Woodland Design, Implementation and Management, Principles & Guides

KEY DOCUMENTS CONSULTED (not exhaustive)

- **UK Forestry Standard (UKFS),** Forestry Commission
- **Managing your woodland for wildlife,** David Blakesley & Peter Buckley
- **Managing Rides, Roadsides and Edge Habitats in Lowland Forests,** Richard Ferris and Clive Carter
- **Plastic Tree Tubes – Who needs them?** Yorkshire Dales National Trust
- **Keeping Rivers Cool: A Guidance Manual** Keeping Rivers Cool
- **Woodland management for butterflies and moths** Butterfly Conservation

CORE CLIENT GOALS FOR CYC WOODLAND

- **plant 50,000 trees by 2023**
- **increase & enhance access to green space**
- **enhanced health & wellbeing outcomes**
- **habitat diversity & biodiversity increase**
- **effective carbon sequestration**
- **green skills & volunteering development**

SOURCING PLANTS

Provenance should generally be as local as practically possible and from a broad genetic base to increase resilience to pests and climatic changes. Comply with standard plant sourcing regulations.

Potential local suppliers:

- **Thorpe Trees, York 01423 330977**
- **Johnsons of Whixley 01423 330234**

The UKFS recommends drawing material from broad genetic base and using well-adapted local or regional origins from similar elevations. The UKFS also recommends encouraging the natural generation of desirable local tree and shrub species with ongoing woodland management.

GROUND PREPARATION AND CULTIVATION

The fields within the site area are currently in arable cultivation which is ensuring that there is not a build-up of unwanted vegetation and weeds across the area. This management should continue prior to the phased meadow seeding and tree planting but the agricultural application of pesticides* and fertilisers should be removed as part of these operations. Prior

to the planting of trees and shrubs it is envisaged that the field areas will be seeded with appropriate wildflower mixes in the spring/ autumn and the subsequent tree planting undertaken during the winter planting seasons, (November to March).

Prior to seeding, any unwanted vegetation will be removed using repeated cultivation as required. The ground should be ploughed, then raked or harrowed to produce a medium tilth and then rolled to produce a firm surface. The seed must be surface sown in overlapping sections applied by machine.

Wildflower mixes/ seeds are to be sown in either August-September or March-April, but timing and application can differ depending on the specific mix and where it is to be applied; consult supplier for details.

*The UKFS recommends using artificial pesticides (including herbicides, insecticides and fungicides) and fertilisers as a last resort in practising sustainable forest management – they should only be deployed in a reactive way when a problem has been identified or is highly likely, and alternatives should be sought if possible. They should match the needs of the stand and be planned with careful attention given to buffer and storage areas, weather and ground conditions and risk to water supplies. Particular care must be taken near to water bodies, where field application of pesticides and herbicides should be excluded, unless approved for use near water. No pesticide or herbicide should be applied within 1m surface of any water body. Check that drainage channels do not convey pesticides, herbicides, fertilisers to water bodies before application and do not apply during rainfall or wind conditions where spray will drift. Appropriate regulators, agencies and authorities may need to be consulted before the application of pesticides or herbicides, especially in or near water or in or near designated sites or priority habitats or species.

Minimising both pesticide and fertiliser applications reduces the operational carbon footprint of the woodland. UKFS further recommends minimising the use of inorganic fertilisers as much as possible and to plan any fertiliser applications to minimise risk of nutrient loss.

TREE PLANTING AND INITIAL MAINTENANCE

It is envisaged that planting will be into establishing areas of meadow. Manual screefing in rows on the proposed planting grid would provide an optimum planting surface. (This would be in preference to spot spraying to minimise herbicide application.)

Trees should be planted within the grids in small species groups. The notch planting technique is to be employed. Shelters are to be employed immediately after planting.

Weed Control

In woodland creation schemes any plant growing within 50cm of a young tree can be regarded as a weed. A 1m diameter weed free zone should be maintained around each tree for years 1-3.

UNWANTED / INVASIVE VEGETATION

Bracken and bramble in particular should be carefully controlled / removed on an ongoing basis where it is unwanted in a woodland context so as not to out-compete other woodland

species and reduce plant diversity. Cutting or rolling can be used to control these plants as can the careful application of a suitable, selective herbicide such as 'Asulam' where it is necessary. Ivy, common nettle, thistles and sward grasses should also be carefully controlled throughout the site on an ongoing basis so as not to out-compete other woodland species. The same applies to other invasive or pernicious plant species.

In general:

- control invasive / pernicious vegetation before sowing / tree planting and throughout early growth stages of desired plants; minimise use of herbicides and spot treat as much as possible
- control invasive / pernicious vegetation on ongoing basis and at an early stage with cutting, rolling, or the careful application of selective herbicide

UKFS recommends taking early action against invasive species when populations are small and minimising the use of pesticides, herbicides and fertilisers to as little as possible. See guidance above.

SEED MIXES / GROUND COVER

Distinct areas for sowing include: wood meadow; general grassland through rides, along hedgerows etc.; herbaceous woodland edge, riparian zone and shaded woodland areas under tree canopy. All identified as separate mixes as below. Sowing rates vary from 1g / m2 for grass/herb mixes to 0.5g / m2 for herbs alone. Seeds are to be sown in either August-September or March-April, but timing and exact application can differ depending on the specific mix and where it is to be applied. In addition to seed sowing, the natural regeneration of desirable woodland species is to be encouraged as and when this occurs throughout the site.

Wood meadow:

Dan Carne (Wood Meadow Creation Officer for Wood Meadow Trust) is to use local seed from Derwent Valley Nature Reserve for the predominantly sandy, existing north-eastern field (Bell Field), however, due to large scale of site – he has recommended that **Emorsgate** be contacted for a **bespoke wood meadow seed mix** for any other areas of wood meadow indicated across the site (also predominantly sandy). Any mix should certainly include yellow rattle. As Bell Field is already sown with an appropriate mix, this area can be left to develop as-is with pernicious vegetation control applied where necessary.

General grassland through woodland rides, along hedgerows etc.:

Propose **Emorsgate EH1 – Hedgerow Mixture** in areas near broadleaf woodland blocks
Details and management notes: https://wildseed.co.uk/mixtures/view/12

Propose **Emorsgate EM8 – Meadow Mixture for Wetlands** in areas near wet woodland (pine- and alder-dominant woodland areas)
Details and management notes: https://wildseed.co.uk/mixtures/view/9

Herbaceous woodland edge:

Propose using **Emorsgate EM10F - Tussock Wild Flowers** for herbaceous woodland edge

Details and management notes: https://wildseed.co.uk/mixtures/view/32

Riparian Zone:
Propose using **Emorsgate EP1 – Pond Edge Mixture** directly after pond establishment and before tree planting in riparian zone
Details and management notes: https://wildseed.co.uk/mixtures/view/13

Shaded woodland areas under tree canopy:
Propose initially using **Emorsgate EH1 – Hedgerow Mixture** before planting of new trees as tree canopy will not be developed enough to support shade-loving woodland species.
Details and management notes: https://wildseed.co.uk/mixtures/view/12

As canopy cover begins to establish over the years, begin to introduce areas of appropriate shade-loving woodland plants in group tree selection and individual tree selection areas (see woodland management) while also encouraging natural regeneration of suitable local woodland groundcover species in these areas. If possible, **Emorsgate EW1F – Wild Flowers for Woodland** can be sown as the canopy begins to close in.
Details and management notes: https://wildseed.co.uk/mixtures/view/33

WOODLAND MANAGEMENT
The overall goal for the site is to create a diverse, uneven-aged structure in time including: mature trees, some dense regrowth, numerous sunny rides and glades, and patches of recently cleared and regenerating open areas with sparse ground vegetation and warm unshaded conditions.

A **continuous cover selection system** is suggested over extended rotations (with cutting intervals in selected areas anywhere from 5 to 10 years), which should be applied throughout the woodland itself, using both the **group tree selection** and **individual tree selection** approach over time. Elsewhere, minimum or no intervention to be considered where appropriate in order to attempt the eventual, natural creation of an uneven-aged structure, though this could take 50-100 years to achieve. Non-intervention areas could be valuable for species requiring old-growth conditions. The increased risk of windthrow should be considered when creating natural regeneration gaps near the woodland edge.

Group tree selection involves the creation of natural regeneration gaps in broadleaf woodland of approximately 0.25 ha within suitable areas over time which are then continually managed to gradually increase mixed age and size classes. This approach is gradually applied throughout the woodland. Smaller gaps can be created within pine-dominant woodland.

Individual tree selection involves the removal of just the crown area of a mature tree; natural regeneration can then occur in this area. As with the group tree selection approach, thickets grow in this area and then are thinned over time until mature trees grow in place and the process is repeated throughout the site to provide mixed age and size classes over time, including seedlings, saplings, semi-mature and mature trees.

As time progresses, review the ongoing suitability and diversity of tree species in regeneration areas in line with changing parameters as further evidence on climate change and the emergence of pests and diseases becomes available.

UKFS recommends carrying out all woodland operations during dryer periods (but outside of bird nesting season) to minimise soil compaction. Soil disturbance should also be minimised as much as possible.

RIDE AND GLADE MANAGEMENT

Sinuous woodland rides have been designed in order to provide a range of habitats and shelter for a diverse range of species, with a particular focus on east-west rides as the more ecologically beneficial arrangement. East-west ride width in particular has been considered so that ride width is generally at least the ultimate height of surrounding tree species on either side (c. 30 metres), ensuring sunlight can reach the central area of the ride as well as the south-facing shrub edge. Ride widths should be maintained as such in the future.

Ends of the woodland rides have been narrowed and 'pinch points' have been created along the rides to decrease the risk of windthrow and creation of wind tunnels. These should be maintained as such. Scallops have been created along the rides, with a particular focus on scallops along the east-west rides' northern edges which receive more sunlight and are more beneficial to wildlife. Individual trees planted at low density across rides have been specified from time to time to increase the mobility of certain tree-dwelling species between distinct woodland blocks. Several glades and box junctions have also been created to provide more varied wildlife habitat at key locations.

Woodland rides and glades all include a graded edge to woodland, comprising:

- central zone of grasses and wildflowers (*turf*)
- tall herbs bordering central zone (*approximately 5m width each side of ride*)
- outer zone of scrub (*of varied density: some low, some high*) grading into high forest (*approximately 5m width each side of ride*)

Rides and glades should be continually maintained to provide open, sunny conditions and a structurally diverse woodland edge, as below.

The rides should be managed on a three-zone system:

- the central turf zone should be mown at least once, possibly twice per year, retaining or creating new areas of bare ground in the process
- up to 25% of the tall herbaceous zone should be cut on rotation throughout the site each year, to create a mosaic of herbs of four different ages (*ideally cut late July-early August; cuttings must be removed*)
- Lengths of the shrubby woodland edge should be cut or coppiced outside of bird nesting season on a rotation every 8-20 years to retain structural diversity. Ideally, the rotation period will match the point at which an area of scrub has reached its

maximum size and density. Some brash can be retained in localised piles along the cut areas as a source of deadwood.

Big blocks of even-aged vegetation greater than 50m should be avoided in both the tall herbaceous zone and the shrubby woodland edge. Cuts should be evenly spread out along the network of rides and should alternate from one side of the ride to the other. Bracken and bramble should not be allowed to encroach on rides or glades and should not be allowed to develop at high densities. Bare ground scrapes should be provided here and there in sunny areas (i.e. northern scallops of woodland rides) for habitat enhancement.

The same management principles as above should be applied to graded vegetation of glades and box junctions, with traditional meadow management also applied to larger open spaces. A scatter of tall trees in glades and box junctions can add diversity but should not take up more than 10% area.

WOOD MEADOW MANAGEMENT

Wood meadows should support a mosaic of habitats and create a variety of different microclimates, from the woodland edge to the meadow centre. Scattered trees and shrubs should be present within the wood meadow but mainly concentrated around the meadow edges, with ideal canopy cover at around 5-15%. These trees and shrubs should eventually be uneven-aged, with some larger standards left in amongst smaller trees and shrubs. Small, scattered coppice coupes are beneficial in a wood meadow (hazel, aspen, birch, etc.) and these should be managed on a long rotation (7-15 years) in a cyclical pattern, leaving some coppice plants to develop into standards.

Year 1

There will likely be a flush of weeds and ruderal species in the first year which may obscure the meadow plants; these should be topped or mowed and cuttings removed. Mow newly sown meadow regularly throughout the first year to a height of 40-60mm, removing cuttings. Avoid cutting in spring and early summer if the meadow contains yellow rattle or if cornfield annuals have been used as nurse cover.

The 'hay cut' of wood meadow should not be done too late (late July from autumn sowing; early August from spring sowing) so that grasses do not dominate and out-compete wild flower species. The 'hay cut' should be cut to 50mm – hay should be left to dry and shed seed for 1-7 days and then removed from site.

Management once established

Meadows should be cut on rotation each year in late July/early August and again in the autumn. This will extend the flowering season and help suppress grasses. Meadow grassland should not be cut from spring to late July/early August to give species an opportunity to flower.

N.B. It may be necessary to sow cornfield annuals as nurse cover in the first year in addition to the bespoke wood meadow mix in order to help suppress weed growth. https://wildseed.co.uk/page/cornfield-annuals-as-nurse-cover

WOODLAND POND MANAGEMENT

Ponds shown are to a size previously recommended by Yorkshire Wildlife Trust (YWT): 150m2 with central depth of 1m. Ongoing pond management will be advised by YWT / specialist, including any control of invasive or pernicious species.

UKFS recommends any fertiliser and pesticide applications be carefully planned with careful attention regarding their risk to waterbodies. Avoid forest drains discharging to waterbodies. Do not cultivate land within 2m of existing waterbodies.

RIPARIAN ZONE MANAGEMENT

The riparian zone should extend to approximately 10m width around water bodies and should be managed to develop a rich herb and shrub layer with a light, broken tree canopy. Tree canopy cover should be continually limited to approximately 50% within the riparian zone to provide light shade, and evergreen tree species should not be present within this zone due to the risk of over-shading.

UKFS recommends limiting the planting/presence of alder to less than 10% of the area within riparian zones. Keep riparian areas clear of brash and avoid felling trees into waterbodies. Restrict application of inorganic fertiliser as much as possible within riparian zone and only apply by hand, do not apply inorganic fertiliser within 2m of waterbodies. Application of organic fertiliser within riparian zone should be totally excluded.

HEDGEROW MANAGEMENT

The majority of existing hedgerows on site are to be retained and managed as separate elements from the woodland. Where existing hedgerows are sparse and gappy, suitable infill planting has been specified to strengthen field boundaries and enhance habitat. Hedgerows are to be maintained at approximately 4m high and cut on rotation (1 side per year) outside the bird nesting season.

TREE / SHRUB PROTECTION

It is understood that an existing population of deer as well as rabbits are a potential threat to the establishment of the new woodlands. A mixture of protective deer fencing and tree tubes is proposed across the site in order to protect young trees and shrubs. It is noted that there is a desire to reduce the use of plastic tree protection as much as possible, but this must be balanced with the potential for significant losses of stock if grazed by deer. Areas where perimeter protective deer fencing is proposed are demonstrated on accompanying plans– these areas are limited to undisturbed woodland blocks which have no through-paths. Protective deer fencing around these woodland blocks should sit between the woodland tree planting and the woodland shrub layer. Elsewhere, 1.8m high tree shelters should be used for all trees and shrubs throughout the site with the specific intent to remove, re-use and/or recycle these tree tubes once they have served their purpose. Temporary fencing of recently coppiced coupes may also be required to provide protection against deer.

COPPICE MANAGEMENT

Two main coppice areas are proposed including more formal, productive willow coppice to south-west of the site and more informal coppice areas within wood meadows. However, large areas of woodland shrub edge should also be coppiced on rotation as part of good-

practice ride management.

- **willow / productive coppice:** divide this coppice area into coupes, separating short-rotation coppice species (willow varieties – one, two or three years, once established depending on use of the arisings e.g. basketry to willow structures) from long-rotation coppice species (hazel & sweet chestnut – eight to fifteen years, once established) & manage accordingly for productive coppice
- **informal / dispersed coppice in wood meadow and in shrub edge:** place random, long-rotation species coupes in wood meadows concentrated on outer edge and manage accordingly for maximum biodiversity; coppice areas of woodland shrub edge on long rotation throughout site to retain ongoing habitat mosaic
- **keep a range of standard trees within coppice areas to maximise structural benefit:** retain some trees as standards within informal / dispersed coppice areas to about 20% cover density, and coppice some plants on a longer rotation to maximise benefits for wildlife (approx. 20 years)
- **all coppicing to be undertaken between late autumn and early spring; robust protection of coppice growth / re-growth against deer and rabbits for 2-3 years is to be provided**

DOGS ON LEADS

Dogs should be kept on leads as much as possible so as not to disturb wildlife throughout the woodland. Dogs should be kept away from, and out of, ponds reserved for wildlife. Signage and interpretation will assist in this aim.

UNDISTURBED AREAS

Some areas of the site are to be left undisturbed by human activity to increase value for wildlife. These include the woodland blocks separated by deer fencing as well as Whinny Woods, located to the south-west of the larger site area.

MOVEMENT AROUND FORAGING PLANTING

Foraging planting in Banana Woods can be planted in groups of three to five plants, with sufficient width for informal mown routes for movement between planting clumps.

DEADWOOD

Deadwood is a valuable habitat resource. Deadwood is to be retained on site in each woodland block (including tree stumps *in situ*) to provide important habitat for a range of species. Leave some deadwood – such as tree stumps, trunks and limbs – in situ where appropriate and safe. Otherwise, move deadwood and brash piles to concentrated, high-value areas of ecological benefit, including in sunny areas near wildflowers, along northern edges of woodland ride scallops and within wet woodland areas to create 'debris dams'. Additionally, create 'old growth' conditions in some areas of the woodland and retain veteran trees.

UKFS recommends 20m3 of deadwood per hectare.

BIRD / BAT NEST BOXES

Could be specified in time once woodland matures to improve ecological outcomes

PUBLIC ART PROGRAMME

Suggestions for public art informed by natural materials have been made as part of the proposals including a mural in the underpass and individual woodland themed wood sculptures and could be extended to willow sculptures and structures. This work could be undertaken by local artists as the woodland evolves. This element could also form part of the signage, interpretation and seating elements within the site.

OTHER FEATURES

Beyond the implementation of the woodland suggestions for a layer of additional features such as car parking areas, visitor centre, forest school location, and a play area have been made.