# The John Muir Way Greening Study

# Outline Specification for Habitat creation and management

*2188/SP01*

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# 1.0 Introduction

This outline specification is intended to provide some detail of the habitat creation and management actions proposed in the John Muir Way Greening Study. It is not fully detailed and should not substitute for the judgement of a qualified and experienced landscape/ecology professional considering each location on a site-by-site basis.

Every site will differ as to ground conditions, soil type, aspect, exposure and degree of use, all of which will influence the selection of species and materials and the manner in which maintenance regimes are applied. This specification provides guidance, but should not replace the informed judgment of an experienced landscape professional in deciding how best to achieve the proposed improvements.

This specification has been informed by the work of the project ecologist, who undertook ecological survey and made management recommendations at a range of sample locations along the John Muir Way. These sample sites included a representative range of typical habitat types. The ecological reports are available from GAT.

The Action Plan for each local authority area sets out the proposals to which this specification refers. It covers the whole range of actions across the breadth of the John Muir Way; thus, not all of the prescriptions will be relevant to each local authority area.

Deviation from the specification should only be undertaken after informed consideration of the resource, amenity and ecological impacts of such a change.

The JMW Partnership Group are keen to promote the participation of local community groups in the creation and management of green infrastructure along the length of the John Muir Way. Some management activities will be well-suited to community involvement as part of sustainable stewardship of the route.

## 2.0 Habitat Types

The route contains a mosaic of habitats important to wildlife; proposals aim to increase the extent and depth of biodiversity along the route. The intimate association of these different habitats in a network across the site will enhance the ecological value of the JMW as a key part of a connected ecosystem.

Sympathetic management is necessary to achieve the varied aims of ecological diversity, recreational function and aesthetic. Management guidance is provided for each habitat type.

### 2.1 Native Woodland Planting / Shelter belt planting

Native mixed woodland will be planted where there is significant area available and where new woodland will provide habitat connectivity between existing woodlands.

Woodland should be planted with a relatively dense edge mix consisting of small tree and shrub species bearing fruit and nuts that form a transition with adjacent open habitats; the core of woodland will be planted at wider spacing and consist of canopy, understorey and shrub species.

Ground preparation : herbicide spot treatment to create clear spots 600mm wide at every plant location. If the site has cover of vigorous pasture grass or ruderal species, an overall herbicide treatment should be done.

Planting : Bare-root transplant stock generally of 45-60cm size, 1+1 or 1+2 planted during November-March dormant period. Woodland core at 2.0m centres and woodland edge at 1.25m centres; the edge to be 5m in depth (5 rows of plants).

The species mix for core and edge shall be designed with reference to existing nearby woodlands and to soil type/conditions. Typical woodland core and edge mix could be :

| Woodland Core mix | Woodland edge mix |
|---|---|
| 20% Sessile oak | 10% Gean |
| 15% Silver birch | 20% Hawthorn |
| 15% Gean | 15% Bird cherry |
| 15% Bird cherry | 10% Rowan |
| 10% Rowan | 15% Hazel |
| 15% Hazel | 10% Elder |
| 10% Holly | 10% Guelder rose |
| | 10% Scottish briar rose |

On wetter ground, the oak, silver birch, rowan and holly can be substituted with alder, downy birch and willow for a wet woodland habitat.

Establishment maintenance to be undertaken for the first 3 years after planting :

- 4 visits to treat grass and weeds growing within the 600mm circle around each tree; use approved systemic herbicide

Long-term Management :

- Once the trees are established and growing strongly after 3 years, weeding should not be necessary and a natural ground flora should be allowed to re-establish up to the trees.

- Once well established, hazel plants can be coppiced back to a stool at ground level, to encourage dense bushy regrowth. This should recur on a 10-year cycle.
- From 6 years the woodland should be assessed for thinning, the initial operation of which is likely to be required in the period 8 – 10 years after planting when canopy closure is achieved. The objective of thinning will be to retain the range of species and reach a final stocking density in the core woodland of 2,000 trees per hectare, or 2.50m centres.
- The edge mix woodland will be denser at all stages. Thinning may not be required, but the selective coppicing of all species will help to stimulate dense bushy growth that maximises shelter and visual screening at low height.
- Thinnings should be logged and left in stacks within the core woodland area to provide dead wood habitat.
- Once shaded woodland conditions are developed in the core areas (likely after 10 years or so), the introduction of native woodland ground flora species may be considered. Plants such as bluebell, anemone, celandine, wood avens, woodrush and honeysuckle could be planted as bulbs or plugs into shady clear ground. Such plants should be sourced from a reputable supplier of native plants, cultivated from seed of native provenance (not harvested directly from the wild).

## 2.2 Existing Woodlands and Trees

Mature trees growing alongside the John Muir Way should be permitted to grow to senescence. Deadwood in the canopy should only be removed where it poses a potential threat to users of the trail beneath. It is recommended that a regular safety inspection of trees be undertaken to identify any issues with tree health or structure that require addressing in order that trees are in reasonably safe condition commensurate with the presence of a promoted public path.

Nesting boxes can be mounted on mature trees that have suitable structure, location and aspect. They should be situated at least 4m above ground level and fixed using galvanized wire or screws. A range of types should be used, to suit different species of bird.

Bat boxes can be installed at between 2 – 7m height, on mature trees situated away from street lighting; install them with a range of aspects, south to west facing for summer roosts and north facing for winter hibernation roosts.

Woodlands should be managed according to a woodland management plan; Scottish Forestry offer guidance and grant aiding of long-term woodland management. Diversification of the canopy structure can be achieved by periodic coppicing of understorey hazel, alder, willow and hawthorn.

In suitable coniferous forest, nesting boxes for pine marten and red squirrel can be installed at 4m height to encourage these species.

## 2.3 Specimen / Avenue Tree Planting

Specimen trees will be planted where an open wooded character is desired, providing continuity of the existing open ground flora whilst introducing tree canopies that help connect dispersed wooded habitats and contribute to a sense of place along the trail. In more formal urban settings, the size of tree stock planted may be increased to increase robustness.

Ground preparation : herbicide treatment to create a 900mm diameter clear spot at every tree location.

Planting : Bare-root nursery stock of up to Light Standard size (6-8cm girth) planted during November-March dormant period into a pit sized to accommodate the full root spread, backfilled with excavated site topsoil with addition of slow release fertilizer.

The species selection should be site-specific, relating to existing trees and local context.

Establishment maintenance to be undertaken for the first 3 years after planting :

- 4 visits to hand weed the bark mulch 900mm circle at each tree; check and adjust stakes, pads and ties to prevent chafing.
- Water trees as required during dry periods (using installed watering pipe). It is not intended that regular watering be required after the first year.
- Tree stakes should be removed once trees have become fully wind-firm.

## 2.4 Orchards

Apple, pear and damson trees will be planted in quincunx pattern (diagonal offset grid) within meadow grassland. These will develop into the character of a traditional orchard, with varied tree size and appearance held within the regular grid layout. Whilst the meadow may be cut only once annually, mowing of paths or grid pattern through the meadow will enrich public use and access. Harvesting of apples can in future provide the basis for shared community activities; the establishment of a community orchard group to organize harvesting, distribution of the fruit, and to tackle the pruning of trees would be beneficial.

Tree varieties should be selected to have semi-vigorous rootstocks suited to open growing without need of continued staking. A blend of pollinator types should be included to ensure all trees can be pollinated.

Establishment maintenance to be undertaken for the first 3 years after planting :

- 4 visits to hand weed the bark mulch 900mm circle at each tree; check stakes, pads and ties, adjusting when necessary to allow for growth and ensure that trees remain adequately supported without chafing.
- Water trees as required during dry periods. It is not intended that regular watering be required after the first year.
- Prune trees where required to remove dead wood and broken, damaged or crossing branches. Pruning shall be carried out by knowledgeable operatives in accordance with good arboricultural practice. Monitor trees for pests and diseases, and appropriate action taken to eliminate disease and recover health.
- In the first 2 years following planting, fruit should be carefully removed when still small, to channel resources into root and shoot growth.

Long-term Management :

- Formative pruning should be undertaken each year in winter, to encourage strong and open canopies through which airflow is maintained and branches do not cross. Pruning will aim to balance resources of the tree between foliage (growth) and fruit production.
- Tree stakes should be removed once trees have become fully wind-firm. Trees should be assessed individually.

- Annual harvesting of fruit is recommended but not essential. If no formalized group or arrangement is made, the fruit will nonetheless be available for picking by the public. A notice board could be used to inform the public with details of the orchard trees and of any orchard management group that may be formed; it might also invite the public to pick the fruit when in season.
- Cutting of the meadow before harvest of the trees will help with windfalls.

## 2.5 Native Mixed Hedgerows, and hedgerow trees

Existing hedgerows should be retained and their management adapted to maximise biodiversity value. To do this, cut every second year to allow flowering and fruiting to take place, and to create a wider range of stature and bird nesting opportunities. Where it is possible to do so, alternate the cutting year of hedges along either side of a road. Hedge trimming should be undertaken in January/February (i.e. when dormant, prior to the nesting season, and once berries/haws have been consumed). Laying of the hedge may be desirable to prevent the hedge thinning from the base; cutting should be ceased for a period to allow the hedge to grow out before laying is undertaken; hedge-laying is a specialist activity that should only be undertaken by skilled and experienced workers.

Hedgerow trees should be promoted to grow on at around 20m spacing; if there are no suitable seedlings in the hedge, plant feathered whip trees, and mark with a tall stake to alert the hedge-cutting operator.

Gaps in the hedge should be planted with suitable species transplants, as described for new hedgerows (below), to close up the hedge. Hedges can be diversified by planting occasional ivy and honeysuckle in the base of the hedge.

Where space permits, a buffer strip ideally of 2m width of uncut verge alongside the hedge benefits many species – wildflowers, invertebrates, amphibians, mammals and birds.

New hedgerows :
Mixed native hedgerows planted using bare-rooted transplants 45-60cm in double-staggered rows at 5 plants/ linear metre, following herbicide treatment to create a bare strip 1.0m in width.

| Native hedgerow mix |
|---|
| 50% Hawthorn |
| 15% Field Maple |
| 10% Blackthorn |
| 10% Hazel |
| 5% Crab apple |
| 5% Holly |
| 5% Scottish briar rose |

Protection from livestock and from browsing deer and rabbits will be required in many cases. If planting shelters/tubes are used, they should be of biodegradable type (high-density cardboard) and not plastic. Planted hedges should be weeded, by hand or herbicide, 4 times per year for the first 3 years. Once hedge established, a native tall grass and forb ground flora should be allowed to develop along their base.

## 2.6 Meadow and Verge Enrichment

Meadow grassland is found along much of the route. Maintaining and improving biodiversity of this habitat can be achieved by careful control of the timing, frequency and height of grass-cutting, and by removal of cut arisings. The way this is done can be varied to best suit the type and extent of meadow found at each location. Knowledge of what suitable species are present in the locality, and could colonise into the site given favourable management, is needed before the decision is taken to seed; there may be valuable species already present yet kept at bay by current grass cutting frequency or timing.

Cutting in September/October will allow full growth, flowering and seed-set during the growing season, before being cut and the hay lifted from site. Removal of the hay crop will help manage soil fertility so that grass species are not over-dominant and a more diverse sward can develop. A further cut may be desirable in November to leave the sward tidy through the winter months, where the location is more urban or managed in character; or this tidying cut can instead be undertaken in March before growth recommences.

A transition from short to tall vegetation is desirable around the margins, for structural diversity and especially to afford cover to amphibians and mammals (for instance, along hedge lines and other linear features, or woodland edges). Inclusion of log piles and exposed stones is also beneficial for animal diversity; these features not being mown at all.

Where a meadow is to be created to replace regularly mown grassland, plant competition and soil fertility will be issues. The existing sward must be sprayed-out using systemic herbicide; once dead, the surface scarified or lightly cultivated and seeded with a wildflower and grass seed mix (suitable mixes being Scotia Seeds MG5 mix for general meadow areas or Scotia Seeds Wet Meadow mix for areas of wetter soil conditions) at the recommended rate. No fertilizer should be applied. During the first year, the developing sward should be cut to 50mm height 4 times, and then once established cut once in November; cuttings should be removed. Vigorous weeds such as dock, thistle, nettle and couch grass should be pulled or spot-treated until the sward has established durable cover/density.

The inclusion of yellow rattle in the seed mixes will help in this process by reducing the vigour of grasses.

Enrichment of grass sward using native and non-native bulbs for spring flowering should use species such as Narcissus, snowdrop, bluebell, violet and crocus, scattered on the ground and planted using a bulb plug tool. Non-native species such as tulip and Camassia may be included for amenity value where appropriate to setting.

Establishment maintenance (first year after seeding):

- In the first year after seeding, cut the sward to a height of 50mm once it reaches 100mm in growth, to suppress annual weeds (unless autumn-sown, in which case avoid cutting until late summer); remove arisings for compost. Repeat up to 4 times in the growing season
- Remove pernicious weeds (ragwort, dock, thistle) by hand or mechanically

Long-term Management:

- Mow grass paths regularly through the growing season to differentiate these from taller meadow grassland.

- Cut the meadow sward in September/October after flowering, to 50-75mm height, removing arisings for compost once they have lain for a week to set seed.
- A further cut before winter may be desirable if significant regrowth occurs, to provide a cared-for appearance through the dormant winter period.
- Remove pernicious weeds (ragwort, dock, thistle) by hand or mechanically
- Meadow margins to hedgerows and woodland shall be left unmown to allow a natural ecocline to develop, subject only to periodic cutting to prevent scrub establishment

## 2.7 Acid Grassland and Heath

This habitat occurs in unimproved and semi-improved types at various locations along the route; in particular, it is present along the Antonine Wall over Bar Hill, Croy Hill and at Roughcastle.

Where it is possible to graze the land, at low stocking density, that should be done. Alternatively, grass cutting in September permits species to complete flowering and to set seed; this should not be done annually, but rather in rotation so that dwarf shrub species (heather, bilberry) can develop in the sward in the years between cuts. The cut height should be raised to 150mm at least, and arisings should be removed. In areas where rushes become dominant, they can be suppressed by topping in August. Transitional habitats should be allowed to develop at the edges of woodland, scrub, hedges and crags.

Unless grazed by cattle, bracken should be cut 2-3 times per year, in June, July and August, to prevent it smothering meadow grassland species.

The stands of mature trees growing at Roughcastle and Bar Hill should be diversified in age and species through planting. Standing and fallen deadwood should be left (unless posing an unacceptable risk to the public using paths beneath).

## 2.8 Watercourses and wetlands

A 10m riparian buffer should be left alongside watercourses wherever feasible; this should be natural wetland marginal, tall herb grassland and riparian woodland. Periodic coppicing of riparian trees can help further diversify habitat structure and vary the daylight conditions in the watercourse.

SuDS swales will receive run-off water, slow and treat the discharge into the existing drainage network. The swales will usually be dry but will temporarily fill after heavy rainfall and then drain down to be dry again in periods between rainfall. Wetland swales with native vegetation, left uncut or only cut annually, enhances the biodiversity value of SuDS features.

Swales will have native wet meadow, with a natural transition to the surrounding drier meadow sward. Continuity of cover will encourage the movement of invertebrates and amphibians from one to the other. Wet meadow vegetation is naturally vigorous; once established these areas will only require limited maintenance by annual cutting in late winter to remove dead foliage and tidy them before spring regrowth.

Wet meadow grassland can be established on site topsoil through seeding with Scotia Seeds Wet Meadow seed mix in the manner described at 2.6; less fertile topsoil will help slower establishment and greater sward diversity.

Establishment maintenance (first year after seeding):

- In the first year after seeding, cut the sward to a height of 50mm once it reaches 100mm in growth, to suppress annual weeds (unless autumn-sown, in which case avoid cutting until late summer); remove arisings for compost. Repeat up to 4 times in the growing season
- Remove pernicious weeds (ragwort, dock, thistle) by hand or mechanically

Long-term Management:

- Cut the sward in March, to 150mm height, removing arisings for compost.
- Remove pernicious weeds (ragwort, dock, thistle) by hand or mechanically.
- Meadow margins to hedgerows and woodland shall be left unmown to allow a natural ecocline to develop, subject only to periodic cutting to prevent scrub establishment.
- Remove litter and debris and check inlet and outlet pipes to remove any obstruction or silt.
- Annually remove any trees or scrub seedlings by herbicide treatment. Periodic removal of self-sown trees and bushes (e.g. willow and alder) will be necessary to prevent the wetland areas becoming overgrown. Catching these species early is vital to prevent strong root establishment.

## 2.9 Pictorial Meadow

Pictorial meadow consists of a mix of native and non-native herbaceous species chosen to provide a tall-herb 'prairie-style' meadow, rich in floral interest and with a long flowering season. The Pollinator Meadow species mix is especially aimed at native invertebrates, providing suitable food species spread over an extended season of sequential flowering. These areas will be managed as tall herbaceous summer meadow, meaning that the sward will be cut early in the summer, flower through the mid and late summer, before being cut and the arisings lifted from site in the autumn. Fertiliser must not be applied to these areas.

Establishment maintenance (first year after seeding):

- In the first year after seeding, remove weed species by hand or using herbicide.

Long-term Management:

- Mow edges of grassland where it meets pictorial meadow, to provide a maintenance marker
- In the early years, cut the meadow in early summer to 75mm height, to thicken basal growth and suppress weeds; remove arisings for compost.
- Cut the meadow in autumn, to 75mm height; remove arisings for compost.
- Remove pernicious weeds by hand or mechanically

## 2.10 Amenity Grassland

This form of grassland is used in areas used by the public for play, informal kickabout, walking routes etc. It is tolerant of wear, but very poor in species and structural diversity.

Where possible, existing amenity grass areas should be transitioned to a regime of less frequent cutting, and of lifting/removal of cuttings so that fertility is gradually depleted. Scarifying and seeding with yellow rattle is helpful in reducing the dominance of coarse grasses.

## 2.11 Coastal Habitats

Along the coastal margin, measures to increase the roughness and complexity of man-made surfaces will increase the potential for habitat diversity.

Gabions can be backfilled with clay soil to fill the voids and improve moisture-holding so that salt-marsh plants can colonise from nearby habitat. The creation of small pockets of substrate in the face and top of walls can replicate natural cliff ledge conditions, for colonization or planting of clifftop species such as thrift, sea campion, stonecrop and toadflax. Use a gravel/sand substrate with some compost.

Vegetated shingle is an important coastal habitat and should be left undisturbed to form a natural gradient of colonization. However, encroachment by scrub and bramble can diminish the value and should be removed where it becomes over-dominant, and certainly where it inhibits use of the trail.

## 2.12 Rain Gardens

Raingardens will consist of a specially blended drainage/growing medium that has water holding capacity but will not become waterlogged; it will serve to hold water following rainfall, releasing it at a slow rate to the drain. CIRIA 753 The SUDS Guide contains useful details of raingarden design including the substrate.

The planting character will be predominantly herbaceous, of vigorous 'prairie-style' grasses and broadleaved species, chosen for a long season of dense cover and interest (including in winter), ability to naturally suppress weed growth, and tolerance of dry conditions (as well as periodic inundation). Long-term management will include pruning of shrubs in winter to maintain appropriate size, and the removal of dead herbaceous growth in late winter to leave areas tidy ahead of spring regrowth.

Because these gardens receive run-off from adjacent hard surfaces, they should have no bark mulch which would float and clog the outfall. The substrate has high stone content with weed suppressing qualities.

Establishment maintenance to be undertaken for the first 3 years after planting :

- 6 visits to hand weed. Dead plants to be removed.
- 1 late-winter visit to cut back and remove dead herbaceous foliage.

Long-term Management :

- Once the planting is established and knitted together, the need for weeding will reduce to that desired for visual tidiness. Spring should be a focus of weeding, to remove weed seedlings before they become well established; 2 visits should be undertaken 4-6 weeks apart to clear the ground.
- Further weeding visits during the growing season will be less demanding, due to the suppressing cover of planting. Selective pulling/hoeing of weeds.
- Annual pruning of herbaceous plants is required in late-winter to remove dead herbaceous foliage.

## 2.13 Control of Invasive Alien Species

The Code of Practice on Non-Native Species (Scottish Government, 2012) should be followed. Non-native species should be removed when discovered. Himalayan balsam can be tackled by hand-pulling or by herbicide treatment, undertaken prior to the formation of seed heads. Giant hogweed and Japanese knotweed by herbicide treatment only; both require a rigorous programme of repeated treatments to ensure eradication from a site.

Rhododendron ponticum is a particular problem in some wooded parts of the trail, causing inhibition of native woodland ground flora as well as creating heavy shade that may feel threatening to trail users. It should be controlled by combination of cutting and herbicide stump treatment.

## 2.14 Other Habitat / Biodiversity Measures

During the bird nesting season March to September, avoid disturbance or removal of trees, understorey shrubs and hedges.

Unless there are particular demands for greater tidiness through the winter months, tall meadow margins should be left uncut until late winter, to provide a source of winter seeds for birds.