conifers in mixture with site native broadleaves</p>	<p>The pace of conversion and methods used to remove conifer and return identified areas to native woodland will vary and is dependant on:</p> <ul style="list-style-type: none"> <li>• The site naturalness class to which each sub-cpt belongs.</li> <li>• Levels of mature broadleaf content.</li> <li>• Levels and vagaries of existing natural regeneration.</li> <li>• How the woodland responds to thinning.</li> <li>• Site characteristics such as topography, soil, aspect, levels of exposure etc...</li> <li>• Landscaping anomalies that need addressing.</li> <li>•</li> </ul> <p>– see options 1 and 2 detailed on the next page.</p>	<p>Where the objective of returning to native woodland has been identified, sites with minimal broadleaf content and having a naturalness class of 4 are more likely to be felled and restocked, or as a second option will have a target removal date set for the final removal of remaining conifer.</p> <p>Other sub-cpts likely to be in a naturalness class of 2 or 3, will contain:</p> <ul style="list-style-type: none"> <li>• An acceptable level of mature broadleaf.</li> <li>• An existing under storey of acceptable broadleaf.</li> <li>• Be showing signs of natural regeneration.</li> <li>• A mixture of any of the above.</li> <li>❖ Successful conversion of these areas is subject to the quality and quantity of broadleaf content.</li> </ul> <p>These areas will be managed through thinning that will:</p> <ul style="list-style-type: none"> <li>• Promote canopy development of existing broadleaf and that of broadleaf natural regeneration within conifer stands.</li> <li>• Open up areas of young broadleaf natural regeneration for development</li> <li>• Recruit regeneration of an acceptable robust size into the future woodland structure.</li> </ul> <p>The factors outlined will determine how quickly conversion can be achieved. Therefore conversion in some areas will be complete with one</p>
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<p><b>Silviculture: Thinning &amp; Felling (cont.)</b></p>	<p><b>Options for native woodland restoration</b> These are based on information outlined on the previous page</p>	<ul style="list-style-type: none"> <li>○ <u>Option 1:</u> Clearfelling followed by restocking may be preferred; especially where landscaping is currently an issue or where broadleaf content is currently minimal.</li>   <li>○ <u>Option 2:</u> This option maintains woodland cover and allows for groups of conifer to be felled creating open plantable spaces of around 0.5Ha to 0.75Ha in size. Multiple groups can be felled during any intervention but not necessarily in the same sub-cpt. giving the advantage of allowing development of a varied structure.</li> </ul>	<p>or two thinnings or if 3 or more interventions are needed, enrichment planting will reduce conversion time and add diversity.</p> <p>Felling coupes are felled in a single operation at some point within the five year period as shown on the felling plan.</p> <p>A balance of premature and delayed felling will be required to complement management intentions for the surrounding woodland, observe Forest Service regulation and remain compliant with UKWAS.</p> <p>Creation of these plantable open areas is carried out at the same time as routine thinning interventions with the remaining crop between these groups thinned as normal. Gaps are then subsequently planted giving opportunity for planting a wide range of native broadleaf species that will either:</p> <ul style="list-style-type: none"> <li>• Increase and complement stocking levels of existing broadleaves within the felled groups or</li> <li>• Create completely new broadleaf components within the conifer matrix.</li> </ul> <p>Option 2 can ensure a more diverse species composition is achieved over several thinning interventions.</p>
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**Figure 6: Charts showing indicative trends in Woodland Composition**



<p><b>Silviculture: Thinning &amp; Felling (cont.)</b></p>	<p>Outside of the Statutory Forest within Flaxley and Welshbury, conifer crops account for 49-50% although inside the statutory boundary in Haywood and Chestnuts Wood the conifer coverage drops to 29%.</p> <p><b>Heathland and open habitats</b> A number of areas of conifer within Haywood have been identified as potential lowland heath or open habitat. Often coinciding with areas of CP heavily infected with DNB; These areas also possess a vegetation layer typical of lowland heath, often particularly rich in bilberry, that arises out of association with the Drybrook sandstone and podzolic soils that</p>	<p>over the whole plan area account for approx 36%. Existing conifer on some sites will play a part to:</p> <ul style="list-style-type: none"> <li>• Aid development of a varied age structure and species composition.</li> <li>• Assist transition of the landscape to one that is more sympathetic &amp; in scale with the surrounding landform.</li> <li>• Maintain the intimacy and scale at which the landscape is perceived.</li> <li>• Add visual diversity to areas restored to lowland heath.</li> </ul> <p>These areas may be restored to heathland following clearfelling, although this is somewhat reliant on resources remaining available into the future for restoration work to continue and be successful. This presents further opportunity for partnership working with Gloucestershire Wildlife Trust.</p> <p>It is not considered that the presence of the young conifers will have a long-term detrimental effect on restoration potential over the next 20 years or so.</p>	<p>to the Felling Plan, detailed on the felling and restocking plan map that should be read in conjunction with the silvicultural systems map.</p> <p>Overall it is envisaged that conifer content within the plan area will fall by around 18% by the end of the 40 year plan period.</p> <p>Potential areas for restoration or creation will be felled in a staggered sequence in order to:</p> <ul style="list-style-type: none"> <li>• Complement management intentions for surrounding woodland.</li> <li>• Observe Forest Service regulation and remain compliant with UKWAS.</li> <li>• Offer continuity of habitat to nesting ground birds.</li> <li>• Ease pressure on future resource management.</li> </ul> <p>There may be opportunity to remove Christmas trees from these sites in the intervening period.</p>
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<p><b>Silviculture: Thinning &amp; Felling (cont.)</b></p>	<p>extend to the west over the gleyed soils.</p> <p><b>Broadleaves</b> Currently account for an equal 46% inside and outside of the Statutory Forest.</p> <p><b>Napoleonic Oaks</b> These are located throughout Chestnuts Wood,</p>	<p>Broadleaf Woodland is generally managed using shelterwood systems that maybe based on group selection or single tree selection methods.</p> <p>Within the initial 10 year period of this FP approval a number of sites in Flaxley will undergo PAWS restoration, totalling some 14.5 Ha and is identified on the 10 year felling schedule.</p> <p>The presence of small-leaved lime will feature to varying degrees.</p> <p>These areas are of high ecological and cultural importance. Associated Sweet Chestnut is a distinctive</p>	<p>These sites will generally move at a much slower pace towards the next rotation than their conifer counterparts and are usually monitored and assessed for signs of natural regeneration at the time of thinning. However, use of natural regeneration will be assessed on not just quantity and quality but also diversity of species. It is therefore likely that a mixture of natural regeneration and enrichment / supplementary planting would normally be used to achieve a future crop that is commercially viable and ecologically robust enough to cope with the wide range of demands the future may bring.</p> <p>Some small scale felling of broadleaves may be required in order to ameliorate landscape anomalies or tidy up broadleaf components left following a conifer clearfell operation.*</p> <p>* Whether achieved through a selective thin or complete removal is dependant on quality of the remnants along with future management for that and the surrounding area.</p> <p>The use of locally collected seed will be explored as an option.</p> <p>Stands will be Managed under a continuous cover system based on group shelterwood system. Thinning should concentrate on promoting and developing small</p>
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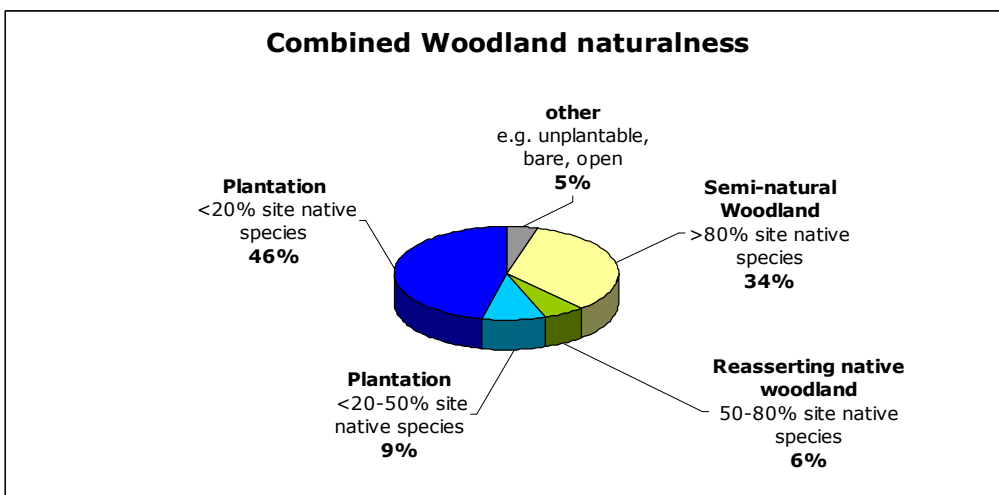
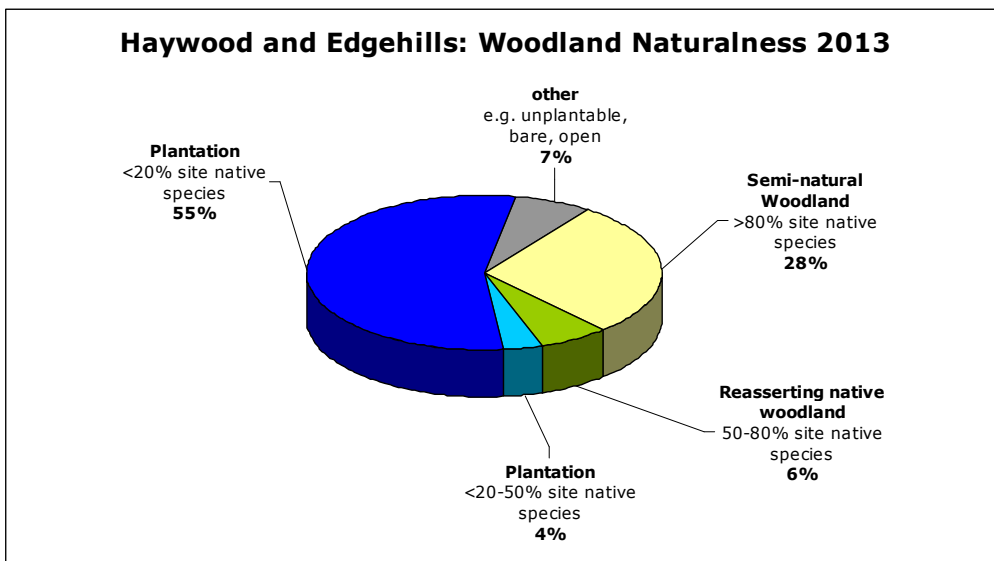
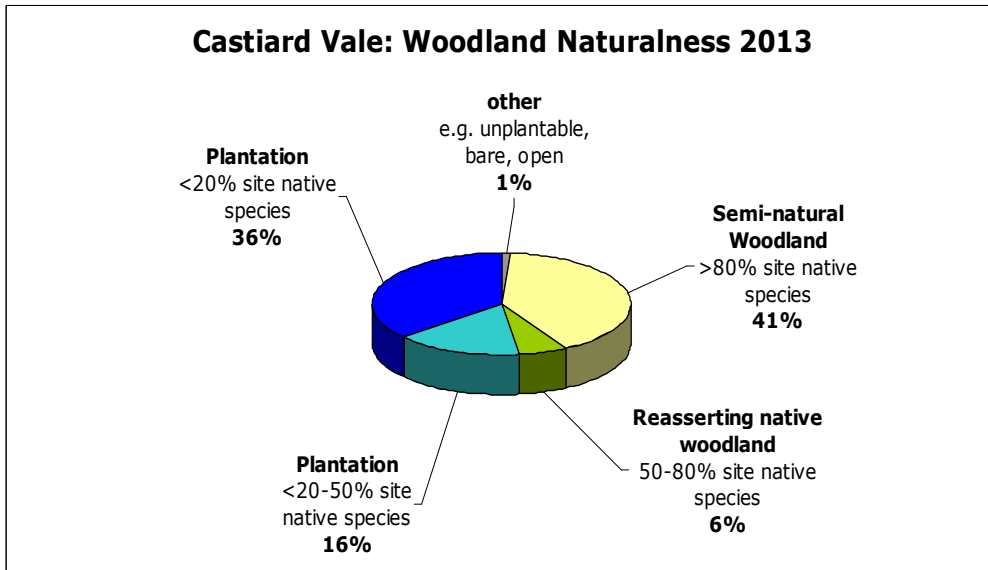


<p><b>Silviculture: Thinning &amp; Felling (cont.)</b></p>	<p><b>Coppice areas</b> An area of ASNW currently undergoing restoration in Hope Wood. (see coppice map)</p> <p><b>Stored coppice</b> The eastern section and northern boundary of Mugglewort Wood (see coppice map)</p>	<p>have been discussed with the County Archaeologist and their recommendations are given in the Welshbury Hill Fort Management Plan. (See Appendix 2 An extract from the SAM management proposals)</p> <p>Some of this area has recently been managed by a local interest group. Potential exists for further coppicing in other areas to introduce a more diverse structure.</p> <p>With recent plantings, ride side management and routine thinning operations, the habitat value for dormouse habitat is increasing.</p> <p>This area is varied in structure with clear remnants of a coppice management system. The area has been identified as being semi-natural in character. - See AWS and woodland naturalness maps.</p>	<p>coppice rotation to help mitigate the risk and threat of damage posed to the SAM area by wind-throw as the lime gets older and the risk increases. *As identified by the county archaeologist.</p> <p>Thinning will continue to revert the woodlands to a native state. Management will be a mixture of traditional methods i.e. standing sales into the firewood / energy fuel markets or through the assistance of local volunteer groups or working parties.</p> <p>Just like all harvesting activities, coppice work will be subject to operational site planning through the Ops 1 procedure taking into account EPS regulations that will safeguard and enhance habitat</p> <p>Coppice with standards will be introduced to this area with coppice being managed on a 25-30 year rotation. Initial thinnings will be undertaken through routine management and include removal of the remaining larch along the northern boundary of Mugglewort. Follow up coppicing operations especially in those areas where extraction distances are long and awkward will have a high conservation agenda, aiming to promote and encourage a variety of deadwood habitat that can be carried out by volunteers such as the Dean Green Team.</p>
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<p><b>Silviculture: Thinning &amp; Felling (cont.)</b></p>	<p><b>Deadwood management</b> Improving quality and quantity of deadwood within the plan area</p>	<p>Opportunities will exist during the plan period to accrue deadwood during harvesting work or as a result of tree surgery operations.</p>	<p>When harvesting in broadleaf crops, especially older crops, a percentage of crowns should be left in tact and not be broken down. Over time this will provide a wide range of habitat types for a numerous variety of insects, fungi and lichen. Deadwood habitat will also be improved with follow up operations after certain areas have been coppiced. (see above &amp; coppicing map)</p>
<p><b>Silviculture: Woodland Naturalness (Fig 7)</b></p>	<p><b>Composition</b></p>	<p>A third of the Castiard Vale contains woodland that has 20% broadleaves or less whilst in Haywood and Edgehills this figure is just over 50%.</p> <p>There is approximately 13% more woodland containing &gt;80% broadleaves in Castiard Vale than Haywood and Edgehills.</p> <p>Taken as a whole the plan area overall has around 34% of woodland containing &gt;80% broadleaves, whilst around 50% of woodland has a broadleaf content of &lt;20%.</p>	<p>Plan proposals move woodland naturalness significantly towards sites containing 50-80% and those containing 80% site native species. (Naturalness classes 1 &amp; 2) through both clearfelling and thinning.</p> <p>In areas outside the Statutory Forest classified as 'conifer on extended rotation', an understory composing of mixed broadleaf will develop over time through thinning by: opening up existing broadleaf components, encouraging crown development and natural regeneration to establish. The transition to a native state will be monitored and in some cases management of these areas may include group felling and planting if future diversity needs to be ensured.</p>

**Figure 7: Woodland Naturalness in Haywood, Edgehills and Castiard Vale**



<p><b>Conservation</b></p>	<p><b>Creation &amp; restoration of lowland heathland habitats.</b> Lowland heath is a rare resource in Gloucestershire. The majority of the small amount of historic lowland heath in the county lies within the Forest of Dean, with most of these areas having been planted with conifers during the middle of the 20<sup>th</sup> Century.</p> <p><b>Nightjar</b> These birds have been in decline nationally and locally over many years. A reduction in the amount of clearfelling and amount of lowland heath has contributed to this decline locally.</p>	<p>The potential for heathland restoration in Haywood is considerable but fraught with difficulty.</p> <p>With previous experience from the forest of Dean environs, heathland will constantly try to revert to woodland. This has implications for resources in maintaining sites in an ecologically favourable condition.</p> <p>Despite these foreseen difficulties the Forestry Commission is committed to making a substantial contribution to biodiversity targets within Gloucestershire by identifying areas for potential restoration to lowland heath, with existing areas of heathland and other open habitats managed in partnership with the Gloucestershire Wildlife Trust.</p> <p>The proposals laid out in the plan should maintain suitable breeding habitat for nightjars in Gloucestershire.</p>	<p>The plan lays out an ambitious and challenging programme of heathland restoration and creation that will provide a high degree of ecological benefit.</p> <p>Haywood is part of the Statutory Forest of Dean that is subject to primary legislation only permitting enclosure of land for the growing of trees. This means that sheep grazing may take place, but it is likely to be light, sporadic and uncontrolled.</p> <p>With some 50-60Ha of heathland planned for restoration over the next 40 years grazing will not, by itself provide the type of management necessary for the maintenance of a healthy heathland vegetation structure and in reality habitat created will be a variety of open habitats ranging from heathland to grassland, mires and bog. Therefore Partnership funding will play an important role in making this project a successful reality.</p> <p>A number of nightjar have been recorded using restock sites on Edgehills for nesting over the last 5-10 years. Recent heathland restoration projects (e.g. Tidenham and Edgehills) have provided habitats for nesting birds. Proposals for the next thirty years should positively contribute to the biodiversity targets in Gloucestershire.</p>
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<p><b>Conservation (cont.)</b></p>	<p><b>Dichomeris ustalella</b> This is a rare UK red data book species of moth found in the last 18 months on the western side of Flaxley. There is some evidence to suggest that it is also in Welshbury. Its main habitat is Small Leaved, having been found on stools from 3-5 yrs old to 40-50 yrs old.</p> <p><b>Dormice</b> Known to exist around Hope Wood</p> <p><b>Conservation of grassland areas. (Forest Waste)</b> There are considerable areas of forest waste around Collafield, Plump Hill and Merring Meend Popes Hill and Shapridge that sit on the edge of the Statutory Forest</p>	<p>The plan will look to incorporate management that is suitable to safeguard habitat for this moth and hopefully create further suitable habitat for successful continuity and stability.</p> <p>Routine thinning operations aimed at benefiting broadleaf components have meant that the woodland habitat is changing from being marginal to favourable and in other parts from unfavourable to marginal. This is especially the case around the Flaxley area of the Castiard Vale.</p> <p>Grazing pressure has reduced considerably since foot and mouth in 2001. These areas are isolated from the main grazing area within the Statutory Forest. Sites comprise of a mixture of important unimproved grassland, bracken and scrub. Encroachment by bracken can be problematic.</p>	<p>The larva of this moth feeds on Small Leaved Lime. The plan outlines the re-introduction of coppicing in parts of Flaxley that would see coppice habitat extended from 5Ha to 15.5Ha with a further 11.5Ha in Welshbury. So by 2054 there would be a total of 19Ha of Small Leaved Lime coppice and 8Ha mixed coppice. There is also currently a further 11Ha of SC being managed as coppice in Haywood.</p> <p>Suitable dormouse habitat will be maintained and expanded as Flaxley moves to more of a broadleaf composition through sympathetic thinning and the planting of minor tree species. This habitat will also be supported by the planned increase in areas to be managed as coppice.</p> <p>All Dormouse areas are monitored through the dormouse monitoring scheme.</p> <p>It is acknowledged that Bracken does have conservation value, however, there remains a need to ensure its targeted control and that a balance of open habitats is maintained achieving provision of a multitude of ecological benefits.</p> <p>This balance is managed through an annual swiping and flailing programme. Timing of these operations is critical and</p>
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<p><b>Conservation (cont.)</b></p>	<p><b>Conservation of geological exposures within Edgehills Quarry SSSI.</b></p>	<p>Notified as a geological SSSI as it provides good accessible exposures of Drybrook Sandstone that lies between the Chadian Whitehead limestone having overlying unconformable coal measures. These sandstones contain good sedimentary structures and trace fossil surfaces suggesting a probable shallow marine environment.</p>	<p>site planning crucial in ensuring that site benefits are maximised and should be decided on by a site by site basis in consultation with the District Ecologist to ensure both the type of management and timing of operations is correct.</p> <p>The principal objective is to maintain the quarry faces clear of vegetation permitting unobstructed viewing of exposures. There is an existing Management Plan for the SSSI. The aim of both the management plan and the FP will be to maintain the SSSI in favourable condition.</p>
	<p><b>Conservation of ecological features associated with the Westbury Brook SSSI.</b></p>	<p>Westbury Brook SSSI is an old ironstone mine that serves as a bat hibernacula. It is particularly important for horseshoe bats. During 2003 important structural work was carried out to prevent the entrance of the mine collapsing and compromising access and egress by bats.</p>	<p>The most important aspect regarding the woodland within the SSSI is ensuring that there is a slow pace of change around the entrance of the mine and that the corridors of vegetation are maintained intact. These corridors assist the bats in navigating to feeding and breeding grounds. No large-scale changes are planned over the next 20 years. There is an existing Management Plan for the SSSI. The aim of both the Management Plan and the FDP will be to maintain the SSSI in favourable condition.</p>

<p><b>Conservation (cont.)</b></p>	<p><b>Conservation of heritage features.</b> Numerous features of archaeological importance exist within the plan area and are identified on the appropriate maps. The most important are given here.</p> <p><b>St Anthony's Well.</b> This is one of the largest and most picturesque holy wells in Gloucestershire. It was used by the Monks of Flaxley Abbey. In the 18<sup>th</sup> and 19<sup>th</sup> Century a bathing pool was constructed of squared course stone and is now a Grade II listed building and well visited by local people.</p>	<p><b>Welshbury Iron Age hill fort.</b> The fort is a Scheduled Ancient Monument and dominates the landform within Welshbury. It is currently covered with a high forest of stored Small leaved Lime coppice that, according to stock data dates back to 1930. However current research tends to favour the theory that the lime is much older than this, having not been planted but has established as broadleaf woodland over a much longer time period.</p> <p>This area of woodland commands a most impressive "Sense of place" that is emotionally evocative to a wide range of people for a wide range of reasons.</p> <p>There has previously been a Management Plan for St Anthony's Well and immediate environs.</p> <p>The basic intention of the old plan was to</p>	<p>The County Archaeology department has just rewritten the management plan for the SAM area that outlines a reversion to a coppicing regime. It continues that this would be more favourable than allowing the continuation of target diameter thinning that potentially is more damaging to the SAM since the threat from wind blow damage and levels of exposure is only increasing as the trees continue to grow. Coupled with the fact that harvesting operations in this type of terrain are a lot more challenging than would normally be the case, especially in thinning conditions is also valid reason for the decision to utilise small scale coppicing that meets archaeological needs whilst remaining sympathetic to the landscape. The reintroduction of coppicing will not only safeguard the earthworks within the SAM area but also bring a higher degree of biological value.</p> <p>The overriding principal to bear in mind in this area is that any future management should continue to be low key with an extremely slow rate of change and the continuity of tranquillity that the site enjoys is best maintained by ensuring an adequate level of tree cover is maintained over the site in perpetuity.</p> <p>Any operation carried out in this area needs sympathetic planning and implementation with minimal adverse impact.</p>
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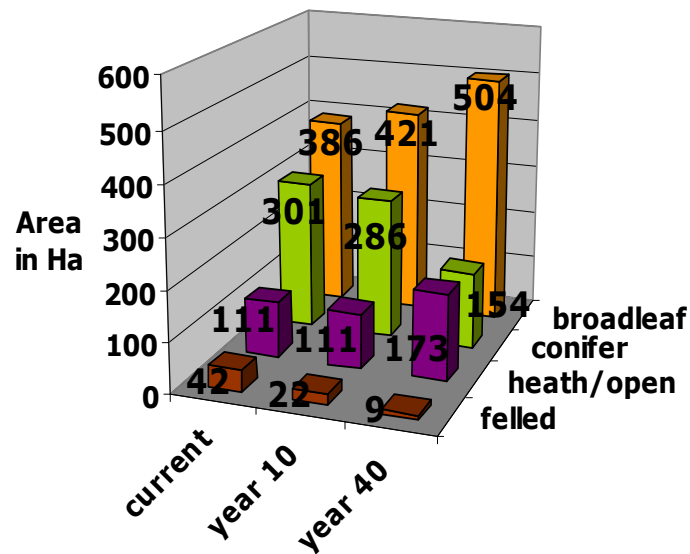
<p><b>Conservation (cont.)</b></p>	<p><b>Scowles.</b> These follow iron ore outcrops that are associated with the limestone and are well distributed along the length Haywood, forming an almost continuous band running north to south on the upper eastern slopes below the Edgehills ridge.</p>	<p>maintain a low level of change, maintain current and in some areas increase levels of open space, encourage regeneration of native species other than Beech in certain areas that in turn would encourage establishment of ground flora and to maintain the stone structure surrounding the well free of scrub.</p> <p>Quite often their locality and distribution can be quite widespread and can cause issue with the practicalities of harvesting work.</p>	<p>Veteran Trees within the area of St Antony’s Well are predominantly Beech will be managed sympathetically and in accordance to the “trees of special interest” guidelines.</p> <p>Archaeological advice is that these features should be maintained in woodland with surrounding trees.</p> <p>Where felling takes place around these features any existing broadleaves will be retained.</p>
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<p><b>Silviculture: Woodland Structure (Fig. 8)</b></p>	<p>The implementation of this plan should see a favourable shift towards broadleaf and open space habitats. The figures below are only indicative but give an idea of the future structure and composition of woodland by year 40:</p> <table border="0"> <tr> <td>Evergreen Conifer</td> <td>18%</td> </tr> <tr> <td>Broadleaf</td> <td>60%</td> </tr> <tr> <td>Heathland &amp; Open space</td> <td>21%</td> </tr> <tr> <td>Felled</td> <td>1%</td> </tr> </table>	Evergreen Conifer	18%	Broadleaf	60%	Heathland & Open space	21%	Felled	1%	<p>Opportunities exist for considerable areas of PAWS restoration predominantly in Castiard Vale but also the eastern slopes of Edgehills and some areas of Haywood that have experienced PR. This will see broadleaf coverage moderately expand throughout the plan area.</p> <p>Although there is now around 15Ha of open space managed for heathland in Edgehills, there is still an abundance of wooded sites showing evidence of relict ground vegetation continuing the support for the idea of large scale heathland restoration spoken of in the previous plan.</p> <p><b>** = By year 40 the total heathland habitat within plan area will be approx 85Ha. And including other open space, total open habitat would rise to around 170Ha.</b></p>	<p>Thinning will continue to promote and develop broadleaf components and may include group felling to facilitate group planting allowing diversification of future species composition.</p> <p>Incorporation of group felling in identified areas will complement the use of natural regeneration alongside clearfelling that will remain a vital tool for the control of plant health issues and help to resolve landscaping conflicts within the surrounding landscape.</p> <p>Use of tree shelters will aid establishment on a small scale where group planting is carried out, although on larger scales where clearfelling is employed, localised fencing may be more appropriate where rabbit or deer pressure may present risks to successful establishment.</p> <p>Staggering the felling dates for areas proposed for open habitat will create a mosaic effect at differing transitional stages and will spread future management input helping maintain the mosaic effect.</p> <p>The felling work will result in 25Ha of Heathland being created by 2035 rising to approx 60Ha by year 40 in 2054**; with possibilities to extend partnership working with GWT under their concordat.</p>
Evergreen Conifer	18%										
Broadleaf	60%										
Heathland & Open space	21%										
Felled	1%										

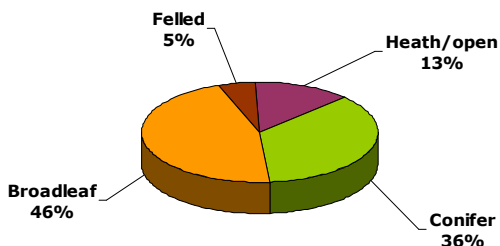


**Figure 8: Overall plan composition showing trends for indicative future cover to year 40**

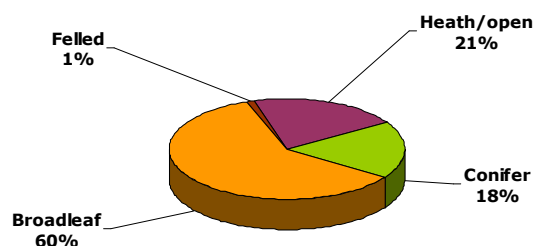
**Charts showing trends for indicative future woodland cover**



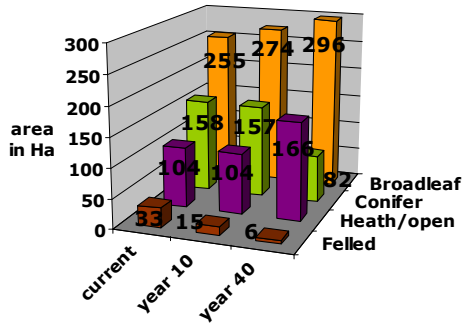
**Current overall Woodland Composition**



**Overall plan area - trends for indicative woodland composition at Year 40**

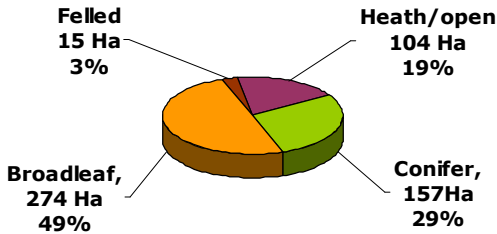


**STATUTORY FOREST - Trends for indicative future woodland cover**

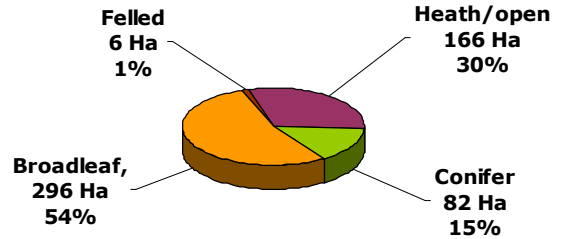


**Figure 9: Statutory Forest: Indicative Woodland Composition at year 10 and year 40.**

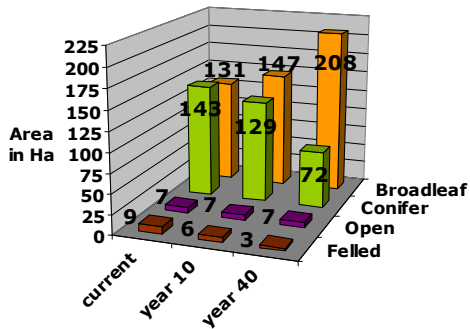
**Statutory Forest - trends for indicative woodland composition at Year 10**



**Statutory Forest - trends for indicative woodland composition at year 40**

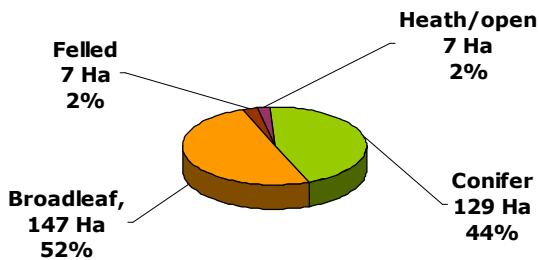


**NON-STATUTORY FOREST - Trends for indicative future woodland cover**

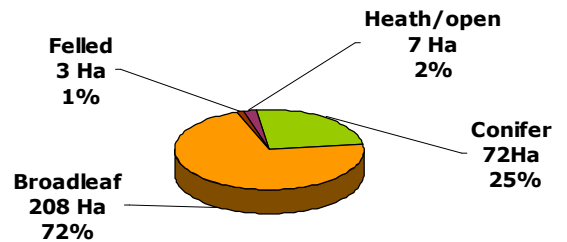


**Figure 9: Non-Statutory Forest: Indicative Woodland Composition at year 10 and year 40.**

**Non-statutory Forest - trends for indicative woodland composition at Year 10**



**Non-Statutory Forest - trends for indicative woodland composition at Year 40**



## The Meeting and monitoring of Objectives

Objective	Description	Proposals & Monitoring
<p>❖ <b>Management of the woodland will be to the standards required to maintain FSC and PEFC accreditation.</b></p>	<p>Management of the district's woodlands is undertaken to the standards required under UKWAS as endorsed by the Forest Stewardship Council and to maintain PEFC accreditation.</p>	<p>Compliance to these standards is monitored through various national and district policies, guidance, field surveys, use of GIS and other IT software, internal support audits and external audits carried out by SGS (Société Générale de Surveillance) which is an independent auditing company.</p> <p>Monitoring can also be achieved through: Site Planning, contract supervision and the Forest Plan review process.</p>
<p>❖ <b>Continued production of sustainable marketable woodland products that also allows the delivery of a range of other public benefits and also provides future opportunities for substituting use of fossil fuels and other energy intensive materials and other materials with the use of wood products.</b></p>	<p>Management of the district's woodlands is undertaken to the standards required under UKWAS as endorsed and certified by the Forest Stewardship Council and to maintain PEFC accreditation.</p> <p>As part of the Forest District's business plan and the organisation's customers' charter, the forest district is committed to financial and sustainable timber marketing targets. Growing quality timber in so far as this is consistent with other objectives.</p>	<p>Sustainable production will be monitored as part of the forest district's marketing plan, five year production forecast and at the Forest Plan (FP) five-year review. This process is audited as part of the FSC forest certification process.</p> <p>Annual pre-thinning survey.</p> <p>Production forecast comparison with actual output to assess accuracy of forecast.</p> <p>Annual Customer Liaison meetings.</p>

	<p>Giving local companies the opportunity to purchase timber through open competitive sales.</p>	<p>The Forestry Commission is already committed to making available supplies of timber for the wood-fuel market and this will be monitored as part of the district’s marketing plan.</p> <p>Monitoring will also be achieved through: Site Planning, contract supervision and the Forest Plan review process.</p>
<p>❖ <b>To undertake management that protects and enhances woodland and open habitats facilitating their resilience and adaptation to projected climate change and threat of disease.</b></p>	<p>Diversify the woodlands so as to develop a better variety of age structures, habitat types and open spaces.</p>	<p>The sustainable programme of thinning and proposed felling together with a varied restock program will continue to diversify stand and age structure, enhance the landscape and benefit a wide range of species and can be monitored during plan reviews.</p> <p>Operational site planning of harvesting and restocking operations should account for landscape enhancements where appropriate minimising the risk of adverse impact resulting from forest operations whilst at the same time highlight opportunities where conservation benefits can be delivered.</p> <p>Appropriate reinstatement works will be carried out once operations have been concluded.</p>

	<p>Lowland heath is a rare resource in Gloucestershire. Forest Enterprise is committed to making a substantial contribution to priority habitats in Gloucestershire such as lowland heath by identifying areas for potential restoration.</p> <p>The implication is that there will be an onerous cost in maintaining sites in an ecologically favourable condition. Partnership assistance will therefore be critical in helping bear the cost of management for these areas.</p>	<p>The potential for heathland restoration in Haywood is considerable but fraught with difficulty. However, this plan lays out an ambitious, challenging programme of heathland restoration and creation that will provide a high degree of ecological benefit.</p> <p>Partnership work with GWT will continue through their concordat with the Forestry Commission and aid in monitoring sites throughout the transitional period and beyond with ecological value being a defining factor in the evaluation of success. Further monitoring will be achieved through: Forest Plan reviews, surveys and contract supervision.</p>
<p>❖ <b>To conserve the ecological features and geological exposures associated with Westbury Brook SSSI and Edgehills Quarry SSSI respectively.</b></p>	<p>Manage both SSSIs in accordance with the SSSI management plans.</p>	<p>The aim of both the SSSI management plans and the Forest Plan will be to maintain the SSSIs in a favourable condition. Work relating to the SSSIs can be:</p> <ul style="list-style-type: none"> <li>• Free standing and carried out by volunteers</li> <li>• Can be integrated along side routine forest operations or</li> <li>• Carried out as separate specialist contracts.</li> </ul>

	<p><b>Westbury Brook SSSI</b> A slow pace of change with no large-scale changes planned over the next 20 years</p> <p><b>Edgehills Quarry</b> The Quarry sits low in the landscape and is reasonably isolated from the woodland.</p>	<p>Monitoring of both sites will be achieved through the review process in place for both SSSI plans and Forest Plans.</p> <p>Thinning should move the woodland towards a more open structure in coupes proposed as open heathland within the SSSI area. Areas of mature SP or broadleaf will be retained.</p> <p>Management is mainly concerned with keeping exposures clear of vegetation, reducing illegal access by climbers and 4x4 users, partly by ensuring a newly planted hawthorn hedge is successfully established and can be laid in the future.</p>
<p>❖ <b>To restore ancient woodland in line with the ‘Keepers in Time’ policy (2005) and to protect areas of native broadleaved woodland.</b></p>	<p>Protect veteran trees and promote the retention of both standing and fallen dead wood.</p> <p>Note that <b>all</b> work in and around areas where veteran trees are present should adhere to the 2013 guidelines for Trees of Special Interest that are laid out in FC operational guidance OPS 31 “Ancient and Veteran Trees”</p>	<p>The District has a robust survey and inspection system in place for the monitoring of such older trees, where tree surgery is used in preference to felling that is deemed as a last resort.</p> <p>The plan area also contains suitable parts where an increased number and variety of deadwood habitats can be promoted. These can be monitored through the site planning process for operations, conservation, and recreation along with contract site supervision.</p>

		<p>Further monitoring will be achieved through: Site Planning and the Forest Plan review process.</p>
<p>❖ <b>To enhance and conserve the very visible natural beauty, “sense of place” and character of the landscape.</b></p>	<p>Each Forest and Woodland within this plan have certain parts that hold their own unique value, and the uniqueness experienced can due to a combination and ratio of any of the following: number and type of tree species present, tree spacing and their size, amount of open space, natural or physical features e.g. streams or terrain amount of light or shade and the types of ground flora present.</p> <p>- Also see the Glossary for a precise definition.</p> <p>The masts on top of Edgehills area an unsightly feature in the external landscape.</p>	<p>The Forest Plan has tried to identify these key areas that add that certain uniqueness. The process has tried to safeguard and develop existing character that will perpetuate and further instil the uniqueness of each of these areas.</p> <p>Certain areas also have their own management plans that should be referred to and cross referenced with the Forest Plan to ensure their correct management.</p> <p>Monitoring will be achieved through: Site Planning, contract preparation and supervision, site visits and the Forest Plan review process.</p> <p>Due their height above the canopy these masts will be impossible to hide entirely, although ground based installations will be maintained within a continuous cover of woodland.</p> <p>Monitoring will be achieved through Site Planning, contract</p>

		supervision and the review process in place for Forest Plans.
<p>❖ <b>To conserve both cultural and heritage features within the plan area.</b></p> <p><b><u>Ensure any guidance from relevant plans is followed.</u></b></p>	<p>There are numerous notable features within the plan notably: Welshbury Hill Fort, Saint Antonies Well and Westbury Brook iron mine. Numerous earthworks associated with past management of the wood also exist within the plan area.</p>	<p>Manage sensitive areas in line with Forest plan proposals referenced to any site specific plans such as SSSI or SAM plans.</p> <p>Maintain a record of any unscheduled features, to improve the quality of existing data sets.</p> <p>Monitoring will be achieved through: Site Planning, contract supervision and the Forest Plan review process.</p>
<p>❖ <b>To maintain the area for the benefit of informal recreation.</b></p>	<p>There are a few small informal car parks including those at Edgehills Quarry, Welshbury, Flaxley, Chestnuts Wood, the Old Vicarage at Forest Church and Haywood School. The whole area is popular with local people from Cinderford and surrounding villages. Haywood is well used by pupils from Haywood Comprehensive and Stem Mills Primary school that both use the woods formally and informally.</p>	<p>There are no plans to extend facilities beyond those currently available.</p>



## Option Testing

<b>Objective</b>	
<b>Option 1 (Current FDP)</b>	<b>Option 2 (Proposed FP)</b>
<p>❖ <b>Management of the woodland will be to the standards required to maintain FSC and PEFC accreditation.</b></p>	
<p>Felling coupes are primarily aimed at restructuring age class distribution at a landscape scale with some thought to landform and with limited number of restocking species.</p>	<p>Sensitivities to landscape are improved by redesigning the eastern slopes of Flaxley to better accommodate landform, whilst maintaining a landscape scale approach. Restocking Coupe design is retained on the western slopes of Haywood despite statutory but premature felling due to PR infected larch; enabling improvements in landscape quality to be realised as per the original plan objectives.</p>
<p>❖ <b>Continued production of sustainable marketable woodland products that also allows the delivery of a range of other public benefits and also provides future opportunities for substituting use of fossil fuels and other energy intensive materials and other materials with the use of wood products.</b></p>	
<p>The primary silvicultural method used in achieving the establishment of future crops is that of clearfelling, whilst suggested species choice does not take into account the impact of new diseases and climate change.</p>	<p>Where desirable issue of restructuring are still recognised with the retention of clearfelling systems, but the choice of restock species has been widened to address the threats from new diseases and climate change. In some cases the ATC approach is used to help meet establishment needs of the more sensitive species.</p>
<p>❖ <b>To undertake management that protects and enhances woodland and open habitats facilitating their resilience and adaptation to projected climate change and threat of disease.</b></p>	
<p>Whilst the original plan identified sites that were suitable for lowland heath, it could not account for the statutory felling that was going to be required in order to manage disease and the implications it brings for timber sales and future timings for the clearfelling of surrounding coupes.</p>	<p>The original restock coupe design has been kept and the restock species expanded to diversify the future woodland composition that will hopefully make the woodland more resilient in the face of future disease issues. Timings of fellings for those areas identified for heathland restoration have been revised to realign and rebalance projections in the</p>

	timber production forecast and help spread the costs associated with restoration work.
❖ <b>To conserve the ecological features and geological exposures associated with Westbury Brook SSSI and Edgehills Quarry SSSI respectively.</b>	
Management proposals were in line with management intentions laid out within site specific management plans.	Here, the proposals fully meet requirements of specific management plans and offer prescriptions that increase potential enhancements to ecological values, although actual potential realised will depend on how the forest Plan is implemented.
❖ <b>To restore ancient woodland in line with the 'Keepers in Time' (KOT) policy and to protect areas of native broadleaved woodland.</b>	
The original plan relied heavily on natural regeneration of existing site native species, especially that of Ash. This narrows the diversity of tree species on such sites for the future. In doing so it also reduces the natural resilience of a woodland to ward off or at least minimise potential impacts of disease.	The proposals in option 2 recognise that some species are under threat from disease and looks to spread risk by planting a wider range of native broadleaves that will improve overall diversity and lead to enhancement in the future conservation value, structure and amenity value of the woodland.
❖ <b>To enhance and conserve the very visible natural beauty, "Sense of Place" and character of the internal and external landscape.</b>	
The existing plan maintained the status quo recognising the value of each site according to its uniqueness.	The Forest Plan has also identified these key areas that add that certain uniqueness. The process has tried to safeguard and develop existing character that will perpetuate and further instil the uniqueness of each of these areas.
❖ <b>To conserve both cultural and heritage features within the plan area notably Welshbury Hill Fort, Saint Antonies Well and Westbury Brook iron mine. Numerous earthworks associated with past management of the wood also exist within the plan area. Ensure any guidance from relevant plans are followed.</b>	
Management proposals were in line with management intentions laid out within site specific management plans.	In light of changes to management prescriptions for some areas that have specific plans of their own, proposals for option 2 have been amended and refined to offer prescriptions that meet these changes more readily and offer potential enhancements to ecological values.

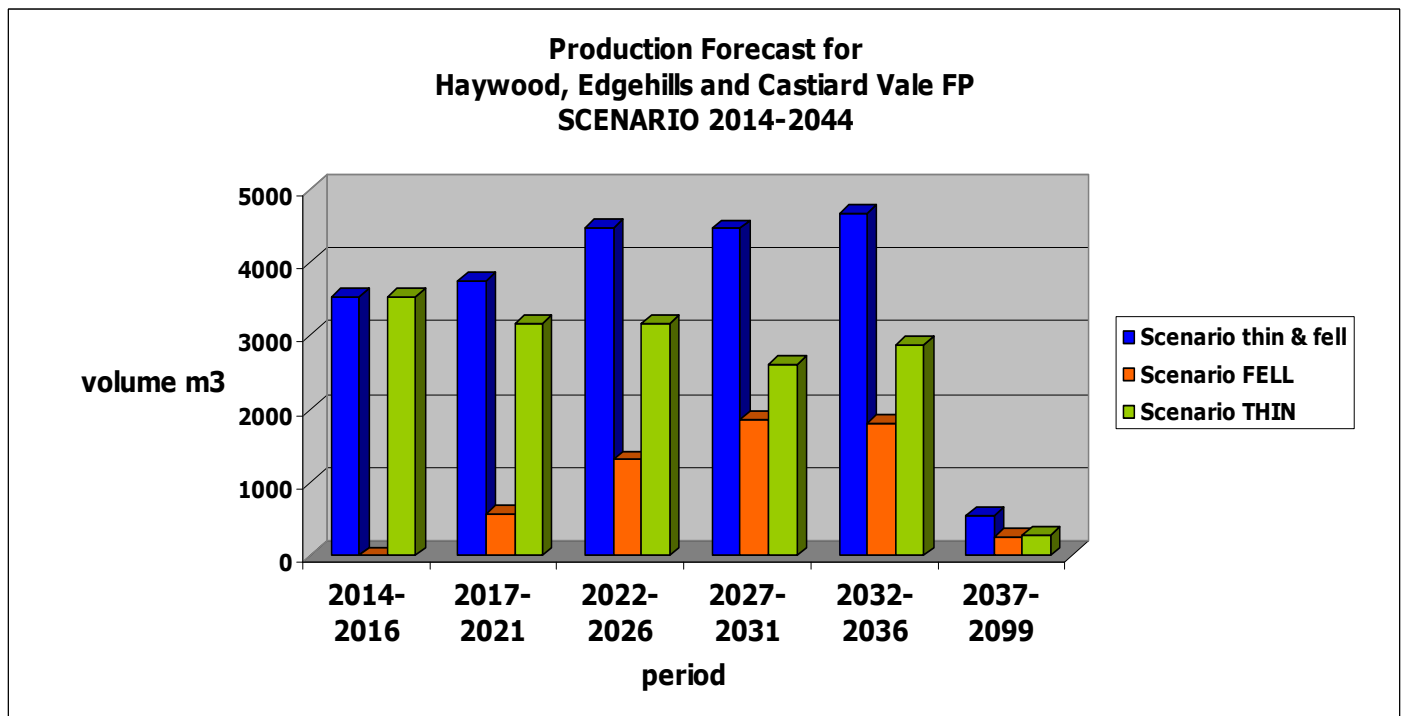
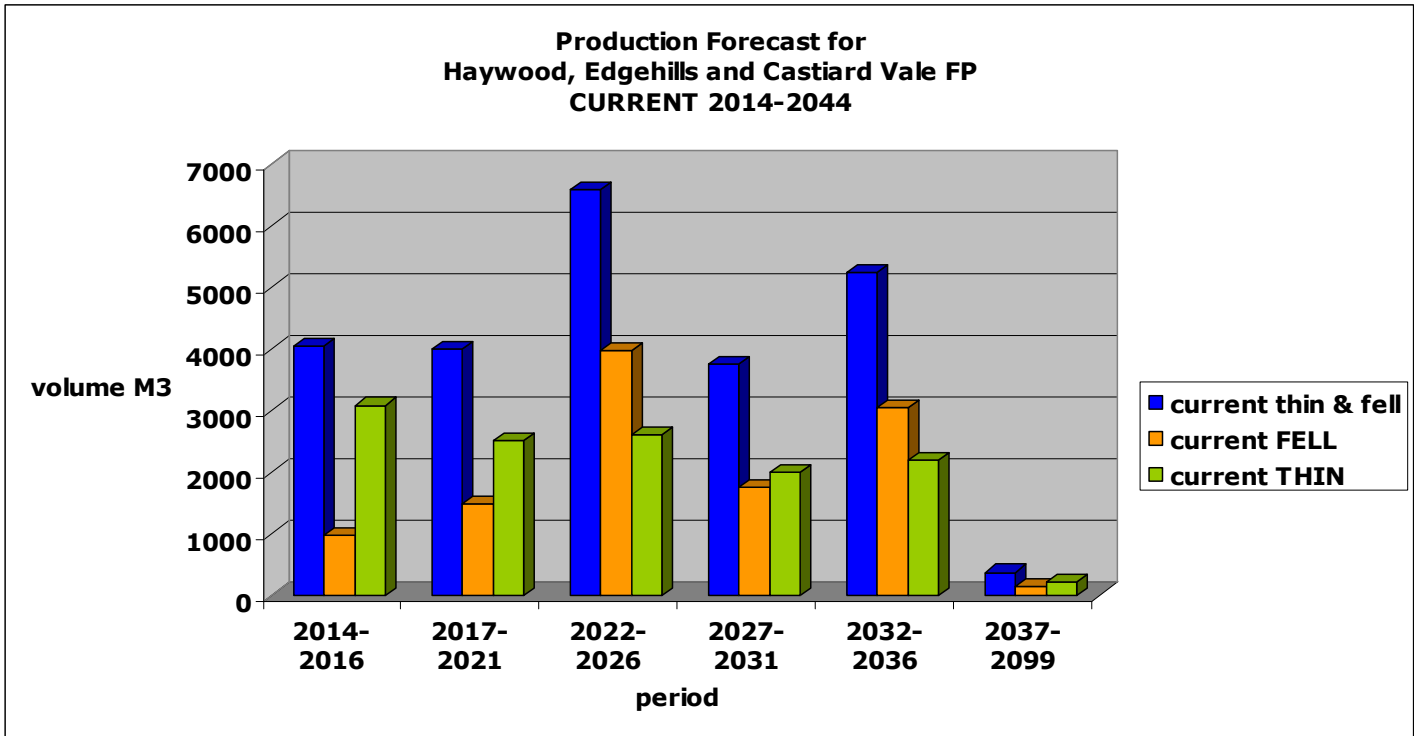
❖ **To maintain the area for the benefit of informal recreation.**

Management proposals saw a steady flow of clearfelling with coupes being smaller close to communities.

This plan has had to address a wider range of issues such as plant health. But this has presented opportunities for increasing diversity of native tree species and amount of open space proposed that will greatly improve the user experience. Timing of SSSI plan revision has also meant improvements in coupe design that will also enhance user experience.

**Option 2 more fully addresses the current management priorities & is the preferred option**

**Option testing: Production Forecasting**  
**Current FP vs Proposed FP**



## APPENDIX 1

### Pests and Diseases

- **Name:** Dothistroma Needle Blight (DBN)  
**First appearance in the Forest of Dean:** mid 1990s  
**Attacks:** Pine species

Often referred to as Red Band Needle Blight (RBN) and can reduce growth rates by between 70 and 90%. Effects of RBN are managed through thinning the wood more heavily than you would normally to introduce higher levels of air flow through the remaining crop.

- **Name:** Phytophthora ramorum (PR)  
**First appearance in the Forest of Dean:** 2012  
**Attacks:** Oaks and Larches

Found originally in Cornwall in 2009, attacking Oak, and in 2012 found to of infected Larch. It is a notifiable disease dealt with by felling the infected area under a statutory plant health notice (SPHN) issued by DEFRA. At present there is no PR on Oak in the Forest of Dean, however, around 12% of all larch within the Dean was felled in 2012 to eradicate the disease with regular aerial flyovers to keep track of hot spots. Luckily flyovers in 2013 have shown no reinfection. This is not to say there will not be a need for further fellings of infected larch required in the future.

- **Name:** Oak 'dieback' or 'decline'  
**First appearance in the Forest of Dean:** unknown  
**Affects:** Oak

Oak 'dieback' or 'decline' is the name used to describe poor health in oak trees and can be split into Chronic decline and Acute decline. Chronic decline is protracted taking effect on the Oak over a number of decades whilst Acute decline is much swifter acting over much shorter periods usually five years or so. Symptoms can be caused by a range of living agents e.g. insect and fungal attack, or non-living factors, e.g. poor soil and drought. Factors causing decline can vary between sites, as can the effects of the factors through time. Oak decline is not new; oak trees in Britain have been affected for the most part of the past century. Both native species of oak are affected, but Pedunculate oak (*Quercus robur*) more so than Sessile oak (*Quercus petraea*). Successive exposure any of these agents on a yearly/seasonal basis further reduces the health of the tree and predisposes it to other living (Biotic) agents that can often spell the final death knell for the tree.

- **Name:** Chalara fraxinea  
**First appearance in the Forest of Dean:** currently N/A  
**Attacks:** Ash

Pretty rampant in Europe, showing up in 2012 mainly in East Anglia and along the East coast of England. To date no infection has been found within the Forest of Dean and let us hope it stays that way!

## APPENDIX 2

### An extract from the draft Welshbury hill fort SAM management plan

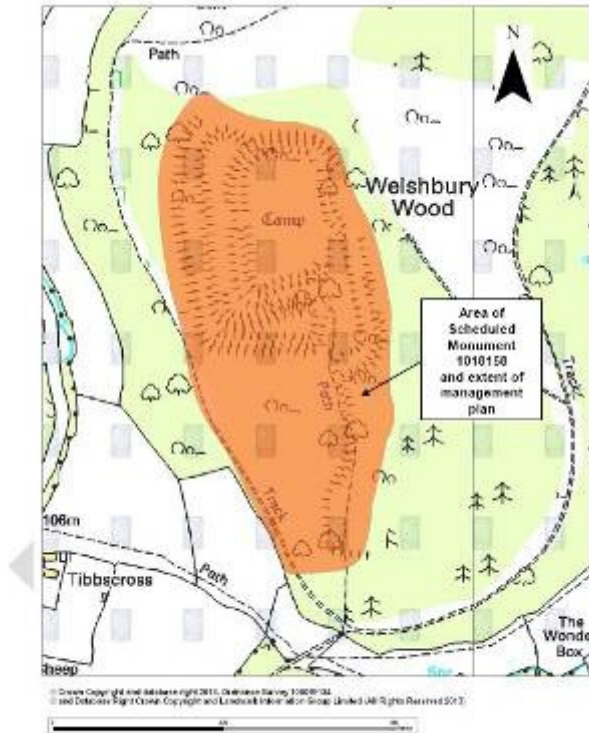


Figure 1: Extent of the management plan area and Scheduled Monument 1018158

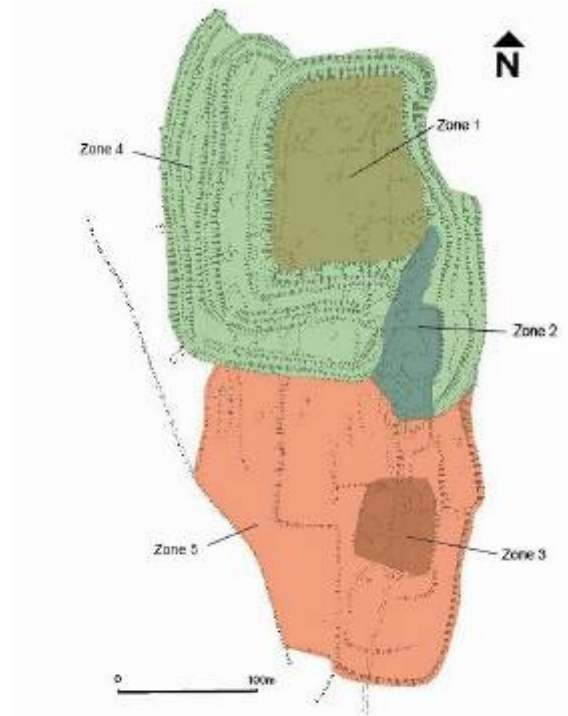


Figure 2: Areas of archaeological significance and management zones  
Base map (c) Royal Commission on the Historical Monuments of England

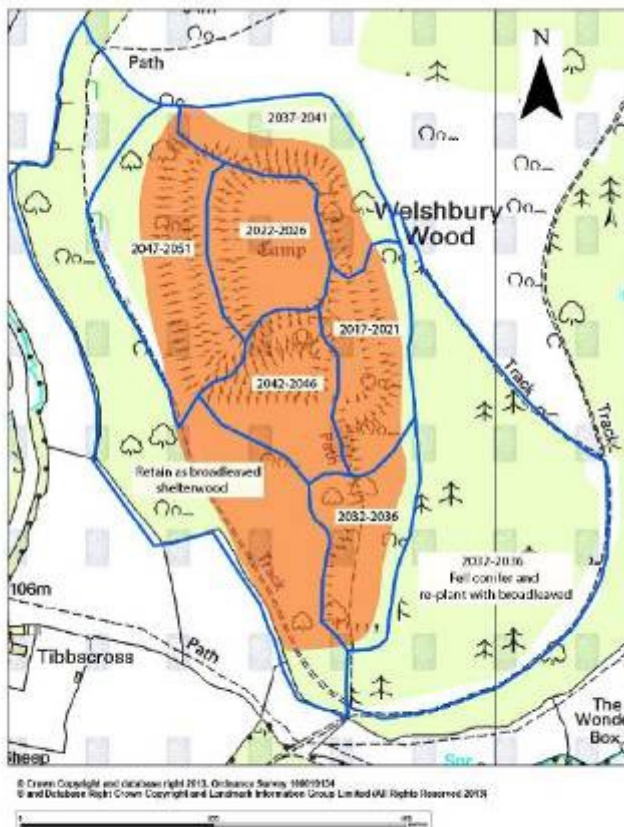


Figure 4: Proposed coppice coupes showing extent of Scheduled Monument and felling years

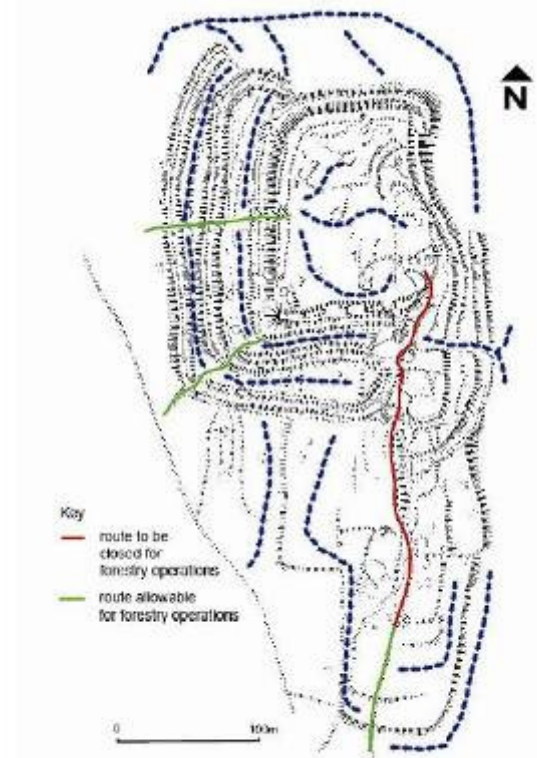


Figure 3: Recommended access routes for forestry operations  
Base map (c) Royal Commission on the Historical Monuments of England

## **4 Management issues**

The appropriate management of the woodland cover is the principal management issue affecting the management of the archaeology of Welshbury Hillfort and its associated field system.

With the exception of Zone 3, which was converted to coppice in August 2001, the woodland has been managed as widely spaced mature standards with enough canopy to suppress (but not eradicate) undergrowth. This has created an almost ideal environment in which the monument is both accessible and legible, although it is not clear how sustainable this management regime is in the long term.

Small leaved lime is considered to be particularly vulnerable to wind blow (Rackham and Jarman 1995, Berry undated) which can be detrimental to archaeological remains as torn-out roots displace the archaeological deposits in which they were embedded. Relatively widely spaced discrete standards may be particularly vulnerable to this and in March 2014 a number of instances of wind blow were noted following the unusually high winds of February 2014. This was, however, less extensive than might have been expected given the severity of the winds, and many of the trees had snapped at the trunk causing no damage to buried deposits.

However, an increasingly aging population of discrete standards may become progressively susceptible to wind throw, and, as trees become larger management operations may become more dependent on the use of heavy machinery with its attendant potential to have a detrimental impact on the surviving earthworks and buried archaeological deposits (Standing 1994).

### **4.1 Management issues by Zone**

#### **4.1.1 Zone 1**

This area is of particular archaeological significance as evidence of human activity and occupation on the site is likely to survive as below ground features, although the woodland in this area tends not to cover visible earthworks and may be more stable than that in Zone 2 (see below).

#### **4.1.2 Zone 2**

Although Zone 2 may contain less significant buried archaeological remains than Zone 1 (the hillfort interior where evidence for the hillforts occupation can be expected) and Zone 3 (the possible site of an unenclosed Bronze Age settlement), this is a complex area of surviving structural remains which may be particularly vulnerable to the impact of wind blow where trees are growing on relatively unstable earthworks. Consequently addressing the management of the mature woodland in this area is a priority.

#### **4.1.3 Zone 3**

As the possible site of unenclosed Bronze Age settlement this area is of particular archaeological significance. In reflection of this the area was converted to coppice in 2001. There is no urgency to re-cut this coppice before the end of the proposed 60 to 70 year coppice cycle (but see 5.1.3 below).

#### **4.1.4 Zones 4 and 5**

Whilst both these zones are likely to contain structural remains of archaeological significance, the overall integrity of these remains may be less sensitive to damage caused by wind blow than those in other Zones and addressing the management of the mature woodland is less of a priority in these areas.

## **5 Management recommendations**

### **5.1 Conversion to coppice**

Zone 3 was converted to coppice in August 2001 partly as this area was considered to be of greatest potential archaeological significance (although whether this is actually the case or not has not been verified) and partly as an experiment to assess the impact which a coppicing regime would have.

In the short term this regime removed canopy cover opening up the area to dense undergrowth (mainly brambles) which impeded access and legibility of earthworks. By March 2014 the coppice had grown sufficiently to suppress undergrowth and the area was once again, both accessible and legible.

Accordingly the conversion of the woodland on the site to coppice is the recommended option for the long-term management of the site, although it would be acceptable to maintain occasional mature standards within the coppice, or retain some woodland on the edge of the management plan area as shelterwood (see 5.1.3 below).

#### **5.1.2 Timescales and extent of conversion**

In the short term, conversion of the whole site to a coppiced management system could be detrimental in the following ways:

- Vehicular access and other timber extraction operations would have the potential to create serious ground disturbance.
- Protective woodland cover may increase the potential for some parts of the site, particularly the ramparts, to suffer from rainwash and other weathering.
- Conversion to coppice may produce a negative public reaction, as its immediate effects, such as increased undergrowth cover, will impede access to and legibility of the monument and have a detrimental effect on its appearance.

The risk of wind blow in the current regime is difficult to predict, although this may be less significant than generally thought (see 4 above) and there appears to be no immediate urgency to remove standards. A gradual, phased approach to conversion would enable to detrimental impacts of this conversion (see above) to be managed more effectively.

The coppice in Zone 3 was inaccessible and overgrown for at least 5 years before it matured sufficiently to suppress undergrowth and conversion should allow enough time between phases to ensure that only one area of coppice is overgrown and inaccessible at any one time. It will also be necessary to allow sufficient time for felled areas to achieve a minimum height of before adjacent areas are felled in order to comply with UKWAS and UK Forest standards (Pete Kelsall, Forestry Commission pers. comm.)

Conversion as small coupes (approximately 1.6 to 2.9ha) would also limit the actual areas of short-term detrimental impact at any one time and would be more in keeping with the intimate nature of the site as perceived by the visitor on the ground.

#### **5.1.3 Prioritisation of conversion to coppice**

Priority should be given to converting management zones to coppice in the following order

1. Zone 2
2. Zone 1
3. Zones 4 and 5
4. Zone 3:

Given the proposed sizes of coppice coupes (see 5.1.2 above), it would be acceptable for the larger zones (Zone 4 and 5) to be converted over a number of stages and also



to bring forward the re-cutting of Zone 3 to bring it within a larger coppice coupe as part of the long-term forward plan for the management of the site as whole.

The outline Forestry Commission programme for conversion of the site to coppice is set out in Figure 4 and was prepared following discussion with the Archaeology Service during the preparation of this revision of the management plan.

This sets out the following plan for conversion to coppice:

- Conversion will be in a series of six small coupes, each approximately 1.6 to 2.9ha.
- Occasional relic trees may be maintained within coppice coupes if deemed appropriate to promote ecological diversity.
- There will generally be an interval of between five and nine years between new fellings.
- The coppice in each coupe will be maintained for approximately 30 years when singling will remove all but the best stem on each stool and promote growth as standards.
- After a further 30-40 years the surviving mature standards in each coupe will be felled and the coppice cycle will begin again.

The proposed coupes are not identical to the archaeological zones set out in 3.2.3 above, and extend beyond the scheduled area. They are, however, larger than the archaeological zones and Zones 1, 2 and 3 are fully encompassed within individual coupes, whilst sections of Zones 4 and 5 are within a number of coupes. The proposed felling order is consistent with the prioritisation of archaeological zones set out above and should form the basis for the future conversion of the site to coppice. The precise limits of these coupes will, however, need to be agreed on site between the Forestry Commission and Gloucestershire County Council Archaeology Service before conversion begins.

The draft programme also includes a proposal to retain a broadleaved shelterwood in the south-western part of the management plan area (the western part of Zone 5) to maintain an area of mature small leaved lime and promote ecological diversity. This is also considered acceptable subject to the monitoring for the threat of wind blow set out in 5.2 below.

## 5.2 Management of woodland prior to conversion to coppice and management of the broadleaved shelterwood in Zone 5

Prior to conversion to coppice, and within the area of the proposed broadleaved shelterwood in Zone 5, the existing woodland should be monitored and selective felling undertaken in advance of the likely threat of wind blow.

Selective felling should take account of the following:

- Trunk diameter and age of individual trees.
- The position of individual trees with reference to the topography of the site.
- Visible signs of decay and instability.

Crucial diameter classes, indicating the optimum felling diameter for trees, dependant upon their type and location, will be defined by Forestry Commission staff. Felling should be restricted to the trees selected in this process, and no clear felling of large areas should be undertaken.

No new planting should be undertaken, and regeneration should be encouraged from existing stumps which should be left *in situ*.

Existing mature trees on the steep slopes of the hillfort ramparts may be particularly vulnerable to wind blow on account of the relative instability of their root systems on uncompacted slopes. Potential for damage to the earthworks is also exacerbated in these areas due to the difficulty in removing logs from rampart areas without dragging them over upstanding earthworks.

### 5.3 General methodology of forestry operations

Archaeological deposits are particularly vulnerable to damage from inappropriate machinery which can cause deep rutting, especially where ground is soft, or in wet weather.

Horse extraction has been recommended for Welshbury in previous occasions, but this should be reviewed as low impact forestry machinery, when sensitively used, may have as little impact on upstanding earthworks as horse traction. Extraction methods will need to be discussed and agreed with the Forestry Commission and the Gloucestershire County Archaeology Service in advance of any forestry operations.

Felled trees should be removed from site immediately and not stored within the scheduled area. Dragging of logs along the ground can cause rutting when the ground is soft and all felling and removal of felled trees should only be undertaken in dry conditions when the ground is firm.

#### 5.3.1 Access onto the site, and movement within the site (Fig 3)

Routes, either for general access or the transportation of felled trees, should not cross surviving earthworks.

The existing track which enters the hillfort from the south, through Zones 2 and 3 should not be used as a general access route for forestry operations into the hillfort, and there should be a presumption against using this where it crosses Zones 2 and 3. Felled logs should be removed from these zones by the most direct route possible which avoids any visible earthworks and the track only used if no other less sensitive options are available. This track could be used for the removal of trees to the south of Zone 3 (Figs 2 and 3).

Access to and from the interior of the hillfort, and particularly the removal of logs, should be along the earlier forestry tracks through the ramparts identified on Fig 3. Special care should be taken to ensure that only existing gaps in the earthworks are utilised, and that logs do not drag against the terminals of surviving ramparts at either side of the designated access routes. Continual re-use of precisely the same alignment within an agreed access route should, as far as is possible, be avoided in order to minimise surface wear.

Where felled logs are to be removed from the ramparts, ditches or hillfort interior, they should be transported to the designated access routes by the most direct route possible whilst avoiding any visible earthworks. In practice this will mean taking a route parallel to the visible earthworks towards one of the designated access routes. Where felled trees are in the bottoms of ditches, it is preferable to drag logs along the ditches directly to a recognised access point, rather than drag them up the face of the rampart.

Where trees are removed from the field system to the south of the hillfort, earthworks should be avoided as far as is possible. Routes should lead towards the existing forestry track to the south-west of the area covered by the management plan, but should, as far as possible, run parallel to visible earthworks (Fig 3).

Trees removed from the eastern ramparts of the hillfort should be taken along a route running parallel to visible earthworks and then taken round the northern part of the area covered by the management plan to meet with the existing forestry track which runs to the south-west of the area.

A schematic representation of preferred access routes is shown on Fig 3. This can, however, only act as general guidance to forestry operations, and precise routes should be agreed and marked out on site.

### 5.3.2 Monitoring and review

The success of the management regime should be monitored, and the management plan reviewed in 10 years time (2024).

## 7 Summary of Management plan progress, and future actions

### Short – medium term management until about 2051

	2014-2017	2017-2021	2021-2026	2032-2036	2037-2041	2042-2047	2047-2051
Continued management of high Forest in Zones not converted to coppice	√	√	√	√	√	√	
Conversion to coppice of Zone 2 and parts of Zones 4 and 5		√					
Conversion to coppice of Zone 1 and part of Zone 4			√				
Re-cutting of Zone 3 and conversion to coppice of part of Zone 5				√			
Conversion to coppice of northern part of Zone 4					√		
Conversion to coppice of southern part of Zones 4 and northern part of Zone 5						√	
Conversion to coppice of western part of Zone 4							√
Continued management of high Forest as broadleaved shelterwood in the western part of Zone 5	√	√	√	√	√	√	√

### Long-term management after about 2051

The long-term management aims at Welshbury Hillfort are to ensure a sustainable balance between the need to preserve archaeologically significant remains on the site and maintain the small-leaf lime woodland cover. It is currently anticipated that after 2051 coppice within coupes over about 30 years old will be singled to remove all but the best stem on each stool and promote growth as standards. After a further 30-40 years the surviving mature standards in each coupe will be felled and the coppice cycle will begin again. Singling and eventual return to coppice will be undertaken on a coupe by coupe basis following the sequence set out on Figure 4. The broadleaved shelterwood on the western side of Zone 5, will continue to be managed as mature woodland with felling in advance of windblow, thinning and regeneration from existing stumps undertaken as appropriate.

## APPENDIX 3

### Glossary of terms

<b>Term</b>	<b>Abbreviation</b>	<b>Description</b>
<b>Ancient Semi-Natural Woodland</b>	ASNW	An ancient woodland site, where trees and other plant species appear to of established naturally rather than having been planted. Predominantly these sites will contain 80% or over of site native species or species native to the surrounding area.
<b>Ancient Woodland Site</b>	AWS	A site that has technically been wooded since 1600AD and is unlikely to have been converted to farmland in the last few centuries.
<b>Clearfell or clearfall</b>	C/F or CF	To cut and remove all trees from a certain area of woodland.
<b>Continuous cover</b>	CCF	A method of management that does not allow the clearfelling of the woodland or forest. It can be used in both coniferous, broadleaved or mixed woods. Methods are numerous and varied, but generally one ends up with a woodland or forest that has 2 or more storeys. Using this technique helps develop structure and can improve the ecological diversity of the wood.
<b>Coppicing</b>		A method of management where the existing crop is cut and the next rotation is established by allowing the stumps of the old crop – or “stools” as they are known – to re-grow. The methods and techniques used to cut the original crop can influence how successful the re-growth and regeneration will be. As coppice stools get older and the more times they are coppiced it is likely that some will regenerate less plentifully and one must consider the need to use enrichment planting as a way of ensuring the successful establishment of the next crop. Protection from browsing mammals can be an important factor too.
<b>Crop</b>		A stand of trees. Often associated with stands completely or partially managed for its timber. Just as farmers manage crops so does forestry the only difference is a farmers’ rotation is shorter and often realised in 1 year. Trees are a

		much longer term crop with rotations varying from 6 years to 400 years. (also see definition for rotation)
<b>Enrichment planting</b>		Planting different species within areas of regen that helps diversify the range of species in a wood and in doing so can make it more resilient to future climate change and future threats from disease. Enrichment may be desirable in areas where success of regeneration is uneven, patchy or where a regen crop is limited by the number of species present.
<b>Group felling / group planting</b>		This is where small areas of woodland are felled hence the name "group felling" and then either allowed to develop through the use of nat-regen or in this case planted hence "group planting". These techniques can help to develop structure* within a wood over a given length of time and is often used in conjunction with continuous cover. *Either in terms of age or number of tree species present, since shelter and shade are provided by the remaining upper storey one can consider a larger number of tree species when deciding what to plant.
<b>Hectare</b>	Ha	Unit of area equating to 2.47 acres.
<b>Mixed Wood</b>		Woodland consisting of both conifer and broadleaf species.
<b>National Vegetation Classification</b>	NVC	A UK wide classification system used to attribute standardised descriptions to plant communities.
<b>Native (and honorary native)</b>		The trees making up the woodland are part of England's natural, or naturalised flora. Determined by whether the trees colonised Britain without assistance from humans since the last ice age (or in the case of 'honorary natives' were brought here by people but have naturalised in historic times); and whether they would naturally be found in this part of England.
<b>Natural Regeneration</b>	Regen or nat-regen	Trees growing on a site as a result of natural seed fall, and can be used as a management process and can allow cleared areas of woodland to germinate, grow and develop naturally. This process can happen anywhere and woods can be

		<p>managed to encourage nat-regen although there is no guarantee of success. In these instances, or if nat-regen is unlikely for a variety of reasons, one can use enrichment planting or group planting to achieve the same affect.</p> <p>The process usually relies on an overstorey of “parent trees” being present or on parent trees being close by to provide the seed. These parent trees will usually of been thinned and managed with natural regeneration in mind.</p> <p>Existing areas of nat-regen are then usually developed through carefully thinning the surrounding woodland over a number of years, to give more light and space to ensure the young trees can establish themselves into larger trees eventually allowing them to be incorporated (‘recruited’) into the main crop for the next rotation at some point in the future.</p> <p>Usually done in small groups or in strips this system can allow a varied woodland structure to develop over time. Protection from competing plant species and mammal browsing might be required in the early stages by fencing or using tree shelters.</p>
<b>Plantation on an Ancient Woodland (Site)</b>	PAW(S)	This is an ancient woodland site that appears to have been planted, usually with a species that is not native to the site and surrounding area and usually conifer.
<b>Rotation</b>		<p>Generally a commercial term used to describe the length of time an area of trees is growing for, from the time of planting to the time of felling. For broadleaves a rotation is generally a lot longer than that of conifer species* and can broadly speaking be anywhere between 80 years to 3-400 years, as opposed to conifer crops whose rotation is generally shorter but can vary from 20-25 years to 120 years plus.</p> <p>*The exception being that of coppice where rotation length can vary from 5 or 6 years up to 30 years plus depending on management objectives.</p> <p>“First rotation” would refer to an area of wood planted on open ground not previously wooded.</p>

		And so “second rotation” is one where woodland has been cleared and replanted.
<b>Sense of Place</b>		A factor or set of factors that give a specific location special character, making it unique in its own intangible way. Often it is a combination of character, features, quality, space and associations that creates and gives a unique sense of identity to a location.
<b>Shelterwood</b>		<p>A management system that is applicable to conifer or broadleaf, where tree canopy is maintained at one or more levels without the need to clearfell the whole site. Felling can occur, but generally in small “groups” whose size shape and spatial distribution will vary depending on site conditions. The “groups” are then either: allowed to develop and establish by the use of natural regeneration, are planted or are established using a mixture of both techniques. This known as a “group shelterwood system”</p> <p>A variation on this is “Single tree selection”. This variation removes individual trees of all size classes more or less uniformly throughout the stand to maintain an uneven-aged stand and achieve other stand structural objectives. While it is easier to apply such a system to a stand that is naturally close to the uneven-aged condition, single tree selection systems can be prescribed for even-aged stands, although numerous preparatory thinning interventions must be made to create a stand structure where the system can truly be applied.</p>
<b>Silviculture</b>		A term coined during late 19th century from the Latin <i>silva</i> meaning 'wood' and the French <i>culture</i> meaning 'cultivation' and so Silviculture is the art and science of controlling the establishment, growth, composition, and quality of forest vegetation to achieve a full range of forest resource objectives.
<b>Silvicultural systems</b>		These refer to a wide range of complete regimes for the regenerating, tending, and harvesting of forests and are called "silvicultural systems".

<b>Stand</b>		A group or area of trees that are more or less homogeneous with regard to species composition, density, size, and sometimes habitat.
<b>Thin</b>	TH	<p>Selective removal of trees from a wooded area, giving remaining trees more space to grow into larger trees. Thinning is done to:</p> <ol style="list-style-type: none"> <li>1. Improve the quality and vigour of remaining trees.</li> <li>2. Remove trees interfering with mature or veteran broadleaf trees.</li> <li>3. Give space for tops (or “crowns”) of broadleaf trees to develop and potentially act as a future seed source.</li> <li>4. Give space for natural regeneration to grow and develop with the intention of recruiting these younger naturally grown trees as a part of the future woodland structure.</li> <li>5. Create gaps for group planting or enrichment.</li> <li>6. Remove species of tree that may compromise the intended management objective of the woodland eg: non-native or invasive species such as Sycamore, Western Hemlock or birch.</li> <li>7. Improve the economic value of a wood.</li> <li>8. Help realise opportunities to enhance ecological value.</li> </ol> <p><b>NOTE:</b> This list is not in any order of priority and will vary depending on management objectives.</p>
<b>Yield Class</b>	YC	A method of measuring the growth rate or “increment” of a crop of trees by age and height; measured in m <sup>3</sup> per Ha per annum. E.g. A crop with a YC of 16 is one that has an annual increment of more than 16m <sup>3</sup> but less than 17m <sup>3</sup> , although generally only even numbers are used when stating YC.