Surrey Wildlife Trust
Pond Farm

Ref: C3198
Date: 21st March 2018

Dear Katy,

Re: Oakhill Meadow – Wildflower Meadow Creation

Background

Oakhill Meadow is located in Wood Street Village, opposite Wood Street School and is part of the road verge that runs along the northern edge of Oak Hill (road). There are two areas either side of a side road that leads to local houses and together they cover approximately 0.3ha, see Figure 1. A few years ago a wildflower meadow was created on this site, which was successful and flowered over the summer. However, unfortunately, a contract tractor mowed the meadow and it did not recover in subsequent years.

Objective

The local community enjoyed the nature of the wildflower meadow when it was originally created, and it was an important local education tool for the school opposite, therefore it was decided that a project should be set up to reinstate the wildflower meadow and create a floristically rich grassland.

Brief

The brief given to SWT Ecology Services was to visit the site, assess the grassland and then provide a short report with information on methods, seed type, sowing time and future management of the site.

Figure 1: Google Earth Pro map of Oakhill

Key:

Red – boundary

Purple – Bramble scrub/tall ruderal vegetation

Wildflower meadow introduction

A new document on road verges has just been published by Plantlife and is apt for this site. It states that '*the vision for Britain's road verges is one where all verges are managed for wildlife as a matter of course, restoring and explaining flower-rich habitats along our road network. This will ensure the survival and natural spread of both common and rate species, for their own sake, for the sake of the wildlife they support and environmental benefits they bring, and to enhance the contact with nature experiences by users of Britain's road network'* (Plantlife, 2018).

There are nearly half a million kilometres of rural road verges in the UK. This is equal to half of our remaining flower-rich grasslands and meadows. For the 23 million people commuting to work by road every day, road verges can be their only daily contact with nature (Plantlife, 2018). Wildflower meadows are both aesthetically pleasing as well as ecologically important.

With over 97% of ancient wild flower meadows destroyed since the 1930s, road verges are a vital refuge for many bees, butterflies, birds, bats and bugs – a good verge will supply a diverse source of nectar and pollen from the first Lesser Celandine in February to the last Devil's-bit Scabious in September. Common Bird's-foot Trefoil alone is a food plant for over 130 species of invertebrate (Buglife, 2018).

Site visit

Katy Fielding, Liaison Officer with Surrey Wildlife Trust (SWT) Countryside Estate Team, introduced the site to Isobel Girvan, Principal Ecologist, SWT Ecology Services, on the 21st February 2018. The proposals for the site were briefly discussed, then walked over, with notes and photographs taken (see Photographs 1 – 6 below).

Current site conditions

Currently the site comprises rough tussocky semi-improved neutral grassland, with a slight slope down towards the houses, see Photograph 1 and 2. The site visit was not undertaken at the optimal time of year, however the following grasses and herbs were evident and identified vegetatively. The main grass components are Yorkshire-fog, Cock's-foot and False Oat-grass with some finer grasses. Herbs are generally poorly represented with occasional Dandelion, Creeping Cinquefoil, Creeping Buttercup, Broad-leaved Dock, Curled Dock, Lesser Celandine, Common Bird's-foot Trefoil, Common Mouse-ear, Ribwort Plantain, White Clover and rare Smooth Tare.

There are several mature trees, including Pedunculate Oak, present in small groups and a patch of Bramble scrub and tall ruderal vegetation on the northern edge including local patches of Common Nettle, Hedge Woundwort, Cleavers and Willowherb sp., see Figure 1 and Photographs 3 and 4.

Several obvious small mammal runs were present in the tall grass, likely to be Field Vole. There was also evidence of mole activity (molehills), see Photographs 5 and 6.

Photograph 1: Eastern side

Photograph 2: Western side

Photograph 3: Trees & scrub

Photograph 4: Trees & scrub

Photograph 5: Small mammal track

Photograph 6: Molehills

Status

The sward currently is of low conservation value when assessed on its own in a very local sense, but as part of the bigger picture of surrounding habitat it is part of the ecological buffer zone, corridor link and dispersion route for many species. It is also part of the Worplesdon Groups of Commons, and directly opposite Broadstreet and Backside Common Site of Nature Conservation Importance (SNCI) site complex.

Management Issues

There are a few issues on the site:

- As the grassland is immediately adjacent to a main road there will be knock-on effects of pollution and nutrient enrichment that will especially affect the first 1-2m on the road edge.
- The grassland is used by local dog walkers and therefore it is likely that there is some additional nutrient enrichment on a localised scale from dog waste.
- Some garden rubbish was also noted and general litter that likely comes from the main road.

Preliminary steps

Before designing the scheme there are some aspects that will need to be considered such as:

- Before designing the project, consider resources for on-going maintenance. Aftercare is often neglected and the scheme can fail as a result.
- If necessary, check that the local highway authority are aware of the project.

Seeding methods

There are several established methods in which to create wildflower meadows. Given the type of site and the information gathered during the site visit, it is recommended that killing off the existing vegetation with herbicide and seeding across the bare ground will be the most effective method. However there are other methods that could work, but may be more resource heavy, see Table 2 at the end of this document.

For example, the scheme could source seed-rich hay. This would involve hay cutting from the source site and then moving and spreading onto the receptor site within a few hours. This should be carried out in mid- to late-July. However, establishment is fraught with complications for example in dry summers and/or drought conditions, this can lead to germination loss. It is bulky to handle and bales must be rapidly unrolled not more than an hour after being made and the hay spread quickly, using a tractor-mounted fork or bucket or rake (FloraLocale, 2005)[3].

Ground preparation

Creating a meadow of perennial wildflowers and grasses takes several years, and unless you prepare and manage the ground properly it will fail to establish (FloraLocale, 2005)[1].

Ground preparation is key. Rotovate or, more preferably in this case, spray herbicide to create bare ground. An alternative to reduce soil fertility is to remove the topsoil (approximately the upper 20 cm) to reveal the subsoil, however this is labour and resource intensive and it is thought that spraying will work in this case.

The final upper surface should be broken up to a firm, fine tilth using a rake (Forestry Commission).

Using this method involves minimal ground disturbance and will help to reduce the risk of weeds and undesirable species, for example Perennial Rye-grass, regenerating from the soil seed bank.

This should be undertaken in approximately mid-August.

A few weeks prior to seeding the mix, apply a total-kill herbicide. Long swards should be prepared by mowing to remove most of the growing biomass. Grass cuttings must be removed.

After the herbicide has been applied review the effectiveness of the weed-killer two weeks after application. A second application may be required to deal with germination of Perennial Rye grass or White Clover from the seed bank.

Seed origin

The current policy stated on the FloraLocale website recommends using species within their existing and historic wild range as they are more likely to be genetically robust:

- Use native British species preferable of local provenance, or at least from south England.
- (Where possible) seed of more local origin should be used in ecologically sensitive areas and sourced from a similar habitat type nearby (FloraLocale, 2007).

A mix with European species reduces the ‘wildness’ of the countryside, starts to erode local countryside character and introduces new risks to our native flora.

Therefore purchased seed should be source-identified (i.e. the supplier should guarantee that the material is of British native origin and provide information on the locality of origin).

A list of suppliers claiming to sell suitable plants and seed is available on the FloraLocale website (FloraLocale, 2005)[2] of which a few have been listed below, but are indicative of what is available and therefore not exhaustive.

Table 1: List of suppliers on FloraLocale recommended list (FloraLocale, 2018)

Charles Flower Wildflowers Flower Farms Ltd Southmead Halwill Junction, Beaworthy Devon EX21 5UB T 01409 220252 M0792285156 flowerfarms@btinternet.com www.charlesflower-wildflowers.co.uk	Emorsgate Seeds Limes Farm, Tilney All Saints, King's Lynn Norfolk PE34 4RT 01553 829 028 enquiries@emorsgateseeds.com www.wildseed.co.uk
Herbiseed Goring Gap wildflowers New Farm, Mire Lane, Twyford, Berkshire RG10 0NJ 0118 9349464 s.morton@herbiseed.com www.herbiseed.com	Heritage Seeds Osmington, Weymouth, Dorset DT3 6EX 01305 834 504 mail@hseeds.fsnet.co.uk www.heritageseeds.co.uk
Landlife National Wildflower Centre, Court Hey Park, Liverpool L16 3NA 0151 737 1819 info@landlife.org.uk www.wildflower.org.uk/	MAS Seeds Ltd 14 Golding Avenue Marlborough Wiltshire SN8 1TH 01672 519994 shop@meadowmania.co.uk www.meadowmania.co.uk www.create-a-wild-flower-meadow.com/

Specifying seed type

Choose a seed mix containing species that are suitable for your site; rather than use a standard off-the-shelf mixture, it can often be better to list the species you want and ask the supplier to make up a mix to suit your requirements.

The seed mix should aim for a semi-improved herb-rich grassland which will contain a reasonable variety of fine-leaved grasses. Make sure that the mix does not contain annual species such as Poppy, as these rely of seed setting and generally do not respond well to a mowing regime.

Suggested species

The proposed list below of suitable species is not exhaustive, but aimed at providing a guide and have been chosen such that they will be appropriate to the soil and locality.

Common Bent (*Agrostis capillaris*)
Crested Dog's-tail (*Cynosurus cristatus*)
Meadow Foxtail (*Alopecurus pratensis*)
Red Fescue (*Festuca rubra*)
Smaller Cat's-tail (*Phleum berolonii*)
Smooth Meadow-grass (*Poa pratensis*)
Sweet Vernal-grass (*Anthoxanthum odoratum*)
Timothy (*Phleum pratense*)

Betony (*Stachys officinalis*)
Black Medick (*Medicago lupulina*)
Cat's-ear (*Hypochaeris radicata*)
Common Bird's-foot Trefoil (*Lotus corniculatus*)
Common Knapweed (*Centaurea nigra*)
Common Sorrel (*Rumex acetosa*)
Cuckoo-flower (*Cardamine pratensis*)
Devil's-bit Scabious (*Succisa pratensis*)
Field Forget-me-not (*Myosotis arvensis*)
Field Scabious (*Knautia arvensis*)
Goat's-beard (*Tragopogon pratensis*)
Ladies Bedstraw (*Galium verum*)
Meadow Buttercup (*Ranunculus acris*)
Meadow Crane's-bill (*Geranium pratense*)
Meadow Vetchling (*Lathyrus pratensis*)
Oxeye Daisy (*Leucanthemum vulgare*)
Perforate St John's-wort (*Hypericum perforatum*)
Red Clover (*Trifolium pratense*)
Ribwort Plantain (*Plantago lanceolata*)
Rough Hawkbit (*Leontodon hispidus*)
Selfheal (*Prunella vulgaris*)
Wild Carrot (*Daucus carota*)
Yarrow (*Achillea millefolium*)
Yellow Rattle (*Rhinanthus minor*)

Seeding rate

The suggested sowing rate would be 10-20kg/ha of processed seed.

Seeding times

The ideal time to sow is late summer to early autumn (i.e. August to mid-September). It should be broadcast sown, as the area is relatively small, with an inert carrier such as sand to help distribute the seed more evenly. Then rolled or lightly trampled in so that it has soil contact but is not buried as it requires some light to germinate. Burying seed only a few millimetres may significantly reduce the germination rate of seed sown.

Seed care

Do not rake after seed is broadcast sown as this can concentrate seed distribution or bury the seed too deep.

If there is a prolonged dry period, the seeded area may be lightly watered (Forestry Commission). Sowing directly into established grass will not allow the seeds to germinate.

First year maintenance

The Plantlife road verge management guidelines are based on a review of grassland, meadow and verge management that investigate the effects of cutting dates on vegetation. They conclude that early cutting dates reduce floral diversity over time. This is because the flowers are deprived of an opportunity to seed, as early cutting encourages the vigorous growth of robust, long-lived species that are more likely to spread vegetatively.

Late cutting dates also reduce flora diversity over time. If cutting is delayed too late in the season, it encourages the build-up of a thick 'thatch' of dead and dying vegetation forming a mat over the soil. Again, this encourages the growth of more vigorous species that do not rely on open soil for seed to germinate, as many of our wildflowers do.

The absence of any cutting can also result in the project failing. If grasslands and verges are left uncut even for just one year their composition begins to change and species begin to decline.

The first year after sowing seed, the meadow should be cut to a height of approximately 5cm in May and the cuttings removed. When the new grassland then grows to a height of 20cm, it should be mown again to a height of about 5 cm, and the grass cuttings removed. This may need to be undertaken a few times over the year.

It will take about two years for the species to flower and five years for the meadow to establish.

After the first year maintenance

There appears to be a narrow window of opportunity each year from mid-July until the end of September to allow the seeds to drop, when cutting helps to maximise species diversity (Plantlife, 2018).

Verges restored or developed for grassland wild flowers must be mown, preferably twice a year, and the cuttings raked off. An additional spring cut, even if every other year, can also be beneficial and will prevent summer flowers from being swamped by tall grasses and herbs. Verge maintenance must be properly organised and agreed with the relevant highways authority (FloraLocale, 2005)[2].

At the end of the growing season the aim is for the sward height to be approximately 5cm (Buglife, 2018).

General maintenance

It is very likely that weeds will grow from seeds already in the soil you are planting into and these should be cut or removed.

Rank and pernicious species such as Common Nettle, Spear Thistle, Creeping Thistle, Broad-leaved Dock, Curled Dock and Common Ragwort should be controlled not eradicated as they do have ecological value, but they should not dominate. This can be achieved by cutting or mowing, and/or spot-spraying with glyphosate (Forestry Commission, 2014).

Another factor to consider when mowing the meadow is that availability of structural features and flowers is very important for invertebrates. This can be achieved by adopting a staggered mowing regime and leaving un-mown strips of grass temporarily in place (Gujer, 2005).

Leaving a buffer zone of 2-3m of uncut grass around the field edges will ensure the survival of at least some of the overwintering invertebrates and eggs.

If grasses become too dominant, then consideration should be made to introducing native Yellow Rattle. Yellow Rattle is useful because the roots tap into the grasses around them, considerable reducing their vigour. Therefore it:

- Reduces the growth of grass by up to 60%, verges do not need to be cut so early and so often and thereby save on mowing budget.
- Opens up the grass sward, creating room for other wild flowers to grow. There is a direct correlation between the number of Yellow Rattle plants and the number and diversity of other flowers in flower-rich grasslands.
- With less grass growth each year, the need to remove clippings is reduced and soil fertility remains lower (Plantlife, 2018).

Yellow Rattle seed can be sown in later summer after the first cut of grass has taken place and the verge has been scarified. One a verge has been inoculated with Yellow Rattle, no more additional work is needed, it will spread rapidly, but on if the verge is not cut until after seed has been set, mid-July onwards.

Monitoring

Taking regular photographs of the site, particularly before and after any management, will give you a historical account of what you are achieving and how it is progressing over the years.

Yours sincerely,

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References/Further reading

Buglife (2018) *B-Lines Fact Sheet 3 – Wildlife-rich Grassland Creation*. Buglife

FloraLocale (2007) *Climate change and wild plants – a discussion document*. FloraLocale

FloraLocale (2005)[1] *Buying native flora advisory note*. FloraLocale

FloraLocale (2005)[2] *Flowers on the verge: planting on road verges*. FloraLocale

FloraLocale (2005)[3] *Sowing wild flower seed advisory note*. FloraLocale

FloraLocale (2008) *Go native: Planting for biodiversity. Guidelines for planting projects.* FloraLocale

FloraLocale (2004) *Creating wild flower meadows on improved agricultural grassland sites*. FloraLocale

Forestry Commission (2014) *Forest research Best Practice Guidance for Land Regeneration Note 15: Wildflower Meadow Creation and Management in Land Regeneration*. Forestry Commission

Gustafsson L & Hansson L (1997) *Corridors as a conservation tool*. Ecological Bulletins, 46:182-190

Gujer J (2005) *A policy to efficiently integrate biodiversity into grassland farming. Integrating efficient grassland.* Farming and biodiversity 73-77

Plantlife (2018) *The Good Verge Guide: A different approach to managing our waysides and verges*. Plantlife

Willmott M & Nowakowski M (2016) *Flower Power: Getting the best from wildflower seed mixes of farmland*. Conservation Land Management Vol 14 No. 2:

Table 2: Different methods for seeding wildflower meadows

Method and key considerations	Key establishment management points	Comment on resulting grassland
Natural regeneration Often the most appropriate method for light soils. For very small, impoverished soil sites near species-rich areas.	Allow plants to regenerate but top regularly (2 to 4 times in spring and summer) in the first two years to increase grass tillering and sward establishment, and reduce annual and perennial weed problems.	Over several years of appropriate grazing or cutting, the established grassland will reflect the species found in nearby grassland. Early thistle and ragwort problems may need spot treatment.
Seed with locally harvested seed Harvest seed from a local flower-rich site (e.g. roadside verge, churchyard, unimproved hay meadow).	If sowing directly into ex-arable land, establish after harvest or undersow in a growing crop in the spring. Alternatively cultivate to create a good weed-free seedbed and drill or broadcast (hand or machine) seed in late summer or early autumn (well before frosts). Roll afterwards to firm up. Take a haycut the following year in June or July. Do not cut before unless there is an overwhelming weed problem (e.g. creeping thistle) in which case spot treat with glyphosate as soon as possible during the growing season.	Over a few years valuable grassland can be created reflecting the local characteristic grassland type and maintaining local genetic diversity. Some mobile insects and other wildlife which has adapted to the local donor grassland will colonise the grassland quickly. Less mobile species may take longer.
Seed with British native seed Check origins of mixes	As above	Valuable grassland can be created supporting a range of wildlife, but with less potential variety than above.
Introduce herb-rich green hay Select donor site with similar physical characteristics (soil type, pH, dampness etc). Harvest donor meadow at optimum time for maximum seed catch i.e. late June to early July (check meadow timing for best harvest). Check all the correct permission is given to harvest the site i.e. owners' permission or discuss taking green hay with English Nature if it is an SSSI.	Prepare seedbed on recipient site. Cultivate to create a weed-free firm site. Harvest donor site as big round bales and roll out all bales over recipient field within 24 hours (the sooner the better) to prevent heating up of bale. One ha of hay should be spread thinly over 2ha of the recipient site to avoid need for raking up and removal after 3 weeks. Loosen and scatter the rolled out bale using a rake, hay turner or muck spreader. The following spring and summer cut repeatedly to minimise thistle and other weed problems and to encourage the sward to tiller out. A light chain harrowing after hay is baled may encourage more seed germination. Then, if possible graze the aftermath until March or until the site shows signs of poaching, ideally with cattle to create some variety in sward structure. In the second and subsequent summers mimic the donor site's normal hay meadow management (June or July).	This method seems particularly suited to the crested dog's-tail-common knapweed grassland (National Vegetation Classification MG5), a widespread but uncommon flower-rich meadow on neutral heavy soils managed as hay meadow. Most species present in significant amounts from the donor site will establish in the new meadow, but some may take some years to do so. Indeed, it appears that hay strewing over other methods seems to promote colonisation by orchids *(I Trueman & P Millet in British Wildlife October 2003)*. To maximise value for invertebrates, ensure as much variety in sward structure is created at the end of every year by leaving some areas uncut each year (up to one third) either as mid-field or field margin strips, rotated each year to avoid scrub encroachment at the margins.