

Colliers Wood Local Nature Reserve

Woodland Management Plan

2017-2021



Contents

1. Introduction	5
2. Woodland Description	6
2.1 General.....	6
2.2. Woodland Compartments	7
2.3 Planting list	7
2.4 Flora and fauna.....	9
3. Previous woodland management policy and work	10
3.1 SWOT analysis	10
3.2 Woodland management objectives/ previous work.....	12
4. Evaluating new native woodland for wildlife	14
4.1. Planting mix.....	14
4.2. Position, layout and design	16
4.3. New native woodland biodiversity.....	20
4.4. Evaluate management of close canopy areas.....	23
5. Updated woodland management plan 2017 to 2021	24
Appendix 1: Compartment Maps	27
Appendix 2 Guidance on Tree Diseases	29
Appendix 3 Compartment map illustrated to show potentially suitable locations for improving woodland edges	30
Appendix 4: Wood products and Potential Income Generation	31
Appendix 5: Habitat / species monitoring recommendations	33
Appendix 6: References and further reading	35

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1. Introduction

This document collates information and provides additional guidance to inform the management of the woodland habitats at Colliers Wood Local Nature Reserve (LNR). The plan has been drawn up by Nottinghamshire Wildlife Trust and Greenwood Community Forest and aims to guide site owners Broxtowe Borough Council and Friends of Colliers Wood (FoCW) in carrying out woodland management work.

The trees were planted in 1996/7 and the woodland, which covers 43% of the site, or 6.1 hectares, is part of Greenwood Community Forest. The woodland is now at a stage where some further thinning operations are required, which offers both challenges and opportunities to the site managers and friends group.

This woodland management plan is intended as a guidance document. Much of the background information has been sourced from the Green Flag Management Plan, personal communication with the Friends Group and Broxtowe Borough Council and other sources, such as woodland management guidance documents and site visits.

Careful targeted woodland management will have benefits for many groups: plants (ground flora), lower plants (bryophytes and lichens) birds, butterflies, reptiles and amphibians, invertebrates and soil organisms, such as invertebrates and fungi, as well the health of the trees.

This report collates baseline data on the woodlands and summarises past approach and management operations, as well as looking at the wildlife interest that has developed during this time. It then evaluates the potential for further improving the plantations for wildlife, based on Blakesley, Buckley and Fitzgerald (2013), *Realising the wildlife potential of new native woodland*, to build upon the substantial previous work carried out.

Recommendations on how to improve the wildlife value of the plantations mainly by means of coppicing and thinning, are presented as a compartment-based management plan.

The options for deriving income from timber and wood fuel are presented at appendix 4, with a view to contributing towards woodland management costs and / or supporting the Friends Group, alongside achieving beneficial ecological outcomes from the woodland management work.

The plan must also recognise the challenging financial climate faced by local authorities and the threat of reduced revenue/ capital budget may restrict some of the actions within this plan. Options to seek alternative funding sources and to work with all partners can be explored as a way to achieve the desired outcomes.

2. Woodland Description

2.1 General

Woodland covers 43% of the site, or 6.1 hectares of this previously opencast coal mined site. It is part of the Greenwood Community Forest.

The trees were planted in 1996/97 using 30-45cm whips (35-40cm tall). Over 17,500 trees were planted as part of the original planting scheme. The species list is presented at 2.3 and the planting design/ layout is evaluated in section 4.

The majority of the original copses are protected by fencing, which was installed at the time of planting to protect the plantation from rabbit and deer grazing. It was not designed as rabbit-proof fencing, as the netting does not extend into the ground or turn outwards. It is standard tensioned chain-link fencing with 3 straining wires and a post top wire. The chain-link terminates at ground level with the bottom straining wire just above ground level, with the bottom becoming shallowly buried over time. The friends group has recently cut strategically placed holes in the fences, at least 12.5cm x12.5cm in size, to increase permeability for wildlife, particularly hedgehogs. The majority of the holes have been formed below the bottom of the straining wire.

The main other habitat type within the plantations is the ditches (present in DH Lawrence Copse, Blackshale East Copse, Tupton Copse, Moorgreen Copse and Wetland Copse).

A range of other habitats can be found adjacent to the plantations. One large pond, the 'Large Pond' is to be found in the north east corner of the site, A second pond, 'Small Pond', was formed but uneven subsidence has affected the pond area, resulting in 'islands' forming and a general drift (sinking) eastwards to encroach on an area of Horseshoe Copse. The pond has subsequently been modified with the excavation of scrape and, at a later time, installation of earth berm. In winter, the water level sometimes rises and reaches the culvert, which carries water to the west to Large Pond.

Other habitats adjacent to the plantations include amenity grasslands, meadows and two cornfield annual/ cereal plots. The site can be considered as a mosaic of plantation with meadow/ grassland.

Good establishment of plantations in certain areas is thought to have been helped by the wet conditions (therefore no issues with drought) and the protective fencing.

There are however, some areas where establishment has been variable and other parts of the site where the wet ground conditions have resulted in stunted growth of oak, field maple and holly. However, many of the saplings of all species drowned to leave bare areas. DH Lawrence copse contains large areas where only pioneer species have survived. Issues associated with wet ground has been particularly noticeable in Engine Lane Copse and parts of Horseshoe Copse and these copses have small areas where shallow surface water stands for much of the year.

The two areas characterised by stunted growth, both mounds of coal washings with limited topsoil coverage, are the top area at the north end of Mound Copse and the eastern end of Engine Lane Copse, beyond the internal fence line. The trees in Mound Copse are surviving in near 'as-planted' whips, almost 18 years after planting. The trees in Engine Lane Copse remained in a similar, 'as-planted' form, until 2013/14 when they put on a good spurt of growth and trees now cover the previously bare areas.

2.2. Woodland Compartments

These are ordered anti-clockwise, from the car park:

- Car Park Copse
- Horseshoe Cops
- Engine Lane Copse
- Moorgreen Copse
- Nursery Copse
- DH Lawrence Copse
- Wetland Copse
- Blackshale East Copse
- Waterloo Memorial Copse
- Community Copse
- Blackshale Central Copse
- Blackshale West Copse
- Mound Copse
- Engine Lane Entrance Copse
- Tupton Copse
- Beggarley Copse
- Large Pond Copse
- Lime Avenue Copse
- Miner's Copse.

A map showing the layout of the copses is presented at Appendix 1.

2.3 Planting list

The original tree and shrub planting list and comments on extent of planting and establishment (taken from Friends of Colliers Wood website, based on Green Flag Management Plan, 2013-18) is shown in the table below:

Species	Common Name	Comments
<i>Acer campestre</i>	Field Maple	Mainly used at perimeters
<i>Alnus glutinosa</i>	Alder	Successful, enjoying wet conditions
<i>Alnus incana</i>	Italian Alder	Successful, enjoying wet conditions
<i>Betula pendula</i>	Birch	Well established
<i>Betula pubescens</i>	Downy Birch	Limited planting only
<i>Corylus avellana</i>	Hazel	Limited planting only
<i>Crataegus monogyna</i>	Hawthorn	Predominantly used as hedging. Single specimens struggle in wet soil
<i>Ilex aquifolium</i>	Holly	Few planted in most compartments
<i>Larix decidua</i>	Larch	Planted in two compartments
<i>Malus sylvestris</i>	Crab Apple	Limited numbers planted in three compartments
<i>Pinus sylvestris</i>	Scott's Pine	Planted in two compartments
<i>Populus tremula</i>	Aspen	Widely planted. Enjoying wet sites
<i>Quercus petraea</i>	Sessile Oak	Struggling to complete against faster growing species
<i>Rosa canina</i>	Dog Rose	Limited planting at edges of compartments
<i>Salix caprea</i>	Goat Willow	Widely planted and dominant
<i>Salix cinerea</i>	Grey Willow	Very limited planting but very successful
<i>Salix fragilis</i>	Crack Willow	Very limited planting but very successful
<i>Sorbus aucuparia</i>	Mountain Ash	In all compartments
<i>Viburnum opulus</i>	Guelder Rose	Used very sparsely in all compartments

Further planting since the original restoration is described on the FoCW website and is summarised below:

- Immediately after the original planting, a small group of English Oak, *Quercus robur* were planted near the car park to form the Miners Copse.
- The Friends has determined that Bird Cherry, *Prunus padus* and Austrian Pine *Pinus nigra subsp. Salzmannii var. Corsicana* were part of the original planting. Both may have been inadvertently included in the nursery supplied whips, or, wrongly labelled at the nursery.
- A short row of Ash *Fraxinus excelsior* exists adjacent to the site boundary at the eastern end of Engine Lane. These pre-date the landscape plantings, probably being established during the open-cast works with the intent of screening the coal waste mound that was left above the original ground level.

- Additionally, a limited number of mature trees exist adjacent the original watercourses. These include Sycamore, *Acer pseudoplatanus* which were retained to maintain visual profiles and shade benefit to the established under-storey.
- The first major project of FoCW was to create an avenue of limes along Engine Lane using Silver lime *Tilia tomentosa*. This is 'outside' the main site area.
- In January 2011, a few Yew, *Taxus baccata* plugs were introduced during an infill planting task. It is not yet apparent if any will survive.
- The external perimeter of copses adjacent the industrial park were planted with a mixed species hedgerow dominated by hawthorn.

2.4 Flora and fauna

A full species list is maintained by FoCW and the most recent version of the species table (dated June 2016 at the time of writing) is available from the group's website. The records are cumulative lists, so species tend not to be removed if not seen for a period of time.

Lists have been compiled for trees and shrubs, wild flowers, fungi, bryophytes across the site. Some taxonomic/ species groups have been studied well (e.g. amphibians, mammals, birds, fungi, butterflies and moths) but further information would be useful on certain groups, especially invertebrates other than Lepidoptera and bats.

Key species associated with the woodland plantations at Colliers Wood are:

- Plants such as Lesser Celandine, Wood Avens, Herb-Robert, Lord's-and-Ladies, Foxglove, Bittersweet, Primrose, Cow Parsley, St Johns-Wort and Hedge Woundwort, which favour the shady conditions. Bluebell and Ramsons have been planted as part of the ongoing development of the site. However, very few bluebells survived and no ransoms have been found for several years.
- Many of the species of fungi recorded are widespread and common in the UK and are either associated with grassland or dying or dead wood, especially willows and birch. The woodland associated-species include Bearded Milkcap, Fly Agaric, Birch Boletus, Hairy Curtain Crust, Sulphur Tuft and several species of Inkcap.
- Bats – As there are few mature trees on site it is thought unlikely that the site offers many roosting opportunities; however, the immature woodland copses and the two ponds will be especially valuable for bats as foraging habitat. Their wet nature will mean that they support a great biomass of invertebrate prey (midges, moths etc). Bats have been sighted for several years around street lights on the section of Engine Lane, close to the Large Pond. At the time of writing, no formal bat surveys have been carried out.
- Of the other mammals, Grey Squirrel, Rabbit, Fox, Shrew, Voles will readily take shelter /live in the woods or its margins, as could Hedgehog. Wet or hard/ compacted ground may limit burrowing.
- Common Frog, Common Toad, Smooth Newt and potentially Grass Snake will forage/ hibernate in woodland habitats. Although grass snakes have not been reported on site, there are well established populations in adjacent habitats.
- A wide range of the bird species listed will be associated with the woods which will be used as foraging or nesting habitat. These include (but are not limited to) Blackbird,

Chiffchaff, Chaffinch, Greater-Spotted and Green Woodpecker, Jay, Treecreeper, Tawny and Little Owl, Wood Warbler and Siskin. Many of these species are currently (or previously) red or amber listed 'Birds of Conservation Concern'. Some of the waterfowl attracted to the two ponds on site will also shelter in the woodlands.

- A wide range of insect families will utilise the woodland, which presents habitat at and below ground as well as in the shrub/ canopy layer and associated with dead wood and leaf litter. Numerous species of bees, wasps, beetles, and spiders will be found. Caterpillars of moths and butterflies will be represented and the woods, especially the edges, will no doubt be used by common darter and southern hawker adults foraging in the summer months.

3. Previous woodland management policy and work

3.1 SWOT analysis

The 2008-13 and 2013-18 Green Flag Management Plans carried out a 'Strengths, Weaknesses, Opportunities and Threats', SWOT analysis in relation to the sustainability/ conservation and heritage elements of the site.

In relation to woodlands, this identified:

Strengths

- Successful establishment of trees in wooded areas
- Thinning work has commenced
- Dead wood habitats provided
- Working with The Conservation Volunteers (now PCV CIC) and Nottinghamshire Wildlife Trust to manage tree planted areas

Weaknesses

- Single aged tree population
- Fence now starting to deteriorate

Opportunities

- Further involvement of Greenwood Community Forest, PCV, FoCW and local college in terms of sustainable management e.g. thinning tree areas
- Management and development of tree planted areas, opening up-glades and allowing public access to designated areas

Threats

- Rabbit grazing
- Potential domination of tree areas by pioneer species / dominant species in tree planted areas e.g. alder
- Reduced revenue funding.

It is thought that the potential issues with rabbits is not likely to be significant as trees have already successfully established and canopies have closed significantly (i.e. there is less grassland within the plantations) but that browsing deer could pose a threat, although is not a significant issue at the current time. A deer fence runs more or less continually along the eastern site (B600) boundary. The FoCW report that deer cross the B600 close to the brook and forage in the woodlands. The deer that cross the B600 forage in the strip of land between the deer fence and residential properties along the B600. Deer hoof marks have been very occasionally seen in the scrape area, which is the only evidence of deer using the site beyond the deer fence.

The ground conditions are quite wet in many of the copses, limiting its attractiveness, particularly in terms of digging/ burrowing, for rabbits and other mammals, such as hedgehog, badger and fox.

An additional threat to consider is tree diseases. This is acknowledged at Appendix 22 (page 169 of the 2013-18 Management Plan). At the time of writing Ash Dieback is a major concern but it is not a component of the planting at this site but has been planted on the site prior to the pit closing, along the eastern end of Engine Lane (now Engine Lane Copse).

Other diseases may affect trees, such as *Phytophthora*, a destructive parasitic fungi causing brown rot and may be found in alder and oak and can be found in young plantations. Pine may also be affected by *Dothistroma* needle blight. Refer to the Forestry Commission England for up to date information and guidance. Additional guidance is provided in appendix 2.

Funding constraints may be, at least partly addressed through applying for and entering the land into agri-environment schemes, such as Countryside Stewardship, CS, or equivalent schemes in the future. However, it is advisable to check with Natural England if the land is eligible for entry into CS. As stated in the current Higher Tier Manual, woodland needs to meet the definition “*an area of land being a minimum of 0.5 ha and minimum average width of 20m under stands of trees with, and with the potential to achieve a height of 5 metres and crown cover of more than 20% of the ground*”. If eligible, the following options may apply (based on the current scheme at the time of writing, March 2017):

- PA3: Woodland Management Plan -The woodland covers 6ha in total and is more than 10 years old, so may qualify for this capital option, which is to produce a woodland management plan to Forestry Commission approved standards. Minimum payment is £1000 and applications can be submitted all year round.
- WD2: Woodland improvement Option. A Forestry Commission woodland management plan (PA3 is required), This will pay £100 per hectare, per year (based on 6ha of plantation, this would be £600 maximum). It can include felling and coppicing but must benefit priority species, priority habitats or improve resilience to climate change.

Further details of current Countryside Stewardship Schemes is available at <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management>

A number of organisations and companies currently offer small grant schemes. Examples include The People’s Postcode Trust, Tesco scheme administered by Groundwork, Veolia,

and the Co-op. FoCW has successfully applied for such grants in the past, which have been used to fund infrastructure improvements, community and habitat related projects.

In line with the groups' constitution, FoCW are seeking a united approach to environmental improvements with other nearby landowners, such as the Greasley Estate, which will help establish and strengthen wildlife corridors and achieve landscape-level gains for wildlife. This can be added to the SWOT analysis as a further opportunity.

3.2 Woodland management objectives/ previous work

The woodland management objectives are stated in the 2013-18 Green Flag Management Plan (page 168).

All work was carried out as per the 'Copse Thinning Work & Infill Planting Schedule 2008, which covered up to 2012 –see Appendix 22 of the 2013-18 Green Flag Management Plan for the supporting drawings. No infill planting was ever carried out. DH Lawrence and Wetland Copse were excluded from this schedule.

No thinning operations were carried out in the non-intervention areas: west part of Engine Lane Copse and Nursery Copse.

All agreed new hedgerow planting and hedgerow infill planting was carried out (see plan in Appendix 22 of the 2013-18 Green Flag Management Plan). Subsequently, hedgerows have been planted on east and west side of Central Meadow.

Appendix 1 of the document shows which copse have been thinned (and year), up to November 2015.

A 'woodland development study' of DH Lawrence copse was carried out (full version is presented in Appendix 24 of the 2013-18 Management Plan. A survey, comprising perimeter survey and three line transects was carried out and the following recommendations were made for the copse:

- Removal of *Alnus glutinosa* suckers/saplings
- Removal of *Populus tremula* suckers
- Create a halo of cleared ground around the *Quercus petraea*
- Thinning of mature trees from the planted rows
- Crown lifting of remaining mature trees
- Treatment of stumps to prevent re-growth
- Create habitat from the stash piles around the woodland
- Consider planting in the woodland, for example, bluebell bulbs and wood anemones
- Ring barking larger trees to provide standing deadwood
- A return to the site in 3 months' time for a more detailed survey would be beneficial. [NB No follow up survey was made].

The implementation of the recommendations for DH Lawrence Copse is ongoing. Three species, *Quercus petraea*, *Larix decidue* and *Pinus sylvestris* have been chosen for halo-thinning, as they will form the long-term structural tree element of the copse. Only good

specimens were chosen for halo pruning and halo distances (measured from canopy spread) are:

- 2.5m for oak
- 1.5m for larch
- 1.2, for Scots pine.

Habitat piles have been created from arisings. Larch is thought to be unstable due to thin soils and dislodgement has been occurring for some years, becoming more frequent as the trees have increased in height and diameter. Set seeds, suckers and regrowth from stumps were removed during halo operations. No other trees have been crown lifted and no stump treatment or ring barking carried out. Some trees have been felled at 2m to leave stump as standing dead wood habitat for insects and woodpeckers.

To date the only work carried out in Wetland Copse by FoCW is the removal of bramble. FoCW, Broxtowe Borough Council and Nottinghamshire Wildlife Trust met up with David McAlinden of Western Power Distribution (WPD) in July 2016 to discuss management of Wetland Copse. Four (two pairs of) overhead 11,000v electricity supply cables run centrally along the length of the copse. There is an issue that some of the trees have grown to height that would jeopardise cable safety. Some of the trees were topped in 2014 and the site is due to be resurveyed within the next 2 years. The surveyor will identify trees that are causing an issue now, in 3-5 years, 5-10 years' time etc. It will assess age and physical structure of trees. A cable clearance height /radius of 0.8m is required.

WPD has offered to carry out further management work and can/ will liaise with site managers Broxtowe Borough Council and FoCW. Arrisings can be placed in habitat piles or treated as required. The suggested approach to tree management is as follows:

- Work will take place as a phased removal and replant, so not all trees will be managed in one go
- WPD are able to replace trees at whip size. Appropriate locations will need to be identified
- Remove large specimens, especially trees that have the potential to grow the tallest, such as oak which are most numerous at the western end.
- Other mature trees (e.g. alder and birch) will be removed
- A sustainable element of work will include coppicing of willows.
- Retention of some bramble (provided it doesn't outcompete with the boundary hedge or encroach upon the Blackshale Path, is desirable as it can provide good wildlife habitat, especially when growth is dense.

The whole of Wetland Copse could be managed on a coppice rotation. This would provide a different habitat type and avoid the needs for periodic intervention by WPD. Many of the species present, especially willow and oak, will respond well to coppicing. This idea is taken forward in the management plan at Section 5.

4. Evaluating new native woodland for wildlife

Below we have carried out an assessment for evaluating new native woodland based on Blakesley, Buckley and Fitzgerald (2013), *Realising the wildlife potential of new native woodland*. Please refer to Chapter 2 of Blakesley, Buckley and Fitzgerald and the assessment sheet appended to this document for details of this approach.

4.1. Planting mix

1. New native wood soil type:

The 1:50 000 scale bedrock geology description from the British Geological Survey (Map Viewer):

Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone. Sedimentary Bedrock formed approximately 309 to 312 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas. Setting: swamps, estuaries and deltas. These rocks were formed in marginal coastal plains with lakes and swamps periodically inundated by the sea; or estuaries and deltas, and shallow seas.

No superficial deposits were recorded.

The soils information sourced from Land Information System (LandIS) accessed from the soilscapes viewer hosted by Cranfield University is as follows:

- *Soilscape 24: Restored soils mostly from quarry and opencast spoil*
- *Texture: Loamy*
- *Drainage: Variable*
- *Drains to: Stream network*
- *Water protection: Many sites suffer from compaction and, as a consequence, run off and erosion. Acid seepage on certain restored mining sites.*
- *General cropping: Appropriate to grass but cereal production on restored sand and gravel workings.*

The soils description (above) fits in with the previous land use (opencast) which has resulted in the geology /soils having been significantly altered. The land will have been capped with clay and topsoil.

2. Reference woods:

Ancient woodlands are found nearby, with High Park Wood within 350 metres of the eastern boundary of Colliers Wood. This wood, also a Local Wildlife Site, is described by NBGRC as 'A predominantly coniferous plantation with deciduous portions and numerous species-rich pockets'. Parts of the wood have been harvested in recent years.

High Park Wood is a private wood and has not been surveyed. It is described on the Nottinghamshire Birds website as a 'Oak and Beech wood, with honeysuckle, rhododendron, holly, elder and hawthorn as the understory. The Oaks are all of a similar age (being about

90 years old, probably planted after the first world war). There is a different and wider variety of trees at the Beauvale Lodge end, including Copper Beech and Horse Chestnut. From this description High Park Wood appears to have associations with National Vegetation Classification NVC types W12 Beech- Dog's mercury woodland or W14 Beech- bramble woodland.

There is some connectivity between High Park Wood and Colliers Wood, along the former mineral railway line, in the form of hedgerows either side of the route and the regenerated spoil area provides a habitat link between the line and High Park Wood.

3. Reference hedgerows/ shaws:

There is a good network of hedges locally. The main component is hawthorn. There are many small woodlands which could be classed as shaws, e.g. to the north and east of Coneygre Farm. At least two of these are old (appear on 1875 maps but two others do not). They are on private land so cannot be surveyed.

4. Identify trees and shrubs in the new native wood including grouping:

The original planting list is presented at Section 2.3 of this report. Copses vary substantially in species mix planted and species survival. Boundary hedges to some copses have been planted and some woody vegetation existed prior to landscaping. These areas include land between the deer fence and brook, southern boundary hedge and the two laid hedges along B600 and West Entrance.

From visiting the site and observing aerial photographs (Google Earth) from the late 1990s it is clear that the design of plantations is uniform, with 2 x 2 or 3 x 3 metre spacing.

The copses are generally even-aged. There is some structural diversity provided by past management (thinning). Some structural diversity has also developed due to some trees and shrubs developing at different rates and also from regrowth (suckering) of alder and aspen. There are two non-intervention copses – east part of Engine Lane Copse and Nursery Copse.

A survey (woodland development study) of DH Lawrence Copse was carried out by Castle College students on 5th June 2010 and supervised by BTCV. This is presented at Appendix 24 of the 2013-18 Management Plan.

The survey comprised a perimeter survey (species listed and composition estimated for 10m margin around the perimeter of the copse) and three line transects to count canopy species. It found:

- Main trees at the periphery are the 3 willows species (grouped together in the survey), especially at the north west and north east boundary (>45% composition)
- Other main species in periphery are alders (mature and saplings <45% composition) especially at west and north east side
- Sessile oak is < 10% composition and groups of hawthorn at <8%, with 11 other species recorded (all of which, except downy birch are on the original planting list).
- Oak, hazel and larch were counted on the transects and a number of other species were noted internally within the copse, the most numerous of which is alder.

We don't have this level of information for the other copses but if time/ resources allow, this survey could be repeated for the other copses to help inform future management planning.

5. Options for enriching closed canopy areas

Simply due to the density of planting and range of species planted, at the current time we would not encourage significant enrichment planting of trees and shrubs internally within the copses.

Structure can be improved by coppicing and thinning. It is recommended that the previous policy of 'where there is goat willow and/ or alder invading the space of any other species, they are to be removed' is still a valid approach and should be used as a basis for future management work.

It has been almost 20 years since the original planting and the canopy is now closing up. The following operations can be considered at this stage of the woodland's development to help improve structure and provide better habitat for wildlife:

- Thinning / re-spacing. As the plantations are established on a grid pattern, taking out every other tree or every third tree in areas could be considered. This should be done in patches. The advantage of thinning is that widely spaced trees will have better structure (spreading crowns and lower branches). This also allows other trees and shrubs to establish through natural regeneration and/ or allows other species already planted to grow. This sort of work has already taken place e.g. in the form of halo-thinning in DH Lawrence Copse to give the oaks, larch and pine more space and is described in section 3.2.
- Pruning. This can be considered to encourage ground layer or shrubs to develop by allowing more light to reach ground level. This also tends to encourage a taller canopy. Again, it is best done in patches. Pruning at the edges of copses has been (and will need to be again) carried out to stop vegetation encroaching onto paths, hedges or meadows.
- Coppicing. Many of the species present will respond well to coppicing, particularly Hazel, Field Maple, Oak and Willows. It is best to focus on the species that are most widespread in this woodland i.e. coppice willow. This would be a quick way to diversify age structure of the wood.

To further diversify the habitat structure, some non-intervention copses/ areas have been established, where no management work is carried out. These are east part of Engine Lane Copse and Nursery Copse.

4.2. Position, layout and design

1. Provision of open space

Some limited open space remains along some of the ditches within the main plantation blocks and in areas where trees have failed e.g. parts of Engine Lane and Horseshoe Copse. Past thinning work, including halo-thinning already described in DH Lawrence Copse has been carried out which has let some light in to ground level but areas of woodland where light reaches ground in summer is localised.

For purposes of this assessment, the space between copses can be considered as rides/ glades. The copses are surrounded by open space in the form of amenity grassland, annual cornfield and cereal 'plots' and wildflower meadows which are seeded/ cut annually. The location and management regime for these areas is shown in Appendix 1 and in the Green Flag Management Plan 2013-18, Appendix 22, page 173 and P174.

2. Options for improving layout

Due to the relatively small size and linear nature of the copses, it is thought it is best to concentrate efforts on improving the perimeters of the copses, which receive the majority of the light rather than creating glades or rides within them. However, (depending on resources) there is still some scope for creating some open ground within them, especially within the largest (DH Lawrence) copse.

Scallop treatment could be considered (cutting small notches), ideally on southern aspects. This would create sheltered, sunny bays which are of particular value to insects. There are some constraints on scalloping, due to presence of hedgerows and fences around the copses. Although it is possible to scallop behind the hedgerow and fence line, any open space created may, over time, become shaded by the hedge if the hedge is left unmanaged, thereby removing any benefits. Some indicative locations for scalloping at Moorgreen, Blackshale East and Horseshoe copse are presented at Appendix 3. This work needs to be agreed on the ground with FoCW and Broxtowe Borough Council. It is proposed any fences surrounding the copses are retained.

3. Structural diversity along woodland margins

The plantations are often even-aged with no defined structure at their edges. There is generally little gradation between high canopy, lower shrub and herb/ grassland.

4. Options for enriching woodland edges

Blakesley states that the greatest opportunity for enrichment planting in most new native woods is along woodland margins, where diverse shrub planting is often missing and we have already identified this is the case. Given the numerous plantations, woodland edge habitat covers a considerable area at Colliers Wood. There is much scope for enriching woodland edges and this work has been started, with some thinning works on the western and southern edges of Blackshale East Copse for instance

Further thinning (coppicing) at the edges of other copses is recommended, along with creating scalloped edges (see section 2 above). Where possible, it is recommended that woodland margin zones are established, around 2m wide (even wider in places where space allows and this does not interfere with the other uses of the site), where a mix of enrichment shrub planting is carried out (recommended species list provided at section 5, below).

Another option is to encourage natural regeneration (of shrubs) and rank grassland, to provide a graded woodland edge. This can be achieved at low cost simply by ceasing all management (mowing) of the existing grassland. This management has in fact been implemented -see Green Flag Management Plan 2013-18 (Appendix 22, page 174) which shows uncut areas in dark green. These could be extended to cover more of the site.

Allowing tall herbs /grasses (the growth of some nettle and umbellifers such as hogweed can be desirable) and scrub (ideally to comprise bramble, hawthorn, blackthorn) to colonise some of the woodland margins would be a significant wildlife enhancement. Bramble and young-stage hawthorn and blackthorn is great cover for nesting birds and habitat for small mammals, such as hedgehog. The ceasing of management (or only managing sections on a 3-year rotation to stop scrub from becoming too mature) would allow larval stages of many insects to complete their lifecycles.

Some indicative locations for enriching the woodland edge through shrub planting and/ or natural regeneration (allowing a mosaic of rank grass and scrub) to establish are provided at Appendix 3. This work needs to be agreed on the ground with FoCW and Broxtowe Borough Council. It is proposed any fences surrounding the copses are retained.

5. Position in the landscape

Colliers Wood is part of an east to west orientated wildlife corridor which encompasses the disused railway, the Beauvale and Nether Green Brook. This links Moorgreen Reservoir and tracks of ecologically important ancient semi-natural woodland above the reservoir (High Park Wood) to east of Colliers Wood, with the Erewash Valley located to the west.

Colliers Wood is located on the edge of two National Character Area Types:

1. Southern Magnesian Limestone
2. Nottinghamshire, Derbyshire and Yorkshire Coalfields.

The woodland habitat in the profile for Southern Magnesian Limestone is described as comprising Oak (*Quercus robur* and *Q. petraeas*), ash (*Fraxinus excelsior*) and lime (*Tilia spp*) canopies. It notes a particular abundance of the nationally scarce large-leaved lime (*Tilia platyphyllos*), which is usually only found in ancient woodland and Yew (*Taxus baccata*). Bird species recorded includes lesser spotted woodpecker, marsh tit, spotted flycatcher and hawfinch.

Opportunities identified for woodland on the Southern Magnesian Limestone include:

- Ensuring that existing woodlands are well managed, including protecting them from grazing and reinstating traditional coppice management to improve the structural and species diversity of native woodland. Appropriate management will ensure that the woodlands continue as features within the landscape, providing timber and wood fuel, as well as enhancing biodiversity and especially supporting the conservation of the dormouse population.
- Promoting the use of management practices to encourage native species development and the value of parkland trees, veteran trees and other woodland designed landscapes.

For the Nottinghamshire, Derbyshire and Yorkshire Coalfields, the natural area profile points out that the “once-active coal mining industry has now largely closed, with colliery sites and spoil tips graded out and restored to woodland and pasture”. This is the case at Colliers Wood, with it being a former opencast site.

The NCA profiles also notes that woodlands are found in patches with varying representation of oak, birch and yew common across the NCA. It also points out that “*woodlands tend to be*

small and fragmented, and are found on poorer soils or steeper slopes". It continues, *'Often woodlands lie within corridors leading in to urban areas. This proximity, of many small areas of woodland close to urban areas raises some pressure on these habitats from inappropriate recreational use. Appropriate management is necessary to stop degradation of the woodland habitats, ensuring diversity of structure and the retention of deadwood to support important assemblages of invertebrates'*.

Opportunities identified for woodland in the coalfields NCA include:

- Increasing areas of native woodland within the landscape for recreational use, providing local sources of wood fuel and incorporating new development, while strengthening the ecological habitat network.
- Managing the area's diverse range of woodlands, veteran trees, wood pasture and parklands to enhance landscape character and safeguard their biodiversity value while seeking opportunities to enhance access.

The landscape has been assessed at a finer scale by Nottinghamshire County Council in the Landscape Character Assessment. When considering which native tree and shrub species for inclusion in planting plans the LCA includes updated (to take account of Ash Dieback) species lists. The following species are included on the Coalfields and Magnesian Limestone LCA lists for woodland (W) and hedgerow planting (H):

Trees:

- Alder (Common) *Alnus glutinosa* **W**
- Aspen *Populus tremula* **W**
- Birch (Silver) *Betula pendula*
- Cherry (Wild) *Prunus avium* **W**
- Crab apple *Malus sylvestris* **W H**
- Elm (English) *Ulmus minor* var. *vulgaris* **W**
- Elm (Wych) *Ulmus glabra* **W H**
- Maple (Field) *Acer campestre* **W H**
- Oak (Common) *Quercus robur* **W H**
- Rowan *Sorbus aucuparia* (Coalfields only) **W**
- Willow (Crack) *Salix fragilis* **W H**
- Willow (White) *Salix alba* **W H**
- Yew *Taxus baccata* (coalfields only) **W**

Shrubs:

- Blackthorn *Prunus spinose* **W H**
- Broom *Cytisus scoparius* (coalfields only) **W H**
- Buckthorn (purging) *Rhamnus cathartica* (Magnesian Limestone only) **H**
- Dogwood (Common) *Cornus sanguinea* **W H**
- Gorse *Ulex europaeus* (Coalfields only) **W H**
- Guelder Rose *Viburnum opulus* **W H**
- Hawthorn *Crataegus monogyna* **W H**
- Hawthorn (Midland) *Crataegus laevigata* (Magnesian Limestone only) **H**
- Hazel *Corylus avellana* **W H**

- Holly *Ilex aquifolium* **W H**
- Osier *Salix viminalis* **W H**
- Privet (Wild) *Ligustrum vulgare* **W H**
- Rosa (Dog) *Rosa canina* **W H**
- Spindle *Euonymus europaeus* (Magnesian Limestone only) **W H**

Ash (not currently planted), Common Oak, and Hawthorn are listed as dominant woodland species.

The main component of native hedges should be hawthorn but the Magnesian Limestone species lists also lists field maple as a dominant species. Please refer to the list above for other species suitable for planting in hedges (H).

4.3. New native woodland biodiversity

1. Woodland shade plants

These are listed in the Site Description (2.4) and include: Lesser Celandine, Wood Avens, Herb-Robert, Lord's-and-Ladies, Foxglove, Bittersweet, Primrose, Cow Parsley, Ramsons, St Johns-wort and Hedge Woundwort. Lord's-and-ladies and foxglove are associated with ancient woodlands.

As ancient woodland is located less than 300 metres away there is the potential for further species (including ancient woodland indicator species such as dog's mercury) to colonise as the woodland matures. However, AWIs are slow to colonise new sites.

2. Options for introducing woodland shade plants

Due to the close proximity of ancient woodland and possible impacts on local genetic plant diversity (see Blakesley table 3.8) we would recommend against doing this and rely on natural colonisation.

If however it is thought that woodland shade plants should be introduced, these are various methods available, such as sowing woodland seed mix, using plug plants or, for certain species, such as native bluebell by bulb or tuber planting. Refer to Blakesley (table 3.9) for a list of suitable species. FoCW have tried to establish woodland plug plants in the past but plants largely failed to establish but planting of primrose and cowslip has been successful along the northern edge of Nursery Copse and within the western fringes of Moorgreen Copse. It is thought that now shading has increased and areas of the site are drier, this could be attempted again, subject to time and funding.

3. Plant communities in rides and glades

As with the woodlands, the adjacent meadows were created in the late 1990s and comprise amenity grassland, sown meadows or cornfield annual plots, together with Large Pond and Small Pond and infrastructure (hard paths, car park etc) –see layout at Appendix 1.

Details of the seed mixes for the meadows do not appear in the Green Flag Management Plan but from the lists maintained by the friends group seems to indicate the following species we included in the mix but some will have established naturally:

- Meadows: Lady's bedstraw, Betony, Wild carrot, Ox-eye daisy, Devil's-bit scabious, Lady's smock, Yellow-rattle.
- Annual plots: Corn chamomile, Corncockle, Cornflower, Field poppy, Sunflower.
- Wetland plants (associated with the two ponds): Flag Iris, Meadowsweet, Reedmace, Common Spike-rush, Soft and Hard Rush.

Four species of orchid have been recorded on site. However, it was clear that some may have been planted by unknown person(s), as imported soil (plugs) was evident. It is thought some orchids may have self-colonised or spread subsequently.

4. Enriching open spaces (rides and glades)

The existing meadows and their margins can be considered as woodland open space. The meadows (outside of the areas cut on 3 week cycle) are generally species rich, having been established by using seed mixes and further diversified through introduction of yellow-rattle and by plug planting, which has been ongoing. Yellow-rattle was last broadcast seeded in February 2017, across grass areas radiating from Large Pond and into the Central Meadow. The meadow areas are managed on an annual August/ September cut (see Figure 3) which is ideal for promoting and maintaining wild flower diversity.

Although not currently required, further wild flower diversify could be encourage in these meadows by further spreading of yellow-rattle seed, plug planting or 'over-seeding' with a suitable clay soils mix and / or yellow-rattle. Green hay transfer is another technique.

In addition to the meadows, two annual 'plots' have been established. One is these is a cornfield annuals plot and the other contains cereals (e.g. wheat and barley), which provides a winter food source for birds.

In the permanent grassland areas it is good to encourage plants species which provide a nectar source during the entire growing season (refer to Blakesley, table 3.4), which we think has largely been achieved in terms of species present on site. As already discussed improvements could be made by establishing more uncut areas.

5. Birds and other wildlife

A species list is available for birds and those likely to be most strongly associated with the copses are listed in the site description at Paragraph 2.4. Information status of birds (e.g. visitor, breeding etc) would be useful in terms of informing the assessment. This could be gathered during future surveys (See Appendix 5).

Butterflies

Common species typically found in Nottinghamshire feature on the list and include Gatekeeper, Orange-tip, Peacock, Red Admiral, Ringlet, Speckled Wood, Small tortoiseshell, green-veined, large and small white. The larger winged species (Peacock, Red

Admiral and Small tortoiseshell) lay their eggs on nettle, whilst the browns (Ringlet and Gatekeeper) are associated with the more grassy habitats. Speckled wood, as its name suggests, is the main woodland butterfly species recorded on site to date. Its caterpillars actually feed on grasses (Cocks'-foot and Wood False-Brome in particular). Orange-tip is often seen in woodland glades, and its larval food plants include cuckoo-flower, garlic mustard and other crucifers.

Invertebrate habitat

With reference to Blakesley, Buckley and Fitzgerald, the following table reviews the biodiversity potential of habitats for insects:

Feature	Extent at Colliers Wood	Details
Good structural variation in vegetation	Moderate	Needs improvement as plantations generally even-aged but some thinning has been carried out in recent years with more work required, especially at woodland edges
Presence of rides, glades and larger open spaces	Good	Large areas of open space are present between the smaller copses. There is much scope for improvement of the edges of the copses, for instance by allowing rough grass / scrub mosaic to establish, which will provide additional cover and over wintering habitat for wildlife
Nectar source/ seed availability throughout the year	Good	Present in surrounding meadows and cornfield/ cereal plots
Scrub, ancient trees, spring, flushes water bodies	Scrub: Moderate, Ancient Trees: Not Present Water bodies: Good	Some scrub is present (mainly under the wayleaves in 'wetland copse'. More scrub would be beneficial. The site is too young to support ancient trees. Ditches and presence of two large water bodies/ wetlands
Patches of bare ground	Good	A few patches are present in areas of high shade. Bare ground in full sun is beneficial for bumblebees etc and the two cornfield plots will provide bare ground habitat
Species-rich semi-natural vegetation	Good	Well-developed meadows but some rough grassland (unmown or mown on rotation every 3 years) would benefit.
Free draining soils	Not present	Due to underlying geology/ soils
Anthills	Not present	Rare in new native woods

Other wildlife

Refugia-based surveys for reptiles are ongoing. These provide incidental records of nesting small mammals and terrestrial amphibians sheltering under felts/ tins. A bat survey needs to be carried out.

6. Opportunities to introduce other features to attract wildlife

Nest boxes for birds

The installation of a tawny owl box in 2014/15 and the little owl box are good additions to the site. Due to the presence of garden and willow warbler, which are declining woodland species, putting up of nest boxes for hole nesters such as tits is likely to lead to competition with the warblers as both feed in the canopy. Therefore, at this stage of the woodland's development, boxes for hole-nesting species are not recommended.

Bat boxes

These are recommended but they should be placed 3-4 m above ground. However, there will be limited locations for sighting boxes until the woodland mature.

Dead wood and compost heaps

Dead wood piles have been created from material derived from previous management work. Some additional material (root balls) has been sourced from off-site to create habitat stacks and positioned at the edge of Tupton Copse, on the western side of Central Meadow.

In terms of wildlife, dead wood provides nesting sites for birds, shelter for mammals, hibernation sites for hedgehogs, basking sites for reptiles, hibernation sites for reptile and amphibians and supports specialist insects, fungi and mosses.

Creation of further dead wood piles should be encouraged. This should be ongoing; as dead wood rots down existing piles can be replenished and new ones created. Dead wood should be carefully placed to reduce the chances of it being stolen for wood fuel or being set alight in-situ.

Compost heaps which have been provided from retention of hay bales at the south of Horseshoe Copse should be maintained and occasionally replenished, with a view to providing breeding habitat for grass snake. Material is sourced from the June cut of the Moorgreen Meadow, which is mown in preparation for events.

4.4. Evaluate management of close canopy areas

A significant amount of woodland management work, including thinning, replanting preparation, replanting, hedgelaying and creation of habitat mounds/ piles has been carried out by FoCW, working with Broxtowe Borough Council, Practical Conservation Volunteers (PCV) and Nottinghamshire Wildlife Trust.

This part of the evaluation, which requires a list of ongoing operations such as pruning or thinning and details of plans for future thinning/ coppicing is set out in the updated woodland management plan (section 5).

5. Updated woodland management plan 2017 to 2021

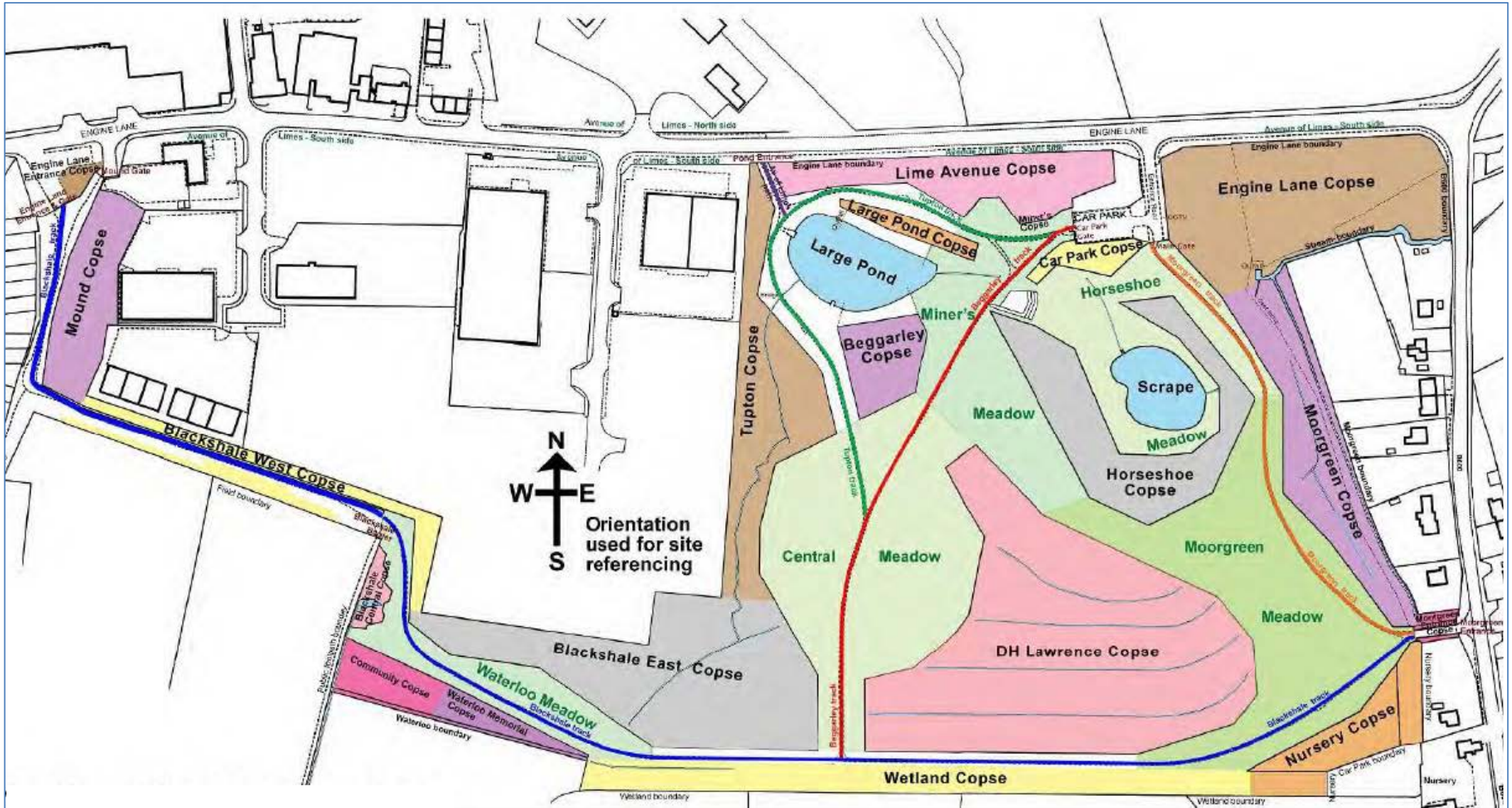
This section presents a revised management schedule, agreed with Broxtowe Borough Council and the Friends of Colliers Wood. It covers the period 2017-2021.

The woodland management objectives as stated in the Green Flag Management Plan (2013-18) and considered in Section 3 of this report are still very relevant and are followed in this updated woodland management plan. Where possible, the management recommendations in the evaluation (Section 4) feature in the new plan, which is set out below.

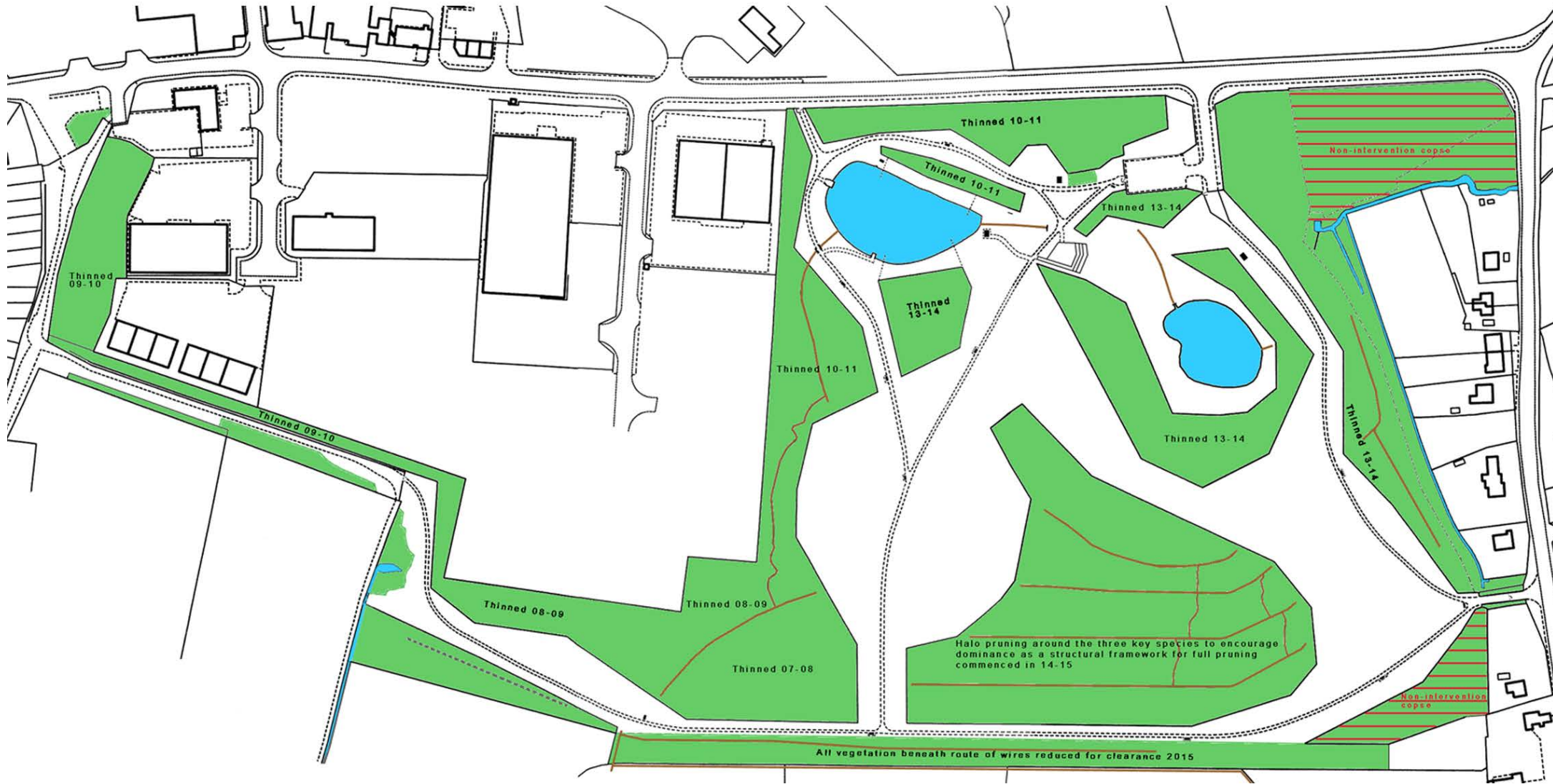
Ref	Copse	Location description and work required	Agreed/anticipated implementation	Date Achieved
1	Blackshale East Copse	Create at least 3 scalloped edges. Achieve this by concentrated coppicing activity within an area of at least 10m x 6m. To be situated on east and south edge of copse.	Winter 2017/18 and re-coppice any regrowth in subsequent years up to winter 2020/21	
2	Horseshoe Copse	Create at least 3 scalloped edges. Achieve this by concentrated coppicing activity within an area of at least 10m x 6m. To be situated on south edge of copse. Consider establishing uncut margins, 2-5m wide, on as much of the copse periphery as possible. The intention is for this to be achieved by relaxing meadow mowing along the fenceline. Plant scrub/ shrub species in groups within the uncut margins.	Winter 2018/19 and re-coppice any regrowth in subsequent years winter 2020/21	
3	Moorgreen Copse	Create at least 3 scalloped edges. Achieve this by concentrated coppicing activity within an area of at least 10m x 6m. To be situated on west edge of copse. Consider establishing uncut margins, 2-5m wide, along as much of the copse periphery as possible. The intention is for this to be achieved by relaxing meadow mowing along the fenceline. Plant scrub/ shrub species in groups within these uncut margins.	Winter 2018/19 and re-coppice any regrowth in subsequent years winter 2020/21	
4	DH Lawrence Copse	Continue halo pruning as described in section 3.2. Maintain habitat piles and create new ones from further brash Continue to remove seedlings, suckers and regrowth from stumps in areas subject to pruning Consider crown lifting, in prune areas and at edge of copse Continue to leave trees felled at 2m to provide standing dead wood habitat.	Winter 17/18 Winter 18/19 Winter 19/20	

Ref	Copse	Location description and work required	Agreed/anticipated implementation	Date Achieved
5	Wetland Copse	<p>Contact WPD in summer 2017. Invite WPD to carry out any high priority coppicing work in winter 17/18.</p> <p>WPD to leave brash in piles in agreed location to form habitat piles (brash cannot be left to block the ditch).</p> <p>If WPD can provide replacement whips these could be planted in any newly established unmown margins (i.e. Horseshoe, Moorgreen and Tupton Copse)</p>	Winter 17/18	
6	Tupton Copse	<p>Establish an uncut margin, a minimum of 2m wide outside the fenceline (i.e. on the western edge of Central Meadow) and plant occasional clusters of scrub/ shrub species.</p>	Winter 17/18	

Appendix 1: Compartment Maps



Copse thinning Progress (upto November 2015)



Appendix 2 Guidance on Tree Diseases

At the time of writing (2017) there is an increasing focus on detection, prevention (e.g. implementation of biosecurity) and managing the impact of any disease outbreaks. The diseases/ pathogens that pose the highest risks at this site are:

Chalara dieback of Ash – it is a fungal disease which has the potential to cause significant damage to ash in the UK, having already caused widespread damage in Europe. However, young trees are particularly susceptible to dieback, whereas mature trees can resist infection, often succumbing to a secondary infection. Some evidence of resistance has been noted in UK native ash trees.

Phytophthora ramorum - The pathogen can be spread on footwear, vehicle tyres, tools and equipment. Whilst most of Nottinghamshire is in Zone 3 (least risk-area) Moorgreen is on the edge of zones 1 and 2 at the time of writing. The disease can affect larch and oak species, along with beech, sweet chestnut and horse chestnut.

Acute Oak Decline - It is widespread in Britain, including the midlands, and is affecting several thousand oak trees. Various species of bacteria and a buprestid beetle, usually found in lesions caused by the disease, is thought to be associated with AOD

Oak Processionary Moth, this non-native moth has been accidentally introduced to south east England but vigilance is needed because there have been isolated cases elsewhere, including the neighbouring county of Yorkshire.

There are several others pest and diseases to be vigilant of, including:

Xylella fastidiosa, which is not currently known in the UK but has potential to infect several species of broadleaved tree.

The latest guidance on tree pests and disease is available from the Forestry Commission's Pests and Diseases website:

<http://www.forestry.gov.uk/pestsanddiseases>

Any work to the tree planted areas may have to be modified based on the management of any disease outbreaks.

Appendix 4: Wood products and Potential Income Generation

Improving woodland structure in young woods can start to provide some wood products. Alder and willows (up to 18-19 year old growth) is the main material available at Colliers Wood. Ensure any income is put back into the management of the site, to make the operation sustainable. Any income could, for instance pay for additional conservation work (e.g. Practical Conservation Volunteers) to carry out some work parties.

Firewood and kindling

Potential

Log burners (wood stoves) are increasingly popular and other groups in the area (e.g. Bunny Wood Nature Reserve Management Committee) hold an annual log sale using materials from woodland management work carried out on site. Alder can be burnt but it burns quickly and gives out lots of heat, so is not usually the sole timber used but can be included with other hardwood species, such as ash, beech and oak. Willow is often quoted as not being ideal for this purpose but if seasoned properly it can be ok. Thin willow whips make good kindling when dried.

Timber from management work could potentially be sold for wood pellet manufacturer. This is a growing market for biomass boilers, which burn wood pellets. Due to the small volume of timber likely to be abstracted this would probably need to be done via a harvesting contractor rather than dealing with a manufacturer directly. There are some manufacturers in the local area e.g Forest Fuels <http://www.forestfuels.co.uk/services/timber-buying>. Nottinghamshire County Council is promoting use of wood pellets as biofuel through the Nottinghamshire Woodheat Project:

<http://site.nottinghamshire.gov.uk/enjoying/countryside/energy-and-carbon-management/biomass-boilers/>

Access at Colliers Wood is generally good for extracting felled logs/ timber, so it is thought that harvesting (and generating a small income) for firewood/ wood fuel may be achievable. There would be issues in the autumn/ winter months when ground conditions can be very wet.

Resource

Timber volume calculations need be made ahead of any thinning/ coppicing work to make sure it is financially viable and worth pursuing.

Personal communication with a local forest/ harvesting contractor (November 2016) suggests buyers could pay £10 - £30 per cubic metre (roughly £20 - £60 per tonne) for 'cordwood' stacked by an access road (usually in 2 or 3 metre lengths which an articulated lorry can take away in 15 - 25-tonne loads), and a bit more if its already seasoned.

How to do it/ practicality

For firewood, logs need to be stacked and air dried for a minimum of one year (often 2 or more years). It is often advised that the top of the stack is covered but air needs to circulate.

Logs cannot touch the ground otherwise they will rot or (especially in the case of willow) may regrow.

Kindling (up to 1" diameter) can be used 6 months after being cut. It needs to be dried in bags or nets.

Wood needs to be stacked (as 'cordwood') for collection by a harvesting contractor if it is to be used for wood fuel processing.

It is possible the friends group could do a limited amount of this work but with assistance/ additional support from a group such as PCV a lot more work could be carried out. Some forestry contractors will fell and extract the wood themselves and a small income (say £6 to £12 per tonne) can still be generated in this way.

Wood charcoal

Alder is good as charcoal wood (for burning in kilns). Most charcoal makes use of thinning or poor quality waste that is too small or awkwardly shaped for other uses, so a mixture of species is normally available. The Nottinghamshire Wildlife Trust has carried out charcoal burning.

Some charcoal making has taken place in Nottinghamshire, involving the Trust at Treswell Wood and Attenborough Nature Reserves. Other groups have also done it, e.g. at Beckingham. A local expert is Ray Lister.

Small diameter branches of fast-burning species will give the best results. Large pieces or slow-burning hardwoods will not reach a sufficiently high temperature and will only be partly carbonised. Willow, sycamore, birch or softwoods are suitable.

Wood should be 50-100mm (2-4") diameter, and 300-360mm (12-14") long, air dried for at least six months. Fairly even-sized pieces of the same species will give the best results.

The costs associated with training and undertaking the charcoal making may make this prohibitive at Colliers Wood.

Other products

There is a huge range/ markets for timber and related materials derived from woodland management work, including baskets, gates, fencing and stakes, hurdles turnery (bowls, plates candle sticks etc) and furniture etc.

Limits on the size/ type of material available at Colliers Wood and the extent of the woods constrain options considerably. For instance, large oak timbers are required for making gates and furniture. Oak and birch can be used for turnery but large diameter wood is required, especially for furniture. Hazel rods are usually used for bean poles and hurdling and are not numerous at Colliers Wood. There might be some potential of selling materials (especially willows) for making woven baskets.

Appendix 5: Habitat / species monitoring recommendations

FoCW has carried out extensive survey and monitoring work in the past, compiling detailed species lists for most taxonomic group. If a volunteer base is available then a monitoring program based on the following principles is recommended, so that any trends in populations / changes to habitats over time can be identified and the results can feed into future versions of the management plan.

Botanical/ plants

Set up vegetation surveys in the Central Meadow, using 2x2 m quadrats to monitor the condition of the grassland. Record species abundance, using DAFOR scale. Quadrat-based vegetation surveys could also be set up in other meadows/ woodland edge habitat. A basic to good knowledge of plant identification is required to carry out the vegetation survey.

Woodland structure

Repeat the perimeter and transect surveys carried out for DH Lawrence Copse and extend this survey to other copses.

Fixed-point photographic monitoring is a good way of identifying subtle changes in the character of the site over time, and observations made/ information gathered can feed into future management plan revisions. It is particularly useful for looking at structure of woodland and woodland edges. For meadows, it can pick up if they are becoming less flower rich and more tussocky / rank.

Fixed locations, which are easy to relocate in future years, need to be set up and the photography repeated from the same spot at roughly the same time of year (ideally within 2 weeks). Woodland photographic monitoring is best carried out either in December, January or February and grassland habitats are best recorded in late May or June. It is recommended that photo monitoring is repeated every 2-3 years.

It is understood that a thorough fixed point photographic monitoring program was set up, which concentrated on meadows and woodland edges, but that no further recording has taken place for some 10 years. This could be revisited, if time/ resources allow in the future.

Birds

Start a formal bird Survey to CBC survey methodology (this requires at least two, ideally three surveys during the breeding season, following a set route). The CBC survey, rather than collection of sightings, would be helpful as it will provide information on breeding status, is repeatable and can be used to see how birds are responding to management. BTO can provide more information on the survey methodology. The results could contribute to local recording schemes. An excellent knowledge of bird identification, behaviour and calls is required to carry out CBC survey.

Butterflies

Butterflies are increasingly recognised as a good indicator of environmental health/ biodiversity. We recommend starting a formal butterfly monitoring programme. Such surveys

are transect-based. The surveys can be repeated to help assess the impact of management and to look at trends over time. It is usually sufficient to visit the woods and meadows (during suitable weather conditions) on 4 occasions during the flight season (e.g. 1-15 May, 1-15 June, 15-30 July and 15-30 August). Butterfly Conservation can provide more information on a suitable methodology and any monitoring could contribute to local recording schemes. A reasonable knowledge of butterfly identification is required.

Amphibians and Reptiles

Continue the monitoring program, carrying out a mix of refugia-based and visual searches for reptiles during the active season (March to early October) and torchlight surveys (counts) for amphibians of ditches and ponds during the breeding season (late February to June).

Laying down of more robust refugia (made out of corrugated iron sheets or onduline) could be considered, as felt mats degrade and can be lost, if accidentally strimmed.

Woodland management

In relation to wood produce, estimate volume of timber to be removed to help planning economic potential of harvesting. The Forestry Commission provides some guidance on this. When further work is carried out be mindful of felling licence requirements (a felling licence is not required if no more than 5 cubic metres is felled in any calendar quarter (e.g., Jan to Mar, Apr to Jun, Jul to Sep and Oct to Dec, as long as no more than two cubic metres are sold. If any timber/ brash is sold, record what happened to it – who purchased it, date, how much etc

Woodland management recording. It is recommend that areas worked on are mapped (using numbering system in the management schedule) and records are made of who carried out the work and when. Photos taken before and after work parties are also a good record. Recording of volunteer hours worked is important as this can be used as match funding in certain circumstances.

FoCW do record their volunteer hours and keep records of the location of works carried out.

Appendix 6: References and further reading

References

Blakesley, D, Buckley, GP and Fitzgerald, JD. (2013) *Realising the wildlife potential of new native woodland*. East Malling Research, East Malling

Broxtowe Borough Council (2008). Colliers Wood Green Flag Management Plan 2008-13

Broxtowe Borough Council (2013). Colliers Wood Green Flag Management Plan 2013-18

Forestry Commission England. *Woodland Management Template*

<http://www.forestry.gov.uk/forestry/inf-d-9bmjwe>

Forestry Commission (1988), *Timber Measurement A Field Guide by P N Edwards*, Forestry Commission Booklet 49 [https://www.forestry.gov.uk/pdf/FCBK049.pdf/\\$file/FCBK049.pdf](https://www.forestry.gov.uk/pdf/FCBK049.pdf/$file/FCBK049.pdf)

Nottinghamshire Birds *Moorgreen Site Information*

<https://sites.google.com/site/nottinghamshirebirds/sites/moorgreen>

British Geological Society *Geology of Britain viewer*

<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Cranfield University LANDIS *Soilscapes Viewer*

<http://www.landis.org.uk/services/soilscapes.cfm>

Nottinghamshire County Council *Landscape Character Assessment*

<http://cms.nottinghamshire.gov.uk/home/environment/landimprovements/landscapecharacter.htm>

Natural England *National Character Area Profiles 30 Southern Magnesian Limestone and 38 Nottinghamshire, Derbyshire and Yorkshire Coalfield*

<https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles>

*All websites accessed November 2016

Further Reading

Woodland Management

Blakesley, D and Buckley, GP. 2010. *Managing your woodland for wildlife*. Pisces Publications, Newbury. Available as free pdf: <http://www.woodlands.co.uk/owning-a-wood/managing-your-woodland-for-wildlife/managing-your-woodland-for-wildlife.pdf>

Forestry Commission *So, you own a woodland? Getting to know your wood and looking after it* Available as free pdf [http://www.forestry.gov.uk/pdf/so-you-own-a-woodland.pdf/\\$FILE/so-you-own-a-woodland.pdf](http://www.forestry.gov.uk/pdf/so-you-own-a-woodland.pdf/$FILE/so-you-own-a-woodland.pdf)

Kent Wildlife Trust *Woodland management: rides, glades and coppice* Available as free pdf http://www.kentwildlifetrust.org.uk/sites/default/files/kwt_land_mgt_advice_sheet_10_-_woodland_management_-_ride_and_coppice.pdf

Rackham, O. (2001) *Trees and Woodland in the British Landscape*. Published by Phoenix Press,

London. RRP £16.99

Small Woodland Owners Group website and monthly newsletter with information about woodland management, events, contacts etc www.swog.org.uk

The Conservation Volunteers Woodlands: a practical handbook and other handbooks on related topics (e.g. fencing) <http://store.tcv.org.uk> Handbooks approx. £12.00 each

Woodland Trust Community Woodland Network <https://communitywoodland.org/> various advice sheets available e.g. 'Getting to know your wood' and management planning.

Butterflies and moths

Butterfly Conservation, *Woodlands for butterflies and moths* <http://butterfly-conservation.org/files/habitat-woodlands-for-butterflies-and-moths.pdf>

Butterfly Conservation ***Woodland Management for Butterflies and Moths: A Best Practice Guide*** <http://butterfly-conservation.org/4951/Woodland-Management.html>

Bats

Woodland Management for Bats
www.bats.org.uk/publications_download.../WoodlandManagementForBats_web.pdf

Reptiles and amphibians

Amphibian and Reptile Conservation Trust, Reptile Habitat Management Handbook
Available as free pdf <http://www.arc-trust.org/Shop/reptile-habitat-management-handbook>

Amphibian and Reptile Conservation Trust, Amphibian Habitat Management Handbook
Available as free pdf <http://www.arc-trust.org/Shop/amphibian-habitat-management-handbook>

Ponds

Freshwater Habitats Trust Designing Wildlife Ponds in Woodlands

<http://freshwaterhabitats.org.uk/wp-content/uploads/2013/09/WOODLAND.pdf>

Birds

RSPB Woodland management for birds (2005), £14.95

RSPB Woodland management for birds: Willow tit A focal red listed (declining) bird

https://rspb.org.uk/Images/willow_tit_updated_advisory_sheet_tcm9-357936.pdf

Tree diseases

Forestry Commission <http://www.forestry.gov.uk/pestsanddiseases>

Woodland Trust <https://www.woodlandtrust.org.uk/visiting-woods/tree-diseases-and-pests/>

*All websites accessed November 2016