

# Lime Kiln Wood

## Second Management Plan

Date (dd/mm/yyyy)	01/01/2019	To	31/12/2023
Date of last review <sup>1</sup> (2.1.3)	n/a		
Owner / tenant	Lime Kiln Wood Trust. (The wood was purchased on 1st October 2010 by a consortium of private individuals who subsequently formed the Trust)		
Agent / contact	Richard Scott, Red Gables, Beckside, Pennington, Ulverston, Cumbria LA12 7NX		
Signed declaration of tenure rights and agreement to public availability of the plan <sup>2</sup> (UKWAS 1.1.3/1.1.5/2.1.2)	I hereby confirm that the Lime Kiln Wood Trust (LKWT) has sole tenure of Lime Kiln Wood, and agrees to make the management plan publically available when requested. <b>Signed of behalf of LKWT:</b>  Richard Scott,      December 2018		

### 1 Background information

#### 1.1 Location

Nearest town, village or feature	Approx ¼ mile SSE of Lindale, Cumbria
Grid reference	SD 415 798 (see Map 1, Section 9)
Total area (ha)	5.06

#### 1.2 Description of the woodland(s) in the landscape

The geography of the wood can be seen at Map 1 (Section 9).

The wood is on an easterly-facing slope, rising steeply from the floor of the Winster valley just north of its entry into Morecambe Bay. This slope is at the foot of a gently rising limestone escarpment that forms a striking foreground to the Lakeland fells when viewed across the Bay. The B5277 runs along part of the eastern boundary. Local residents use the wood for gentle recreation and access to Lindale.

<sup>1</sup> The plan must be reviewed every five years.

<sup>2</sup> As owner, tenant or manager, you have the right to manage the wood in accordance with this plan. At least a summary of the management plan must be made publicly available on request.

## 1.3 History of management

There is no documentary evidence of previous management before 2010. Independent assessments suggested that there had been little, or no, active management prior to the wood's purchase by the Lime Kiln Wood Trust (LKWT) in 2010. However, from a sample-based inventory of trees and ground flora (see Annex 4), it was evident that Larch (*Larix* spp.) had been planted and that hazel (*Corylus avellana*), and other broadleaved standards, had been coppiced, probably over 50 years previously.

The LKWT were not aware at that time of any pre-existing legal permissions or consents, nor any Forestry Commission grant schemes or dedications. LKWT obtained a licence to fell a few dangerous trees (ref: 010/79/11-12), and was then given a Woodland Improvement Grant (WIG) (ref: 28783) in 2011 which expired in 2016. The primary objective of the grant was to improve biodiversity by removing some shading by over-dense tree canopy. This involved the removal of 400 sycamore trees over the 5 years of the WIG, plus the re-introduction of the hazel coppicing cycle. One 2500 m<sup>2</sup> coppice coupe was established each year for 5 years. In addition, a number of secondary objectives were met, including the removal of beech seedlings, the installation of many bird and bat boxes, the erection of two interpretive sign boards, the repair of many drystone walls, and the stabilisation of the 19<sup>th</sup> century lime kiln.

The impact of the various management activities on aspects of the ecology of LKW has been monitored since 2010. Among other things, the decreases in shading have led to increased growth of brambles within coppice coupes which has not been fully offset by deer browsing. However, it is not yet clear whether the biodiversity of ground flora has increased significantly. Some data have been gathered on the biodiversity of birds, bats, butterflies and moths, but more systematic surveys will be necessary to establish whether biodiversity as a whole has improved.

## 2 Woodland information

### 2.1 Areas and features

2.1.1 Designated areas	In woodland	Adjacent to woodland	Map
Special Areas for Conservation (SACs)	No		
Special Protection Areas (SPAs)	No		
Ramsar Sites ( <b>see note on Guidance</b> )	No		
National Nature Reserves (NNRs)	No		
Sites of Special Scientific Interest (SSSIs)	No		
Other designations e.g.: National Parks (NPs), Areas of Outstanding Natural Beauty (AONBs), Local Nature Reserves (LNRs)	Yes <sup>1</sup>	Yes <sup>2/3</sup>	Yes

#### Details

<sup>1</sup> Part of the wood is subject to a Limestone Pavement Order – see Map 3, Section 9, and the whole wood is a Cumbria County Wildlife Site.

<sup>2</sup> The wood lies immediately south of the boundary of the Lake District National Park – see Map 4, Section 9

<sup>3</sup> A local Nature Reserve (Brown Robin) lies about ½ km from the SW corner of the wood.

2.1.2 Rare and important species	In woodland	Adjacent to woodland	Map
Red Data Book or BAP species	Yes <sup>1</sup>	Yes <sup>2</sup>	
Rare, threatened, EPS or SAP species	Yes <sup>3</sup>	unknown	
<b>Details</b>			
<p><sup>1</sup> Yew (<i>Taxus baccata</i>) occurs in the woodland canopy (an estimate of 133 trees has been made). Herb Paris (<i>Paris quadrifolia</i>) is found in the NE corner of the wood.</p> <p><sup>2</sup> In an unimproved meadow to the west, Green-winged orchids (<i>Anacamptis morio</i>) are common (along with other, more common, orchid species). No other information is available.</p> <p><sup>3</sup> The known species of interest are pipistrelle bats (<i>Pipistrellus pipistrellus</i> and <i>P. pygmaeus</i>), brown long-eared bats (<i>Plecotus auritus</i>), Natterer's bats (<i>Myotis nattereri</i>) and Noctule bats (<i>Nyctalus noctula</i>) (as identified by members of the Furness and Westmorland Bat Group).</p>			
2.1.3 Habitats	In woodland	Adjacent to woodland	Map
Ancient semi-natural woodland (ASNW)	Yes	Yes	
Other semi-natural woodland			
Plantations on ancient woodland sites (PAWS)			
Semi-natural features in PAWS			
Woodland margins and hedges	Yes	Yes	
Veteran and other notable trees	No <sup>1</sup>		
Breeding sites	Probably <sup>2</sup>	Probably <sup>2</sup>	
Habitats of notable species or subject to HAPs	Probably <sup>2</sup>	Probably <sup>2</sup>	
Unimproved grassland		Yes	
Rides and open ground	Yes		
Valuable wildlife communities			
Feeding areas			
Lowland heath			
Peatlands			
Others			
<b>Details</b>			
<p><sup>1</sup> The woodland has been checked by Mrs Vanessa Champion, Ancient Tree Verifier for the Woodland Trust</p> <p><sup>2</sup> The Lime Kiln Wood Trust has conducted surveys of trees, ground flora, birds, bats and night-flying moths. Natural bat roosts have not been found, and the bats have been recorded roosting in bat boxes introduced by LKWT. The Trust has also installed many bird boxes.</p>			

2.1.4 Water	In woodland	Adjacent to woodland	Map
Watercourses			
Lakes			
Ponds			
Wetland habitats			
<b>Details</b>			
There are no signs of water features on this predominantly limestone site.			

2.1.5 Landscape	In woodland	Adjacent to woodland	Map
Landscape designated areas		Yes <sup>1</sup>	
Landscape features	Yes <sup>2</sup>		
Rock exposures	Yes <sup>2</sup>		
Historic landscapes			
Areas of the woodland prominent from roads	Yes <sup>3</sup>		
Areas of the woodland prominent from settlements	Yes <sup>4</sup>		
<p><b>Details</b></p> <p><sup>1</sup> The wood is immediately South of the Lake District National Park (see Map 4, Section 9).</p> <p><sup>2</sup> Locally, there are extensive areas of limestone pavement and outcrop within the woodland (see Map 3, Section 9).</p> <p><sup>3</sup> About 75m of the eastern boundary of the wood is immediately adjacent to the B5277 (Lindale to Grange-over-Sands, "bottom road") and the NW corner of the wood is close to the B5271 (Lindale to Grange-over-Sands, "top road") – see Map 1, Section 9.</p> <p><sup>4</sup> The wood can be seen from some residents of Lyndene Drive, and from parts of Lindale village.</p>			
2.1.6 Cultural features	In woodland	Adjacent to woodland	Map
Public rights of way	Yes <sup>1</sup>	Yes <sup>2</sup>	Map 5, Section 9
Prominent viewing points		Yes <sup>3</sup>	
Permissive footpaths	No <sup>4</sup>		Map 5, Section 9
Areas managed with traditional management systems			
<p><b>Details</b></p> <p><sup>1</sup> There is a length of footpath (about 125m) that runs just inside, and adjacent to, the northern end of the eastern boundary. A new public right of way (400 m) across the middle of the wood has been established since LKWT took ownership</p> <p><sup>2</sup> There are rights of way along the eastern and northern boundaries (outside the wood).</p> <p><sup>3</sup> There are prominent viewing points adjacent to the wood along the B5271 ("top road").</p> <p><sup>4</sup> Although not technically 'Permissive footpaths', several paths within the woodland are used by the local members of the public.</p>			
2.1.7 Archaeological features	In woodland	Adjacent to woodland	Map
Scheduled monument			
Historical features	Yes <sup>1</sup>		Map 6, Section 9
<p><b>Details</b></p> <p><sup>1</sup> As the name confirms, there is an early 19<sup>th</sup> century lime kiln within the woodland. It was in a poor state of repair when the Trust took ownership, and LKWT has recently (autumn 2018) stabilised and partially restored the structure with a grant from Friends of the Lake District. The wood also contains traces of an old limestone quarry which was apparently used to supply the kiln.</p>			

## 2.2 Woodland resource characteristics

The major aim of the Lime Kiln Wood Trust is to manage the woodland for biodiversity, with local access (for peaceful recreation) being a secondary aim. Timber production is not an objective for the Trust although some firewood extraction may result from other management activities.

The Trust's understanding is that Lime Kiln Wood can be managed as a Small and Low Intensity Managed (SLIM) woodland (or even a VSLIM). Accordingly, the UKWAS standard, under Section 6 (Conservation and enhancement of biodiversity) forms the basis of the Trust's guidelines. However, given that the main aims are related to biodiversity, the Trust has had no difficulties in meeting these guidelines. In particular, the Trust notes recommendations in relation to mapping, baseline-recording, monitoring, field observation, safeguarding, enhancement, damaging activities, deadwood habitats, non-conversion and record-keeping. No game species (mainly roe deer) have been or will be hunted, although pest species (grey squirrels) are being controlled by trapping.

Given the relatively small size of the wood, the Trust has not created any sub-divisions, or blocks, within the woodland. It is being managed as a single unit, although management activity is focussed on different areas of the wood at different times.

The main resource comprises the trees themselves. The sample survey the Trust members have carried out (see Annex 4) indicates that tree species proportions are appropriate to the site with healthy numbers of oak (*Quercus petraea* or hybrid), ash (*Fraxinus excelsior*), yew (*Taxus baccata*) and hazel (*Corylus avellana*) but there is some concern about the abundance of beech (*Fagus sylvatica*) and, especially, sycamore (*Acer pseudoplatanus*). There has been some redressing of the balance through the removal of 400 sycamores and an on-going programme of beech seedling removal. The surplus wood resulting from our biodiversity aims is used by LKWT members and by the local public for firewood.

Other resources are very secondary and non-timber products (such as foliage, moss, fungi and berries) are not being harvested.

## 2.3 Site description

Factors which may influence woodland (even low-key woodland (SLIM)) management will include:

1. Access – there is little need for access except to remove small quantities of timber on irregular occasions. There are two main vehicular access points (near the NW and SE corners) where domestic vehicles can be parked. It is unlikely that industrial-scale vehicles will need to come into the woodland but, if required, there is a new gateway in the SE corner that could be used. There is no metalled access route within the woodland. However, the existence of a Limestone Pavement Order will preclude the use of very heavy machinery.
2. The wood is on a slope (estimated at an average of about 20° across the site). This may have consequences for the removal of any larger timber (down-hill only).
3. The soil is a shallow brown earth on top of limestone which may have consequences for wind-throw and moisture availability, although many trees are rooted in the limestone grykes.
4. The wood faces east and so is protected for much of the time against prevailing south-westerly winds. However, easterly gales could prove hazardous.
5. Uses of the woodland will be restricted to biodiversity enhancement, quiet and casual recreation and occasional fuel-wood collection (as a result of other management).
6. Since we continue to aim to improve ground flora diversity, this will be considered when planning any management interventions which could affect ground quality and plant life.

## 2.4 Significant hazards, constraints and threats

Hazards: No significant hazards have been identified except for a few (<20) dangerous trees near the boundary and along public rights of way. These have been removed.

Constraints: The only constraints that have been noted relate to public access which, if over-encouraged, might be detrimental to some wildlife. This does not appear to have been the case to date – indeed, the growth of bramble as a result of increased light penetration is helping to restrict public access to the main paths. Proximity to an industrial site on the south east border has required tree safety assessments, and a few have been removed.

Threats: No significant quantities of pest species have been noted but monitoring will continue. Some basal stem damage (and subsequent hollowing) has been seen in some sycamore trees in part of the wood, but the cause is unclear. There had been some minor vandalism (e.g. graffiti) and other activity (e.g. BMX cycle ramps, den-building) when the Trust took ownership, but these did not constitute major problems and did not affect the health of the trees. No new graffiti or other vandalism has been evident during the last 7 years. Photographic records are being maintained.

## 3 Long term vision, management objectives and strategy

### 3.1 Long term vision

The long-term vision of the Lime Kiln Wood Trust continues to be to own, manage and improve a wood which has high biodiversity value and is available to its members and the public for peaceful enjoyment, education and research.

### 3.2 Management objectives

No.	Objective
1	To maintain and improve the balance of tree species and their age distribution
2	To maintain and improve the number and variety of ground flora species to maximise wildlife potential.
3	To ensure that suitable routes are maintained to allow the public access to the site for peaceful recreation on foot.
4	To maintain the landscape character of the woodland and associated features (e.g. drystone walls and the lime kiln).
5	As far as possible, to manage the wood in accordance with (i) the <i>UK Woodland Assurance Standard</i> , (ii) the <i>UK Forest Standard</i> (iii) the FC's <i>Managing ancient and native woodland practice guide</i> , and (iv) the FC's <i>Forest Practice Guides for Semi-natural woodlands</i>

### 3.3 Strategy

Given the relatively simple objectives, and the intention to manage the whole wood as a single block, it is felt that there is no requirement to develop an explicit spatial strategy. Nevertheless, the 2011 tree survey (Annex 4, but see first Management Plan for details) shows that certain tree species were more numerous in some areas than others, and this has been taken into account when planning and conducting management operations.

Little has changed since 2011, except for the removal of 400 mature sycamores in the southern half of the wood, the coppicing of hazel in 5 coupes, and the on-going removal of beech seedlings. The only new aspect of our future strategy will involve the construction of a glade in the northwest quadrant of the wood in order to increase the length of wood/grassland ecotone to encourage greater biodiversity. The current spatial distribution of management activities is shown in Map 7. It will be apparent that two areas of the wood are to be left in a semi-pristine condition with minimal management.

### 3.4 Woodfuel initiative

Would you be interested in receiving information on funding opportunities for the purchase of harvesting machinery or wood fuel boilers?

~~Yes~~ / No (delete as appropriate)

## 4 Management prescriptions/operations

### 4.1 Silvicultural systems

#### 4.1.1 Harvesting

No harvesting will take place, although the timber resulting from construction of a glade will be used for firewood.

#### 4.1.2 Phased felling and restructuring of plantations

n/a

#### 4.1.3 Establishment, restocking and regeneration

Natural regeneration will be encouraged, with suitable protection (e.g. portable fencing) where appropriate.

### 4.2 New planting

We will begin a programme of planting locally-sourced understorey species, especially hazel, because the understorey is thin or non-existent in places. Consideration will also be given to improving LKW's resilience to climate change through the planting of canopy species likely to cope successfully with anticipated rainfall, wind and temperature regimes over the next 50-100 years. There are some uncertainties about the likely success of this activity given that planted trees may not thrive in the shade of existing taller trees (especially beech). For that reason, an initial area of planting will be monitored to ensure the young trees are growing well before the programme is extended. Saplings will be protected from browsing using 1.2 m shelters, and will not be located in areas with thick

canopy (e.g. under beech).

### 4.3 Other operations

Maintenance: the site is contained by traditional dry stone walls which, as a result of neglected management over a number of years, had been threatened by unrestrained growth of trees and shrubs. Where there was a conflict and damage had resulted, some trees were removed. Wall damage has been extensively repaired since the Trust took ownership, and we are now maintaining a watching brief to ensure that new damage is rapidly attended to.

### 4.4 Protection and maintenance

#### 4.4.1 Pest and disease management

Pests: at present, there is little sign of pest species. A few Grey squirrels are present and are being managed by trapping. Similarly, there are isolated sightings of Roe deer, and some browsing of hazel etc., but it is thought that the numbers of dog-walkers are discouraging them. There is currently no need for deer management as their numbers have appeared to reduce over the last 5 years.

Diseases: the only noticeable disease problem is some rotting at the base of a number of sycamores (with subsequent hollowing). The cause is unknown, but there have been no attempts at treatment. However, the tree thinning programme has removed many affected trees, and more will be removed during construction of the glade.

#### 4.4.2 Fire plan

If a fire is detected, or reported, then the Fire Brigade will be contacted. Glass bottles, and other litter which could start a fire, are regularly removed.

#### 4.4.3 Waste disposal and pollution

There are no activities proposed within the wood which are likely to produce significant waste or pollution.

Any waste from woodland management activities is removed from site.

#### 4.4.4 Protection from unauthorised activities

The only unauthorised activity that had originally been identified was the marking of trees and the lime kiln with graffiti, but this has stopped since the wood was taken over by LKWT. Relationships have been built with local residents (through direct contact and through our website) and by chatting to walkers. The primary school in Lindale has also been encouraged to use the wood for 'forest school' classes, and it is likely that this has induced local children to treat the wood with greater respect. Discreet signage at two access points, indicating the conservationist aims of the Trust, had also been installed as part of the WIG.

In summary, it seems that community pressure has stopped vandalism, and the local



community has responded favourably to the care with which LKWT is managing the wood.

#### 4.4.5 Protection of other identified services and values (4.1.1)

n/a

### 4.5 Game management

No game management is proposed.

### 4.6 Protecting and enhancing landscape, biodiversity and special features

#### 4.6.1 Management of designated areas

The only designation which affects the woodland is a Limestone Pavement Order (Map 3). The Trust fully complies (and will continue to comply) with the Order so that the limestone pavement is not damaged, and no limestone is removed.

#### 4.6.2 Measures to enhance biodiversity and other special features (2.1.1 and 6.1.1)

Enhancing biodiversity is the major objective that the Trust has identified for this wood. It is, *de facto*, easy for the Trust to meet all UK Forest Standard and UKWAS requirements in relation to enhancing biodiversity. For example:

- (i) 100% of the woodland area has been identified as important for conservation
- (ii) Dead wood is not being collected routinely from the woodland floor and a proportion of any fellings or thinnings are left to lie. Standing dead wood is not being removed.
- (iii) Veteran trees are being encouraged (and welcomed).
- (iv) A wide path (now a public right of way) which runs as a 'chevron' up and down the wood is now being partly managed as a ride. It is intended to construct a glade to increase ground flora and associated insect fauna.
- (v) As well as carrying out sample grid surveys of trees and ground flora, other notable species are being recorded and maintained on a database. This information will be used as a measure of biodiversity, and as a resource for education and research.
- (vi) A rolling programme of hazel coppicing will be continued to encourage the ground flora in some areas. However, it is not intended to re-cut the 5 existing coppice coupes for at least 5 years.

#### 4.6.3 Special measures for ASNW and SNW

Lime Kiln Wood is classified by Natural England as Ancient Semi-natural Woodland (ASNW). The Trust believes that the measures set out elsewhere in the Plan demonstrate

that the UKWAS requirements are being and will be addressed. Specifically:

- (i) Enhancement of the semi-natural characteristics of the woodland will be intricately linked with the efforts to maximise biodiversity. The biodiversity of the wood will form a resource for education and research.
- (ii) The only trees that might be considered as exotic are beech, sycamore, horse chestnut and larch. These will be gradually reduced over the long term. The Trust is not proposing to carry out wholesale changes at a stroke, believing that some wildlife that has come to utilise so-called 'exotics' needs time to adapt to their removal.
- (iii) All work will comply with the UK Forestry Standard and the Forestry Commission publication Managing ancient and native woodland practice guide.
- (iv) Any harvesting (coppicing and thinning) will continue to use lower impact systems.
- (v) Some oaks (and understorey species such as hazel) will be planted in the more impoverished areas. Strains of local provenance will be used. However, it could be argued that resilience to climate change would be improved by introducing non-local southern strains, and this approach will be considered.

#### 4.6.4 Special measures for PAWS

n/a

#### 4.6.5 Measures to mitigate impacts on landscape and neighbouring land (3.1.2)

The management proposals for Lime Kiln Wood are unlikely to have any impacts on neighbouring land, or the local landscape.

### 4.7 Management of social and cultural values

#### 4.7.1 Archaeology and sites of cultural interest

The only archaeological or cultural site associated with the wood is the lime kiln, which has recently (2018) been stabilised. The condition of this structure will continue to be monitored to ensure that any new damage is rapidly repaired.

#### 4.7.2 Public access and impacts on local people

There is 125 m of public right of way (footpath) in the NE corner of the wood. Another 400 m of public right of way has recently been officially designated, forming a chevron-shaped path across the whole wood which is used extensively by local people (see Map 5). In addition, there are other ad hoc and shifting minor paths used by walkers.

The Trust notes the UKWAS requirement that all existing permissive or traditional uses of the woodland are sustained, unless they are threatening the integrity of the woodland, or the achievement of management objectives. To this end, all paths that are used routinely in the wood are to remain un-blocked. For example, where walls have been knocked down over the years, to allow unauthorised access to the woodland, the walls have been re-built with a tidy opening or gate for pedestrian access.

For the record, the site is not 'Open Access' woodland under the CROW Act.

## 5 Consultation

Organisation/individual	Date received	Comment	Response/action
Edward Mills, Cumbria	Nov 2018	Provided helpful comments on the new draft management plan.	Plan amended

## 6 Monitoring plan summary

Objective number, issue or UKWAS Requirement	Indicator	Method of assessment	Monitoring period	Responsibility	How will information be used?
1	Diversity of birds, bats, rodents, moths and other invertebrates	Surveys by trust members and external experts	As and when possible	Trust members	To track the long-term impact of management activities
2	Ground flora abundance and diversity	Surveys by trust members	As and when possible	Trust members	To inform about the success of coppicing, tree thinning, ride widening and glade construction.
3	Unimpeded access	Visual assessment	At least monthly	Trust members	Any obstructions will be removed.
4	Walls in good condition	Visual assessment	At least biannually	Trust Members	Any repairs deemed necessary will be carried out
4	Lime Kiln in satisfactory condition	Visual assessment	At least biannually	Trust Members	Any repairs deemed necessary will be carried out if affordable
5	Management in accordance with guidelines	Revue of operations at Trust AGM	Annually	Trust Members	Practices will be amended if necessary

## 7 Work programmes

### 7.1 Outline long-term work programme (2019 to 2039)

Compartment or area	Activity	Year		
		6-10	11-15	16-20
Whole wood	Coppice as part of cycle (mainly hazel)	No	Yes	No
Northwest quadrant	Creation of a glade	Yes	No	No
Selected areas with sparse understorey and/or canopy	Planting of various tree species, including oak and hazel. This may be supplemented with species judged to be more resilient to expected climate change.	Yes	Yes	Yes
Whole wood	Removal of hazardous/damaging trees	Yes, if present	Yes, if present	Yes, if present
Perimeter of wood	Repair of wall-gaps	If necessary	If necessary	If necessary

### 7.2 Short-term work programme (2019 to 2024)

	Compartment or area	Activity	Year (2019-2024)				
			1	2	3	4	5
1	Whole wood	Coppice as part of cycle (mainly hazel)	-	-	-	-	-
2	Whole wood	Compile new list of plant species	Yes	-	-	-	Yes
3	Inside and outside coppice coupes and glade	Continue/begin quantitative ground cover surveys using quadrats. These will remain the most important method of objectively measuring the immediate consequences of our management actions.	-	Yes	-	-	Yes
4	Whole wood	Compile comprehensive list of bird species	Yes	-	-	-	Yes
5	Whole wood	Continue moth surveys (hopefully, with assistance of Edward Mills)	Yes	-	Yes	-	Yes
6	Whole wood	Systematic butterfly surveys	-	Yes	-	Yes	-
7	Whole wood	Beetle surveys using pitfall trapping or sweep netting.	-	Yes	-	Yes	-
8	Whole wood	Small mammal surveys using Longworth traps.	Yes	-	Yes	-	Yes
9	Inside coupes 1-5, and in the glade	Control brambles by cutting a proportion (up to 25%) of each coppiced area and the glade during the winter, and monitor success in improving the ground flora. This will be introduced gradually, starting with a demonstration of its effectiveness in a single area (e.g. coupe 4, where bramble growth is densest). Unless damage to other ground flora from mechanical cutting can be avoided, this work will be done by hand cutting. Brambles will also be cut along the margins of the new ride.	Yes	Yes	Yes	Yes	Yes

	Compartment or	Activity	Year (2019-2024)				
10	Northwest quadrant (north of coupe 4 and west of coupe 3)	Construct a large glade (≥50 m diameter) in a part of the area dominated by sycamores. The only other possible area for a glade would be in the southwest quadrant of the wood, but that contains higher tree diversity and would involve the undesirable felling of species such as yew. This would mean removing some species in addition to sycamore, but all trees would be allowed to coppice. Based on tree survey data from the most sycamore-dense part of this quadrant of LKW, approximately 250-300 trees in a 50 m diameter area would have to be felled, most of which are sycamore and ash, with a sprinkling of hazel and cherry. The glade should be sited in such a way as to minimise the risk of wind-throw ( <i>i.e.</i> not too close to the woodland edge), paying attention to guidelines published by the Forestry Commission ( <a href="https://www.forestry.gov.uk/pdf/ewgs-on011-ride-mangt.pdf/\$FILE/ewgs-on011-ride-mangt.pdf">https://www.forestry.gov.uk/pdf/ewgs-on011-ride-mangt.pdf/\$FILE/ewgs-on011-ride-mangt.pdf</a> ). Forestry Commission permission and a felling licence will be required for this project.	Yes	Yes	-	-	-
11	Northwest quadrant (north of coupe 4 and west of coupe 3)	Maintain and develop the glade by regular cutting of coppice and possible introduction of grassland species.	-	-	Yes	Yes	Yes
12	Ride	Maintain and develop the ride by regular removal of tree seedlings and possible introduction of grassland species. Do not extend until its benefits have been demonstrated.	Yes	Yes	Yes	Yes	Yes
13	Southwest quadrant (west of coupes 1 and 2)	Maintain in a semi-pristine condition, with the exception of removing invasive species such as beech seedlings, and planting understorey species where necessary.	Yes	Yes	Yes	Yes	Yes
14	Central eastern zone (east of coupes 1 and 2)	Maintain in a semi-pristine condition, with the exception of removing invasive species such as beech seedlings, and planting understorey species where necessary.	Yes	Yes	Yes	Yes	Yes
15	Areas of thin or non-existent understorey or canopy	Begin a programme of planting locally-sourced understorey species, especially hazel. Consideration should also be giving to improving LKW's resilience to climate change through the planting of canopy species likely to cope successfully with anticipated rainfall, wind and temperature regimes over the next 50-100 years. There are some uncertainties about the likely success of this activity given that planted trees may not thrive in the shade of existing taller trees (especially beech). For that reason, an initial area of planting should be monitored to ensure the young trees are growing well before the programme is extended. Saplings should be protected from browsing using 1.2 m shelters, and should not be located in areas with thick canopy ( <i>e.g.</i> under beech).	Yes	Yes	-	-	-
16	Whole wood	Thinning of undesirable species (mainly beech seedlings)	Yes	Yes	Yes	Yes	Yes
17	Whole wood	Checks for, and removal of, hazardous/damaging trees along boundaries and public rights of way	Yes	Yes	Yes	Yes	Yes
18	Whole wood	Install improved woodpecker-resistant bird boxes in order to maintain a reasonable number (50?) at any one time.	Yes	Yes	Yes	Yes	Yes

	Compartment or	Activity	Year (2019-2024)				
19	Whole wood	Install more bat boxes in consultation with, and assistance from, Rich Flight and the South Cumbria Bat Group	Yes	Yes	Yes	Yes	Yes
20	Perimeter	Repair wall-gaps as necessary	Yes	Yes	Yes	Yes	Yes
21	Whole wood	Regular checks for ash dieback and other tree diseases	Yes	Yes	Yes	Yes	Yes

## 8 Costing Operations

Most of the management activity will be carried out by members of the Lime Kiln Wood Trust who are a mixture of retired professionals (including ecologists) and enthusiasts. Such work will include coppicing, thinning of saplings and smaller trees, tree planting, wall building and estate maintenance. Time will be given freely.

The removal of larger trees (mainly from the new glade) will be carried out by external professionals. This may be carried out in exchange for the resultant timber or by using the Trust's own funds (members contribute monthly) or by seeking grants.

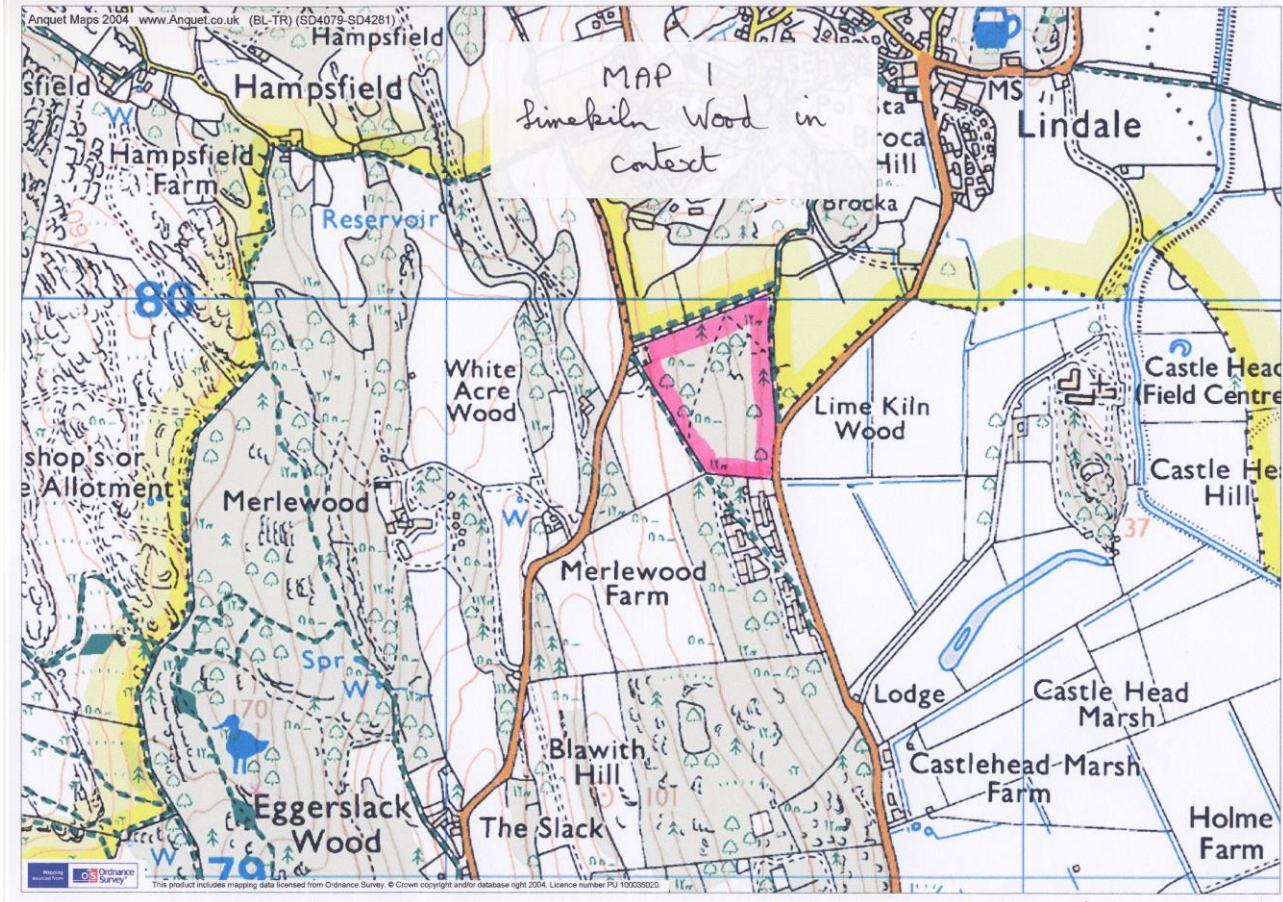
Estate management costs (e.g. temporary fencing, maintenance of tools) will be paid through the Trust's funds.

Any timber resulting from management activity (not forming part of an exchange with contractors) will be offered to Trust members at no cost. Any surplus timber will be left for the public to collect.

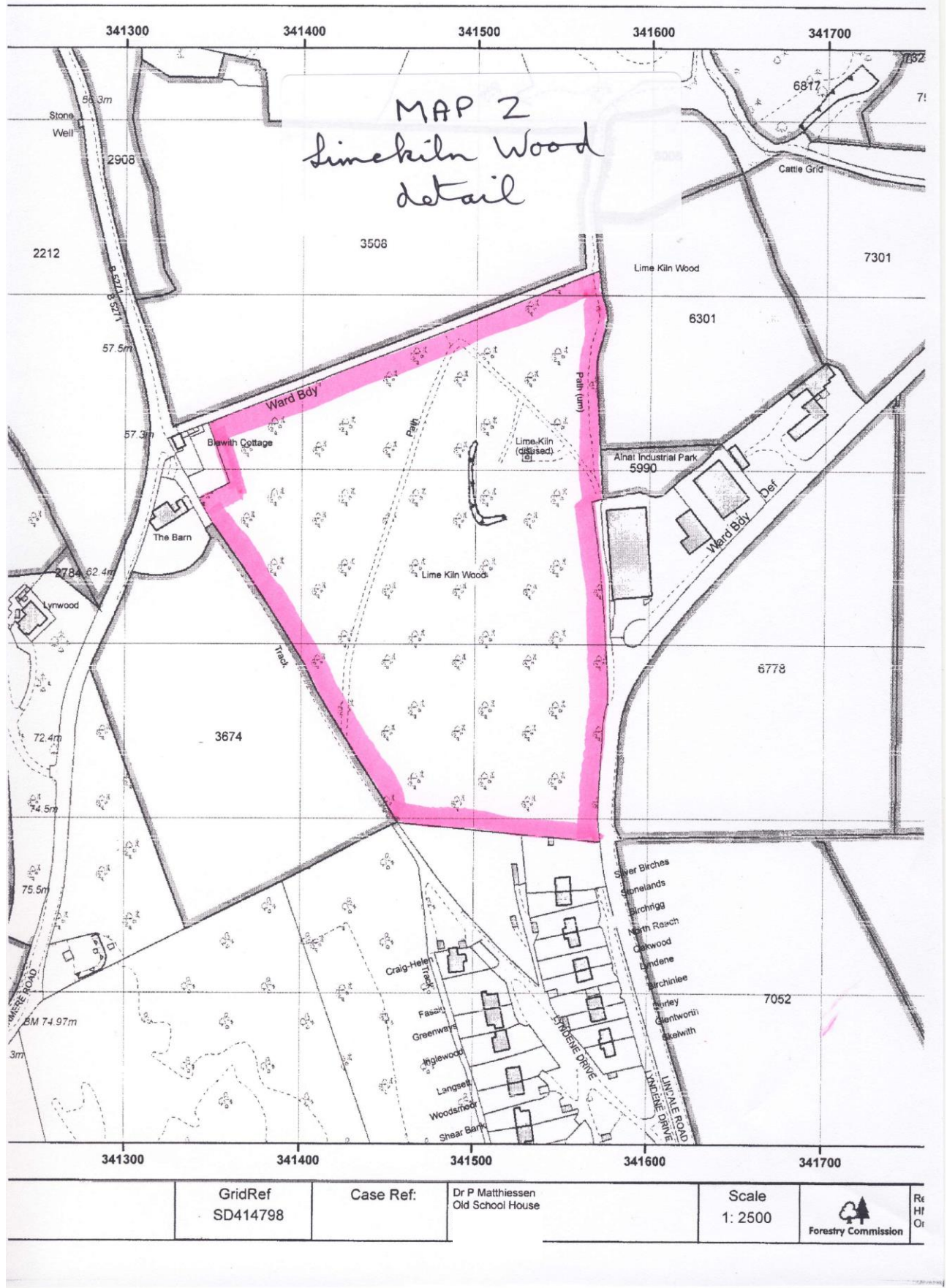
## 9 Maps

Map No./Title	Description
1	Ordnance Survey map showing Lime Kiln Wood in context
2	Map showing details of Lime Kiln Wood
3	Map showing the geographical extent of the Limestone Pavement Order
4	Map showing the Lake District National Park boundary
5	Rights of Way (RoWs) and other routes
6	Location of Lime Kiln
7	Planned management activities in Lime Kiln Wood, 2018-2023.

Map 1. Lime Kiln Wood in context

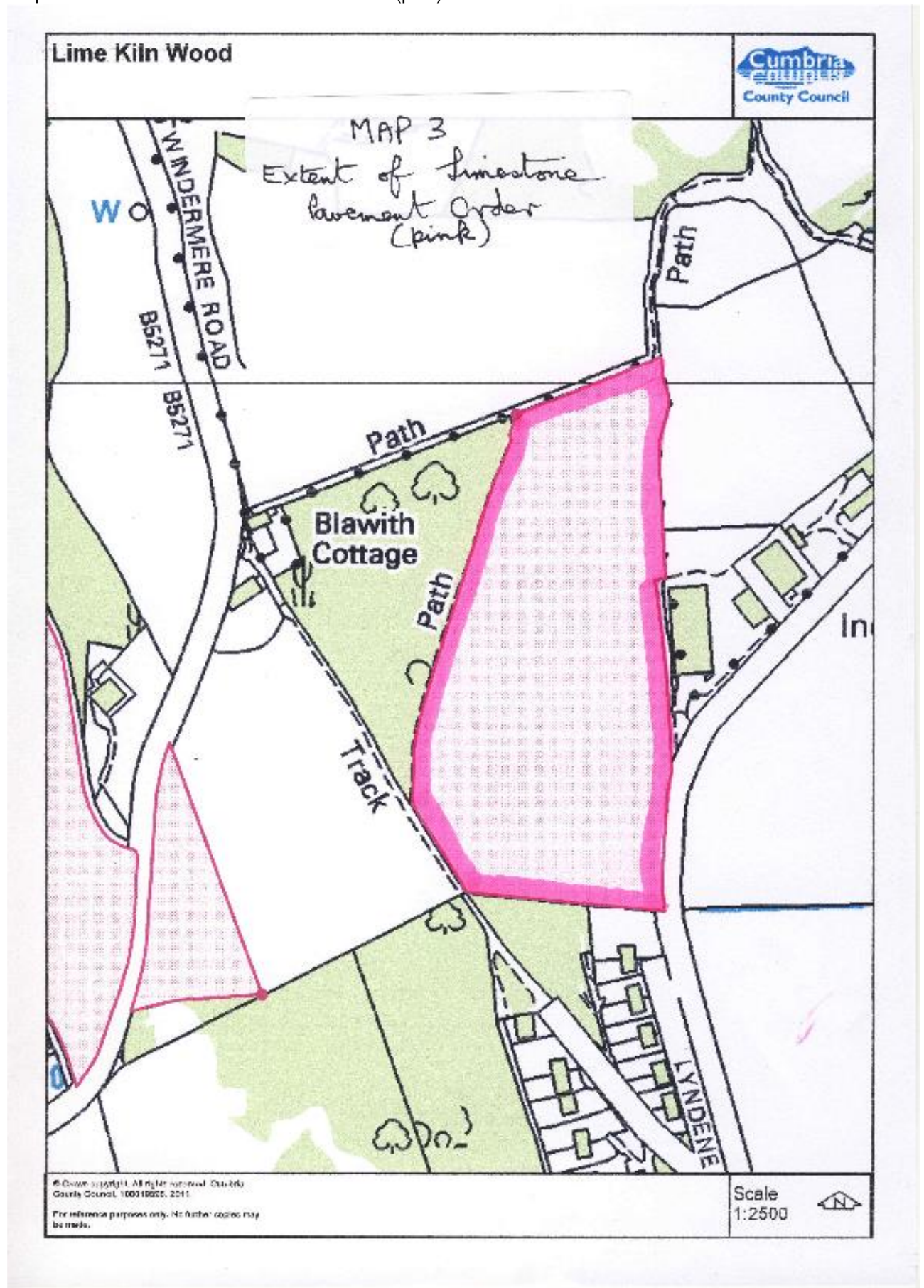


Map 2. Lime Kiln Wood detail

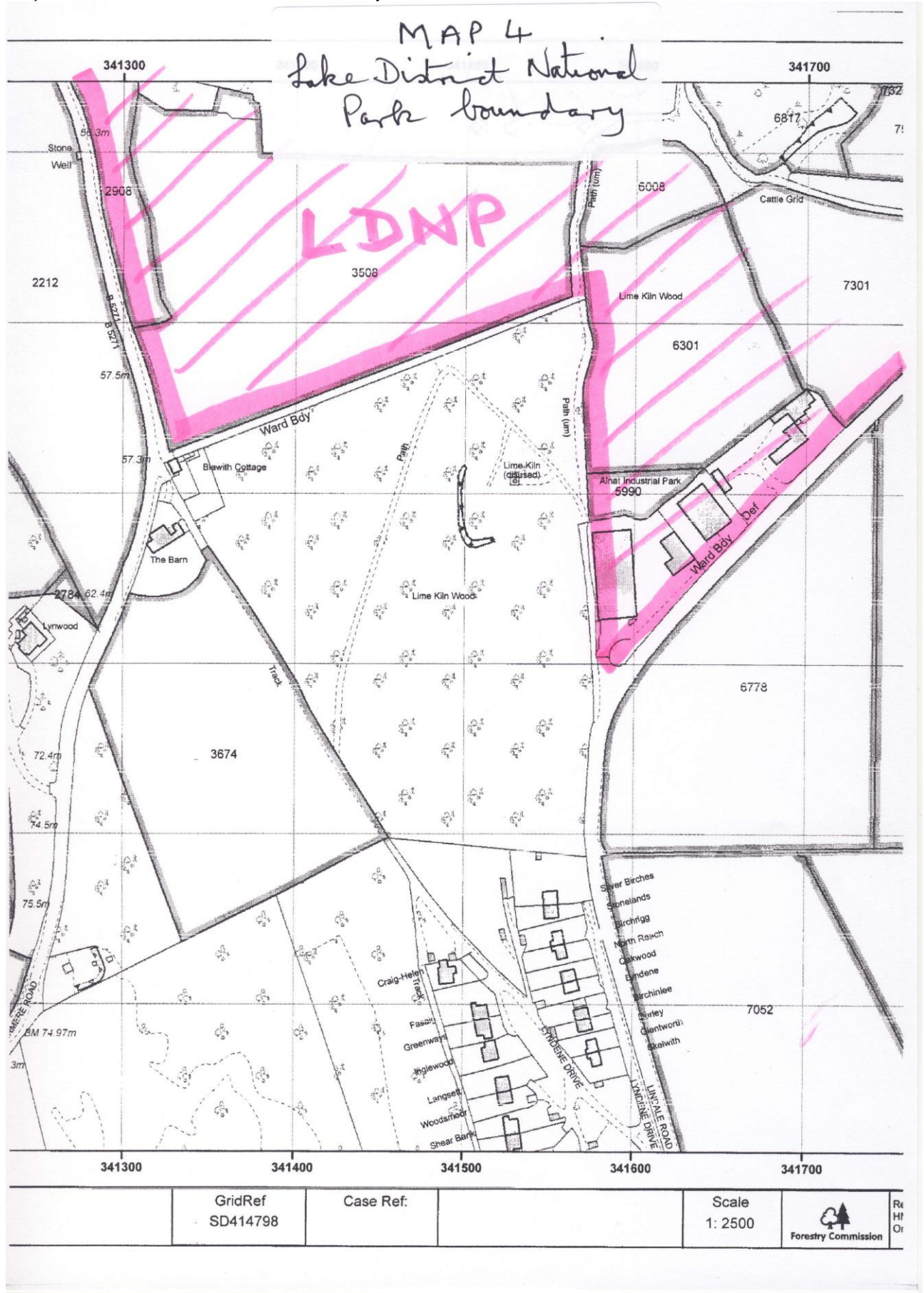




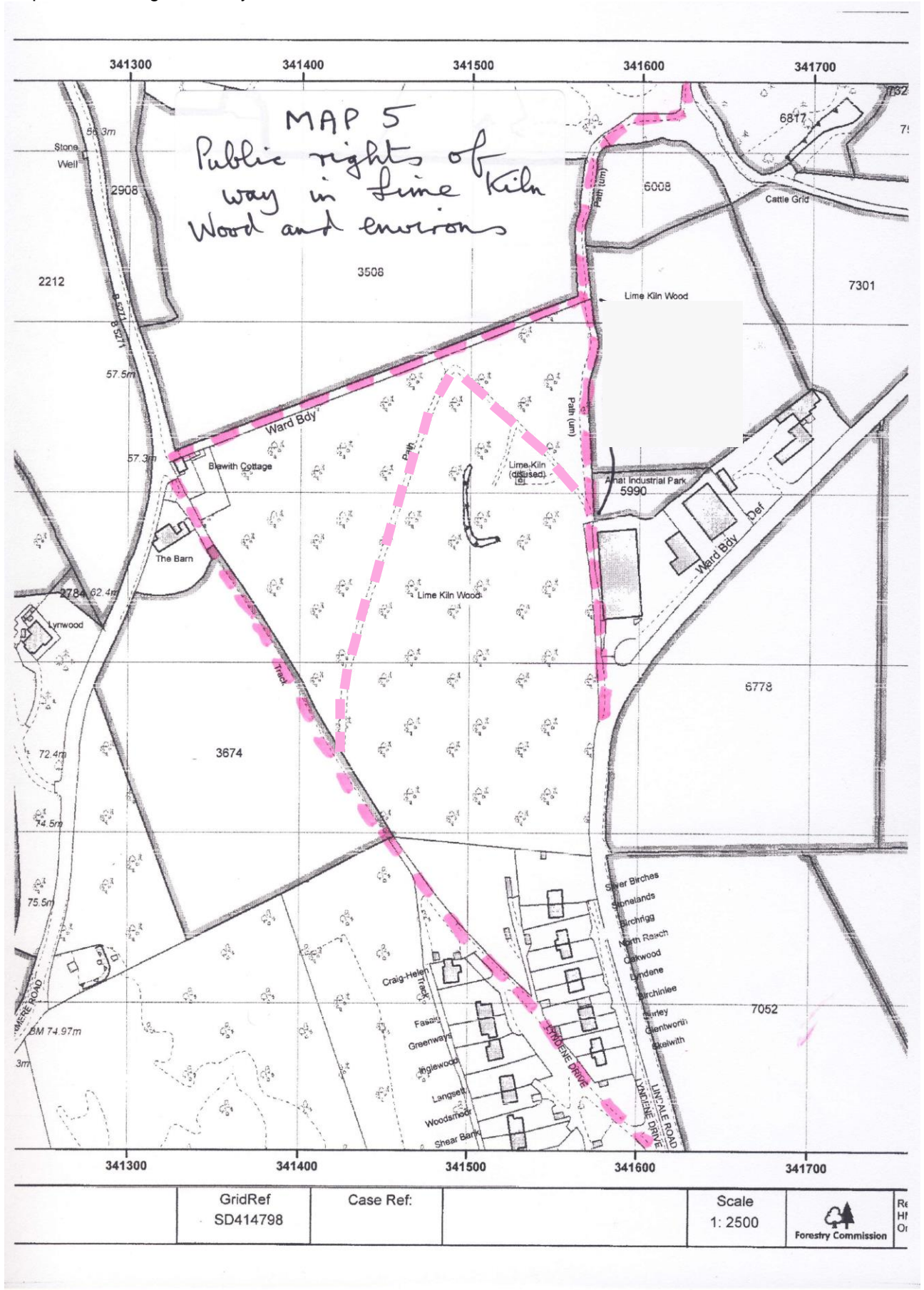
Map 3. Extent of Limestone Pavement Order (pink)



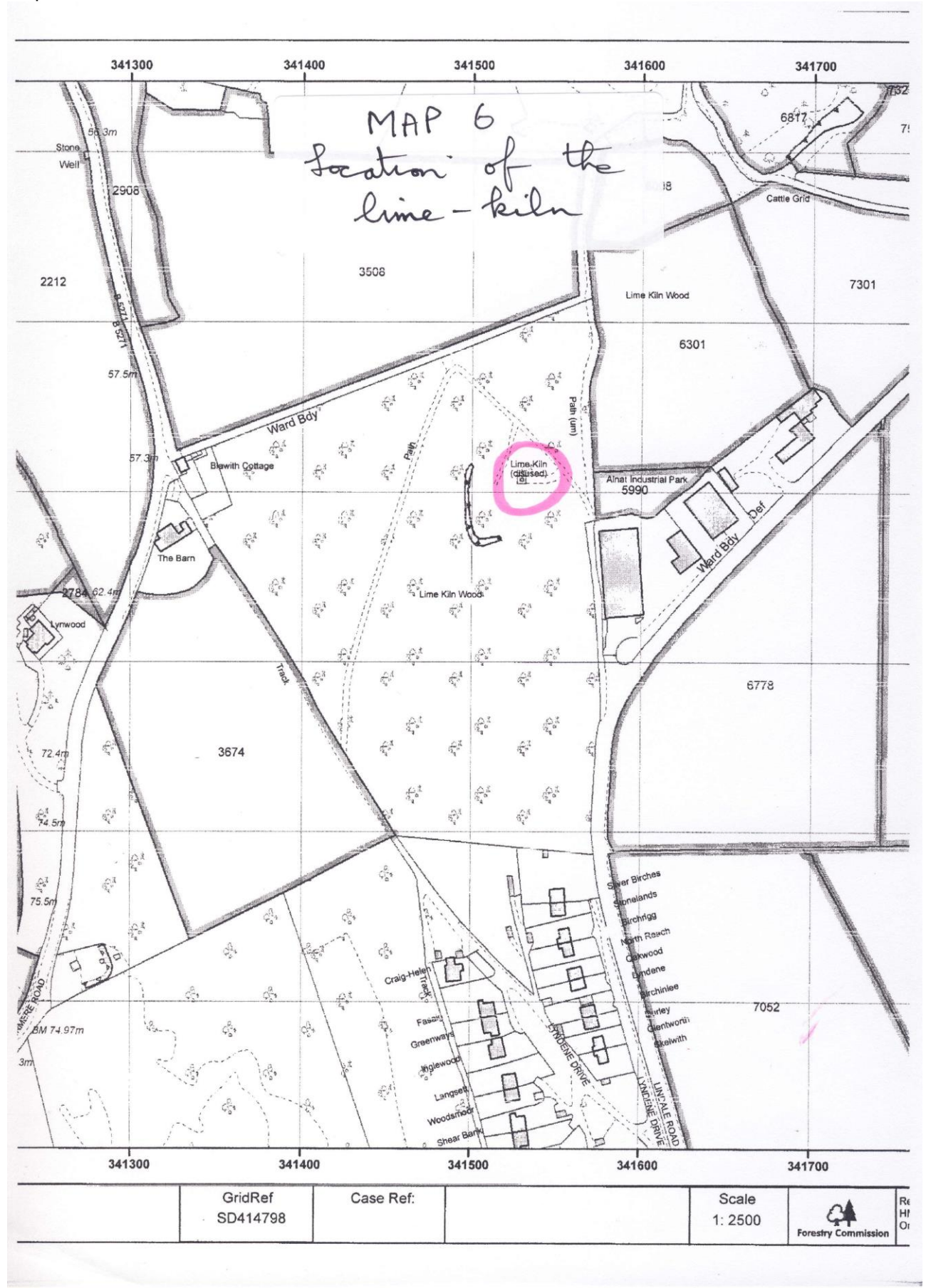
Map 4. Lake District National Park boundary



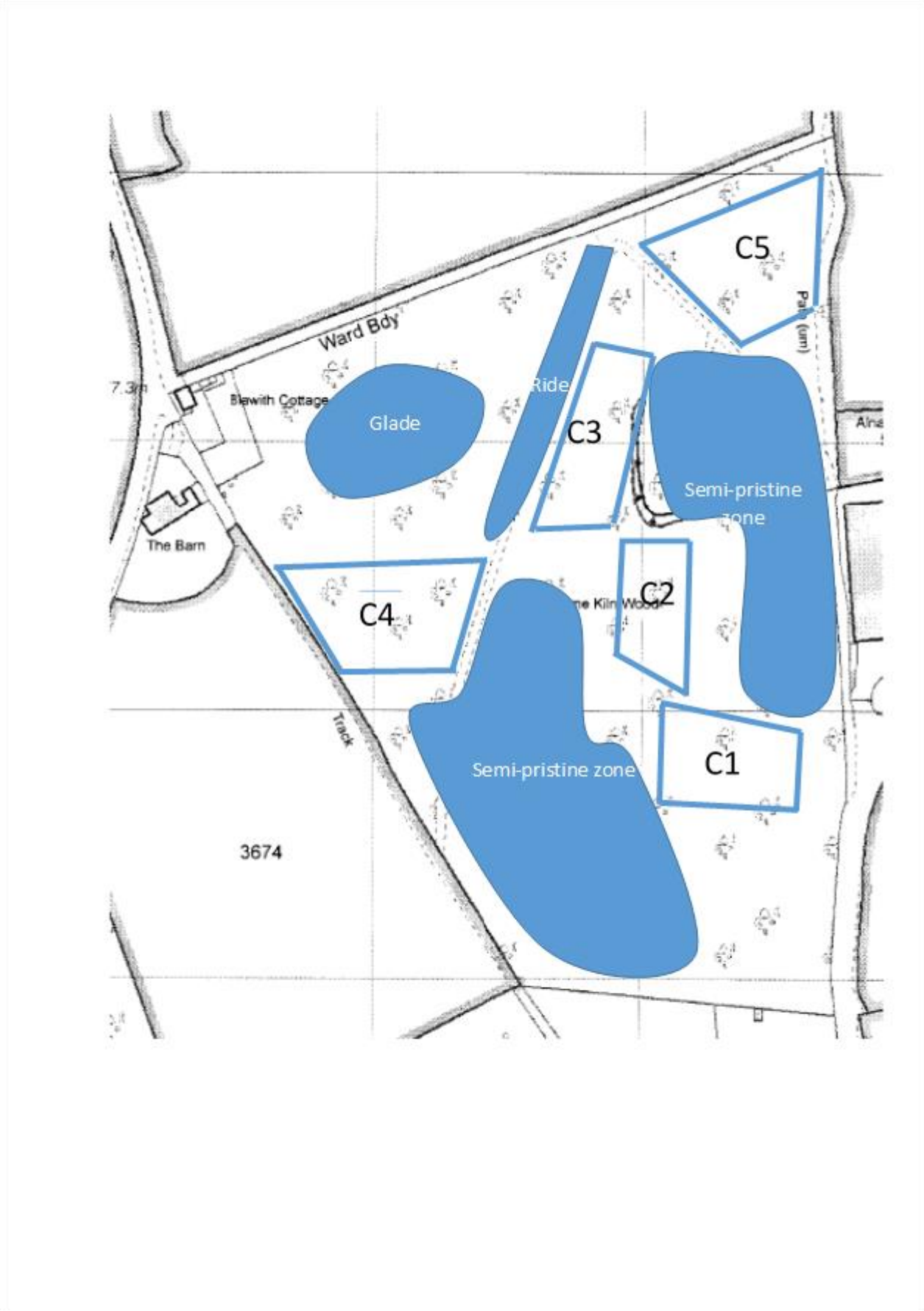
Map 5. Public Rights of Way in Lime Kiln Wood and environs



Map 6. Location of the restored lime kiln



Map 7. Certain planned management activities in various parts of Lime Kiln Wood during 2018-2023. Note that no coppicing is planned during this period. Areas shown are not exactly to scale.



## 10 Thinning, felling and restocking proposals

**Applicants seeking funding through the wood fuel initiative** for harvesting machinery or wood fuel boilers must indicate the total volume that is to be thinned and felled during the period of this plan, **by completing Table A.**

This section **should not be completed** for any other applications.

All applicants **must** complete **Table B.** where harvesting work is to be undertaken.

### 10.1 Table A.

Species	Total estimated volume to be harvested during plan period (m <sup>3</sup> )
<b>Broadleaves</b>	n/a
<b>Conifers</b>	n/a

## **10.2 Table B.**

This section must be completed if you wish to gain felling licence approval from the Forestry Commission. The work detailed below should match the proposals set out in the plan.

For details on how to complete the table, please refer to [EWGS 4 Woodland Regeneration Grant Guide \(PDF 84kb\)](#).

Cpt/sub cpt	Area	Area to be worked	Type of felling	% of felled area comprising		Type of licence	Change in woodland type	Preferred claim year	Restock species %	Establishment by natural regeneration %	Standard proposals	Notes
				BL	CON							
All	5.1 ha	0.2 ha	FIT	100	0	C	None	n/a	None	nil		Removal of standard trees to create a glade in the northwest quadrant of the wood. Majority of trees are sycamore, with a few ash and oak.
All	5.1 ha	5.1 ha	FC <sup>2</sup>	100	0	C	None	n/a	Same	100%		Coppice rotation (not until 2025)
All	5.1 ha	5.1 ha	FIT <sup>3</sup>	100	0	C	None	n/a	None			Felling standard trees if hazardous or damaging

<sup>1</sup> Thinning

<sup>2</sup> Fell Coppice

<sup>3</sup> Felling Individual Trees

## **Addition information if required**

### **List of Annexes.**

1. Summary of current conservation status of Lime Kiln Wood (2018).
2. Records of bats
3. Night-flying moths recorded by Edward Mills. Species common to both years highlighted in yellow.
4. Summary of LKW tree species (>2 m high) surveyed in 2010.
5. Size-frequency distribution of trees (standards) in 2010. Size is diameter at breast height (dbh) in cm. Vertical scale is % of all records.
6. Ground flora recorded in Lime Kiln Wood, 1999 and 2011.



## **Annex 1. Summary of the current conservation status of Lime Kiln Wood (2018)**

This section of the new management plan briefly outlines current biodiversity in the wood and, where possible, indicates any changes that have occurred over the 7 year period since LKW was taken over by the LKW Trust.

### **a. Bats**

There have been several bat surveying visits to the wood assisted by the South Cumbria Bat Group and their acoustic bat detectors. The first visit, on a wet evening in 2011, managed to detect the presence of 3 species (Brown Long-Eared bat *Plecotus auritus*; Pipistrelle bat *Pipistrellus pipistrellus*; Soprano Pipistrelle bat *P. pygmaeus* – the smallest UK species) by their distinctive call spectra. Then, in 2013, 2 bat boxes were installed by Rich Flight of the Bat Group, followed by a further 8 in 2014, 2-3 more in 2016, and totalling 13 boxes of various designs by 2016. Inspections of these over the period 2014-2016 (see Annex 2) have revealed the presence of bats in 5 boxes, and most of these were probably occupied from soon after they were installed. This rapid uptake has been attributed to the relative lack of suitable natural bat roosting sites in LKW. The boxes were found to contain both species of pipistrelle, but also two groups of 5 Natterer's bats *Myotis nattereri* and a lone Noctule bat *Nyctalus noctula*, the largest species in the UK. This makes a total of 5 species to have been found in LKW since 2011.

It is not possible to be sure whether the installation of bat boxes has improved the status of bats in LKW, although it does seem likely that they now find it a more attractive site for roosting given the shortage of natural holes and crevices. With the exception of the few outcrops of un-vegetated limestone pavement, suitable roosting sites are rare because not many trees are sufficiently old to offer such opportunities. It had been thought that the partially rotted bases of many sycamores might be suitable for bats, but casual observations have failed to find any occupants. Likewise, the drystone walls may offer some roosting opportunities, but bats in residence have never been observed during the many wall-repair working parties.

### **b. Birds**

In comparison with the bats, there are many more sites suitable for nesting birds, although those species which prefer holes and crevices are presumably at a similar disadvantage. To remedy this potential problem, we have introduced bird boxes around the wood. About 20 boxes were installed in 2011 and another 20 in 2013, but there has been serious attrition from woodpeckers attempting to eat eggs and nestlings. As a consequence, only about 10 functioning boxes remain (mainly those with metal reinforcement around the entrance hole). However, a survey of the initial 20 after 1 year showed that about 50% had been used for nesting, and casual observation has revealed occupation by several species including nuthatches. Due to the woodpecker problem, it is doubtful whether the bird boxes have made much impact on overall bird numbers or diversity.

Two systematic surveys have been conducted – by Jamie Green in 2013 – (Table 1), and Jack Ellerby and Mandy Lane in May 2018 – (Table 2), although several casual reports are also available.

**Table 1. Jamie Green's bird survey, Spring 2013.**

Blackbird <i>Turdus merula</i>	Long-tailed tit <i>Aegithalos caudatus</i>
Blackcap <i>Sylvia atricapilla</i>	Marsh tit <i>Parus palustris</i>
Black-headed gull <i>Larus ridibundus</i>	Mistle thrush <i>Turdus viscivorus</i>
Blue tit <i>Parus caeruleus</i>	Nuthatch <i>Sitta europaea</i>
Buzzard <i>Buteo buteo</i>	Robin <i>Erithacus rubecula</i>
Carrion crow <i>Corvus corone corone</i>	Rook <i>Corvus frugilegus</i>
Chaffinch <i>Fringilla coelebs</i>	Song thrush <i>Turdus philomelos</i>
Chiffchaff <i>Phylloscopus collybita</i>	Swallow <i>Hirundo rustica</i>
Coal tit <i>Parus ater</i>	Tree creeper <i>Certhia familiaris</i>
Goldcrest <i>Regulus regulus</i>	Wood pigeon <i>Columba palumbus</i>
Great spotted woodpecker <i>Dendrocopos major</i>	Wren <i>Troglodytes troglodytes</i>
Great tit <i>Parus major</i>	

**Table 2. Mandy Lane and Jack Ellerby's bird survey, May 2018.**

Blackbird <i>Turdus merula</i>	Great tit <i>Parus major</i>
Blackcap <i>Sylvia atricapilla</i>	Great Spotted Woodpecker <i>Dendrocopos major</i>

Blue Tit <i>Parus caeruleus</i>	Jackdaw <i>Corvus monedula</i>
Bullfinch <i>Pyrrhula pyrrhula</i>	Jay <i>Garrulus glandarius</i>
Buzzard <i>Buteo buteo</i>	Mistle thrush <i>Turdus viscivorus</i>
Carrion Crow <i>Corvus corone corone</i>	Nuthatch <i>Sitta europaea</i>
Chaffinch <i>Fringilla coelebs</i>	Pheasant <i>Phasianus colchicus</i>
Chiffchaff <i>Phylloscopus collybita</i>	Robin <i>Erithacus rubecula</i>
Coal tit <i>Parus ater</i>	Song thrush <i>Turdus philomelos</i>
Collared Dove <i>Streptopelia decaocto</i>	Swallow <i>Hirundo rustica</i>
Cuckoo <i>Cuculus canorus</i>	Tawny Owl <i>Strix aluco</i>
Dunnock <i>Prunella modularis</i>	Treecreeper <i>Certhia familiaris</i>
Garden Warbler <i>Sylvia borin</i>	Willow Warbler <i>Phylloscopus trochilus</i>
Goldfinch <i>Carduelis carduelis</i>	Wood pigeon <i>Columba palumbus</i>

To the combined list of 34, we have also added house martin *Delichon urbica*, and swift *Apus apus*, but there are doubtless many more awaiting identification. According to species lists held by the British Trust for Ornithology, approximately 60-70 woodland bird species have been commonly observed since 2014 in the 2 km buffer area around LKW. There are insufficient data to show whether the bird community in LKW has changed since 2011, and at present it is not even possible to say whether the bird fauna are representative of woodlands of this type. However, it is striking that out of the total of 36 species seen to date, only 23 were observed in the 2013 survey.

### c. Butterflies and moths

There have been no systematic attempts to survey the butterfly community. Orange tips (*Anthocharis cardamines*) and speckled wood (*Pararge aegeria*) butterflies were observed in April 2017, and brimstones (*Gonepteryx rhamni*) are seen fairly frequently. There have also been sightings of fritillaries, but it is not known of which species. LKW had been identified in 2011 by Butterfly Conservation as potentially suitable for the high brown fritillary (*Argynnis adippe*) which, although rare nationally, is still present in the general area of Morecambe Bay, and management efforts have been partially aimed at encouraging its food plant (mainly dog violet *Viola riviniana*). However, the difficulty of identifying fritillaries to species in the field (which generally requires the use of near-focus binoculars) has prevented firm records being made. As with the birds, it is not yet possible to state whether the butterfly community in LKW is representative of the area.

The data on night-flying macro-moths are more comprehensive due to the expert assistance of Edward Mills. Three light-trapping surveys have been conducted in LKW, on 9 June 2016, 5 July 2017 and 14 July 2018 (Annex 3). These revealed the following:

1. We have recorded 107 different species over the 3 years
2. Totals of 56 spp were recorded in 2016 (June 6<sup>th</sup>), 38 in 2017 (July 5<sup>th</sup> – poor weather), and 53 in 2018 (July 15<sup>th</sup>)
3. Only 7 spp were recorded in all 3 yrs (Barred fruit tree tortrix, Clay triple lines, Common pug, Light emerald, Peppered moth, Pretty chalk carpet and Willow beauty)
4. 8 spp were recorded in both 2016 and 2017 but not in 2018
5. 12 spp were recorded in both 2017 and 2018 but not in 2016
6. 6 spp were recorded in both 2016 and 2018 but not in 2017
7. 35 spp were recorded uniquely in 2016 (62.5% of 2016 records); 11 spp were recorded uniquely in 2017 (28.9% of 2017 records), and; 28 spp were recorded uniquely in 2018 (52.8% of 2018 records).

It is surprising how few species have been found constantly over the three years, but the implication is that there are many more to be found. It is known that 500+ species (including micro-moths) are to be found in southern Cumbria as a whole. Nevertheless, these surveys have drawn attention to the considerable species diversity among the Lepidoptera in LKW, and it seems likely that other invertebrates such as beetles (Coleoptera) may be similarly diverse. Several of the moth species seen are very locally distributed in Cumbria, including the clay triple lines moth (*Cyclophora linearia*) and the pretty chalk carpet moth (*Melanthia procellata*). Other relatively rare species found in LKW include the phoenix moth (*Eulithis prunata*), the northern spinach moth (*Eulithis populata*), and the coronet moth (*Craniophora ligustri*).

### d. Other animals

There have been no systematic surveys of larger animals in LKW. There are sporadic sightings of common frogs (*Rana temporaria*) and toads (*Bufo bufo*), but no records of lizards or snakes. Of the mammals, roe deer (*Capreolus capreolus*) were seen intermittently during the early years of the LKW Trust's involvement,

to the extent that it was felt necessary to fence the coppice coupes. However, in recent years the number of roe deer sightings has reduced significantly, and deer-browsing of hazel shoots is less frequent though still in evidence. Grey squirrels (*Sciurus carolinensis*) are observed regularly, and the local red squirrel group has been trapping them in LKW in the hope that the few remaining local reds (*Sciurus vulgaris*) might move in. To date, this does not appear to have happened. Red foxes (*Vulpes vulpes*) regularly traverse the wood, as do badgers (*Meles meles*). There have been no sightings of hedgehogs, weasels, stoats or other mammals, although various rodents and mustelids are almost certainly present.

#### e. Trees

Trees were intensively surveyed in 2010 by Peter and Christine Matthiessen, and a summary of the data is given in Annexes 4 and 5. The estimated total stock (based on a 50% count) was just short of 6000 trees (now reduced to 5600 after the removal of 400 sycamores), with a total of 23 species. Full details are given in the original management plan. As a result of this survey, it was judged that the tree and understorey canopy were too dense, thus limiting the diversity of the ground flora and dependent invertebrates. It was also concluded that some tree species (especially sessile oak) were not regenerating very well, again possibly due to shading. Furthermore, beech seedlings were felt to be too numerous in many areas. Consequently, the management programme implemented between 2011/12 and 2016/17 began felling mature sycamores in the southern half of the wood (80 per year for 5 years = 400 trees), and a large but unrecorded number of small beech seedlings was pulled up. Furthermore, during the same period, hazel was coppiced in 5 approximately 2500 m<sup>2</sup> coupes (1 per year) (see Map 7). Hazel coppicing was halted after 2016, but the main transverse path across the western part of LKW was widened by approximately 6-10 m during late 2017 and early 2018, creating a corridor or ride.

The purpose of all this activity was to introduce more light to the woodland floor with the object of encouraging diversification of the ground flora. The next section (ground flora) describes the results after 5 years.

#### f. Ground flora

Surveys of ground flora species occurrence were conducted in 1999 and 2011, and the combined list is shown in Annex 6, comprising a total of 56 species. A colony of Solomon's seal (*Polygonatum* sp.) has been recorded since then, but the species is unknown (possibly *P. odoratum*). Raspberry (*Rubus idaeus*) has also been recorded, but it is unknown if it is the wild strain or a cultivated variety.

In 2011 and 2012, systematic surveys of percentage ground cover were conducted by Richard Scott, employing 87 quadrats distributed evenly across the wood (see original management plan for details). There were several distinct vegetation zones in LKW, closely linked to tree species locally dominating the canopy. A striking feature was the virtual absence of living plants under yew and beech canopy, but elsewhere there were dense stands of dog's mercury (*Mercurialis perennis*), ramsons (*Allium ursinum*) or bluebell in opened up areas, often dominated by just one of those species. The NW corner had a very open canopy with spindly young trees and the stumps of recently felled sycamore trees. The result was a continuous spring carpet of ramsons and bluebells. The southern margin of the wood had very depauperate ground flora, under a canopy dominated by yew and beech trees.

In 2013 and 2017, further quadrat surveys of ground cover were undertaken by Richard Scott and Colin Barr, with the explicit objective of comparing the situation inside and outside the coppice coupes. The 2013 survey compared un-cut areas with Coupes 1 and 2 (*i.e.* areas cut, respectively, 12 and 6 months previously). Differences between areas were apparent, but these mainly appeared to reflect the different plant communities that pre-dated establishment of the coupes. For example, the number of recorded plant species varied from 19 outside the coupes, to 13 in coupe 1 and 9 in coupe 2, while respective total plant ground cover was 44.8%, 51.0% and 19.9%. At that time, differences in mean ground cover of bramble (*Rubus fruticosus*) were minor (2.2% outside, 3.4% in coupe 1 and 1.8% in coupe 2).

However, by 2017 the situation had changed markedly in the older coupes. Figure 1 compares the percentage ground cover of bramble inside and outside the coupes.

**Figure 1. Percentage ground cover of bramble (*Rubus fruticosus*) inside and outside the coppice coupes in 2017.**

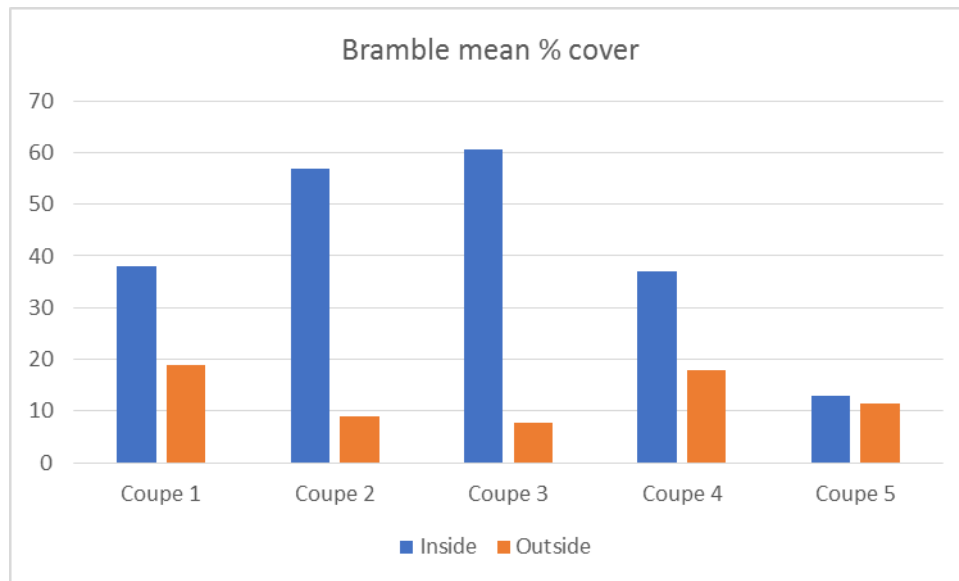


Figure 1 clearly shows that coppicing had led to a big increase in bramble cover, although the fact that cover had increased around coupe 1 from 3.4% to 18% suggests that bramble had increased since 2013 in the wood as a whole. There is a hint that the in/out disparity had begun to lessen in coupe 1 by 2017, but even then there was still twice as much bramble cover inside by comparison with outside. It had of course been expected that coppicing would lead to bramble growth, but deer browsing has been less than originally expected, so the brambles have been doing exceptionally well. However, the bramble cover outside the coupes in 2017 (mean cover = 8-19%) is nevertheless considered acceptably low, so it does not appear that the reduced deer browsing is having a major impact on the wood.

On the other hand, numbers of plant species in 2017 did not differ markedly inside and outside the coupes (Table 3).

**Table 3. Numbers of plant species inside and outside the coppice coupes in 2017.**

	Inside	Outside
Coupe 1	12	13
Coupe 2	11	10
Coupe 3	9	9
Coupe 4	14	11
Coupe 5	18	16

This apparent failure to improve plant species diversity in the coupes is at first sight disappointing, and is probably attributable to the huge increase in bramble growth which may have shaded out other species. Experience in other coppiced hazel woods suggests that the bramble will eventually die back as the tree canopy begins to close over again, and it does have certain conservation benefits. For example, it provides excellent food and cover for a variety of invertebrate, bird and mammal species. Furthermore, although human access to LKW is encouraged, bramble growth will deter visitors from departing too far from the paths, thus keeping trampling to a minimum. However, there is now a need for a proportion of bramble growth in the coppice coupes to be kept under control.

It is also worth noting that the longest established coppice coupe is only 6 years old, and the coupes should therefore be given more time to mature. In addition, quadrat surveys (while essential for obtaining objective information on the effects of our management actions) are not an efficient method for establishing total plant

species numbers, and simple walk-through surveys such as were conducted in 1999 and 2011 are more likely to obtain an accurate total. More data are therefore required before we can be sure that plant diversity has not improved. Another widely-held opinion among Trust members is that we do not want to coppice the entire wood – certain areas should be left un-coppiced in perpetuity.

**Annex 2. Records of bats collected by Rich Flight.**

Annex 2. Lime Kiln Wood Bat Boxes											
Box Number	Box Type	Tree Species	Year Erected	Date Checked							
				2014	18/10/2015	14/02/2016	02/09/2015	15/07/2017	25/02/2017		
1	Polycrete	Beech	2015								
2	Long wooden crevice	Beech	2013		1 x common pip			Slugs	Not checked		
3	Polycrete (multichamber)	Oak	2015								
4	Agriplastic & wood	Scots Pine	2015						1 x soprano pip		
5	Wooden wedge	Beech	2015					Slugs	Slugs		
6	Polycrete	Scots Pine	2015					Bird droppings			
7	Polycrete	Ash	2015		8 x common pip	7 x common pip	3 x common pip			4 x common pip (hibernation)	
8	Polycrete	Beech	2015		5 x Natterer's		2 slugs			6 x common pip (hibernation)	
9	Agriplastic & wood (under branch)	Oak	2015						Not checked		
10	Large wood maternity	Ash	2016				5 x Natterer's	Lots of cobweb and feathers	1 x noctule and 2 x soprano pipistrelle		
11	Wooden crevice	Oak	2016					Slugs & moth			
12	Wooden crevice	Beech	2016						Slugs		
13	Wooden wedge	Oak	2016						Slugs		

**Annex 3. Moth species caught in Lime Kiln Wood by Edward Mills in 2016, 2017 and 2018.**

DATE	SPECIES	VERNACULAR	TAXON
09/06/2016	argyresthia trifasciata		<i>Argyresthia trifasciata</i>
09/06/2016	barred fruit tree tortrix	Barred Fruit-tree Tortrix	<i>Pandemis cerasana</i>
09/06/2016	barred umber	Barred UMBER	<i>Plagodis pulveraria</i>
09/06/2016	beautiful golden Y	Beautiful Golden Y	<i>Autographa pulchra</i>
09/06/2016	bee moth	Bee Moth	<i>Aphomia sociella</i>
09/06/2016	bramble shoot moth	Bramble Shoot Moth	<i>Notocelia uddmanniana</i>
09/06/2016	brimstone moth	Brimstone Moth	<i>Opisthoptera luteolata</i>
09/06/2016	buff ermine	Buff Ermine	<i>Spilosoma luteum</i>
09/06/2016	celypha lacunana		<i>Celypha lacunana</i>
09/06/2016	chrysoteuchia culmella	Garden Grass-veneer	<i>Chrysoteuchia culmella</i>
09/06/2016	clay triple-lines	Clay Triple-lines	<i>Cyclophora linearia</i>
09/06/2016	clouded border	Clouded Border	<i>Lomaspilis marginata</i>
09/06/2016	clouded silver	Clouded Silver	<i>Lomographa temerata</i>
09/06/2016	common carpet	Common Carpet	<i>Epirrhoe alternata</i>
09/06/2016	common marbled carpet	Common Marbled Carpet	<i>Chloroclysta truncata</i>
09/06/2016	common pug	Common Pug	<i>Eupithecia vulgata</i>
09/06/2016	common wave	Common Wave	<i>Cabera exanthemata</i>
09/06/2016	common white wave	Common White Wave	<i>Cabera pusaria</i>
09/06/2016	coronet	Coronet	<i>Craniophora ligustri</i>
09/06/2016	crambus lathoniellus		<i>Crambus lathoniellus</i>
09/06/2016	cream wave	Cream Wave	<i>Scopula floslactata</i>
09/06/2016	dark spectacle	Dark Spectacle	<i>Abrostola triplasia</i>
09/06/2016	diamond back moth	Diamond-back Moth	<i>Plutella xylostella</i>
09/06/2016	elachista argentella		<i>Elachista argentella</i>
09/06/2016	flame	Flame	<i>Axylia putris</i>
09/06/2016	flame carpet	Flame Carpet	<i>Xanthorhoe designata</i>
09/06/2016	flame shoulder	Flame Shoulder	<i>Ochropleura plecta</i>
09/06/2016	foxglove pug	Foxglove Pug	<i>Eupithecia pulchellata</i>
09/06/2016	garden carpet	Garden Carpet	<i>Xanthorhoe fluctuata</i>
09/06/2016	green carpet	Green Carpet	<i>Colostygia pectinataria</i>
09/06/2016	green silver lines	Green Silver-lines	<i>Pseudoips prasinana</i>
09/06/2016	grey dagger	Grey Dagger	<i>Acronicta psi</i>
09/06/2016	hedya pruniana	Plum Tortrix	<i>Hedya pruniana</i>
09/06/2016	ingrailed clay	Ingrailed Clay	<i>Diarsia mendica</i>
09/06/2016	light brown apple moth	Light Brown Apple Moth	<i>Epiphyas postvittana</i>
09/06/2016	light emerald	Light Emerald	<i>Campaea margaritata</i>
09/06/2016	map-winged swift	Map-winged Swift	<i>Hepialus fusconebulosa</i>
09/06/2016	marbled minor	Marbled Minor	<i>Oligia strigilis</i>
09/06/2016	mottled pug	Mottled Pug	<i>Eupithecia exigua</i>
09/06/2016	nemapogon cloacella	Cork Moth	<i>Nemapogon cloacella</i>
09/06/2016	nematopogon swammerdamella		<i>Nematopogon swammerdamella</i>
09/06/2016	pale tussock	Pale Tussock	<i>Calliteara pudibunda</i>
09/06/2016	peppered moth	Peppered Moth	<i>Biston betularia</i>
09/06/2016	pretty chalk carpet	Pretty Chalk Carpet	<i>Melanthia procellata</i>

DATE	SPECIES	VERNACULAR	TAXON
09/06/2016	<i>Ptycholoma lecheana</i>		<i>Ptycholoma lecheana</i>
09/06/2016	<i>scoparia ambigualis</i>		<i>Scoparia ambigualis</i>
09/06/2016	scorched wing	Scorched Wing	<i>Plagodis dolabraria</i>
09/06/2016	silver ground carpet	Silver-ground Carpet	<i>Xanthorhoe montanata</i>
09/06/2016	small angle shades	Small Angle Shades	<i>Euplexia lucipara</i>
09/06/2016	small fan foot	Small Fan-foot	<i>Herminia grisealis</i>
09/06/2016	small magpie	Small Magpie	<i>Anania hortulata</i>
09/06/2016	small phoenix	Small Phoenix	<i>Ecliptopera silaceata</i>
09/06/2016	<i>udea olivalis</i>		<i>Udea olivalis</i>
09/06/2016	white ermine	White Ermine	<i>Spilosoma lubricipeda</i>
09/06/2016	white pinion spotted	White-pinion Spotted	<i>Lomographa bimaculata</i>
09/06/2016	willow beauty	Willow Beauty	<i>Peribatodes rhomboidaria</i>
05/07/2017	<i>agriphila straminella</i>		<i>Agriphila straminella</i>
05/07/2017	<i>aleimma loeflingiana</i>		<i>Aleimma loeflingiana</i>
05/07/2017	barred fruit tree tortrix	Barred Fruit-tree Tortrix	<i>Pandemis cerasana</i>
05/07/2017	bee moth	Bee Moth	<i>Aphomia sociella</i>
05/07/2017	bramble shoot moth	Bramble Shoot Moth	<i>Notocelia uddmanniana</i>
05/07/2017	clay	Clay	<i>Mythimna ferrago</i>
05/07/2017	clay triple-lines	Clay Triple-lines	<i>Cyclophora linearia</i>
05/07/2017	codling moth	Codling Moth	<i>Cydia pomonella</i>
05/07/2017	common footman	Common Footman	<i>Eilema lurideola</i>
05/07/2017	common pug	Common Pug	<i>Eupithecia vulgata</i>
05/07/2017	common white wave	Common White Wave	<i>Cabera pusaria</i>
05/07/2017	coronet	Coronet	<i>Craniophora ligustri</i>
05/07/2017	<i>dipleurina lacustrata</i>		<i>Eudonia lacustrata</i>
05/07/2017	garden carpet	Garden Carpet	<i>Xanthorhoe fluctuata</i>
05/07/2017	garden pebble	Garden Pebble	<i>Evergestis forficalis</i>
05/07/2017	heart and dart	Heart and Dart	<i>Agrotis exclamationis</i>
05/07/2017	july highflyer	July Highflyer	<i>Hydriomena furcata</i>
05/07/2017	large yellow underwing	Large Yellow Underwing	<i>Noctua pronuba</i>
05/07/2017	light emerald	Light Emerald	<i>Campaea margaritata</i>
05/07/2017	mother of pearl	Mother of Pearl	<i>Pleuroptya ruralis</i>
05/07/2017	muslin footman	Muslin Footman	<i>Nudaria mundana</i>
05/07/2017	northern spinach	Northern Spinach	<i>Eulithis populata</i>
05/07/2017	peach blossom	Peach Blossom	<i>Thyatira batis</i>
05/07/2017	peppered moth	Peppered Moth	<i>Biston betularia</i>
05/07/2017	phoenix	Phoenix	<i>Eulithis prunata</i>
05/07/2017	plain golden Y	Plain Golden Y	<i>Autographa jota</i>
05/07/2017	pretty chalk carpet	Pretty Chalk Carpet	<i>Melanthia procellata</i>
05/07/2017	purple clay	Purple Clay	<i>Diarsia brunnea</i>
05/07/2017	riband wave	Riband Wave	<i>Idaea aversata</i>
05/07/2017	sandy carpet	Sandy Carpet	<i>Perizoma flavofasciata</i>
05/07/2017	<i>scoparia ambigualis</i>		<i>Scoparia ambigualis</i>
05/07/2017	small fan-foot	Small Fan-foot	<i>Herminia grisealis</i>
05/07/2017	small fan-footed wave	Small Fan-footed Wave	<i>Idaea biselata</i>
05/07/2017	straw dot	Straw Dot	<i>Rivula sericealis</i>
05/07/2017	swallow-tailed moth	Swallow-tailed Moth	<i>Ourapteryx sambucaria</i>
05/07/2017	<i>swammerdamia caesiella</i>		<i>Swammerdamia caesiella</i>



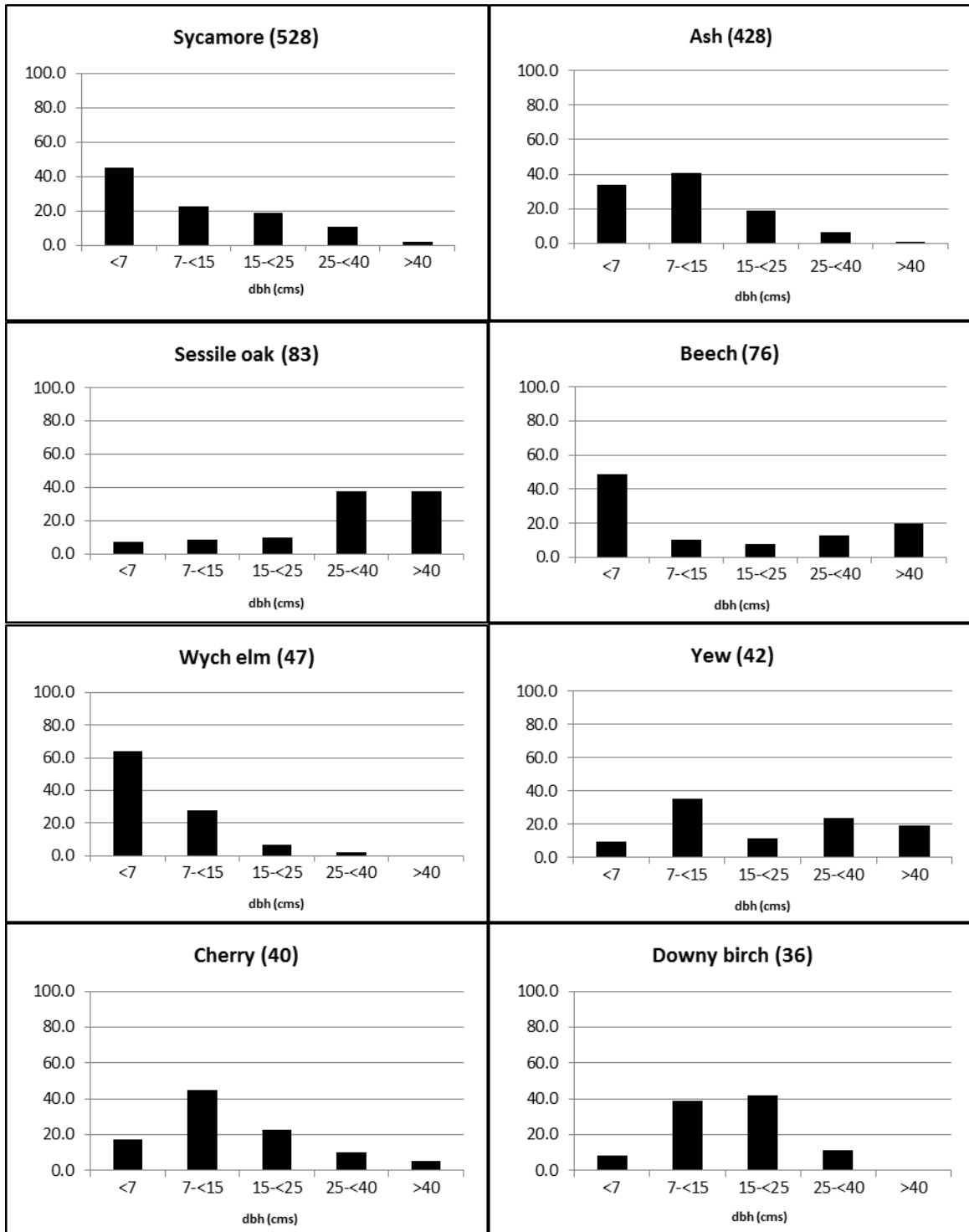
DATE	SPECIES	VERNACULAR	TAXON
05/07/2017	udea olivalis		<i>Udea olivalis</i>
05/07/2017	uncertain	Uncertain	<i>Hoplodrina alsines</i>
05/07/2017	v-pug	V-Pug	<i>Chloroclystis v-ata</i>
05/07/2017	willow beauty	Willow Beauty	<i>Peribatodes rhomboidaria</i>
14/07/2018	small fan-footed wave	Small Fan-footed Wave	<i>Idaea biselata</i>
14/07/2018	july highflyer	July Highflyer	<i>Hydriomena furcata</i>
14/07/2018	eudonia mercurella		<i>Eudonia mercurella</i>
14/07/2018	argyresthia albistria		<i>Argyresthia albistria</i>
14/07/2018	swallow-tailed moth	Swallow-tailed Moth	<i>Ourapteryx sambucaria</i>
14/07/2018	buff footman	Buff Footman	<i>Eilema depressa</i>
14/07/2018	common footman	Common Footman	<i>Eilema lurideola</i>
14/07/2018	muslin footman	Muslin Footman	<i>Nudaria mundana</i>
14/07/2018	buff arches	Buff Arches	<i>Habrosyne pyritoides</i>
14/07/2018	bird cherry ermine	Bird-cherry Ermine	<i>Yponomeuta evonymella</i>
14/07/2018	triple-spotted clay	Triple-spotted Clay	<i>Xestia ditrapezium</i>
14/07/2018	pretty chalk carpet	Pretty Chalk Carpet	<i>Melanthia procellata</i>
14/07/2018	willow beauty	Willow Beauty	<i>Peribatodes rhomboidaria</i>
14/07/2018	riband wave	Riband Wave	<i>Idaea aversata</i>
14/07/2018	brimstone moth	Brimstone Moth	<i>Opisthograptis luteolata</i>
14/07/2018	purple clay	Purple Clay	<i>Diarsia brunnea</i>
14/07/2018	agriphila straminella		<i>Agriphila straminella</i>
14/07/2018	mother of pearl	Mother of Pearl	<i>Pleuroptya ruralis</i>
14/07/2018	drinker	Drinker	<i>Euthrix potatoria</i>
14/07/2018	emmelina monodactyla		<i>Emmelina monodactyla</i>
14/07/2018	udea lutealis		<i>Udea lutealis</i>
14/07/2018	udea prunalis		<i>Udea prunalis</i>
14/07/2018	blastobasis adustella		<i>Blastobasis adustella</i>
14/07/2018	common pug	Common Pug	<i>Eupithecia vulgata</i>
14/07/2018	white-spotted pug	White-spotted Pug	<i>Eupithecia tripunctaria</i>
14/07/2018	v pug	V-Pug	<i>Chloroclystis v-ata</i>
14/07/2018	barred fruit tree tortrix	Barred Fruit-tree Tortrix	<i>Pandemis cerasana</i>
14/07/2018	peppered moth	Peppered Moth	<i>Biston betularia</i>
14/07/2018	oak eggar	Oak Eggar	<i>Lasiocampa quercus</i>
14/07/2018	straw dot	Straw Dot	<i>Rivula sericealis</i>
14/07/2018	snout	Snout	<i>Hypena proboscidalis</i>
14/07/2018	purple bar	Purple Bar	<i>Cosmorhoe ocellata</i>
14/07/2018	light emerald	Light Emerald	<i>Campaea margaritaria</i>
14/07/2018	double square spot	Double Square-spot	<i>Xestia triangulum</i>
14/07/2018	small rivulet	Small Rivulet	<i>Perizoma alchemillata</i>
14/07/2018	common carpet	Common Carpet	<i>Epirrhoe alternata</i>
14/07/2018	flame	Flame	<i>Axylia putris</i>
14/07/2018	clay triple lines	Clay Triple-lines	<i>Cyclophora linearia</i>
14/07/2018	dark barred twin spot carpet	Dark-barred Twin-spot Carpet	<i>Xanthorhoe ferrugata</i>
14/07/2018	large yellow underwing	Large Yellow Underwing	<i>Noctua pronuba</i>
14/07/2018	carcina quercana		<i>Carcina quercana</i>
14/07/2018	engrailed	Engrailed	<i>Ectropis crepuscularia</i>
14/07/2018	dun bar	Dun-bar	<i>Cosmia trapezina</i>

DATE	SPECIES	VERNACULAR	TAXON
14/07/2018	yellow tail	Yellow-tail	<i>Euproctis similis</i>
14/07/2018	green carpet	Green Carpet	<i>Colostygia pectinataria</i>
14/07/2018	flame shoulder	Flame Shoulder	<i>Ochropleura plecta</i>
14/07/2018	early thorn	Early Thorn	<i>Selenia dentaria</i>
14/07/2018	acleris forsskaleana		<i>Acleris forsskaleana</i>
14/07/2018	common lutestring	Common Lutestring	<i>Ochropacha duplaris</i>
14/07/2018	ypsolopha dentella	Honeysuckle Moth	<i>Ypsolopha dentella</i>
14/07/2018	phoenix	Phoenix	<i>Eulithis prunata</i>
14/07/2018	flame carpet	Flame Carpet	<i>Xanthorhoe designata</i>
14/07/2018	dark umber	Dark Umber	<i>Philereme transversata</i>

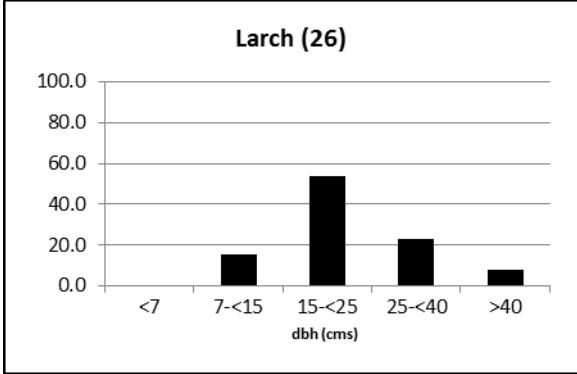
**Annex 4. Summary of LKW tree species (>2 m high) surveyed in 2010.**

	<b>Counted trees</b> (in 31 blocks of 25x25 m = 19,375 m <sup>2</sup> )	<b>Trees extrapolated to whole wood</b> (52,230 m <sup>2</sup> )
Hazel <i>Corylus avellana</i>	604	1628
Sycamore <i>Acer pseudoplatanus</i>	528	1423
Ash <i>Fraxinus excelsior</i>	428	1154
Holly <i>Ilex aquifolium</i>	101	272
Hawthorn <i>Crataegus monogyna</i>	96	259
Sessile oak <i>Quercus petraea</i>	83	224
Beech <i>Fagus sylvatica</i>	76	205
Wych elm <i>Ulmus glabra</i>	47	127
Yew <i>Taxus baccata</i>	42	113
Wild cherry <i>Prunus avium</i>	40	108
Downy birch <i>Betula pubescens</i>	36	97
Larch <i>Larix europaeus</i>	26	70
Blackthorn <i>Prunus spinosa</i>	12	32
Rowan <i>Sorbus aucuparia</i>	10	27
Spindle <i>Euonymus europaeus</i>	6	16
Elder <i>Sambucus nigra</i>	2	5
Scots pine <i>Pinus sylvestris</i>	2	5
Horse chestnut <i>Aesculus hippocastanum</i>	1	3
European barberry <i>Berberis vulgaris</i>	1	3
Willow <i>Salix</i> sp.	1	3
European fly honeysuckle <i>Lonicera xylosteum</i>	1	3
Silver birch <i>Betula pendula</i>	1	3
Wild crab apple <i>Malus sylvestris</i>	1	3
<b>TOTALS</b>	<b>2145</b>	<b>5783</b>

**Annex 5. Size-frequency distribution of trees (standards) in 2010. Size is diameter at breast height (dbh) in cm. Vertical scale is % of all records.**



**Annex 5 (continued). Size-frequency distribution of trees (standards) in 2010. Size is diameter at breast height (dbh) in cm. Vertical scale is % of all records.**



**Annex 6. Ground flora recorded in Lime Kiln Wood, 1999 and 2011**

<i>Alchemilla sp.</i>	[no common name]
<i>Allium ursinum</i>	Ramsons / wild garlic
<i>Anemone nemorosa</i>	Wood anemone
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Arum maculatum</i>	Cuckoo pint / Lords and Ladies
<i>Athyrium filix-femina</i>	Lady fern
<i>Brachypodium sylvaticum</i>	False-brome
<i>Cardamine pratensis</i>	Cuckoo flower
<i>Carex sylvatica</i>	Wood sedge
<i>Circaea lutetiana</i>	Enchanter's nightshade
<i>Conopodium majus</i>	Pignut
<i>Cotoneaster horizontalis agg.</i>	Cotoneaster
<i>Cruciata ciliata</i>	Crosswort
<i>Ctenidium molluscum</i>	Chalk comb-moss
<i>Dactylis glomerata</i>	Cock's foot
<i>Dicranum sp.</i>	[moss]
<i>Dryopteris dilatata</i>	Broad buckler-fern
<i>Dryopteris filix-mas</i>	Male-fern
<i>Epilobium montanum</i>	Broad-leaved willowherb
<i>Fragaria vesca</i>	Wild strawberry
<i>Galanthus nivalis</i>	Snowdrop
<i>Galium odoratum</i>	Woodruff
<i>Geranium robertianum</i>	Herb robert
<i>Geum urbanum</i>	Wood avens
<i>Hedera helix helix</i>	Common ivy
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hypericum androsaemum</i>	Tutsan
<i>Hypnum sp.</i>	[moss]
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lysimachia nemorum</i>	Yellow pimpernel
<i>Meconopsis cambrica</i>	Welsh poppy

<i>Melica uniflora</i>	Wood melick
<i>Mercurialis perennis</i>	Dog's mercury
<i>Oxalis acetosella</i>	Wood sorrel
<i>Paris quadrifolia</i>	Herb paris
<i>Phyllitis scolopendrium</i>	Hart's-tongue
<i>Poa trivialis</i>	Rough meadow-grass
<i>Polytrichum formosum</i>	Bank haircap
<i>Potentilla sterilis</i>	Barren strawberry
<i>Primula vulgaris</i>	Primrose
<i>Ranunculus acris</i>	Meadow buttercup
<i>Ranunculus auricomus</i>	Goldilocks
<i>Ranunculus ficaria</i>	Lesser celandine
<i>Ribes rubrum</i>	Red currant
<i>Ribes uva-crispa</i>	Gooseberry
<i>Rosa canina</i>	Dog rose
<i>Rubus fruticosus</i>	Bramble
<i>Senecio jacobaea</i>	Common ragwort
<i>Stachys sylvatica</i>	Hedge woundwort
<i>Taraxacum officinale</i>	Dandelion
<i>Thuidium tamariscinum</i>	Common tamarisk-moss
<i>Tortula sp.</i>	[moss]
<i>Veronica chamaedrys</i>	Germander speedwell
<i>Veronica montana</i>	Wood speedwell
<i>Vicia sepium</i>	Bush vetch
<i>Viola riviniana</i>	Dog violet