

# Harwood Forest Plan 2017



## North England Forest District



## Planning and District Context

The Strategic Plan for the Public Forest Estate in England outlines the delivery of forest policy at a national level. At a regional level there are six Forest Districts covering the country that directly oversee the implementation of policy actions in local public forest estate woodlands. Forest Enterprise England is the organisation responsible for managing the English public forest estate.

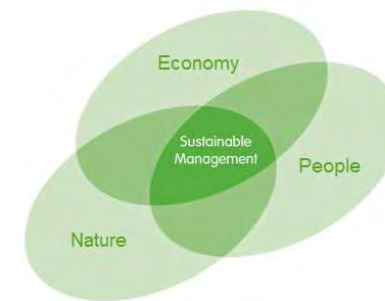
North England Forest District (NEFD) is the management unit that manages the public forest estate in Northern England. This is an extensive area encompassing 9 county or unitary authority areas from the Scottish border to Durham and Lancashire.



Our task is to realise the potential of each of the forests in our care for sustainable business opportunities, wildlife and nature conservation, and the enjoyment and well-being of local people and visitors. Each of our forests supports the economy through local jobs, sustainable timber production and the provision of recreation and tourism opportunities. All are funded by revenue from timber sales and recreation provision.

The woodlands of the district are currently arranged in 62 management areas, and their management is covered by individual ten year Forest Plans that identify local issues and the broad silvicultural management of the woods. Forest Plans are reviewed every five years.

Individual Forest Plans aim to deliver a range of public benefits with achievable objectives that deliver the three drivers of sustainable land management outlined in the North England Forest District Strategy.



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These key drivers are supported by the following Forest District Policy;

- we will optimise the financial return from timber production compatible with achievement of other forest district objectives while complying with the UK Forestry Standard and meeting the requirements of the UK Woodland Assurance Scheme
- we will provide public access to all our forests and woodlands where there are no legal or safety restrictions. We will encourage and permit a wide range of recreational activities from walking and quiet enjoyment to more specialised activities.
- we will ensure that rare and threatened habitats are protected and managed to maintain or enhance their conservation value

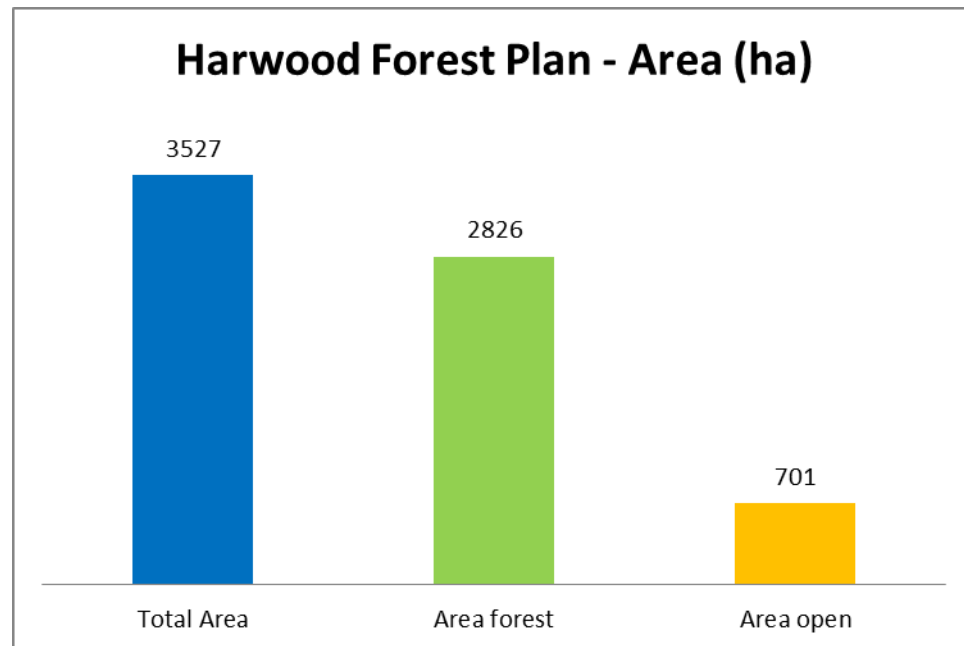
## Harwood Forest Plan

This is the third revision for the Harwood Forest Plan which incorporates the nearby small woodland of Elf Hills. Changes to the previous plan include some re-scheduling of harvesting coupe periods in response to what has been felled during the period of the previous plan, some minor coupe boundary changes and inclusion of additional roading requirements. Two previously approved amendments have been incorporated into this revision.

### Part 1 Background Information

#### Introduction

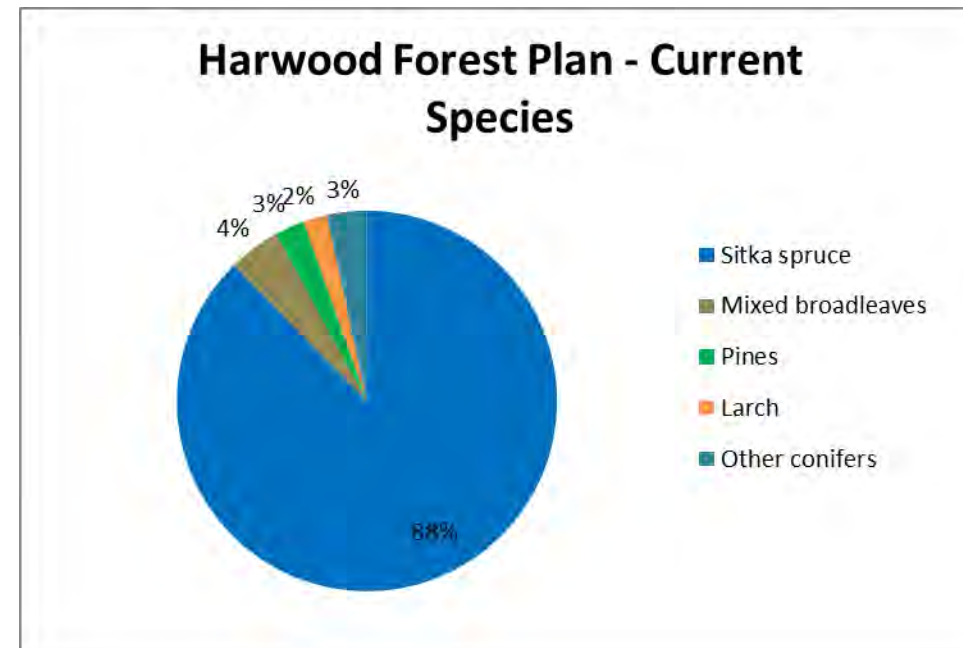
Harwood Forest is located to the Southeast of Rothbury and occupies the land from the lower slopes of Simonside hill in the north to the upland landscape in the south. The area of forest covered by this plan is 3527 ha and includes both Harwood (3513ha) and Elf Hills (14ha), 946 ha are owned freehold the remainder being leasehold. The original plan was drawn up in the early 1990s, being formally approved by the Forestry Commission in 1995.



#### Current Woodland composition, species and timber potential

The current species composition is mostly conifer, a mixture of spruce, pine and larch with Sitka spruce dominant reflecting the primary aim of the initial planting and subsequent early second rotation restocking to produce a timber resource.

Subsequent restocking proposals have incorporated an introduction of greater species diversity and native broadleaf planting to balance the aims of a multipurpose forest.



The altitude over the sites vary from 160m on the lower southern slopes to 420m on the summit of Simonside; however the majority of the forest falls within the range 250 to 300m above sea level. Soil types are generally dominated by gley and peat soils, though podzolic and iron pan soils are present in the North of the forest. With the exception of the slopes of Simonside site stability is generally below average, the majority (80%) being identified as wind hazard class 5 (see wind hazard class maps). This has a significant effect on the ability to retain crops. The trees are generally growing well, where Sitka spruce is planted an average Yield Class of 12 and above is obtainable, other species generally growing more slowly. Due to the high wind hazard class and fast tree growth, as with the majority of the upland forests within Great Britain, managing the risk of windthrow is a major constraint when allocating felling dates. Due to more recent age class restructuring currently few crops are at risk of overturning through windthrow. However, over the next 10 to 20 years a significant percentage of the crops are likely to have blown over if not harvested. The felling proposals therefore need to mitigate the likely onset of windthrow.



## Designated areas

The Simonside Hills SSSI (also notified as a SAC) borders the forest and Condition Unit 6, currently in favourable status, is within the Forestry Commission's lease. Approximately 50% of the forest, mainly to the north and west, lies within the Northumberland National Park.

## Conservation

Part of the Simonside Hills SSSI is present within the forest and managed in accordance to a management plan agreed with Natural England. Additionally four undesignated raised blanket mire sites are present which were partially planted as part of the first rotation. Three (Chartners, Little lough and Peterstone) are now clear of trees and are maintained as open space. The final site, which has been partially cleared, is programmed for clearance in the period 2022 to 2026 when the crop will be of harvestable size.

In addition to specific sites of conservation interest the forest habitat that Harwood provides is also becoming of greater interest, forming the base habitat for many species of fauna and flora. Too numerous to mention individually where sites are considered significant they have been recorded as conservation sites.

Some species though being mobile, relate to the habitat as a whole rather than specific locations, notable are Red squirrels. Harwood has been included in the suite of Red squirrel reserves in the North of England. Therefore the restocking will not include any large seeded broadleaf species. The long term success of Harwood as a Red squirrels reserve also depends upon Grey squirrel being prevented from reaching Harwood from the adjoining buffer area, and or research developments on squirrel pox virus and contraception.

Historically Black grouse were present, though there are no recent records in the vicinity. However, completion of work to secure suitable habitat, involving the creation of 48ha of open space/open woodland along the neck of Simonside will assist any potential future recolonization of the species (Figure 1 below).



Additionally the current restocking proposals through varying the planting boundary at the forest edge will mean that 50% open space (>400ha) will be included in the first 200m from the ownership boundary which will develop naturally into a transitional edge habitat.

## Communities and recreation

Recreational provision varies through the forest from the popular rugged paths over the Simonside Hills to quieter simple walking trails through the forest. Projects such as the sustainable footpath work that has been undertaken on the top of Simonside demonstrate the important role that Harwood has in providing opportunities for the public to engage in outdoor leisure activities. A series of public rights of way run through the forest including sections of the long distant St Oswald's Way and Sandstone Way mountain bike route. Additionally the Forestry Commission has dedication (under the Countryside and Rights of Way Act 2000 (CRoW)) access on foot on the area of freehold ownership. Public access at Elf Hills is restricted to the public path which runs along the external north east boundary of the wood.

## Pests and diseases

Roe deer are present throughout and populations are managed by Forestry Commission rangers in freehold woodlands and elsewhere where permitted by the terms of any leasehold agreement.

Larch is threatened by the disease *Phytophthora ramorum* and although remaining a favoured species both for restocking and as natural regeneration in areas of Continuous cover management the future appropriateness of this species will be kept under review.

## Access and roading

Internally forest operations are generally adequately served by a network of forest road and tracks with the exception of two coupes in the east of the forest where a road extension is needed to access future felling. This will require EIA screening and is indicated on the Operations map.

## Landscape and Topography

### Harwood – National Character Area Profile

National Character Area (NCA) Profiles are a series of guidance documents produced by Natural England which identify areas that share similar landscape characteristics across England. The information they contain supports landscape scale planning and help to inform choices about how land is managed and can change. Each profile includes a description of the natural and cultural features that shape the landscape, how the landscape has changed over time, the current key drivers for ongoing change, and a broad analysis of each area's characteristics and ecosystem services.

Harwood Forest is located within NCA Profile 2 – Northumberland Sandstone Hills which curve across central Northumberland in a series of distinctive flat-topped ridges providing panoramic views of the Cheviots and the coast. The ridgetops and upper slopes are covered with heather and grass moorland broken by large geometric blocks of conifer. Below this is pasture with some arable cultivation on the lower and dip slopes, broadleaved woodland on scarp slopes and along watercourses and a few notable parklands.

### NCA Landscape Opportunities that Harwood Forest delivers

- Ongoing restructuring of Harwood, through the period of the last two forest plans is softening the landscape impact of the forest. For example, along the Fallowlees Burn and River Font, shown below, where a mix of open space, establishing broadleaved woodland and retained Scots pine is enhancing these riparian zones.



- 47ha of open woodland habitat created at the 'neck' of Simonside is providing habitat enhancement and linkage with the Simonside Hills SSSI.
- Designation as a red squirrel reserve means that management is undertaken with this species in mind, avoiding clear-felling where silviculturally practicable and diversifying species avoiding large-seeded tree species.
- The wealth of prehistoric and medieval archaeology is recognised and protected. Maintenance and protection of Scheduled Monuments.
- Species diversification is being introduced at restocking contributing to climate change resilience.
- Approx. 60ha of previously afforested raised blanket mire across three sites have been restored and are being managed as permanent open habitat. 13ha is scheduled to be felled from the remaining site during the period of the plan.
- Access provision and recreational facilities are provided such as the car park and forest trails at Simonside.



Extensive conifer forests such as Harwood are recognised features in the NCA. Provision of soft wood remains important in this NCA and Harwood is designated as a Red Squirrel Reserve. Ongoing restructuring and species diversification is lessening the impact on the landscape and increasing biodiversity value.



The landscape of Harwood can be split into 3 main topographic zones:

*Simonside:* the northern section is dominated by the steep slopes of Simonside. It is also prominent in the view to the South from the town of Rothbury, and its internal structure provides the backdrop to the main recreation use of the forest. The Western boundary does form a linear intrusive feature vertically up the slope. This is however the main windfirm boundary and if continuous cover silviculture is to be employed it may only be mitigated slowly through thinning

*The neck of Simonside:* a transitional zone south of Simonside moving from the more rugged appearance of mountain to the rolling upland of the main body. The impact of trees on the skyline viewed from the north has significantly improved as clearfelling and restocking to a softer line progresses.

*Main body of Harwood:* Rolling upland landform incised east to west by three main watercourses. Though prominent in the view South from Simonside it tends always to be viewed in the oblique.

### Heritage features and Historic Landscape

A significant number of sites of archaeological interest also exist within the area of the plans, a number of which are scheduled (see Table 1). All the scheduled sites are well documented and covered by management plans. Sites will be opened up appropriately as felling progresses, and any newly discovered sites will be recorded and notified to the county archaeologist.

Table 1 - Harwood - Scheduled Ancient Monuments		
SAM Number	Site Name	Site Type
20892	Cairn WNW of old stell crag	Bronze age cairn
20893	Simonside cairn	Bronze age cairn
20894	Cairn WNW of old stell crag	Bronze age cairn
20895	Cairn south of Great Tossion	Bronze age cairn
21035	Manside settlement	Iron age defended settlement and medieval cross
21038	Harwood head farmstead	Romano-British farmstead

Assisting this process Northumberland National Park previously carried out a survey (where access permitted) of an area of Simonside which contains significant archaeological interest. Archaeological records have been updated in light of this survey and it has been agreed that the forest district will notify the National Park archaeologist prior to carrying out any harvesting within the area. A single undesignated boundary stone feature is located in Elf Hills which will be protected during future harvesting and restocking operations.



SAM 20894 Cairn WNW of Old Stell Crag



SAM 21038 Romano-British Farmstead, Harwood Head

## Historic Landscape

The characteristic Fell Sandstone of the area is a thick sequence of sandstones deposited in a series of mainly south-east flowing rivers during Carboniferous times, about 300 million years ago. Erosion of the weaker rocks has produced the highly distinctive series of landforms such as the Simonside Hills crags. For centuries the moorlands, many of which were cleared in the Neolithic and Bronze Age to provide grazing land, have been used for grazing. Neolithic standing stones and burial cairns, 'cup and ring' marked rocks, and bronze-age burial and field clearance cairns are common in the area. Later prehistoric features include a number of Iron Age hill forts, enclosed farmsteads, shielings and upland grazing pastures, the more accessible of which developed as farmsteads in the medieval period.

Village-based settlements and the market towns of Rothbury and Alnwick were established in the 12th to 14th centuries, with the area dominated by arable cultivation. The surviving remains from the medieval period, which include deserted villages, individual settlements and ridge-and-furrow cultivation patterns, still make an important contribution to the character of the hills today and suggest a period of greater population before the border conflict, raids, famines and epidemics of the 13th century onwards drove people from the area. The Union of the Crowns in 1603 paved the way for more settled conditions with an increase in the droving of cattle from Scotland and improvements in pasture and arable production by estates. There was localised industrial activity from the medieval period onwards such as iron working, coal mining and water milling. Extensive estates and designed parkland were built in the later 18th and 19th centuries such as Chillingham and Cragside. Many of the estates planted conifer blocks and shelterbelts in the late 19<sup>th</sup> and early 20th centuries. In the 1920s the area was targeted for its suitability for large-scale commercial conifer planting; Forestry Commission plantations such as Harwood were established and geometric shapes dominated the landscape. Today forestry objectives recognise the inclusion of wider benefits like nature conservation, landscape, heritage and public access and 'softening' the earlier impact of these plantations is being achieved through ongoing felling and restructuring programmes, incorporating open space and habitat diversity into future commercial crop rotations.

## Part 2 Analysis and Concept

The factors outlined in Part 1 present various opportunities and issues.

Factor	Opportunities	Issues
Current species	Growth rates are good with an average yield class of 12 though the range of yield class is wide from 2 to 22	Spruce may become less viable in future rotations due to climate change projections. Larch and ash are both at risk from disease.
Management type	Combination of clearfelling and Continuous Cover Forestry (CCF) in areas of lower wind hazard classification. Long term retention of native broadleaved restocking. Maintain CCF in Simonside.	At higher elevations felling coupes are dictated by existing windfirm boundaries. Some coupes from the previous plan were not felled and rescheduling and minor coupe boundary changes are required. Elf Hills will need to be felled as one coupe due to high WHC.
Landscape Character	Several opportunities exist to contribute toward the NCA recommendations for landscape change: Continued management of red squirrel reserve with this species particularly in mind. Continued maintenance of open habitat from key areas of deep peat previously cleared. Maintaining an economically viable forest that contributes to the production of softwood supporting the timber processing sector in the region. Conserving the historic features and landscape of the forest. Ongoing species diversification in response to climate change. Ongoing restructuring of plantations to 'soften' the impact on the landscape, to include more open space and rides and increasing the	An appropriate balance of objectives is needed to maintain an economically viable forest that continues to support its status as a red squirrel reserve.  The design concepts map indicates several intrusive external boundaries which do not fit well in the landscape.

	broadleaved component especially along rides and watercourses. Continuing to provide recreational provision to locals and visitors to the area.	
Biodiversity	Further expansion of open woodland habitat particularly adjacent to the Simonside Hills SSSI. Complete the removal of conifer from previously identified raised mires. Manage natural regeneration on permanent open areas. Maintain a healthy and viable red squirrel population.	Natural regeneration of spruce on cleared raised mire sites and some areas previously identified as permanent open habitat. Grey squirrels present a threat to the native population of red squirrels.
Access/Roading	Generally adequate internal network of forest roads	New roadline required in east of the forest – EIA screening will be required prior to implementation
Historic Landscape	Area of significant archaeological interest in the Northern area of Harwood; six Scheduled Monuments. Potential to enhance historic landscape character in the area with sympathetic restocking plans.	Historical interests need to be incorporated into operational planning and restocking proposals need to be flexible in response to the discovery of historic features through the restructuring process.
Pests and disease		Deer present challenges to natural regeneration and restocking. Ash and Larch need to be monitored for plant health risk.
Future Species/ Climate change	Opportunity for wider species diversification. Spruce likely to remain viable until at least 2080 according to high emissions climate change projections. Areas of low wind hazard provide best potential for diversification through natural processes.	Impacts of climate change may mean that some species could become less suitable in the future.
Public access	Regular informal recreation use particularly in the area around Simonside.	Review impacts of recreational use such as path erosion and car parking.



**Part 3 Objectives and Proposals**

The following objectives have been identified based on FEE National Policy and NEFD Strategic Plan

Forest District Strategic Goal	How Forest Plan delivers
<p><b>ECONOMIC</b></p> <p><i>'we will optimise the financial return from timber production compatible with the achievement of other district objectives whilst complying with the UK Forestry Standard and meeting the requirements of the UK Woodland Assurance Scheme'</i></p>	<p>Over the next 10 years of approval we will fell approx. 230,000m<sup>3</sup> of timber through either clearfelling or thinning operations.</p> <p>Thinning and possible underplanting of CCF areas.</p> <p>Construct new forest road to facilitate harvesting of inaccessible coupes (see Operations map)</p>
<p><b>NATURE/HERITAGE/LANDSCAPE</b></p> <p><i>'we will continue to diversify the age class structure of our even-aged woodlands and increase the value of all our woodlands and forest for wildlife'</i></p> <p><i>'we will ensure that rare and threatened habitats are protected and managed to maintain or enhance their conservation value'</i></p>	<p>Maintain Red Squirrel Reserve. Continuous Cover management at Simonside and wider age and species diversification throughout the forest.</p> <p>Through felling, thinning and/or restocking plans 1) create linkage of open habitat and broadleaved woodland particularly along riparian corridors, adjacent to historic features, public access routes and areas of raised mire and 2) continue to mitigate the landscape impact of intrusive external boundaries. Maintain open character of previously cleared raised mire sites and complete removal of conifer from the final site within the period of the plan.</p> <p>Maintain and continue to enhance the area of open woodland habitat along the 'neck' of Simonside and adjacent to the Simonside Hills SSSI</p>

	<p>through the ongoing restructuring process with a 'long term' objective for open mixed woodland.</p> <p>Protect Scheduled Monument's (SM's) and maintain/enhance open historical landscape character around known heritage features during ongoing restructuring of the forest.</p> <p>Ensure that known features of historical interest are protected and enhanced during the ongoing restructuring of the woodlands and opportunities to identify as yet unknown features are incorporated into operational planning.</p>
<p><b>PEOPLE</b></p> <p><i>'we will utilise the land and resources at our disposal to assist communities close to our forests to enhance their environments and hence their quality of life'</i></p> <p><i>'we will provide public access to all our forests and woodlands where there are no legal or safety restrictions...'</i></p>	<p>Maintain existing network of public and permissive paths within the woodlands.</p> <p>Maintain provision of public access to Simonside including the crags for recreational climbing use.</p>

#### Part 4 Monitoring plan

The objectives identified in section 3 will be monitored in the following ways;

Objective	Criteria for success	Assessment
<p><b>ECONOMIC</b></p> <p>Timber production</p> <p>Sustainable economic regeneration</p>	<p>Marketable parcels of timber on offer to the market</p> <p>Maintain timber harvesting access and infrastructure</p>	<p>Contract and sales records</p>
<p><b>NATURE/HERITAGE</b></p> <p>Restructuring</p> <p>Heritage/Landscape</p>	<p>Delivery of Forest Plan felling/thinning/restocking proposals</p> <p>Protection of SAM's and maintain/enhance open historical landscape character around known heritage features during ongoing restructuring of the forest</p>	<p>Five yearly Forest Plan review</p> <p>Scheduled Monument plan reviews linked to Forest plan 10 year revision process.</p>
<p><b>PEOPLE</b></p> <p>Visual enhancement to visitors.</p>	<p>Maintenance and ongoing restructuring of the woodlands.</p>	<p>Five year Forest Plan review.</p>

#### Part 5 Forest Plan Maps

- Location – 1:50,000 scale showing location in context of other woodland in the local area
- Current Species – species composition in 2017
- Landform – indicating topography of the woodlands and local area
- Yield Class – indicating the productivity of the timber
- Wind Hazard Classification – indicating the windiness of the sites
- Conservation and Heritage – statutory and non-statutory conservation and heritage features
- Access and Services - formal public rights of way, FC access and local services
- Design Concepts – broad concepts of future management
- Operations Proposals – showing felling proposals, areas of Long Term Retention and Continuous Cover and new roading proposals
- Future Species – representing the long term vision for future species composition



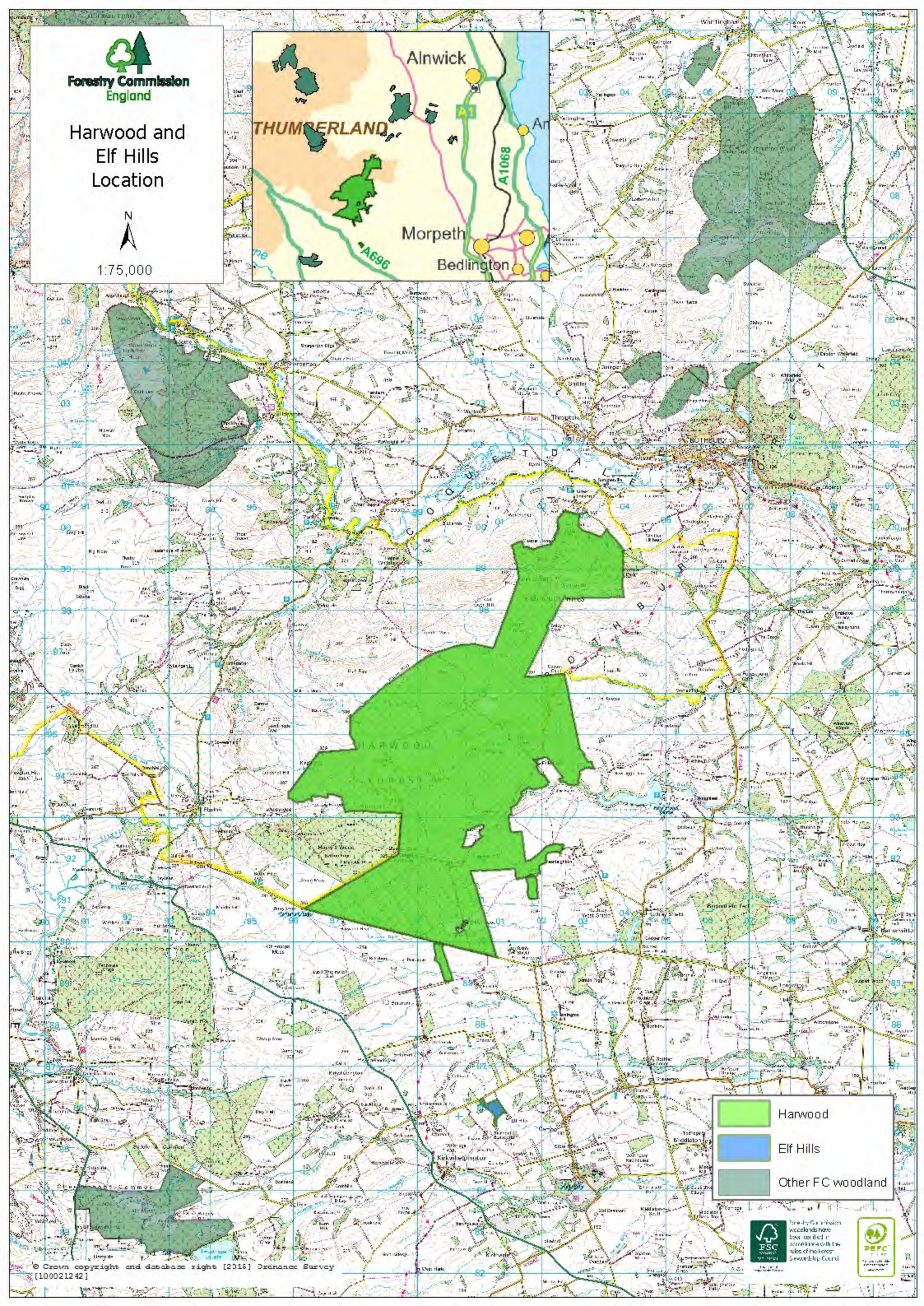


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# Harwood and Elf Hills Location



1:75,000



	Harwood
	Elf Hills
	Other FC woodland







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# Harwood and Elf Hills Current Species



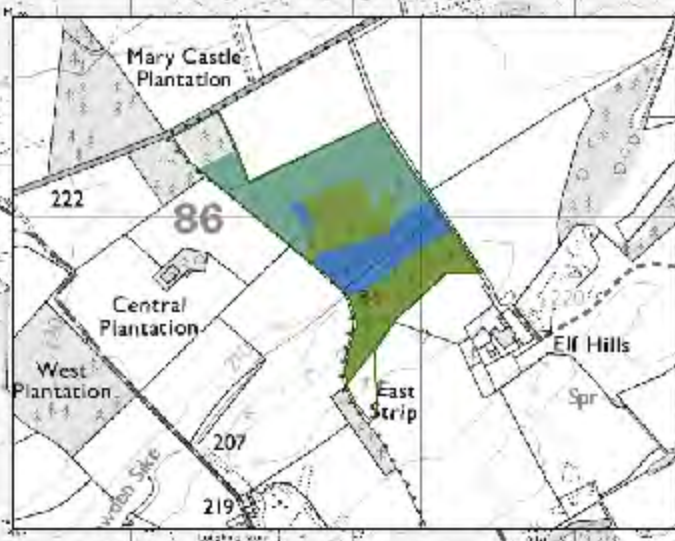
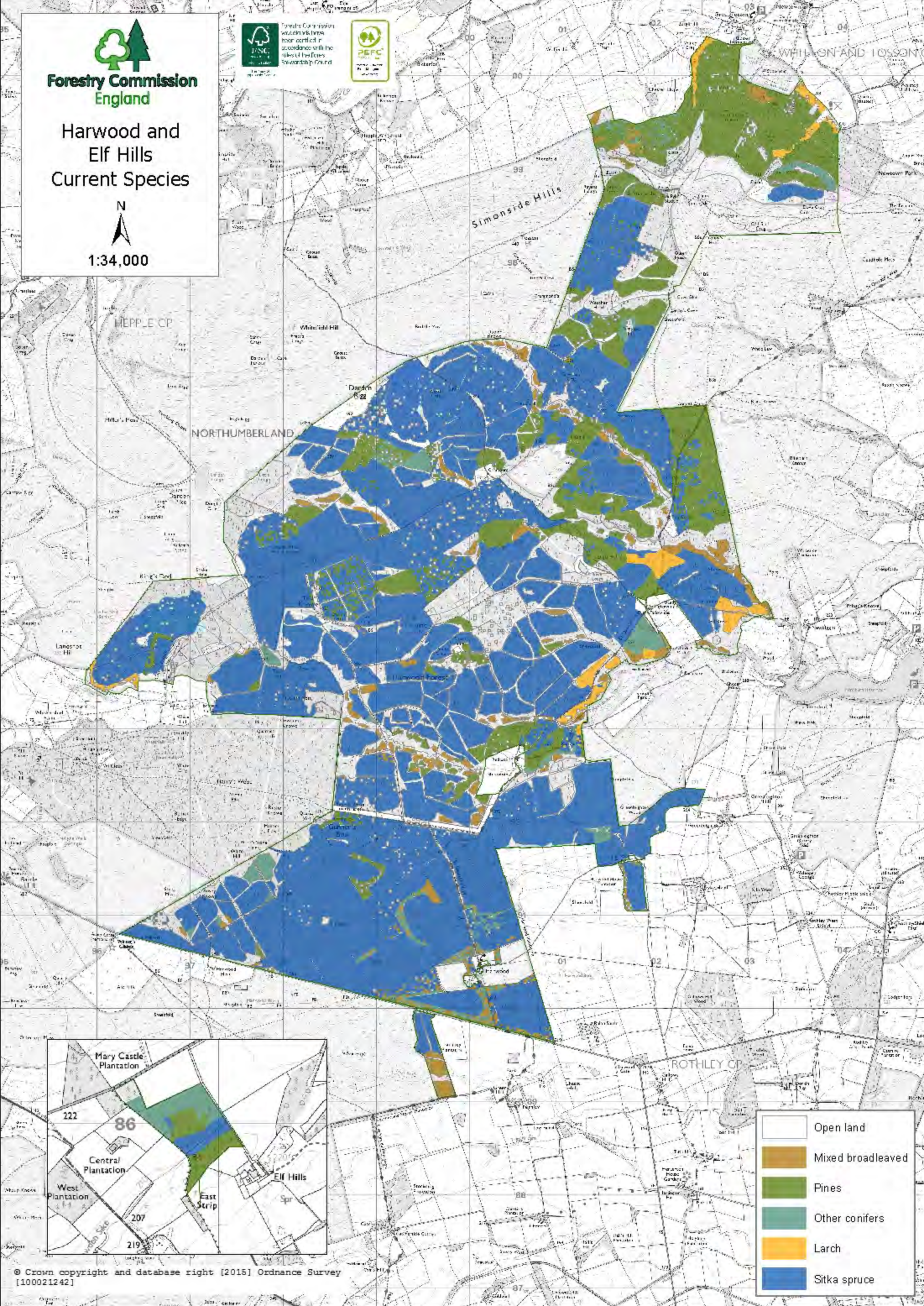
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wood products have  
been certified in  
accordance with the  
rules of the Forest  
Stewardship Council



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	Open land
	Mixed broadleaved
	Pines
	Other conifers
	Larch
	Sitka spruce





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# Harwood and Elf Hills Landform



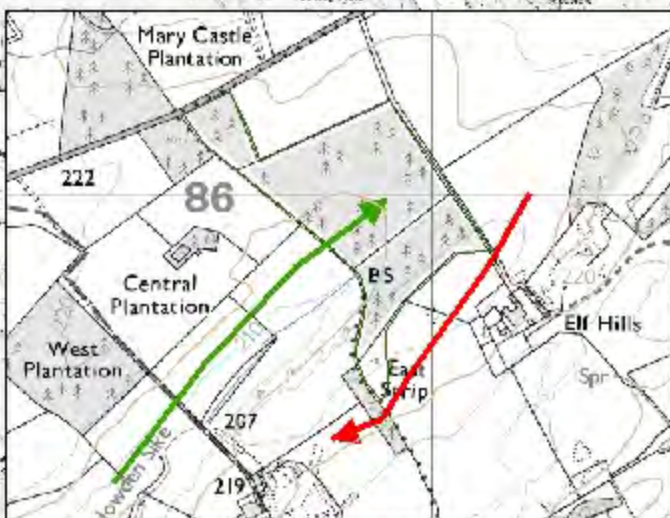
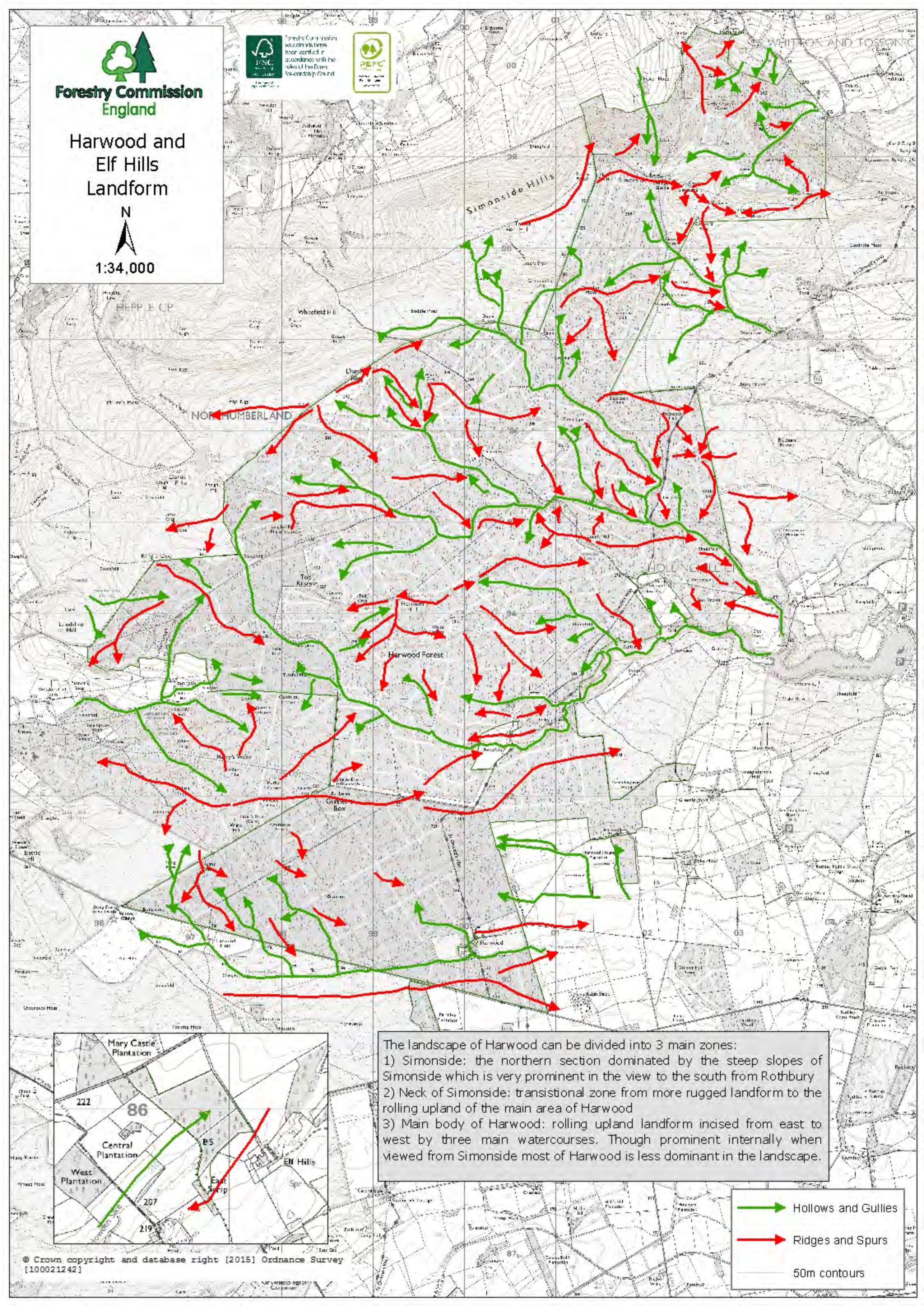
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Stewardship Council



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The landscape of Harwood can be divided into 3 main zones:  
1) Simonside: the northern section dominated by the steep slopes of Simonside which is very prominent in the view to the south from Rothbury  
2) Neck of Simonside: transitional zone from more rugged landform to the rolling upland of the main area of Harwood  
3) Main body of Harwood: rolling upland landform incised from east to west by three main watercourses. Though prominent internally when viewed from Simonside most of Harwood is less dominant in the landscape.

- Hollows and Gullies
- Ridges and Spurs
- 50m contours





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# Harwood and Elf Hills Yield Class



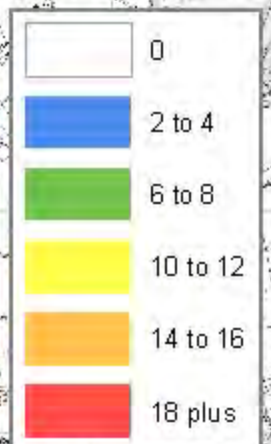
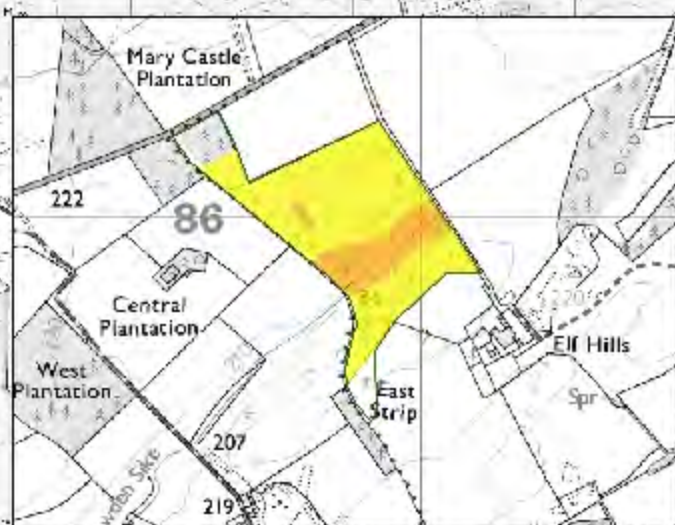
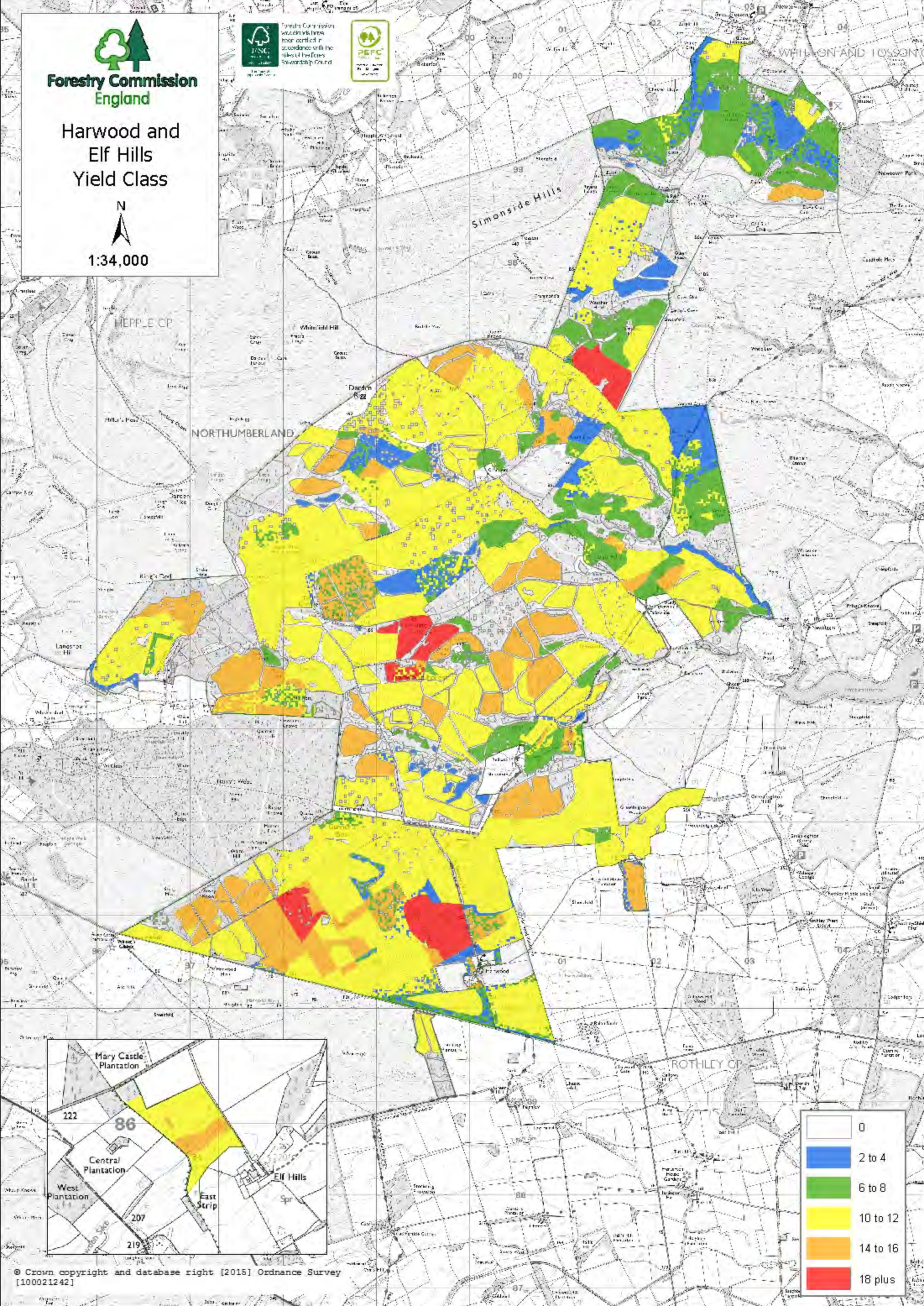
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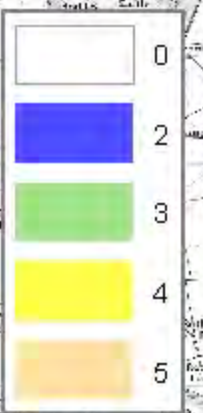
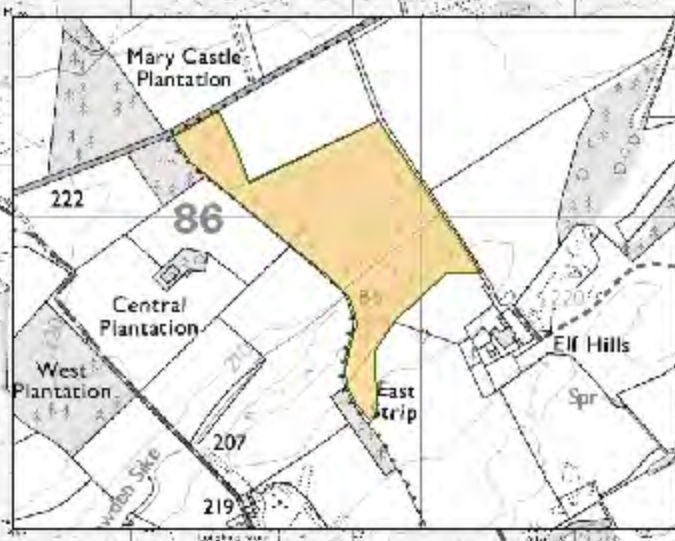
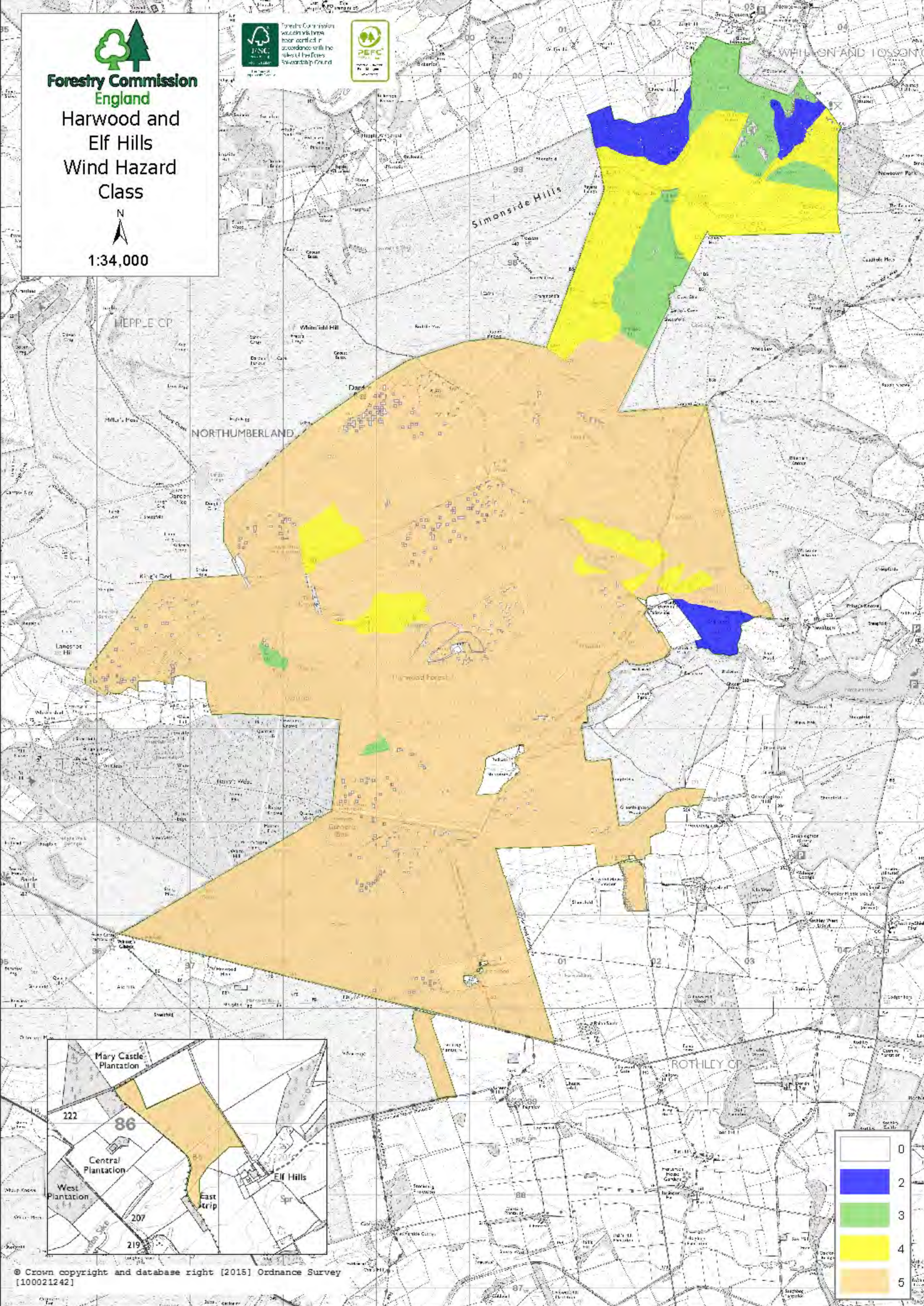




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Harwood and  
Elf Hills  
Wind Hazard  
Class



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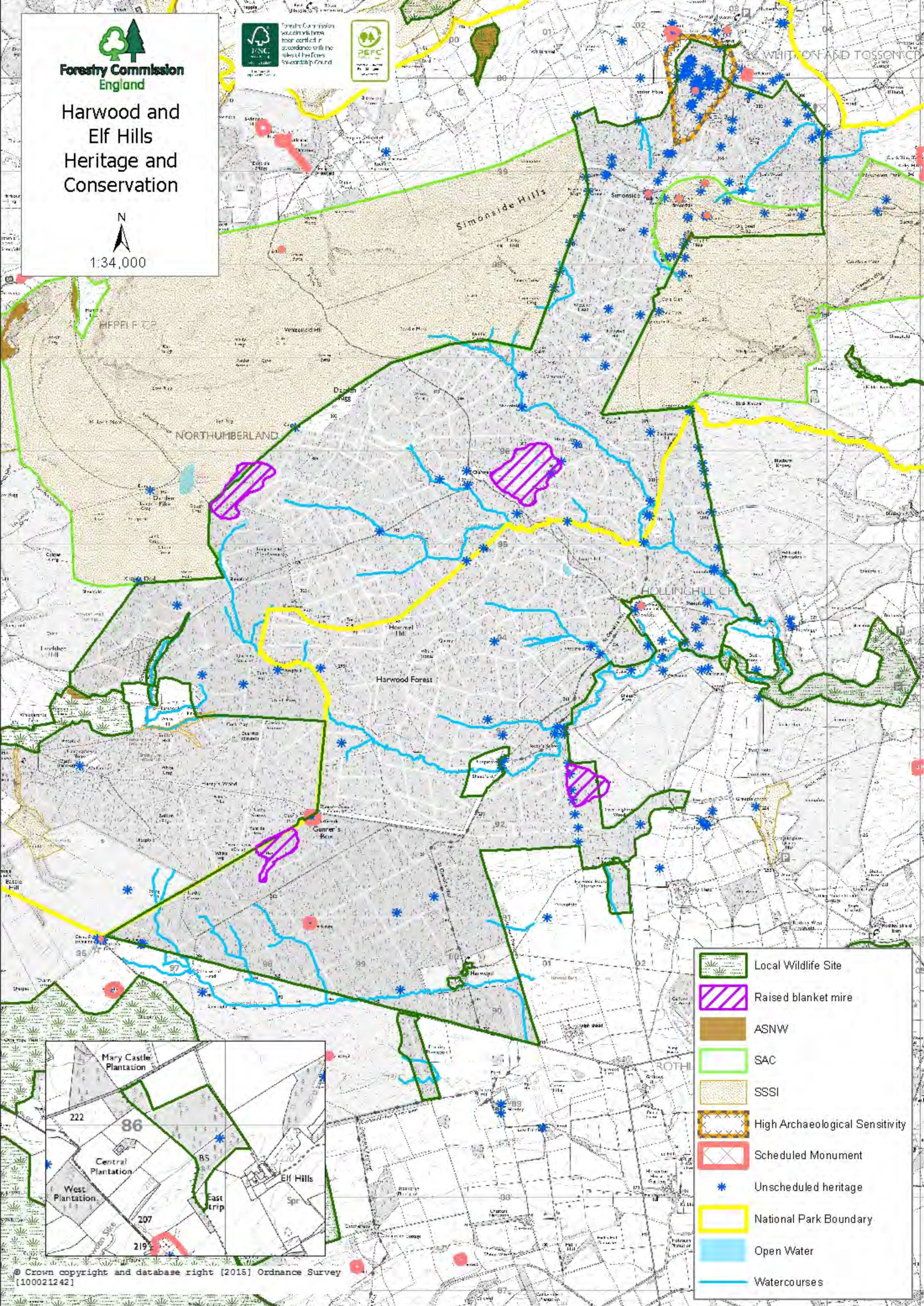


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# Harwood and Elf Hills Heritage and Conservation



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-  Local Wildlife Site
-  Raised blanket mire
-  ASNW
-  SAC
-  SSSI
-  High Archaeological Sensitivity
-  Scheduled Monument
-  Unscheduled heritage
-  National Park Boundary
-  Open Water
-  Watercourses





**Forestry Commission  
England**  
Harwood and  
Elf Hills  
Recreation,  
Access and  
Services



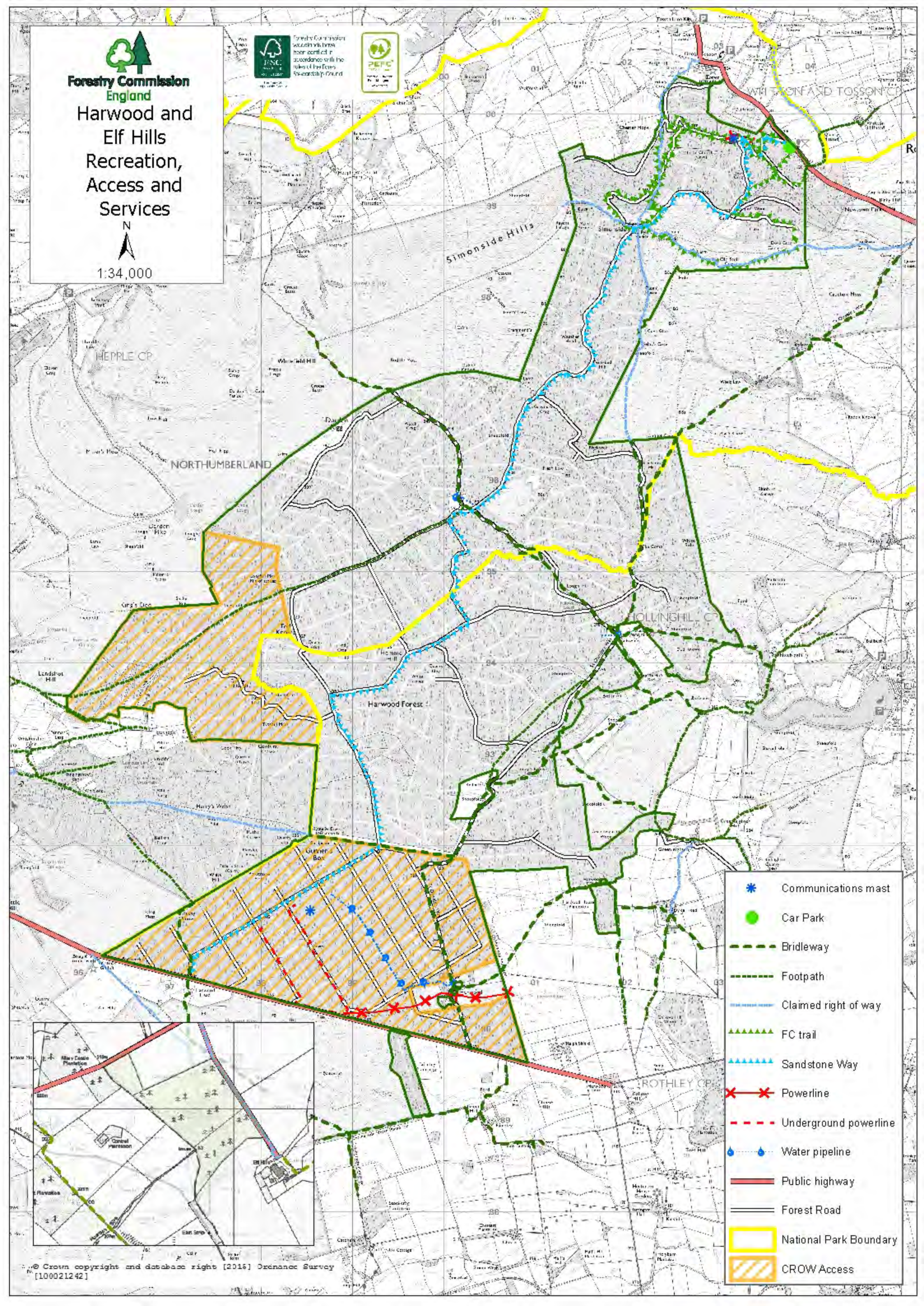
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- Communications mast
- Car Park
- Bridleway
- Footpath
- Claimed right of way
- FC trail
- Sandstone Way
- Powerline
- Underground powerline
- Water pipeline
- Public highway
- Forest Road
- National Park Boundary
- CROW Access







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England

# Harwood Forest Design Concepts



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### Main Watercourses

These gully and hollow features provide the greatest opportunity for the introduction of broadleaf species and internal open space within the main productive area

### Intrusive External Boundaries

Visible external boundaries that do not fit in the landform, aim to make them more sympathetic either through thinning or at the time of restocking

### Blanket Mire

A number of raised mires are present representing a valuable habitat resource. Where a crop is currently present this should be removed at clearfelling and mire maintained as open habitat

### Forest Roadside Edge

External boundary with mixed habitats. Maintain varied edge strip at clearfell and increase species diversity at restocking

### Simonside

Area of greatest visual impact which is also significant for recreation and archaeological interest and contains the most stable sites. This allows the use of Continuous Cover silvicultural systems to maintain both external and internal landscape value, with a slow progression towards a more mixed species woodland

### Open Woodland Habitat

Open woodland habitat through the neck of Harwood created by previous heavy thinning with a shrub and herb layer now developing. Allow to develop through natural processes

### Future Open Woodland Habitat

Long term objective to create an area of mixed open woodland in the area north of Simonside Hills SSSI

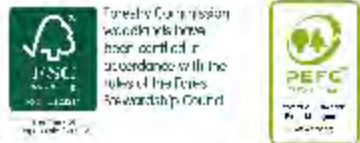
Area of High Archaeological Sensitivity  
This area contains numerous sites of significant archaeological interest, and operational planning should include liaison with NNP archaeologist. Numerous scheduled monuments are located throughout the forest

### Restructured Productive Zone

Main productive area is less sensitive within the wider landscape and significant restructuring has taken place, though there are further opportunities within the southern section to diversify crops age and structure at clearfelling and restocking. The dominant species will be Sitka Spruce which assists in buffering against the establishment of grey squirrels.

### Harwood Village

The forest adjacent to the village is important both visually and as shelter. The previous unstable crops are now removed. The woodland adjacent to the village should be maintained as mixed retention crops







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England

# Harwood and Elf Hills Operations

*Paul Clavery*



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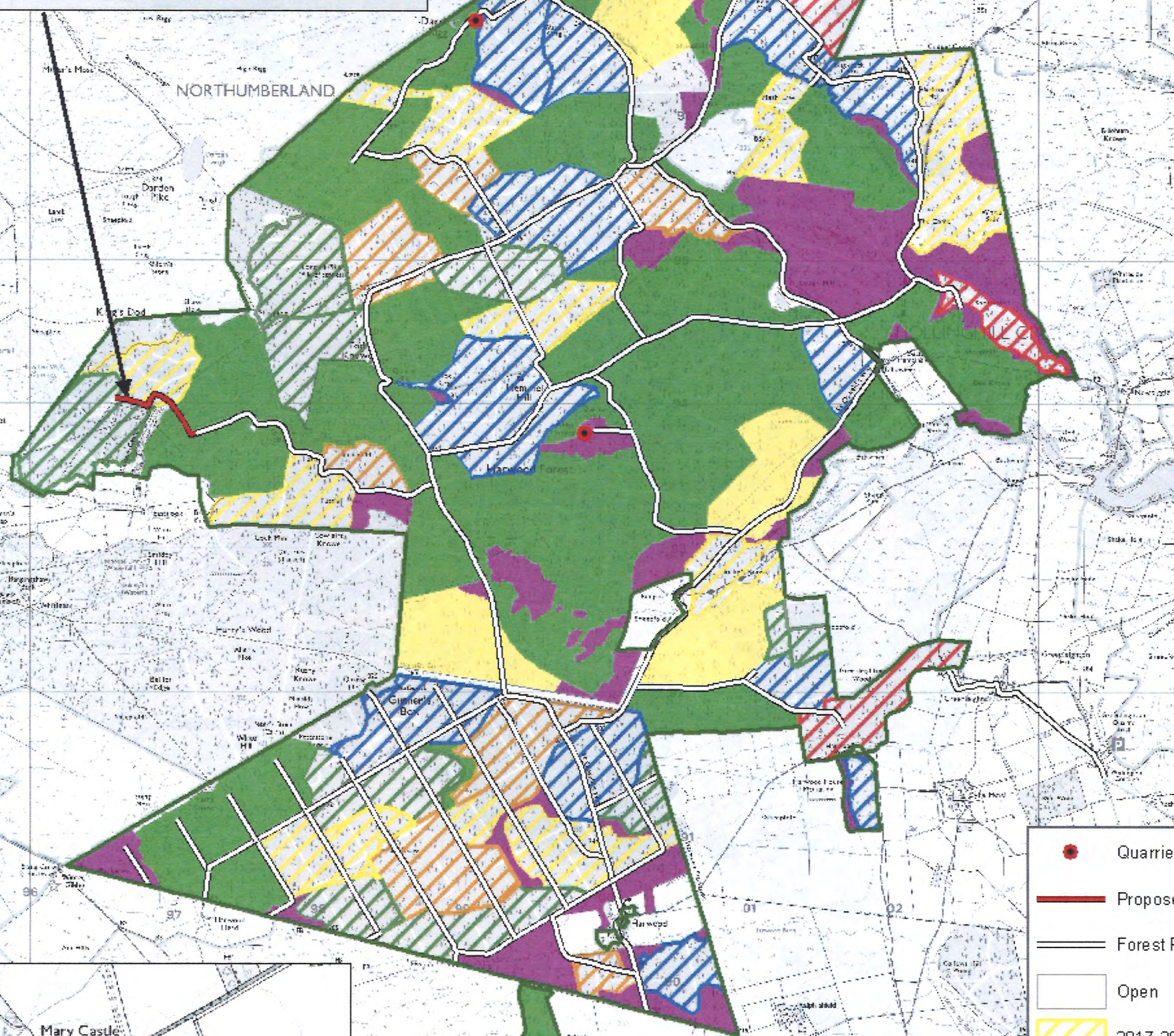


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Forest Stewardship  
Council

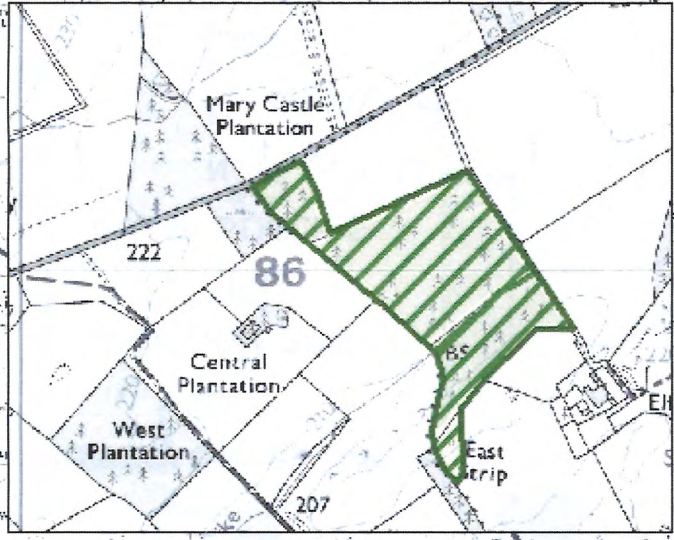


PEFC  
Programme for  
the Endorsement  
of Forest  
Certification

Proposed new forest road extension.  
EIA screening application to be  
submitted to Forest Services at the  
appropriate time prior to implementation



- Quarries
- Proposed new road
- Forest Road
- Open
- 2017-2021
- 2022-2026
- 2027-2031
- 2032-2036
- 2037-2041
- 2042-2046
- 2047 onwards
- CCF/Min Int





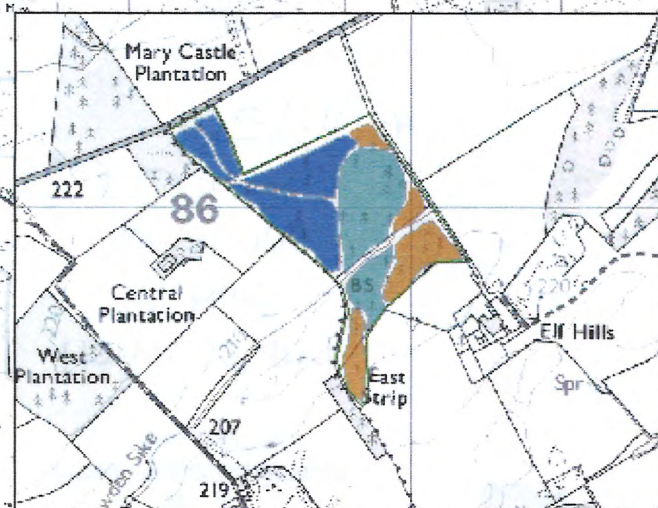
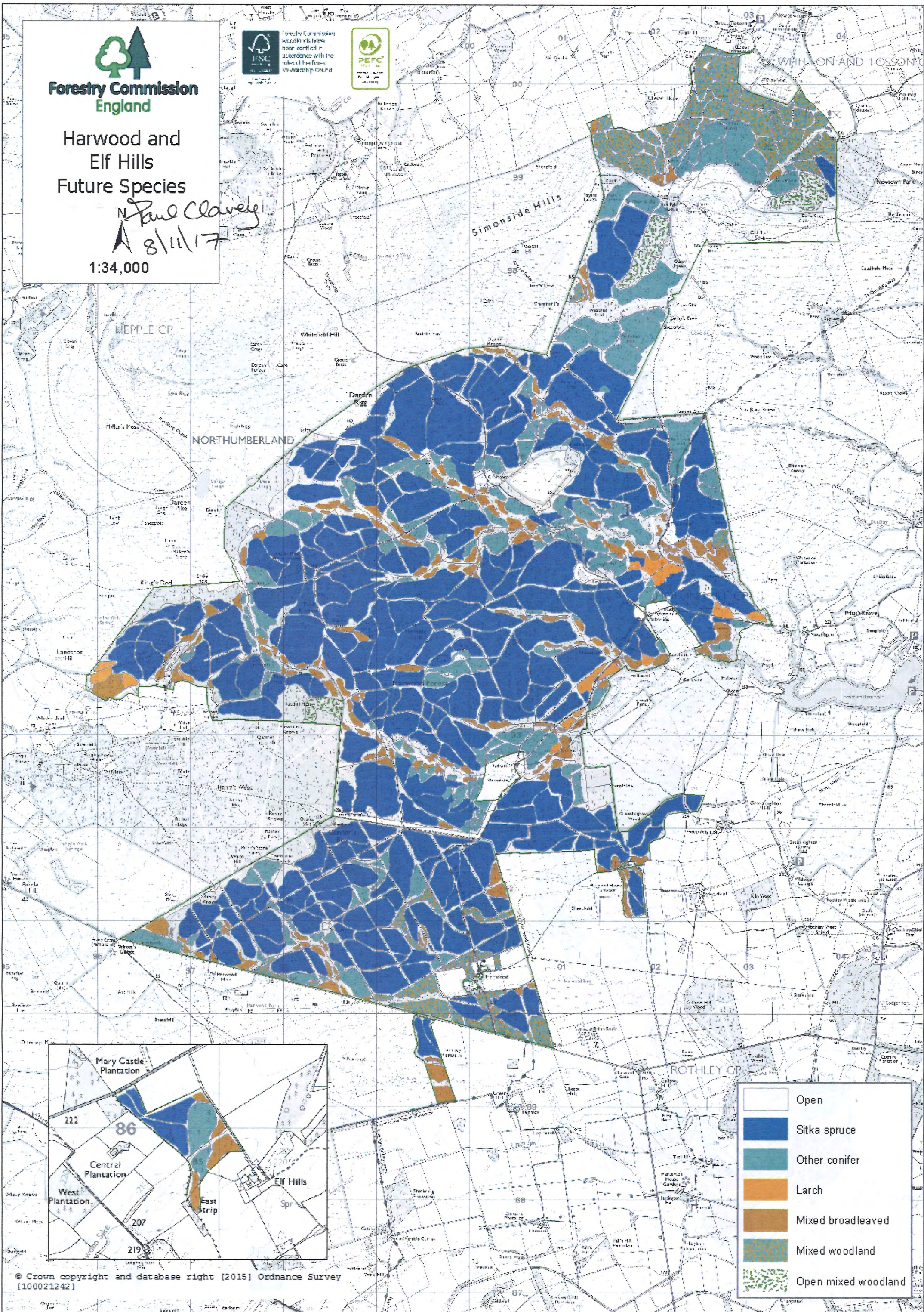


Forestry Commission  
England

# Harwood and Elf Hills Future Species

*N Paul Clavey*  
8/11/17

1:34,000

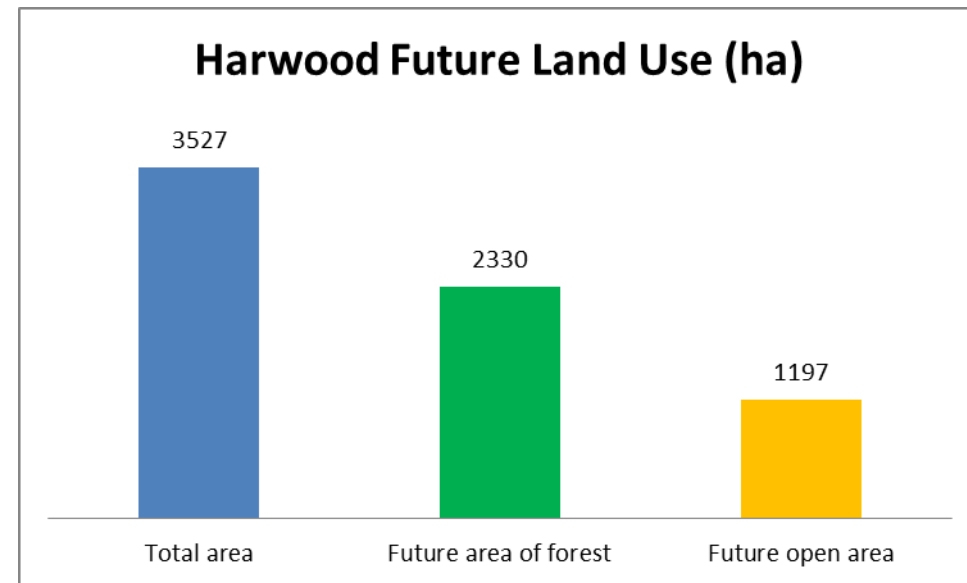


	Open
	Sitka spruce
	Other conifer
	Larch
	Mixed broadleaved
	Mixed woodland
	Open mixed woodland

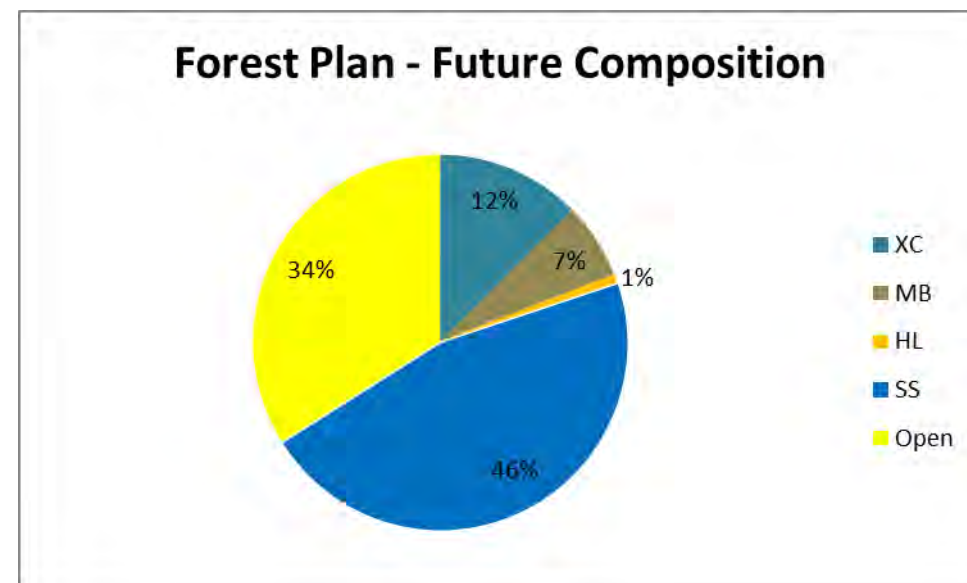


## Part 6 Forest Plan Outcomes

### Future Land Use and Species Composition



The species percentages (of net-planted area) for the indicative restocking plans are presented below:



These percentages of future species composition comply with UKFS and UKWAS (65% primary species (Sitka spruce), 5% mixed broadleaves and 10% open space). Note: the increased amount of open space reflects restoration of raised blanket mire sites, open ground within areas of minimum intervention riparian woodland and increased open woodland habitat particularly adjacent to moorland SSSI.

At restocking, as indicated by the indicative restocking plan, the opportunity is being taken to restock both to mitigate the straight boundaries of the earlier planting, increase the open area, and introduce broadleaf species into the restocking. Where broadleaf species are planted the species will be chosen on the basis of their naturalness to the site (National Vegetation Classification), with the exception that no large seeded broadleaf species will be introduced at restocking. Restocking plans are indicative and proposals may need to be refined as the sites are clear felled and features that are difficult to assess while tree cover is present become clearer. In addition to these general principles opportunities will be taken to introduce an element of open woodland (see below) adjacent to the open moor where this does not detract from other conservation values.

#### Open woodland

In areas of transition from open moor to high forest the aim is to establish an open woodland type to ameliorate the abrupt habitat change by establishing a low and varied density planting, establishing 300 – 400 trees per ha. The species mix being based on the proportions below.

Species	Approx. %
Birch ( <i>Betula Pubescens</i> )	40 -50
Willow ( <i>Salix aurita</i> )	15 - 25
Rowan ( <i>Sorbus aucuparia</i> )	10 -20
Aspen ( <i>populus tremula</i> ) <sup>1</sup>	5 -10
Alder ( <i>Alnus glutinosa</i> ) <sup>1</sup>	5 -10
Scots pine ( <i>Pinus silvestris</i> )	5 -10
Juniper ( <i>Juniperus comunis</i> ) <sup>2</sup>	0 - 5
1 To be planted in localised areas where suitable ground conditions exist.	
2 Planted only within its known distribution.	

The aim is to establish an uneven spaced tree cover from groups to sparse singletons. There is no formal prescription for the most suitable means of establishing this form of woodland however, being woodland edge habitat, fencing, especially deer fencing, will be avoided where practical to do so. It is therefore

proposed that initially areas identified to be restocked as open woodland will be planted at a density higher than the finally required stocking, with the sporadic form of woodland developing through natural losses. Natural regeneration will also be accepted where it does not establish to a level which could diminish the habitat value

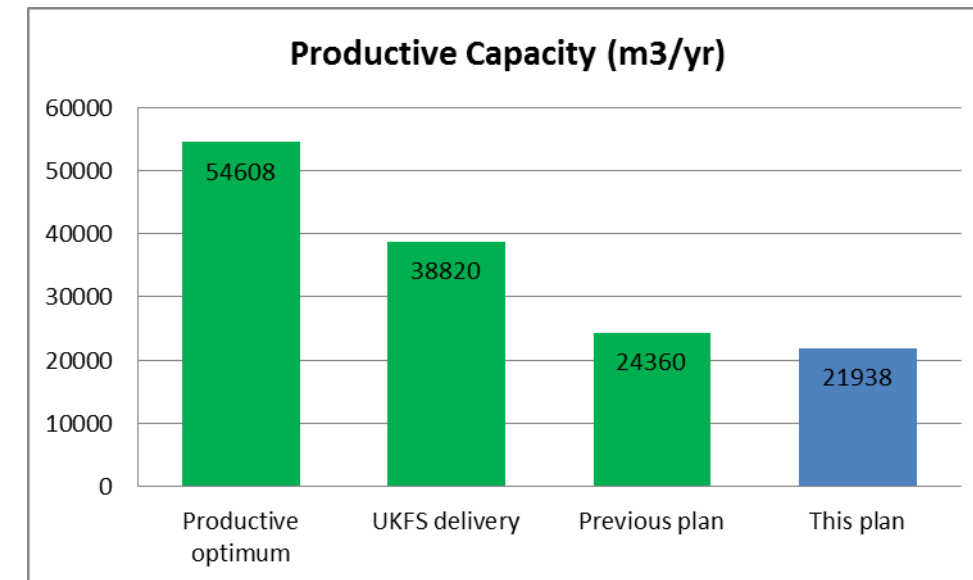
### Productivity

The productive potential of the forest is optimised through timber production achieved through delivery of the harvesting plan and delivery of ecosystem services and other non-market benefits included in biodiversity, climate change mitigation, water, people and landscape. This is represented in the Productive Capacity Analysis below:

The graph below shows the relative productive capacity (m<sup>3</sup>/year) of Harwood forest only based on average yield class as a comparison between the following scenarios;

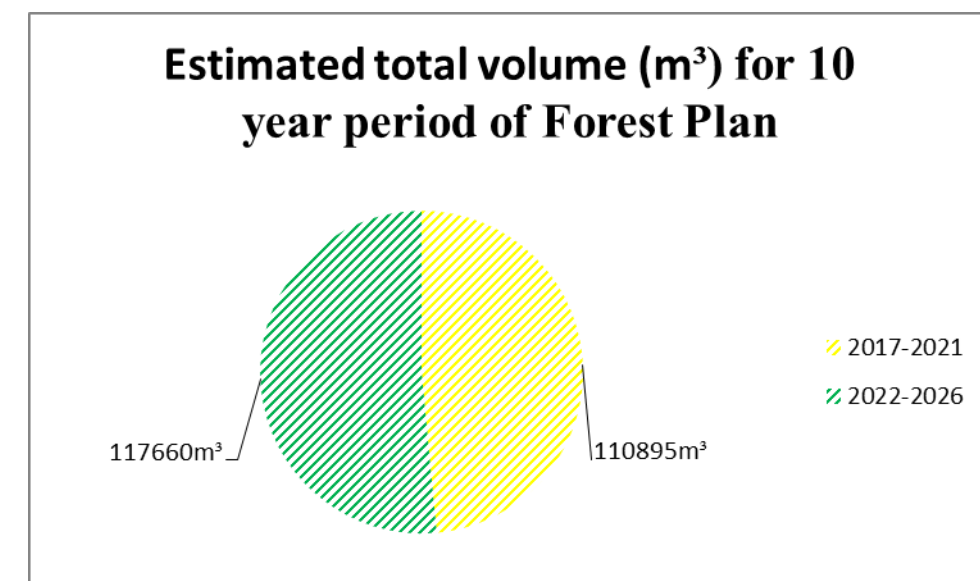
1. Productive optimum – productive capacity assuming that all the productive area (3413ha i.e. total area less agricultural and implantable land) is planted with the optimum commercial species suited to the site (i.e. Sitka spruce YC 16).
2. UKFS delivery – productive capacity achievable through minimum compliance allowing for designated sites and a species percentage mix comprising 65% primary species (SS YC 16), 20% secondary species (MC YC 14), 5% broadleaved (YC 4) and 10% open space.
3. Previous plan – productive capacity achievable based on a productive area of 2575ha incorporating current progress toward wider conservation and landscape objectives i.e. 20% open space and species percentage mix comprising 46% primary species (SS YC 16), 13% MC, 7% broadleaved).
4. This Forest Plan – productive capacity based on the proposed future productive area (2319ha i.e. 34% open) on completion of objectives with a percentage species mix for this plan.

Note: The difference between UKFS and Forest Plan reflects the increased open ground associated with objectives for blanket mire restoration, transitional open woodland habitat creation, enhancing the historic landscape around Scheduled sites, and areas of open space within riparian broadleaved corridors.



### Timber production

The felling plan aims to achieve a sustainable yield of timber whilst balancing the conservation, landscape and recreation management objectives of the forest within the constraints of both the current status of windthrow and its future management. Through the ten year approval of the plan we will harvest approximately 230,000m<sup>3</sup> of timber. Average timber production per period is shown below:





## Landscape Appraisal

Landscape considerations from the previous plan focused on the impact of clearfelling crops on the main slope of Simonside (below) and subsequent adoption of Continuous Cover silviculture in this highly visible part of the forest. As there are no proposals to change from this management regime no further landscape analysis is presented in this plan.



With respect to the wider forest area Harwood is an important red squirrel reserve and timber resource in the region, factors recognised in the NCA profile description. Additionally ongoing wider plan objectives are contributing to the guidelines for landscape change, for example; mitigating the impacts of straight forest boundaries through the felling and restructuring program, future planting of 'open woodland' habitat where high forest abuts open moorland and management of areas of relatively stable crops by continuous cover silviculture thus protecting the landscape character of areas such as Simonside. Internally an increase in open space and mixed broadleaved woodland along riparian corridors, open space around heritage features and areas of cleared raised mire will enhance the historic landscape significance of important areas within Harwood through future rotations.

## The United Kingdom Forest Standard (UKFS)

The UKFS is the reference standard for sustainable forest management in the UK. The UKFS is supported by a series of guidelines which outline the context for forestry in the UK, defines standards and requirements and provides a basis for regulation and monitoring. These include General Forestry Practice, Forests and Biodiversity; Climate Change, Historic Environment, Landscape, People, Soil and Water.

Harwood Forest Plan is able to demonstrate that relevant aspects of sustainable forest management have been considered and the stated objectives in Part 3 and outcomes in Part 6 show how sustainable forest management will be achieved. The plan provides a clear means to communicate the proposals and to engage with interested parties and serves as an agreed statement of intent against which implementation can be checked and monitored.

In addition to conforming to general sustainable forest management principles UKFS is demonstrated in the following key areas:

Productivity	The productive potential is optimised through timber production achieved through delivery of the harvesting plan and delivery of ecosystem services and other non-market benefits included in biodiversity, climate change mitigation, water, people and landscape. This is represented in the Productive Capacity Analysis graph.
Structure	Future species composition complies with UKFS requirements. Long term structure will improve through linking of permanent broadleaved and open habitats.
Silvicultural	A combination of clearfell and restocking will be continued with Continuous Cover of areas of mixed conifer and broadleaved woodland where crop stability allows.
Biodiversity	Habitats and species are considered during the planning phase. Ecological connectivity achieved by extending and linking areas of broadleaved woodland and open space will ensure that the area is managed with conservation and biodiversity as an ongoing objective.
Climate change	Forest resilience will be enhanced over time through greater species diversity, particularly establishment of alternative conifer species with age and stand structure diversification to help mitigate climate change and disease/pest outbreaks. Ecological Site Classification will be used to identify the most appropriate species at the time of restocking.
Landscape	The planning process refers to the Landscape Character Profile to inform the forest design. Visual sensitivity and consideration to visibility and the importance and nature of views of the woodland from key viewpoints is used to inform shape, landform and scale. Particular emphasis is made on mitigating geometric shapes, symmetry and distinct parallel lines in the landscape through species choice, forest edge and coupe design.

Historic	Historic features are recognised and their safeguard will be routinely incorporated into operational management. The historical landscape setting of important areas are also recognised and being proactively managed in the future.
People	The Forest Plan is consulted with individuals, the local community and organisations with an interest in the management of the forest.
Water	Quality will be protected through adherence to Forest and Water guidelines during harvesting and forest management operations.

### **Longer term management proposals**

The proposals in this plan will lead to a more diverse and resilient forest with a greater range of species and habitats. Substantial areas of alternative conifer species will have been established, and the range of broadleaved species and open habitat will have been extended particularly in riparian and forest edge areas and adjacent to features of historical significance.

Timber production remains a priority and will continue through a clearfell/restock regime with the focus on Sitka spruce but also with the introduction of a much broader range of conifer species and broadleaves. This strategy will contribute toward climate change mitigation and long term forest resilience. In more stable sites the area managed through Continuous cover silviculture will have been expanded.

Public use of the forest will continue to be made available with ongoing maintenance of permissive trails, car parking and public routes as appropriate.