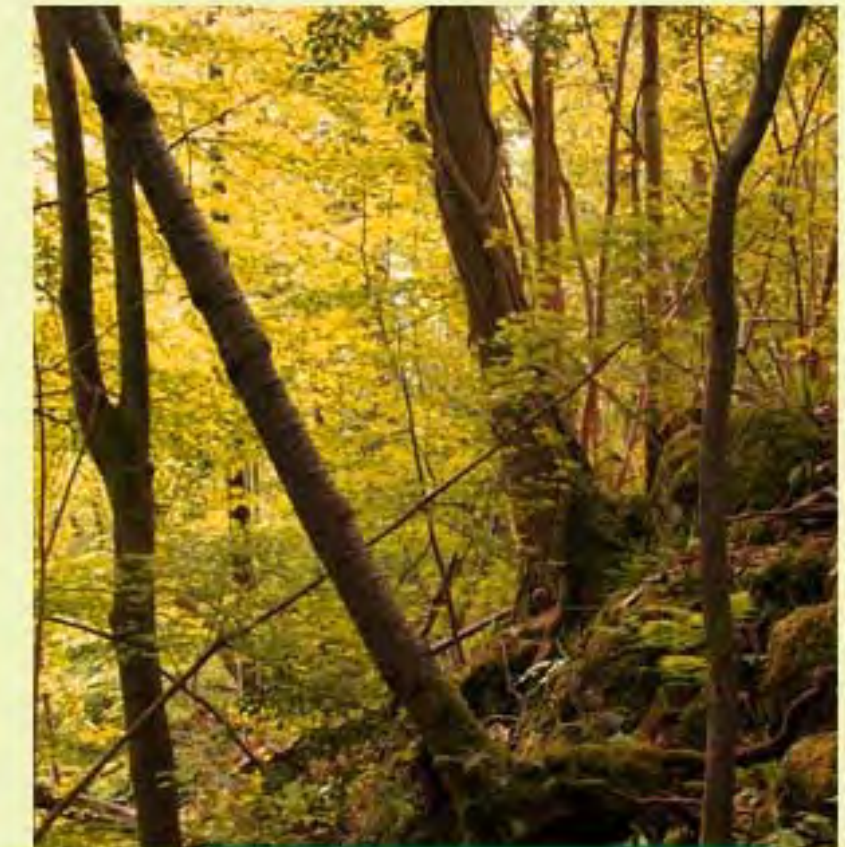


North England Forest District



Arnside and Silverdale Woodlands
Forest Design Plan October 2012



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

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Planning context

This plan sets out the Forestry Commission's plans for a group of woodlands collectively known as the South Cumbria Limestone Woods. It comprises the individual woodlands of Middlebarrow, Hagg Wood, Underlaid, and Marble Quarry. This document replaces three individual plans previously approved by the Forest Authority as follows:

Underlaid FDP/L/36, approved 1/11/06
 Marble Quarry FDP/L/42 approved 20/10/00
 Hagg Wood and Middlebarrow FDP/L/33 approved 1/11/06

Introduction

Analysis of previous plan

The previous plans included a number of main objectives. These are summarised in the table below, together with an assessment of how well these objectives were achieved.

Objective	Achieved?	Comment
Small scale operations and commitment to coppicing some woods for conservation benefit provide potential for development of specialised contractors.	Ongoing	The focus has been on conifer removal, but now can move towards small scale working
Maintain quiet, appropriate low key access on foot and lead occasional visits by interested groups. Do not provide additional recreational facilities so as to avoid compromising conservation interest. Provide simple on-site interpretation of management operations.	Yes	
Manage according to the HAP's agreed with English Nature.	Yes	The management plan agreed in 1997 has been followed closely and is now being updated.
Avoid forest operations which may cause damage to limestone pavements and features.	Yes	Careful site management has avoided damage during harvesting operations.
Remove all exotic conifers over the next 10 years and all exotic broadleaves over the next 20 years and restore the natural vegetation types. The only exception will be a few open grown larch and Scots pine which are an important landscape feature. Once exotics have been removed native woodland will be managed on a continuous cover basis.	Ongoing	The conifers have almost all been removed, with only around 4 hectares remaining.
Re-establish natural vegetation by natural regeneration where possible.	Yes	Native woodland habitats are recovering well on the restored areas.

Maintain deer cull at a level where the ground flora and natural regeneration can proliferate.	Yes	Regeneration of both tree species and ground flora is good on all sites.
Supplementary planting of native species such as yew and juniper will be carried out where is no seed supply using local stock.		Yew is regenerating well. No juniper is being planted at the moment, due to the risk of spreading <i>Phytophthora austrocedrae</i>

Part 1. Background Information

The four woodlands included in this plan are as follows:

Hagg Wood 19 ha; Middlebarrow 22 ha; Underlaid 132 ha; Marble Quarry 58 ha

Total: 221 ha

The freehold of all these woodlands is held by the neighbouring Dallam Estate. In 1962, the Forestry Commission acquired them on a 199 year lease.

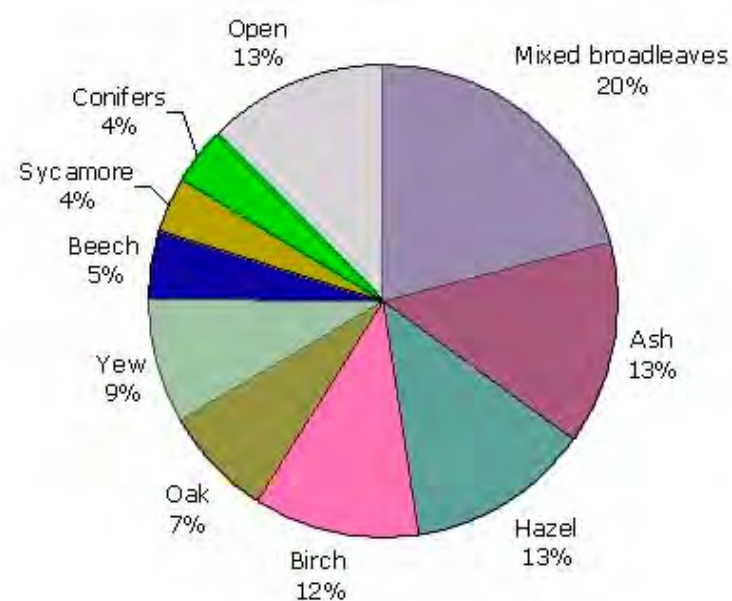
Management History.

Historically, these sites would appear to have been managed on a coppice system, as were the surrounding woodlands. They would have been an important part of the local economy, supplying, amongst other products, charcoal for the Furness iron works. Prior to acquisition by the Forestry Commission, part of Burntbarrow Plantation had been planted with a crop of European larch in 1914, and Corsican pine in 1932. Much standing timber in the woodlands, including hardwoods and conifers, was reserved by Dallam Estate to be sold separately, although some of this was later acquired by the Forestry Commission.

Initially, the Forestry Commission managed the sites for timber production. Areas of bare ground were planted with Corsican pine, and areas of hazel and birch scrub were under-planted with beech with a western red cedar nurse. Some areas were cleared and planted with blocks of conifers such as European and hybrid larch, and Norway spruce. Good quality oak and areas of small-leaved lime were retained as were the groves of yew woodland. Some areas of the native hazel-ash woodland community remained unaltered.

Significant areas of semi-natural woodland survived this intervention, and much of the recent management has been aimed at reversing this process and re-establishing semi-natural habitats. This has involved small scale clear felling, as well as thinning the red cedar nurse crop. At Underlaid Wood some trial areas have been coppiced mainly along rides and also along the wayleave for the electricity powerline.

Current Woodland composition



The chart above shows the progress that has been made in restoring native species. In 2005, the woodlands contained 19% non-native conifers, and this has been reduced to 4% over a seven year period. The percentage of non-native broadleaves is harder to determine as the previous plans grouped all broadleaves together, but this figure has also reduced over the same period.

Landscape

The woods are all contained within the Arnside and Silverdale Area of Outstanding Natural Beauty (AONB).

The particular features of landscape interest in the AONB are the outcrops of Carboniferous limestone, with well developed limestone pavements; the mosaic of contrasting landscape types; the extensive sandbanks along the coast and the dramatic views over Morecambe Bay.

All four woods adjoin other woodland blocks and contribute to an overall network of wooded habitats. Now that restoration is so well advanced, they fit very well into the intimate mosaic of woodland, meadow, pasture, wetland and limestone pavements that characterise the AONB. Although pockets of conifers still persist, the recent felling in Middlebarrow removed the last major block of conifers, and the overall impression now is of a series of mixed age, mixed species broadleaved woodlands, very similar in nature to the surrounding woods.

Biodiversity

The Arnside and Silverdale AONB includes a range of internationally valued and protected wildlife resources, including a variety of limestone habitats, such as lowland mixed ash woodland, species-rich lowland limestone grassland and limestone heath. Large wildfowl and wader populations winter on the estuary, and there is a network of wetlands and mosses in the low lying areas between limestone outcrops.

The woods reflect the diversity of the surrounding area. Habitats present include semi-natural woodland types, calcareous grassland, screes and limestone pavements, both wooded and open. They support significant populations of nationally rare and uncommon plants and have a notable invertebrate fauna. The limestone pavements in particular are botanically very diverse and rank amongst the richest in Great Britain. Marble Quarry has the biggest population of dark red helleborine in Cumbria, whilst Underlaid has the biggest population of rigid buckler fern within low-lying pavements in Great Britain.

The rich diversity of habitats present in the woodland provide ideal conditions for many invertebrates, the best studied of which are the butterflies. Underlaid Wood is particularly important for a number of rare butterfly species including the Red Data Book Species, high brown fritillary, and the nationally scarce Duke of Burgundy fritillary, pearl-bordered fritillary and the northern brown argus. Other species of interest include the purple hairstreak and green hairstreak

The following botanical information is summarised from the SSSI plan prepared in 1997

The deeper grikes of the open pavements contain shade tolerant plants such as herb-robert, dog's mercury, male fern, hart's-tongue fern and hard shield-fern. Weaknesses and cracks in the grike walls are colonised by maidenhair spleenwort and wall-rue (which are abundant throughout the sites and, more occasionally, wall lettuce and hairy rock-cress). The shallower grikes and solution pockets contain the most diverse flora including four nationally scarce species: rigid buckler-fern, angular Solomon's-seal, dark-red helleborine and fingered sedge. Lily-of-the-valley, bloody crane's-bill, and mountain melick are all locally abundant in the grikes, whilst bramble, wood-sage and goldenrod occur frequently.

The grikes also support abundant ash, yew and hazel with frequent sycamore, and occasional rowan, holly, wych elm, silver birch and sessile oak. Where the clints are large and grikes few the character of the pavement remains open, but where the pavements are more dissected, the character is semi-wooded. This relationship between pavement form and plant community is well displayed at all of the sites.

The shrub layer contains abundant hazel, buckthorn, hawthorn and frequent to occasional and dog-rose. Wild privet and spindle are scattered throughout the pavements but rarely grow to any size.

The wooded pavements on the southern and western side of Underlaid Wood are dominated by a yew and small leaved lime canopy. Groves of yew are also present on the wooded pavements in the north and west of Marble Quarry. Here the pavement clints are moss-covered and the ground flora is typically sparse with only the shade tolerant hart's-tongue fern protruding from the grikes. Groves of yew and small leaved lime are also present on limestone screes and rubble in Middlebarrow Wood.

The gutter-like runnels which drain the clint tops are frequently grassy, containing sheep's-fescue, blue moor-grass and dropwort together with salad burnet and hairy violet. The runnels are occasionally deeper and contain species such as ash or the nationally scarce fingered sedge. Flat-bottomed runnels and solution pans are predominantly colonised by biting stonecrop, parsley-piert or rue-leaved saxifrage but occasionally support species such as jointed rush which are typically associated with wetter habitats.

Transitions to broadleaved woodland are well shown where the pavements are more dissected or the soil cover thicker. Oak, ash and hazel dominate the woodland with lily-of-the-valley, polypody and fingered sedge characterising the woodland edge. Small leaved lime is scattered throughout Middlebarrow Wood. Transition to a more acidic woodland is occasionally seen where oak and birch dominate the canopy with heather and bilberry forming the ground flora. The acidic woodland has developed on patches of thicker glacial debris and its relationship with the limestone communities is of particular interest.

Unimproved calcareous grassland is widespread within the woodlands occurring in an intricate mosaic with the pavement areas and scars. The grassland occurs in shallow grikes, runnels and occasionally on the pavement surface in small pockets of thin soil, but also in clearings and rides within the wood. The grassland is species rich and is dominated by the nationally scarce blue moor-grass with limestone bedstraw, wild thyme, sheep's-fescue, bird's-foot trefoil, rock-rose and quaking grass. The nationally scarce spring cinquefoil is present at Underlaid Wood, and the pale St John's-wort is present at Underlaid Wood and Marble Quarry within the woodland clearings.

The relatively close proximity of these woodlands to each other and to other sites of ecological importance eg Gait Barrows NNR and Eaves Wood SSSI, as well as other areas of semi-natural vegetation means that these sites are not ecologically isolated.

Designations

The majority of Underlaid Wood (excluding Burntbarrow Plantation) is contained within the Underlaid SSSI and the majority of Marble Quarry falls within the Marble Quarry and Hale Fell SSSI. Middlebarrow Wood borders but does not include the Middlebarrow SSSI.

All these three SSSIs also form part of the Morecambe Bay Limestones Special Area of Conservation (SAC). On 1st April 2012, this area was further designated as one of Defra's 12 Nature Improvement Areas. These are areas selected for their potential to deliver ecological networks, often on a large scale, to integrate with surrounding landuses, to enlarge and enhance existing wildlife sites and to inspire people by enhancing their experience of the natural world.

At the time of plan preparation, Marble Quarry and Hale Fell SSSI and all units of Underlaid SSSI within the Forestry Commission leasehold are classified as "unfavourable recovering."

Underlaid Wood was last assessed for condition in 2010. Natural England noted improved regeneration, removal of conifers, improving limestone pavement condition, good vegetation structure, good amounts of fallen deadwood, no issues with non-natives and a good understorey dominated by hazel. They also reported under-representation of old trees, little standing deadwood and unrepresentative ground flora in the cleared areas.

Marble Quarry was also assessed in 2010 and was described as being in "excellent condition" and concluded "This woodland is unrecognisable from 10 years ago and is now richer, more diverse and with a better outlook.". The report noted removal of the final conifers from the SSSI, strong emergent growth on the pavements, with a mix of woody cover and open glades, improving structure and composition, sufficient regeneration. No negative aspects were recorded.

Marble Quarry, Underlaid and Middlebarrow are also covered by Limestone Pavement orders, in recognition of their unique geological value.

Hagg Wood, Middlebarrow, the great majority of Underlaid and the northern third of Marble Quarry are also designated as Ancient Woodland Sites. Although they are recorded as PAWS (Plantation on an Ancient Woodland Site), any reclassification now would probably redefine them as ASNW (Ancient Semi-natural Woodland), due to the extent of habitat restoration that has taken place.

Communities and recreation

Marble Quarry and Underlaid Wood are well served by public rights of way. Middlebarrow has one path running along the bottom of the wood and access is much more restricted in Hagg Wood, with just a short section of path running along one edge. Due to the conditions of the lease, it has not been possible to allow a general open access or to provide permissive paths in these woodlands. In general, the area is well served by footpaths and is highly valued as a quiet, low-key recreational area. The AONB is noted for its intimate scale and tranquillity, giving a particular sense of place which is highly valued by local people and visitors alike. The area is particularly popular with naturalists, attracted by the rare limestone plants and the bird populations. Popular sites within the AONB, and very close to these woods are the RSPB's Leighton Moss nature reserve, Gait Barrow National Nature Reserve and Arnside Knott.

Heritage

Several archaeological sites are recorded in these woodlands. In Hagg Wood, there are records of axe hammers and a brooch being found. Marble Quarry contains the quarry itself as well as old rigg and furrow formations. It is also part of the old Beetham Hall medieval/post medieval deer park. Burntbarrow Plantation includes an old well, a long barrow and the feature known as the Dog Hole cave, thought to be a ritual shaft. The cave is protected by a metal grill and during several excavations has yielded animal and human bones that are thought to date from Saxon through to Roman periods.

Access and roading

None of the woods have extensive road networks. Marble Quarry has two access points with short roads and stacking areas, as does Underlaid Wood. There are no good access points into Burntbarrow Plantation (the northern section of Underlaid), Hagg Wood or Middlebarrow.

Timber potential

Small pockets of mature conifers remain, particularly in Marble Quarry and Underlaid. These will provide some income in the short term, although they are generally in the least accessible areas. As the last of the conifer resource is gradually removed, any future timber production will have to come from the broadleaves that replace it. Due to the nature of the woodlands and the access issues, this potential is limited. Underlaid Wood (with the exception of Burntbarrow Plantation) is the most accessible, and offers the best opportunity for future broadleaved production.

Tree Health

At the time of preparing this plan, *Chalara fraxinea*, ash dieback, has been identified on a planting site within 10 km of Dalton Craggs. The long term implications of this disease are not yet clear but have the potential to change both the age class structure and species composition of the woodland quite dramatically.

Part 2. Analysis and Concept

The factors outlined in Part 1 present some opportunities and issues. These are summarised below.

Factor	Opportunities	Issues
Biodiversity	<p>These woodlands are of very high biological value with unique assemblages of vascular plants. Further conifer clearance will reduce the risk of needle accumulation in the limestone pavements and will allow further regeneration of ground flora.</p> <p>The woods fall within an area important for butterflies, and there is scope to work with Butterfly Conservation in landscape level habitat improvement work.</p> <p>Well-managed woodland, incorporating significant deadwood habitat as well as open and coppiced areas has great value for woodland birds, many of which are suffering significant decline</p>	A balanced programme of coppicing, combined with development of high forest in some areas will be necessary to keep the diversity of habitats in good condition. Lack of grazing could lead to a degradation of the open grassland habitats – management such as tree and shrub clearance could become necessary.
Geology and landscape	The external landscapes can now be considered to be restored. Further thinning and coppicing could help to protect the limestone pavement features	
Timber	Now that the first phase of restoration is virtually completed, thought should be given to longer term management. In selected areas this could include commercial production of broadleaved timber, firewood production or coppice products	Few opportunities now remain for a timber income from the conifer crop, which is largely gone. Small scale local use of Western red cedar or European larch for estate purposes is still feasible on a small scale
Recreation	The quiet, undeveloped nature of these woodlands as well as their biological and geological interest gives them a special character.	Any further development of recreational activities should respect this character.
AONB and Nature Improvement Area	Management of these woodlands has the potential to deliver significant elements both of the AONB management plan and the objectives of the Nature Improvement Area	
Tree health		There is the possibility of significant loss of young and mature ash trees, depending on the eventual severity of the Chalara ash dieback disease. The extent of this will not be known for some time

associated with the limestone pavements. Key partners in this work will be Butterfly Conservation, who are looking at creating a strategic network of butterfly habitats in the Arnside area and Natural England.

Recovery zone

A large proportion of Middlebarrow Wood has recently had its conifer overstorey removed. Natural regeneration, mainly of native species, has started to occur across the site. Over the next few years, no major works are planned here, but the site will continue to be monitored for regeneration

Community involvement

There is a growing interest locally within the AONB in community woodland and woodfuel initiatives, with a community woodfuel pilot project being carried out over winter 2012-13. The initiative aims to work with a range of public and private partners to deliver quality woodfuel to local homes from local woodlands managed in a sustainable way for their wildlife and to stimulate community involvement and interest in the local woodlands. The project aims to establish at least 20ha firewood coppice within the AONB. The FC would welcome an approach from the AONB to act as partners in this initiative. The woodlands covered by this plan are well suited to this type of management and could potentially play an important part in this and similar projects.

Part 3. Objectives

1. Protect the limestone pavements and their associated geological features
2. Maintain and enhance the botanical interest of the limestone pavements
3. Continue restoration of the ancient woodland sites
4. Bring the SSSIs further towards favourable condition
5. Produce timber and coppice products on a small scale where possible and appropriate

Part 4. Proposals

Four different management zones have been identified and are marked on the concept map. These are as follows:

Selective felling zone: Burntbarrow Plantation and the north end of Marble Quarry

Thinning zone: Underlaid Wood and Hagg Wood

Habitat management zone: The main part of Marble Quarry

Recovery zone: Middlebarrow Wood

Selective felling zone

There are very few patches of conifer plantation remaining to be felled. These are in the north end of Marble Quarry (sub-compartments 556d and 556e) and Burntbarrow Plantation (550g and 550f).

Subcompartment 556d (Marble Quarry) is mainly European larch, and has a well developed understorey of native woodland species. The larch will be removed in the 2012-2016 felling period

556e (Marble Quarry) is mixed conifers, including Western Red Cedar and Yew. The red cedar will be removed gradually over a period of time rather than in one felling operation.

550g (Burntbarrow) is European larch of an unusually good size and quality for this area. The proposal is to fell this in the second felling phase, 2017 – 2021. This is of a lower priority than removing the remaining western red cedar in thinning operations.

550f (Burntbarrow) is Corsican pine with a good understorey of native species. The pine will be felled in a series of thinning operations. Logistically, this is a challenging site as the trees are growing on a limestone plateau with no access for machinery. This could potentially be a horse-logging job.

Thinning zone

This area has had the majority of conifers removed in previous operations. The sites have recovered well and are now ready for their next intervention. Thinning here will vary in intensity and will focus on habitat improvement and native woodland restoration. Non-native broadleaves, mainly beech and sycamore, will be removed in preference to native species, but it is not considered feasible or desirable to remove them altogether. Thinning will also give the opportunity to fell remaining conifers (mainly western red cedar) and to remove young conifer regeneration.

Habitat management zone

Most of Marble Quarry is now clear of conifers and the focus can switch to management of semi-natural habitats. This will include the introduction of a coppicing programme and the maintenance of open areas, particularly where

Part 5. Monitoring plan

Objective	Criteria for success	Assessment
Protect the limestone pavements and their associated geological features	Pavement features are marked on operational plans and no damage observed following harvesting operations.	Any operational plans show limestone features, and site diaries record no damage.
Maintain and enhance the botanical interest of the limestone pavements	No loss of key species as defined by Natural England, and an expansion of their range	SSSI site condition monitoring carried out by Natural England
Continue restoration of the ancient woodland sites	Non-native species continue to be removed, regeneration of these species is controlled and native species regenerate. Chalara ash dieback does not threaten the long term integrity of the woodland	Sub-compartment database shows a reduction in the percentage of non-native species. Areas currently recorded as “felled” on the SCDB are re-classified to show regeneration of native species. Tree health checks show continued regeneration of ash after the disease has been identified.
Bring the SSSIs further towards favourable condition	Natural England report no loss of condition	SSSI site condition monitoring carried out by Natural England
Produce timber and coppice products on a small scale where possible and appropriate	Selected areas of restored woodland are harvested for a range of forest products.	Five year review and/or the next 10 year resubmission show evidence of felling, thinning or coppicing



**Forestry Commission
North England
Location map**

**Arnside and Silverdale
Woodlands**

Date: 06/09/2012

Scale: 1:50,000



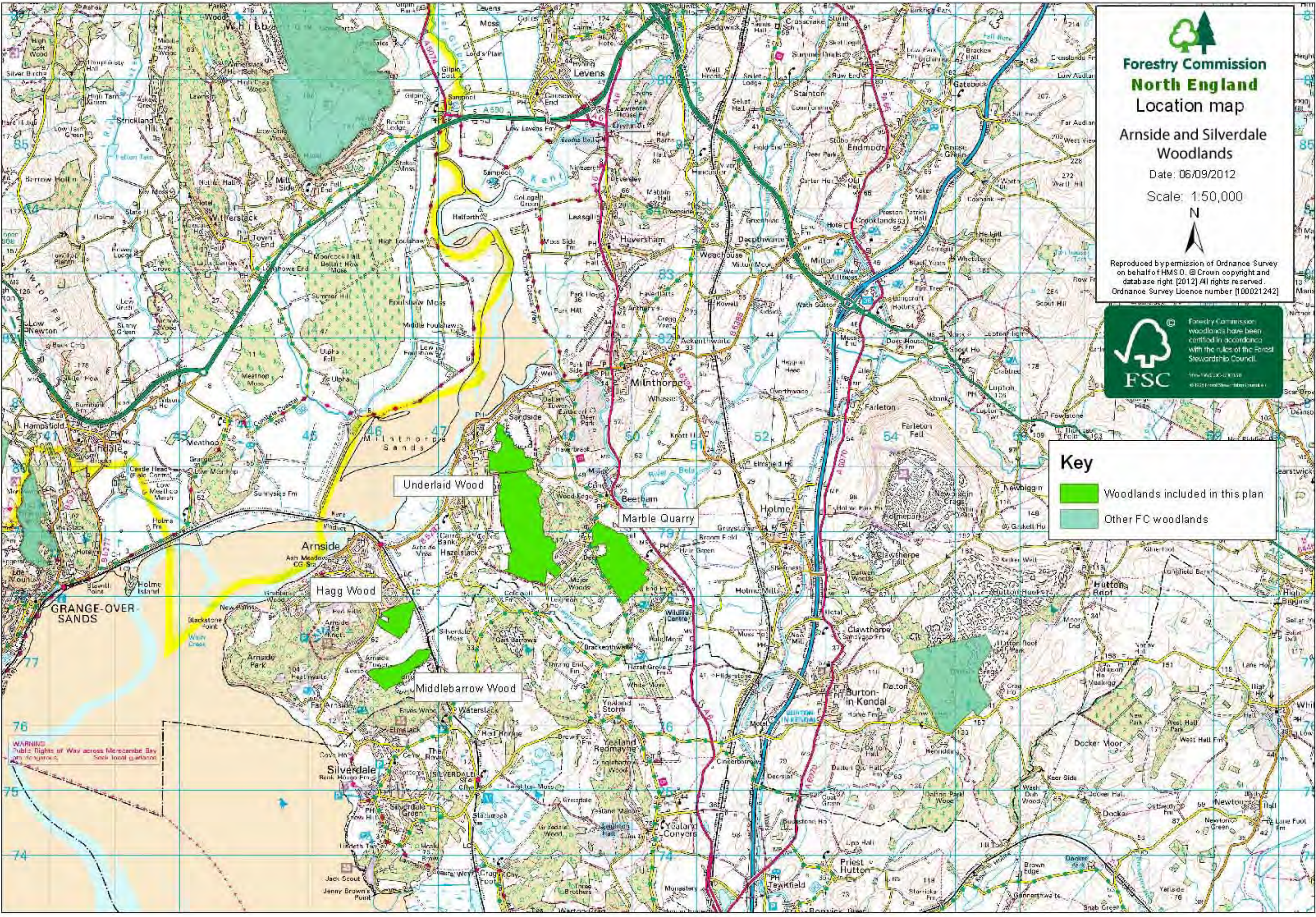
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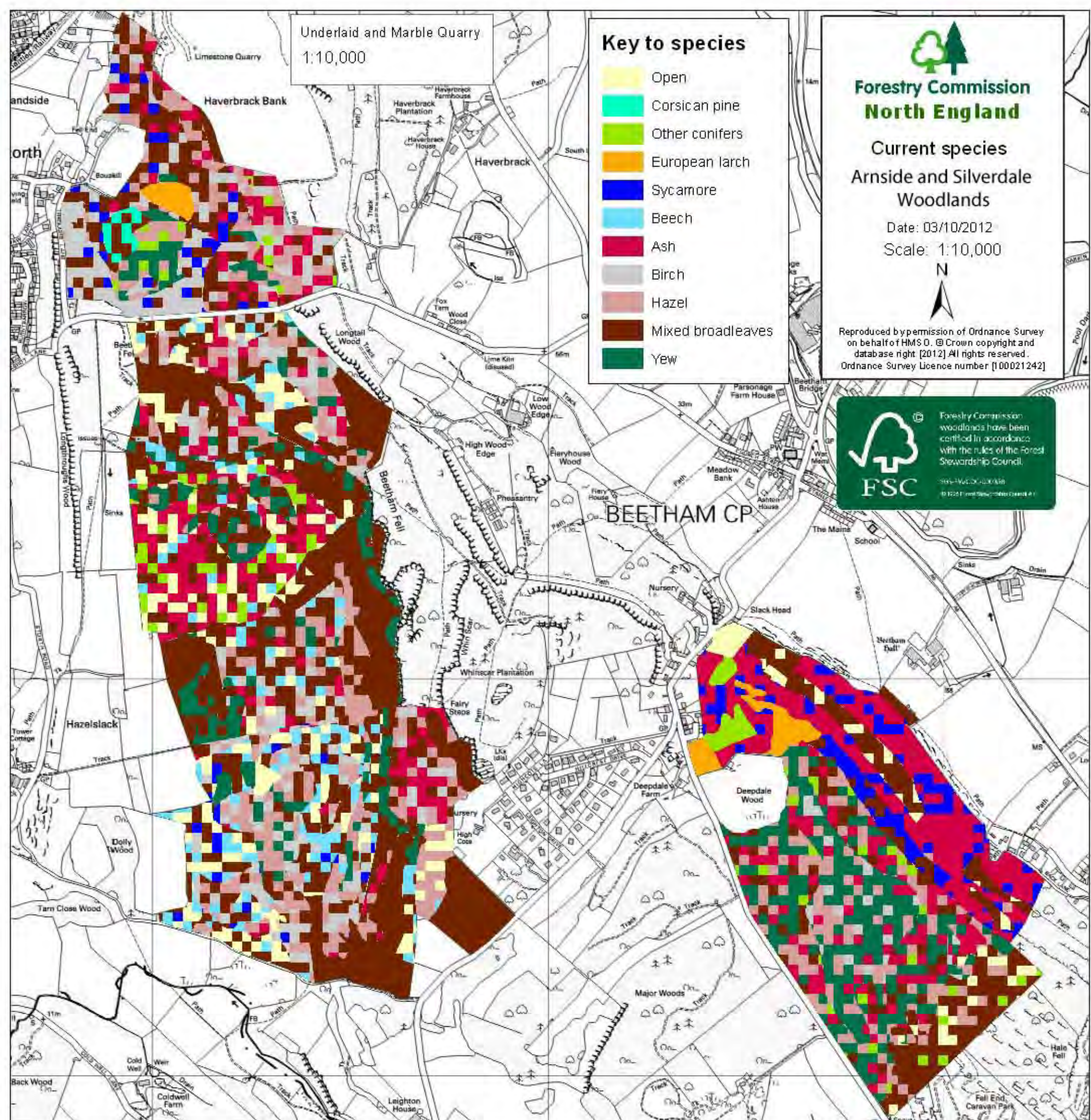
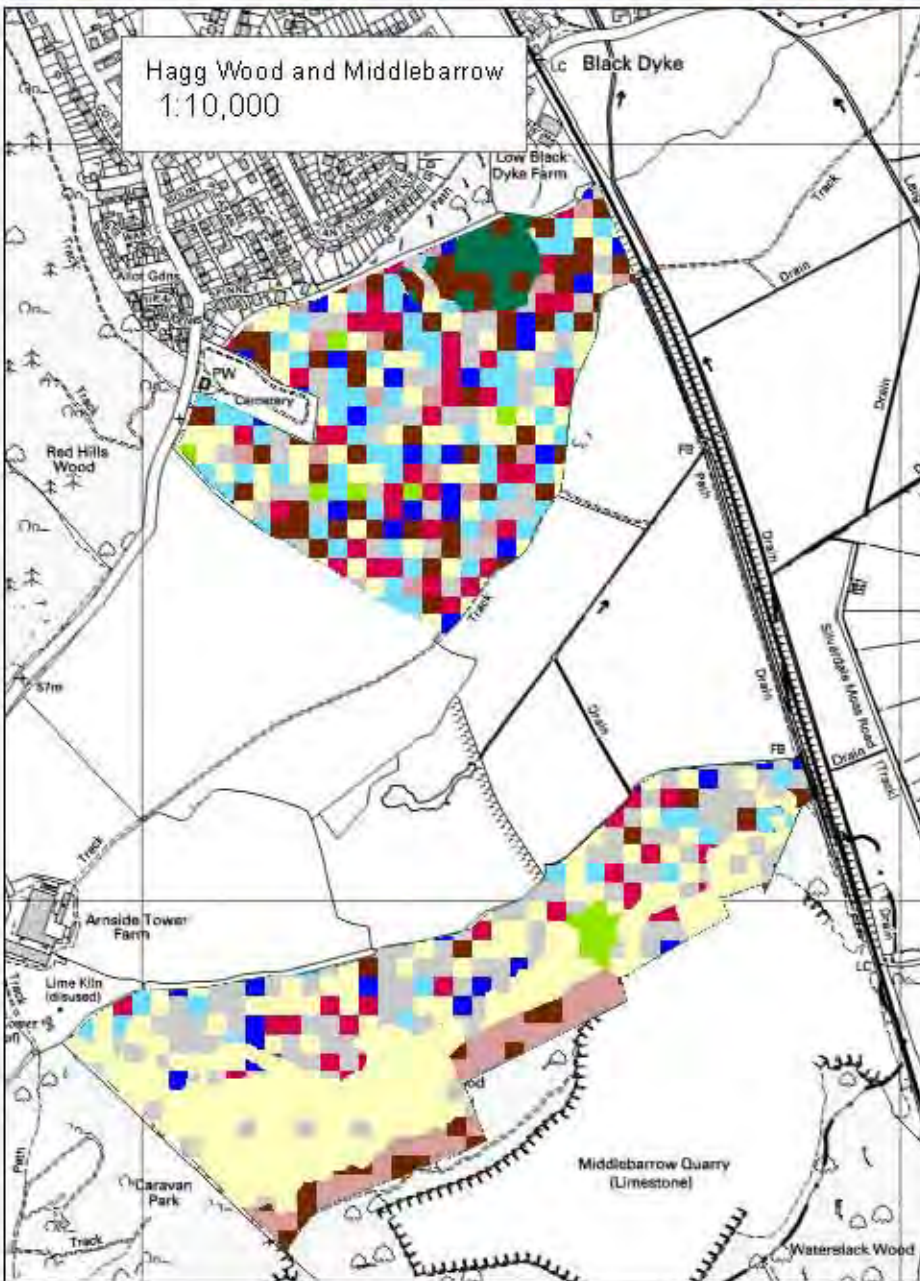
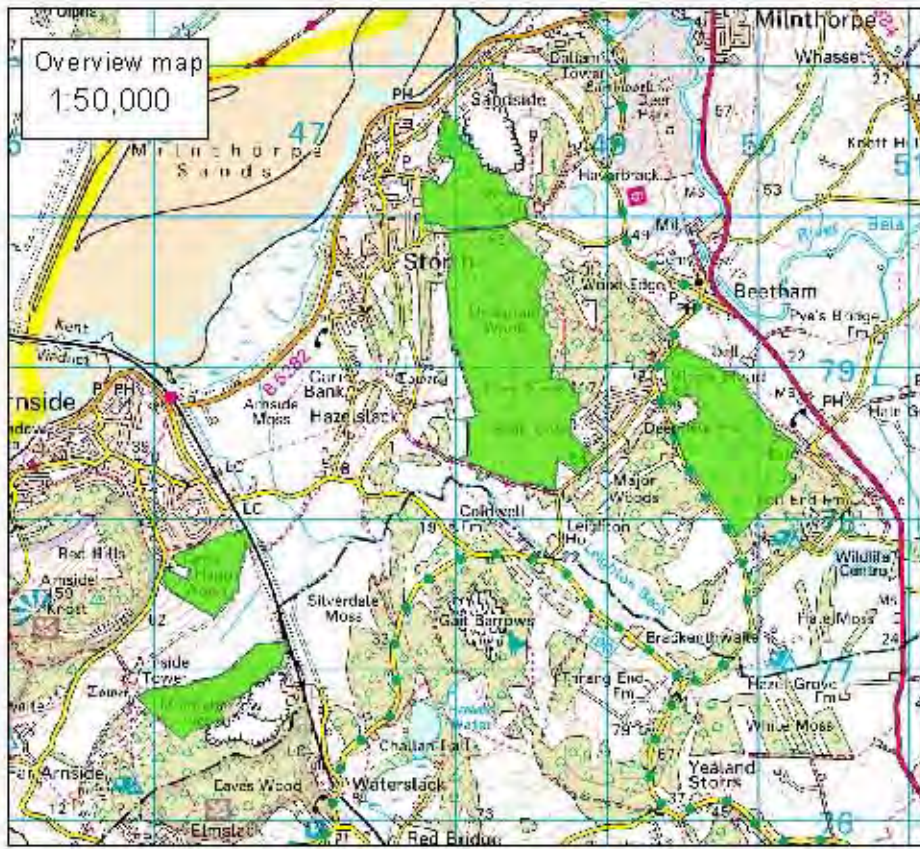
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Key

- Woodlands included in this plan
- Other FC woodlands



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**Forestry Commission
North England**

**Contours and landform
Arnside and Silverdale
Woodlands**

Date: 03/10/2012

Scale: 1:20,000

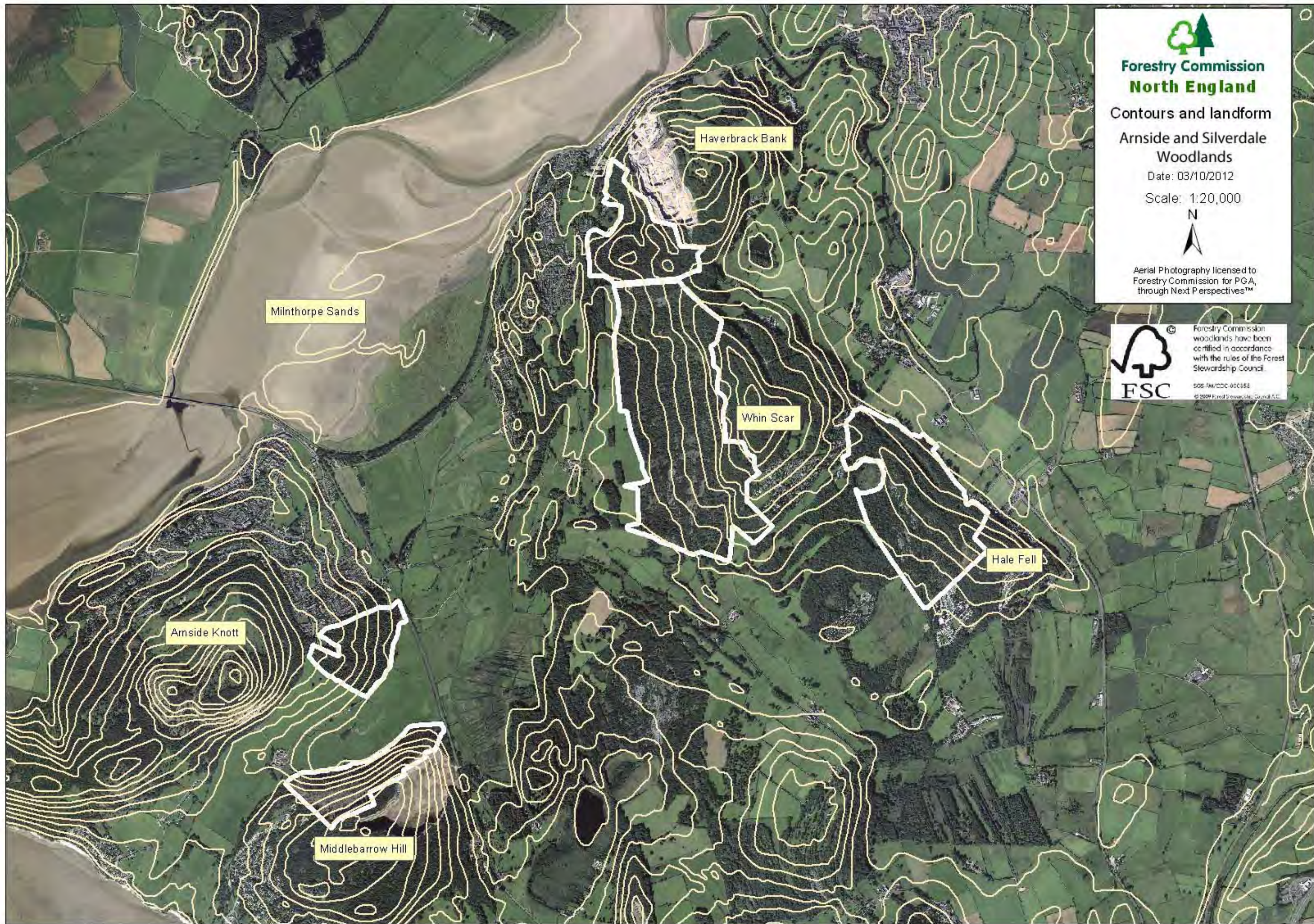


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Haverbrack Bank

Milnthorpe Sands

Whin Scar

Hale Fell

Arnside Knott

Middlebarrow Hill



Forestry Commission
North England

SSSI map

Arnside and Silverdale
Woodlands

Date: 06/09/2012

Scale: 1:18,000



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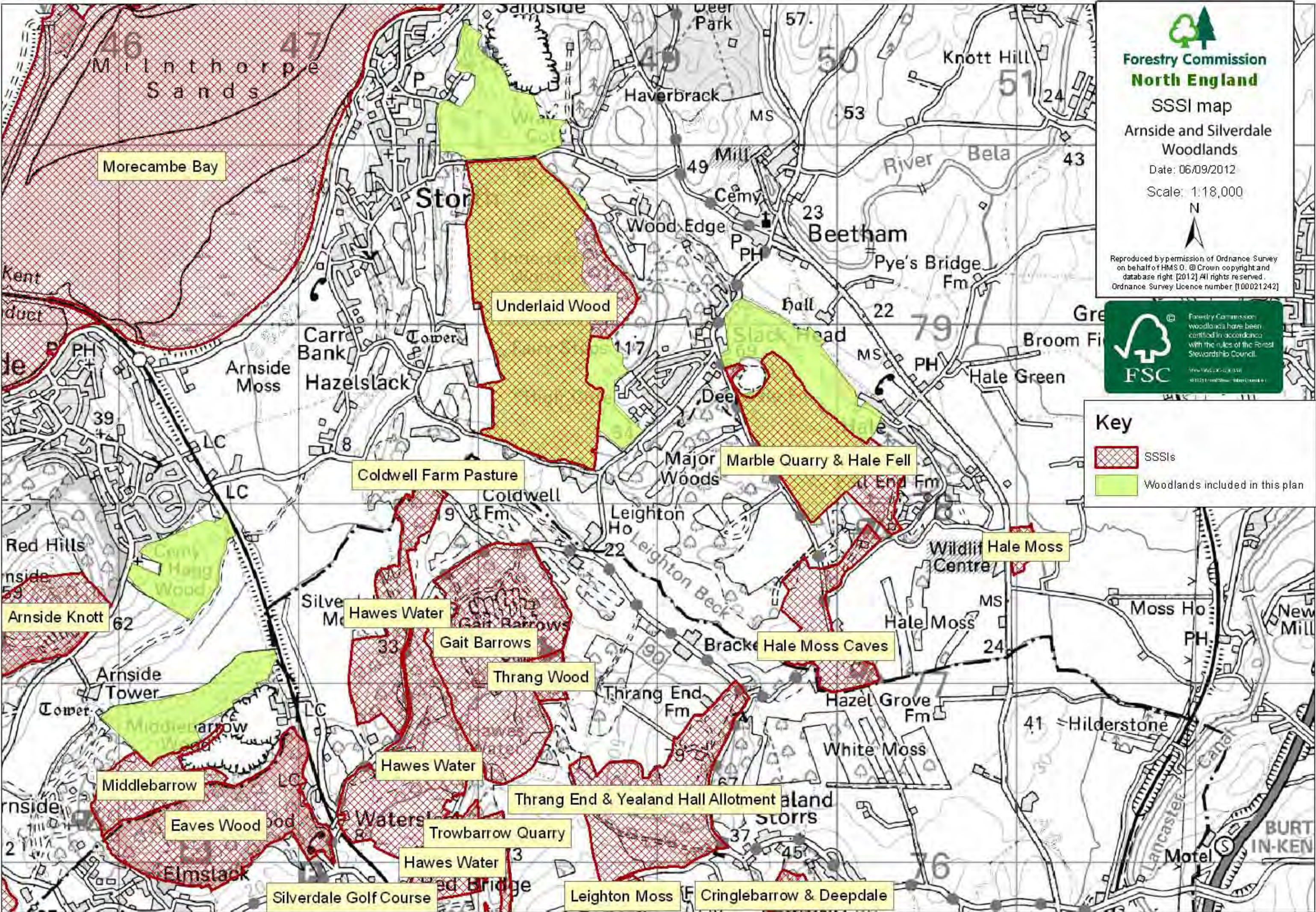
Key



SSSIs



Woodlands included in this plan



Morecambe Bay

Underlaid Wood

Marble Quarry & Hale Fell

Coldwell Farm Pasture

Arnside Knott

Hawes Water

Gait Barrows

Thrang Wood

Hale Moss Caves

Arnside Tower

Middlebarrow

Hawes Water

Thrang End & Yealand Hall Allotment

Eaves Wood

Trowbarrow Quarry

Silverdale Golf Course

Hawes Water

Leighton Moss

Cringlebarrow & Deepdale



Forestry Commission
North England

AONB map
Arnside and Silverdale
Woodlands

Date: 03/10/2012

Scale: 1:50,000





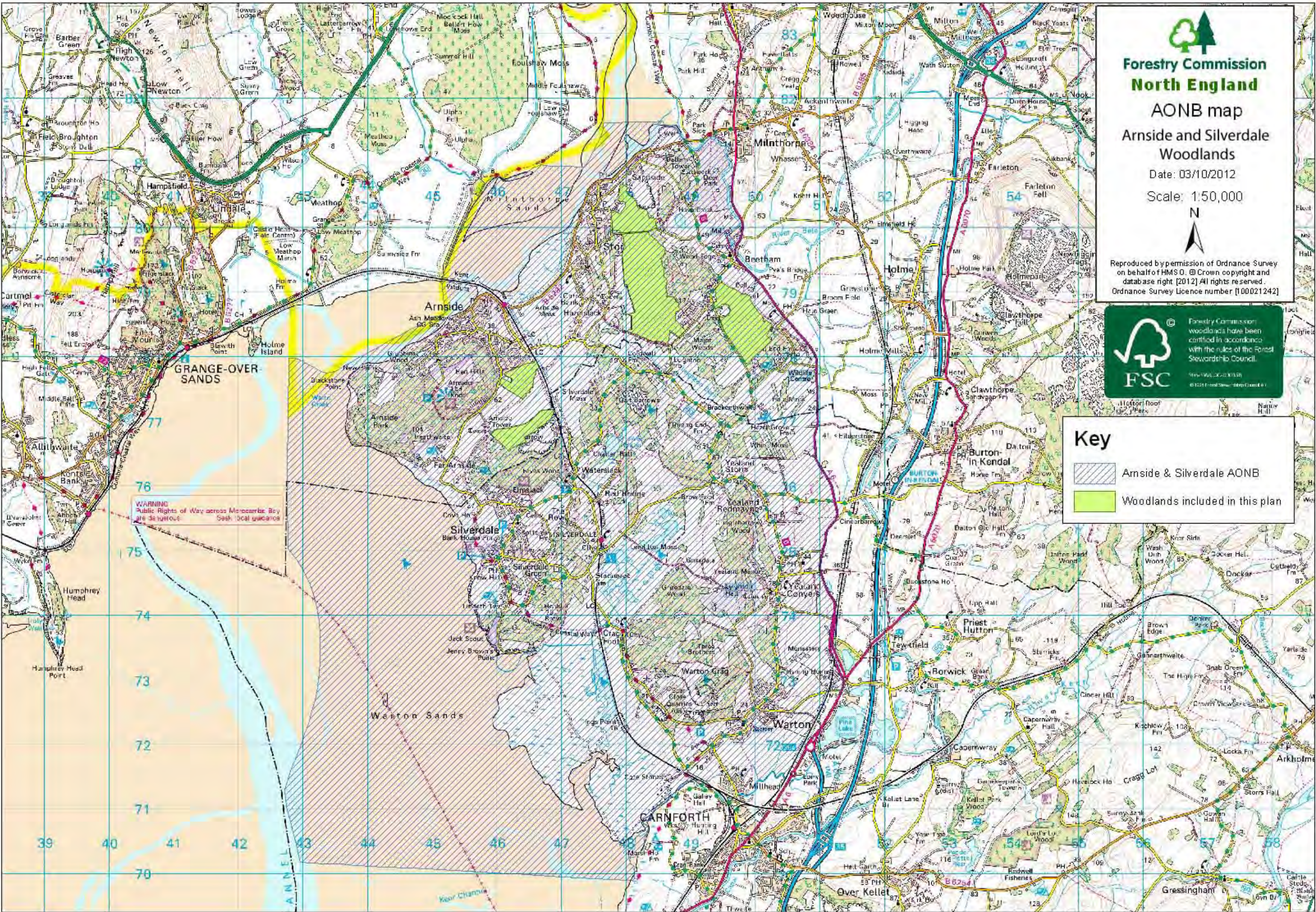
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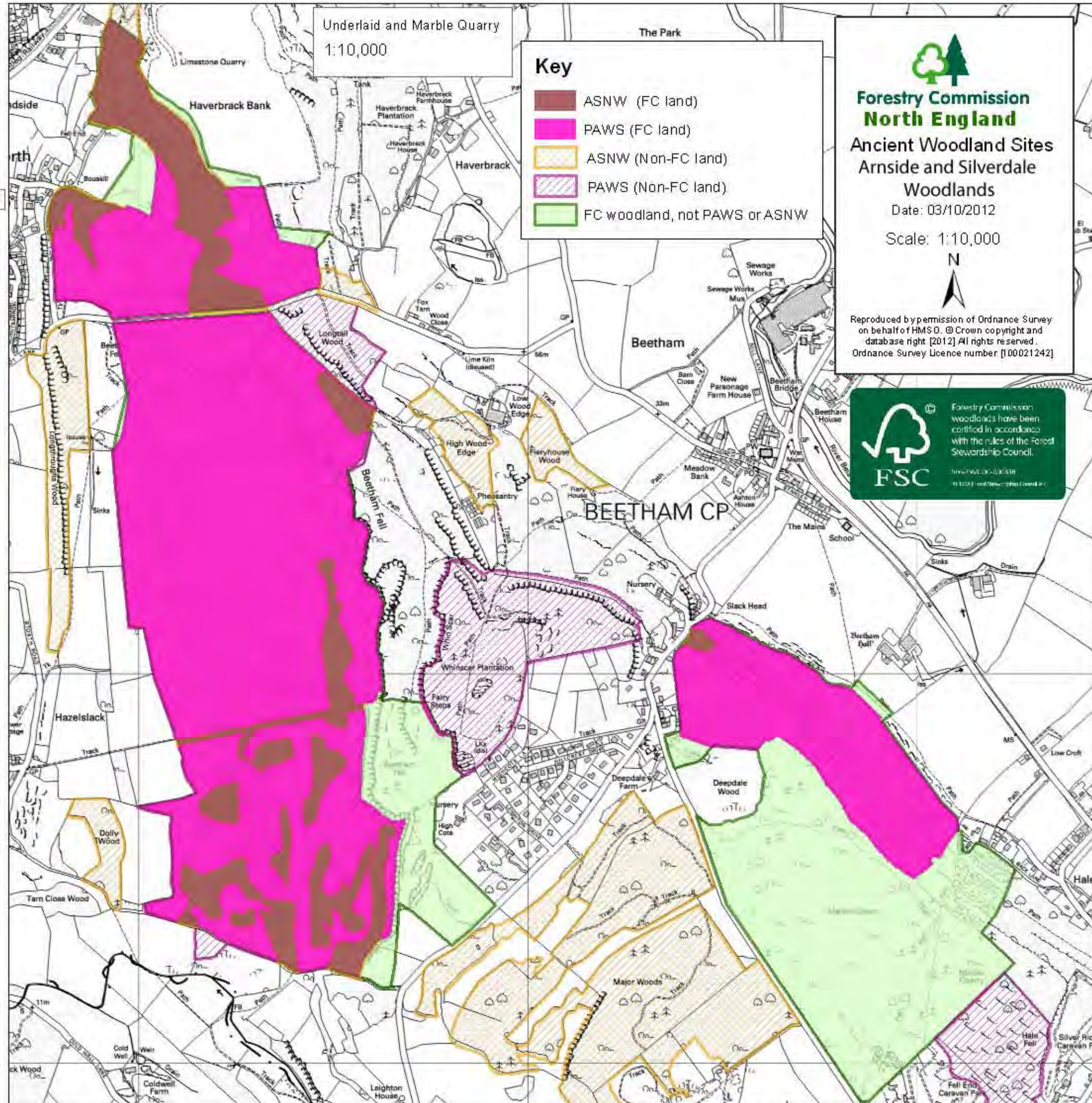
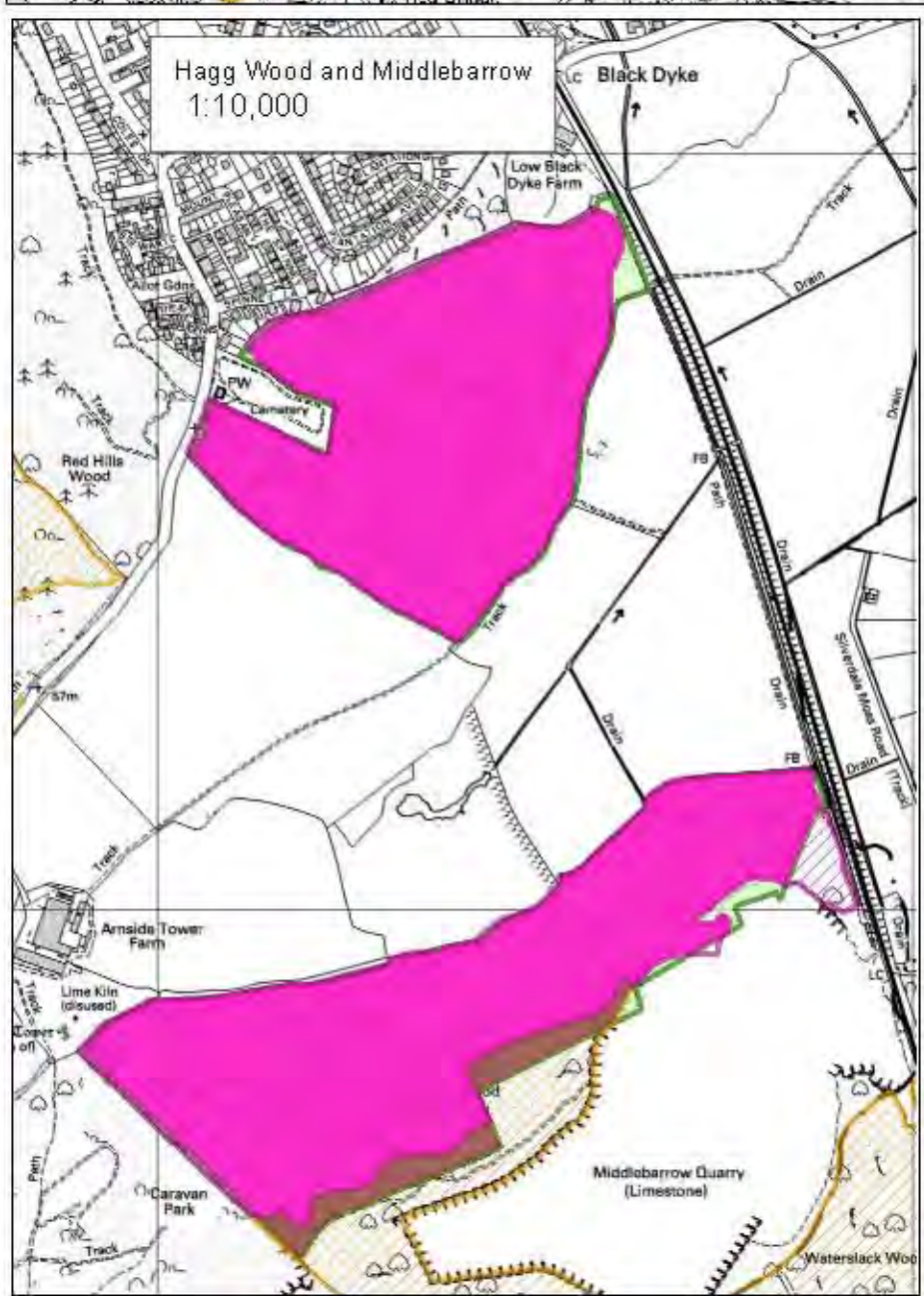
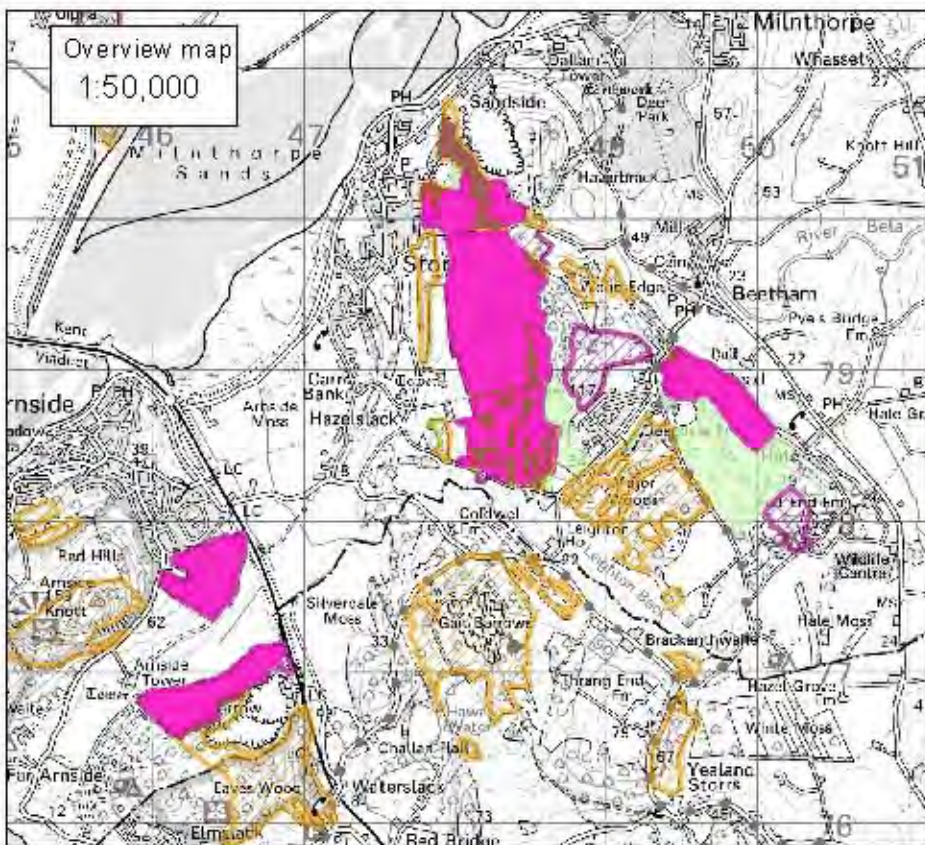
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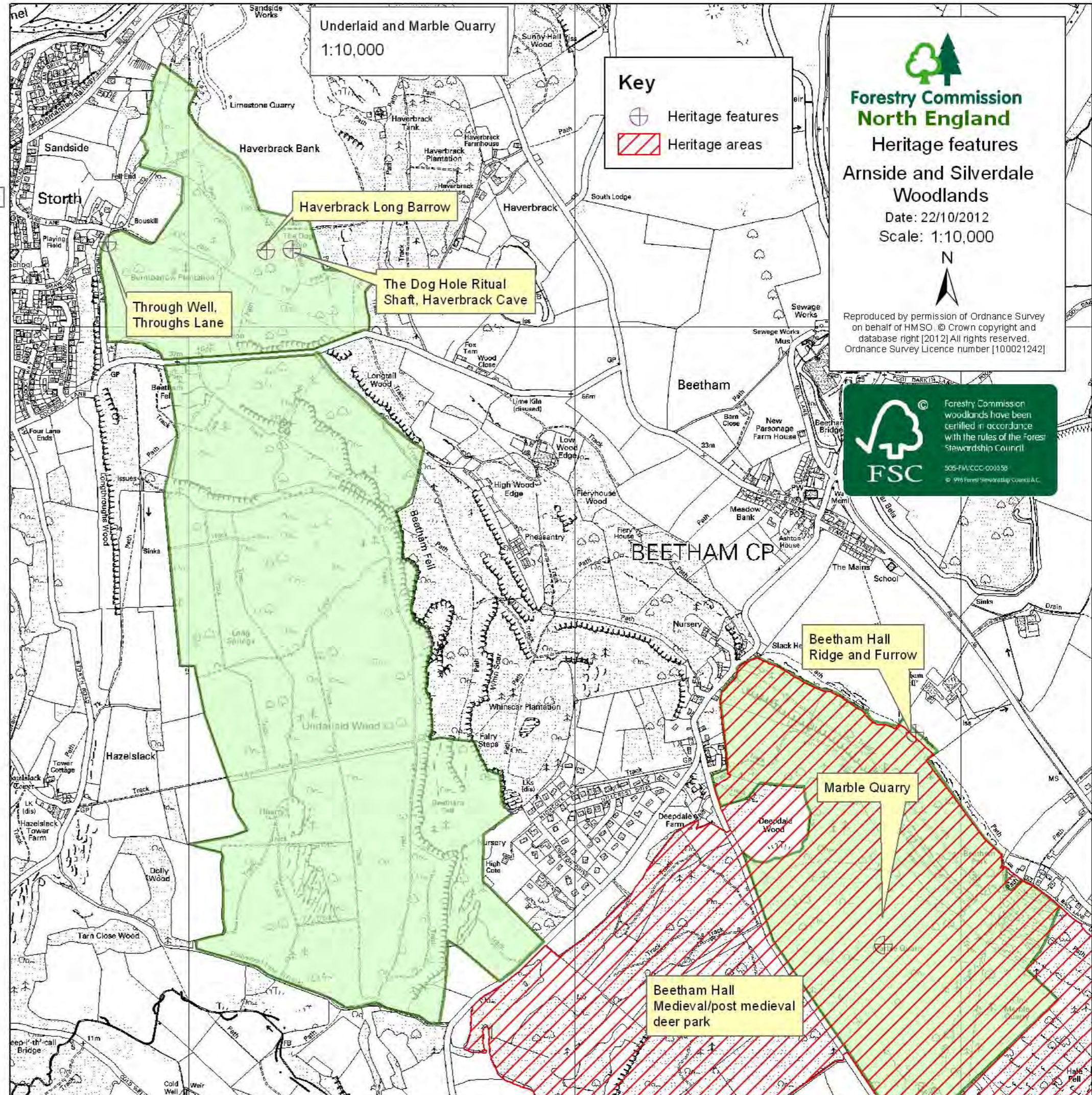
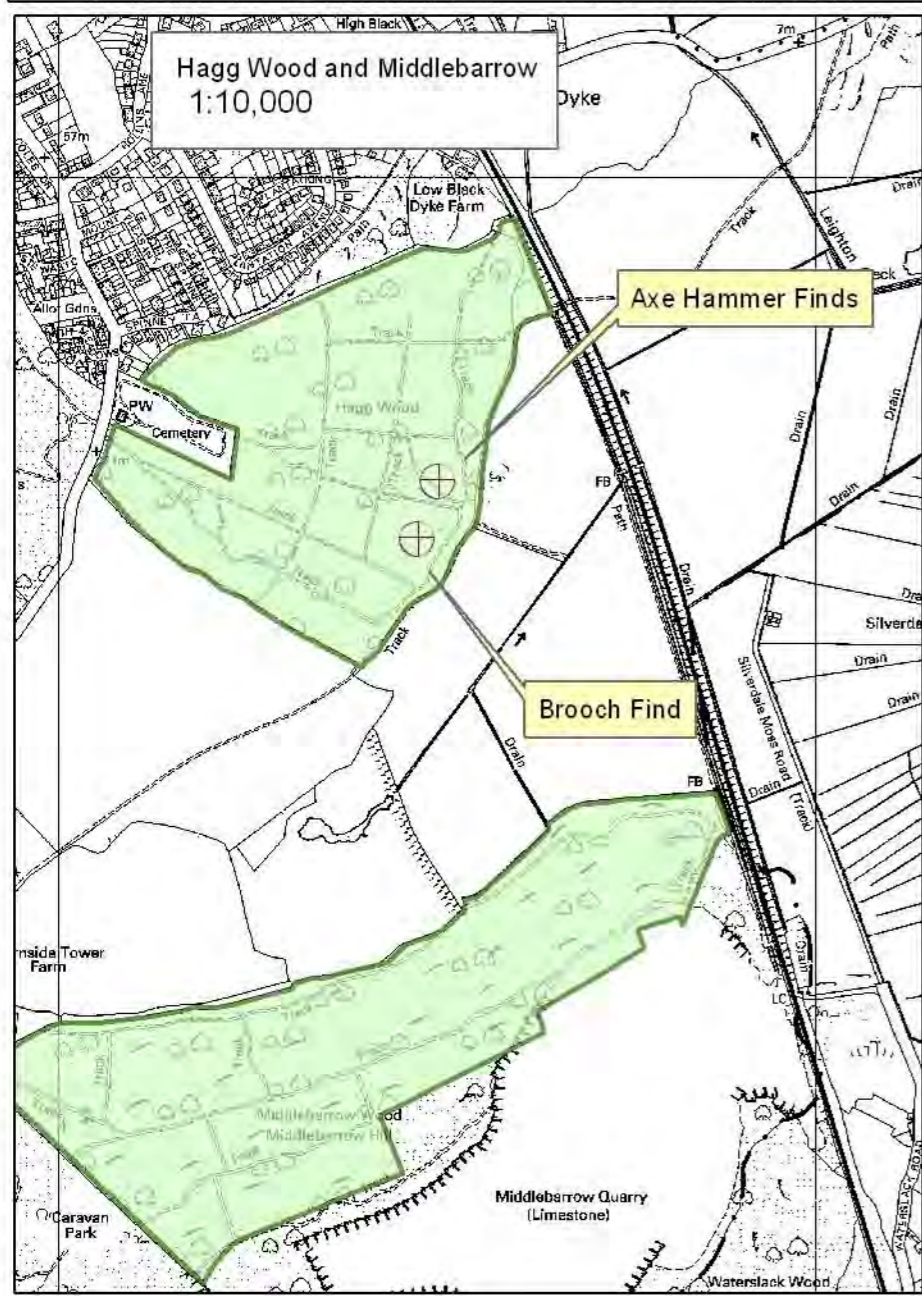
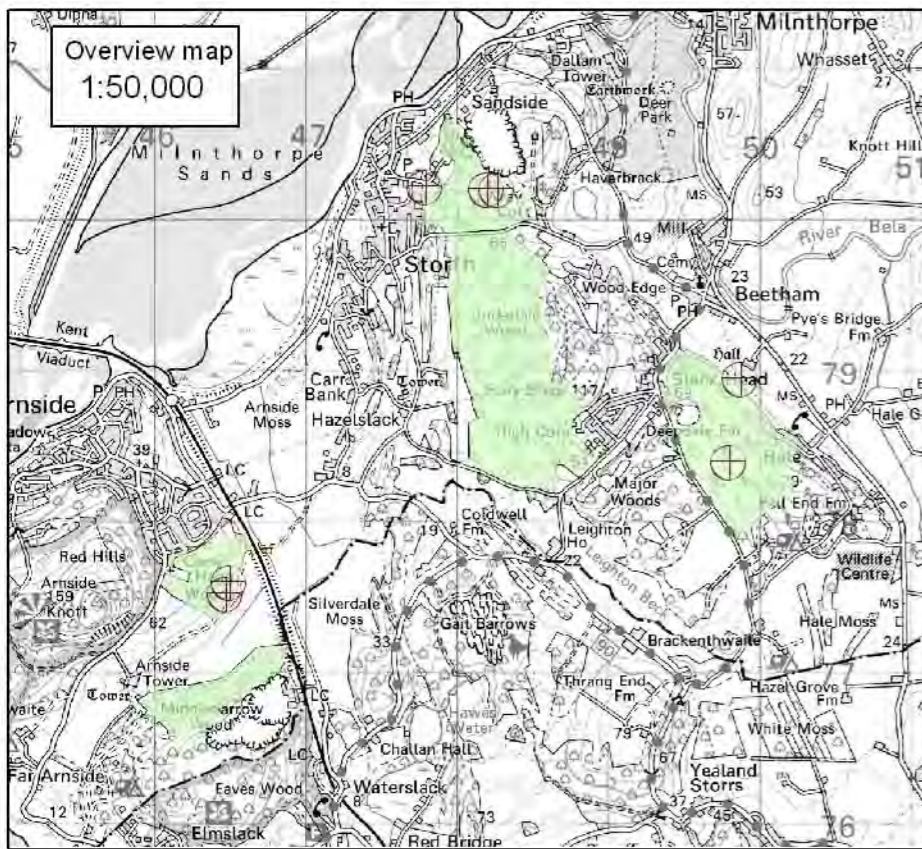
Key

-  Arnside & Silverdale AONB
-  Woodlands included in this plan



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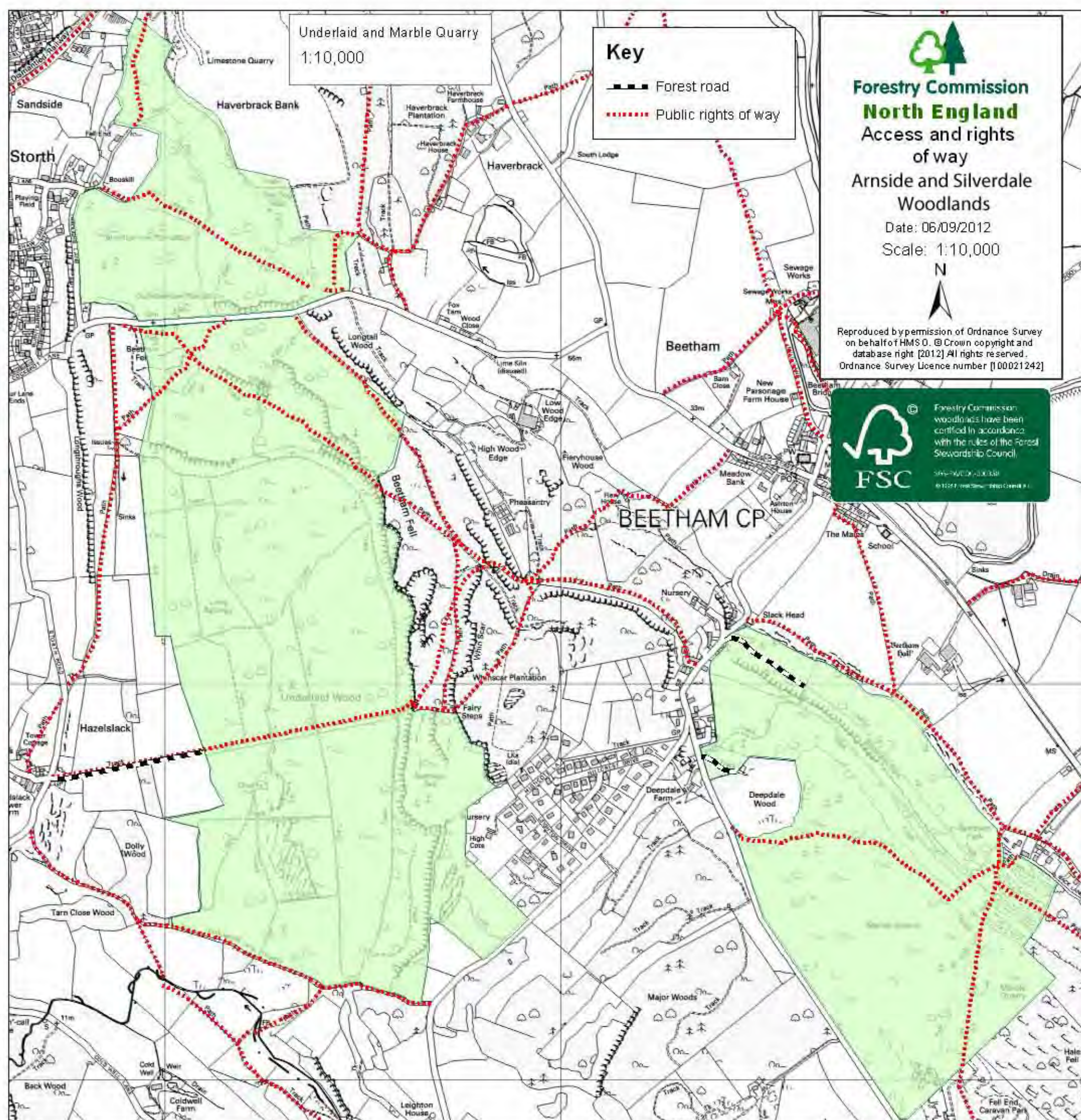
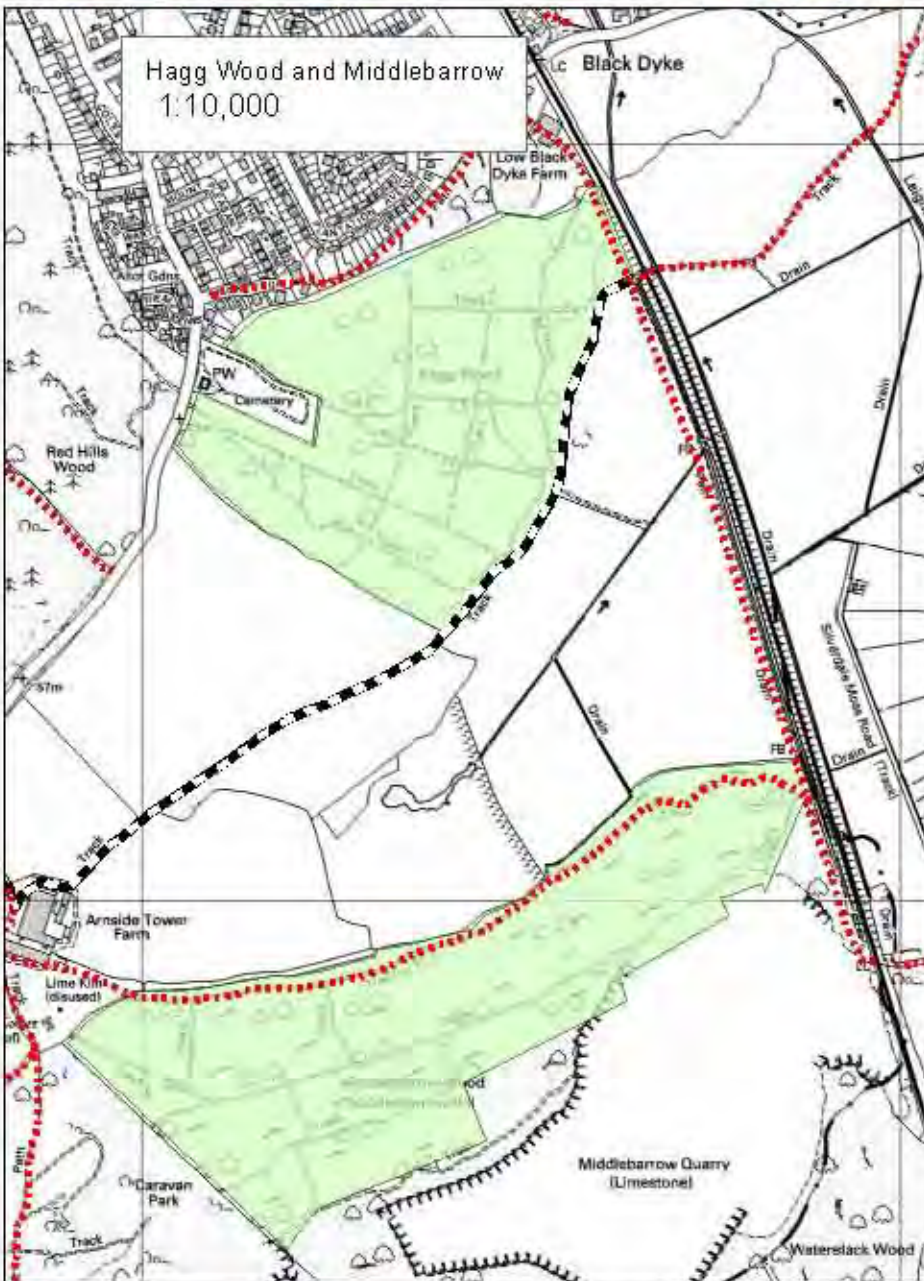
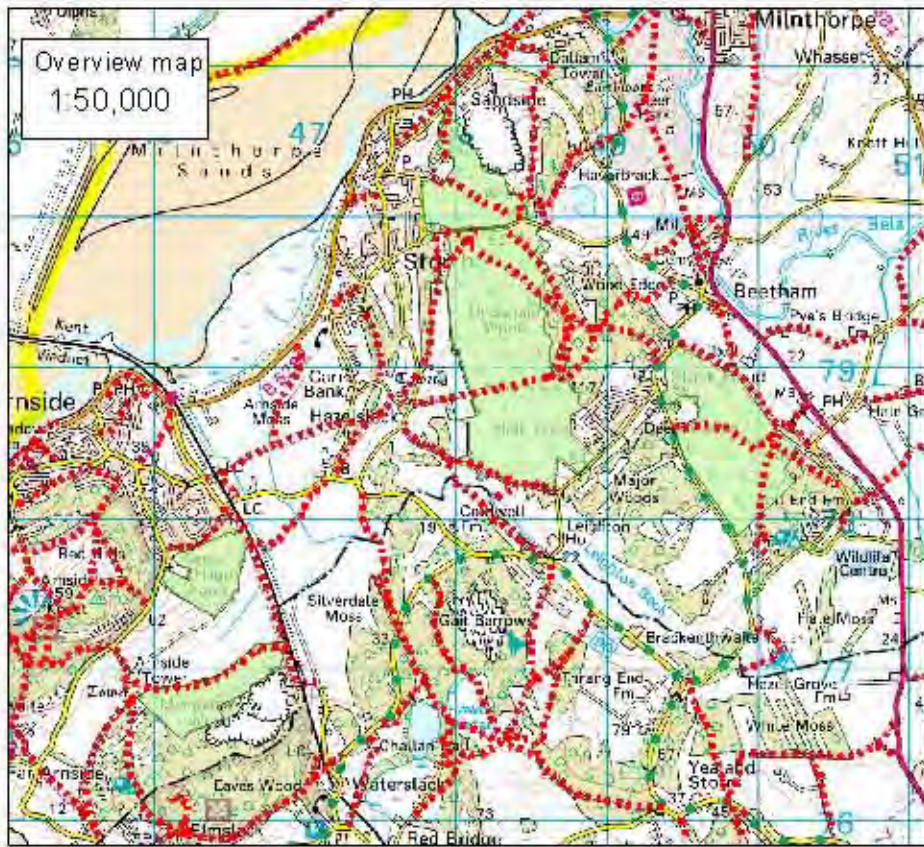
Forestry Commission North England
Heritage features
Arnside and Silverdale Woodlands
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Aerial photographs
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**Forestry Commission
North England**
Concept map

Arnside and Silverdale
Woodlands

Date: 04/10/2012

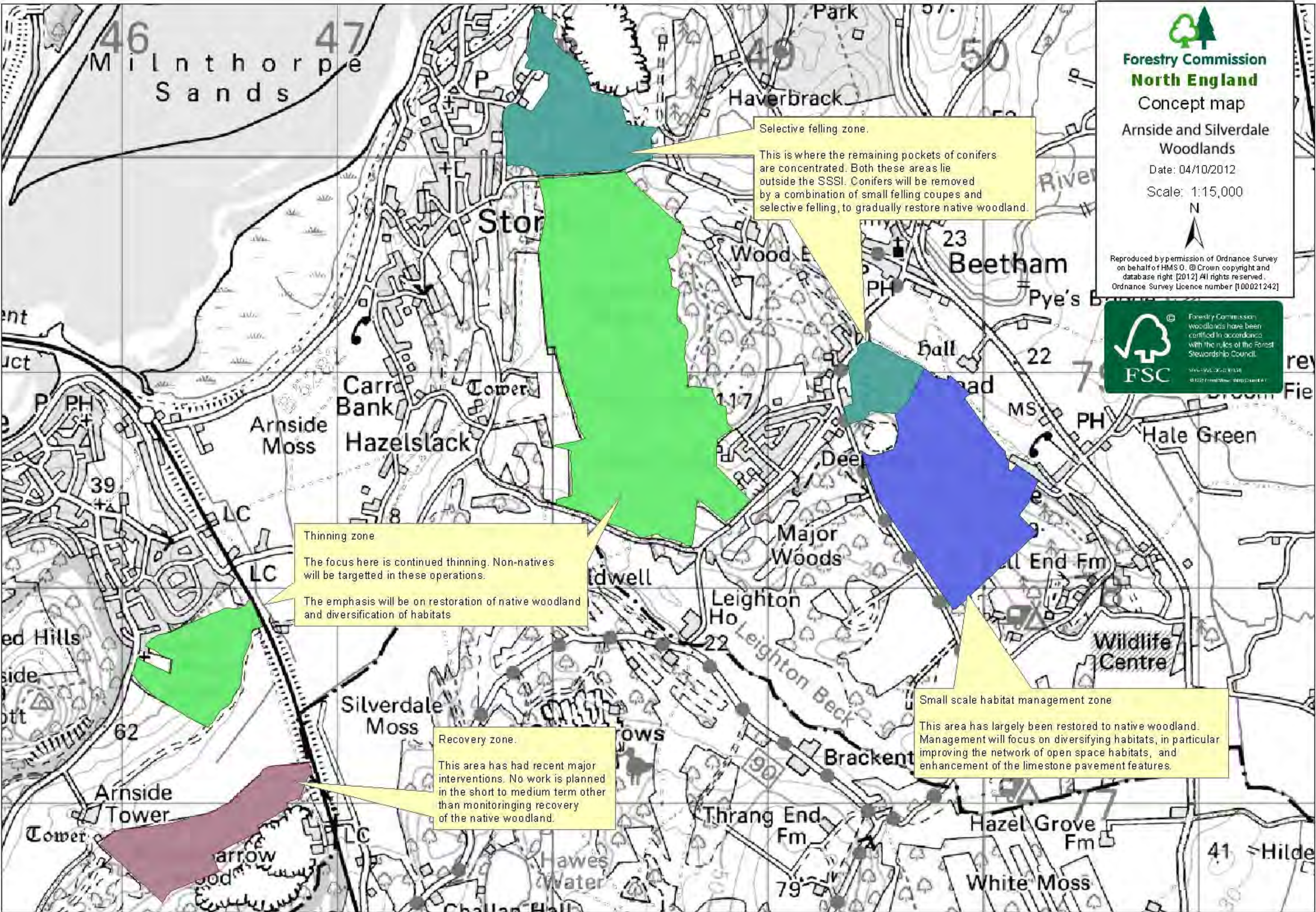
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Selective felling zone.
This is where the remaining pockets of conifers are concentrated. Both these areas lie outside the SSSI. Conifers will be removed by a combination of small felling coupes and selective felling, to gradually restore native woodland.

Thinning zone
The focus here is continued thinning. Non-natives will be targeted in these operations.
The emphasis will be on restoration of native woodland and diversification of habitats

Recovery zone.
This area has had recent major interventions. No work is planned in the short to medium term other than monitoring recovery of the native woodland.

Small scale habitat management zone
This area has largely been restored to native woodland. Management will focus on diversifying habitats, in particular improving the network of open space habitats, and enhancement of the limestone pavement features.

46 Milnthorpe Sands 47
49 Haverbrack 50
23 Beetham
22
7
39
LC
Arnside Moss
Carr Bank
Hazelslack
Tower
Major Woods
Leighton Ho
Leighton Beck
Wildlife Centre
62
Silverdale Moss
Arnside Tower
Arrow
Hawes Water
Brackent
Thrang End Fm
Hazel Grove Fm
White Moss
41 Hilde

