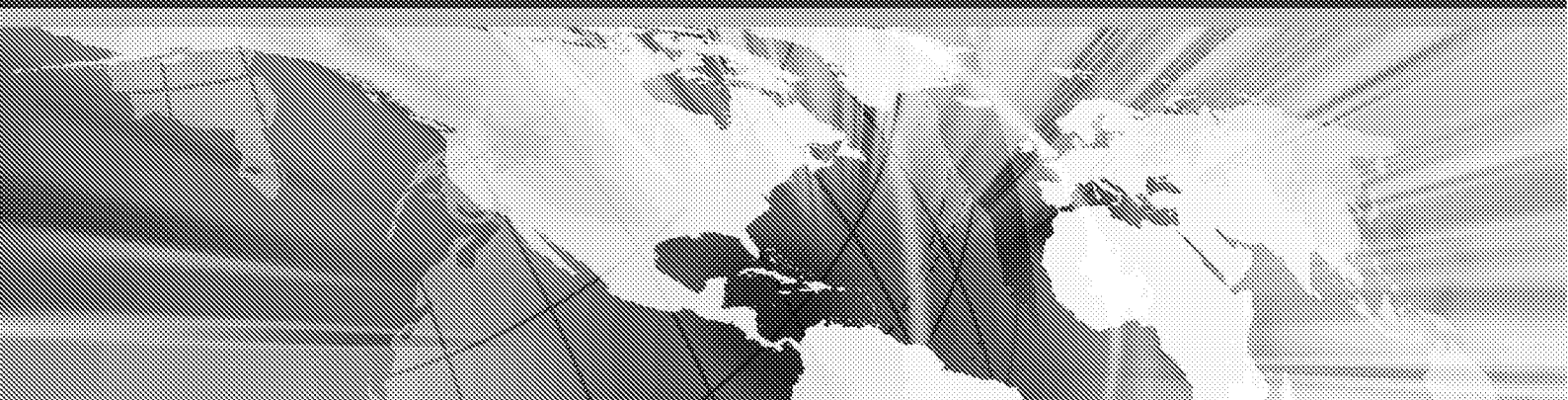




LIGHTSOURCE RENEWABLE ENERGY LTD

PROPOSED SOLAR FARM AT LOWER FARM, YAPTON LANE, WALBERTON

BIODIVERSITY MANAGEMENT PLAN

NOVEMBER 2014

your earth our world



DATE ISSUED: November 2014

JOB NUMBER: PE10439

REPORT NUMBER: REN/667

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PROPOSED SOLAR FARM AT LOWER FARM, YAPTON LANE, WALBERTON

BIODIVERSITY MANAGEMENT PLAN

NOVEMBER 2014

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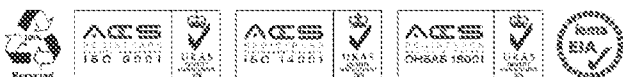
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WASTE RESOURCE MANAGEMENT

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DRAWINGS

PE10439/Planting Plan

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1 INTRODUCTION

Wardell Armstrong LLP was commissioned by Lightsource Renewable Energy Limited to prepare a Biodiversity Management Plan for the proposed solar farm at Lower Farm, Yapton Lane, Walberton, West Sussex, grid reference SU983 047, hereafter referred to as the 'site'.

The site covers an area of approximately 12.5 hectares of improved grassland bounded by defunct hedgerows with some mature trees.

1.1 General Aims

The general aims of the management proposals provided below are to:

- Minimise disturbance through the development proposals to receptors of conservation value on the site;
- Enhance the potential for nesting and foraging birds to use the site;
- Enhance the potential for roosting and foraging bats to use the site; and
- Enhance the botanical diversity and wildlife value of the site as a whole.

1.2 Specific Objectives

The specific objectives of the management proposals provided below are as follows;

- Improvement of existing hedgerow habitat by 'gapping up' and extension of hedgerows to enhance connectivity for a range of fauna, including breeding and foraging birds and foraging bats; and
- Establishment of suitable cutting and grazing regimes to maximise ecological value of the grassland and hedgerow on site, particularly to breeding and foraging birds.

1.3 Management Proposals

The following habitat management guidelines have been prepared as recommendations for the enhancement of the conservation value of the site. In addition to those outlined below, specific recommendations relating to protected species, as per the Preliminary Ecological Appraisal report of February 2014, should be consulted.

Hedgerows

Hedgerows are an important resource for wildlife and should be maintained wherever possible within the scheme design. An overall increase of hedgerows on site will provide a net ecological benefit. It is understood that no hedgerow removal is required as part of this development. Where gaps in existing defunct hedgerows (western and southern boundaries) occur these should be gapped up (Refer to Figure PE10439/Planting Plan). A new hedgerow should be planted along the northern boundary of the site. Gap filling and new hedgerow sections will enhance the connectivity around the site. It is recommended that some of the new trees planted are allowed to grow to maturity. Recommendations for planting of new hedgerows and gapping up are outlined below¹:

- Landscape contractors should be familiar with the national Plant Specification and follow relevant British Standards and Codes of Practice.
- Species in the following ratios are recommended for gapping/planting of hedgerow:
 - Blackthorn *Prunus spinosa* 20%
 - Hawthorn *Crataegus monogyna*, 30%
 - Hazel *Corylus avellana* 20%
 - Beech *Fagus sylvatica* 15%
 - Dog rose *Rosa canina* 10%
 - Holly *Ilex aquifolium* 5%
- Whips should be 40-60cm in height as this is the most viable size for establishing a new hedgerow.
- The area should be cleared of weeds and grass prior to planting to prevent competition. Peat-free organic matter should be incorporated into the soil to improve the soil structure, nutrient content and its ability to retain plant nutrients over a longer period.
- Ground should be mulched after planting with shredded bark or woodchip to conserve moisture, suppress weed growth, and provide a foraging medium for birds.

¹ Appendix 1 provides further detail on the planting of new hedgerows.

- Whips (1-2 years old) should be planted in double staggered rows and spaced 30-35cm apart in each row. This will provide a broad, dense hedgerow once established.
- Immediately after planting, all plants will be thoroughly watered, without damaging or displacing the soil. During the first year the new plants will need watering regularly and it may be necessary to continue watering into spring and summer during the second and third year after planting.
- Each plant should be protected by a large diameter spiral rabbit guard for a short period only. When used for longer periods they prevent air circulation which allows mould infection and produces spindly plants (Clare, 2013). Therefore it is recommended that a plastic mesh guards are used or 400mm high plastic spiral rabbit guard supported by a 750mm stake or cane. All plants will be protected during establishment by individual shrub guard.
- Dead whips should be replaced during the first available planting season using plants of a similar species and height.
- Adjacent hedgerows should be hard pruned or even coppiced where necessary, to reduce the effects of shading on newly establishing whips. Where adjacent mature trees over hang existing gaps, shade tolerant plants such as holly and beech should be favoured.
- Planting should take place during October and March, and preferably before January. Periods of prolonged cold, where frost may penetrate to the new roots, should be avoided.

Existing Hedgerow Management

Existing hedgerows on site have the potential to support a range of passerine bird species, and provide foraging habitat for bats. The following measures would maximise this potential:

- All hedgerows should be fenced with suitable fencing to prevent stock from grazing the new growth and also to allow ground flora to flourish. A margin of 2m from each hedgerow is recommended.
- Cutting of hedgerows should be undertaken on a three-or five-year rotational basis, with a maximum of one third of the hedgerows on site being cut in any one year. This will allow a diversity of habitats for fauna on site and prevent growth problems relating to over management.
- Cutting should be undertaken to encourage the development of an 'A' shaped profile, to maximise density at the hedge base rather than hedge top.

- Cutting should take place in late winter (late January-February) each year to avoid the breeding bird season and to maximise the availability of food resources, in particular berries, to overwintering passerine birds.
- Cutting should ideally be undertaken using reciprocating blade-type cutter, rather than flail, although the timing of these cuts are more important than the tool used.
- Each cut should be made higher to allow a small increase in height of each hedgerow. This will maximise the lifespan of the hedgerow on site.

Grassland

The existing improved grassland provides suitable foraging habitat for badgers and birds. Under the current proposals, a small footprint of improved grassland will be temporarily disturbed during construction. Although this represents a small percentage loss in context with the wider landscape, it still represents a net loss of potential terrestrial habitat for great crested newts *Triturus cristatus* and foraging habitat for badger *Meles meles*, brown hare *Lepus europaeus* and farmland birds. It is recommended that any grassland habitats damaged during construction of the solar farm (i.e. from cable laying) should be re-sown with a diverse grassland mix such as Emorsgate Seed Mixture EG27², or similar. This mixture will promote botanical biodiversity and provide a range of nectar sources for invertebrates, which will encourage foraging opportunities for bats and birds on site. Recommendations for implementation and maintenance of this grassland are given below:

- The area should be cleared of weeds prior to sowing. The seed mixture should be applied in early autumn or spring. The seed must be surface sown and lightly covered by soil.
- If the site is to be grazed, the grass should be allowed to establish before sheep are introduced for grazing.

Grassland Management

If the area inside the solar farm is to be grazed by sheep ideally stocking densities should be 0.2 livestock units per hectare upon commencement of grazing, roughly equivalent to 2 ewes per hectare. This figure shall be reviewed via ongoing monitoring, to be undertaken by a suitably qualified ecologist. Reviews of the grazing regime shall be made in consultation with the Local Planning Authority and the grazier.

² Further information on establishing and maintaining species-rich grassland is provided in Appendix 2 and 3

The arable field margins between the security fence and the boundary features should be subject to a main summer hay cut in combination with autumn and early spring mowing. No cutting or grazing should occur between April and late July/August.

Monitoring

In order to ensure the successful establishment of the hedgerows and grassland on site, a programme of botanical surveys should be undertaken following the instatement of these features to monitor success and make recommendations for remediation and improvement. Surveys should be undertaken twice in the first year (ideally in May and September), annually from Year 2 to 5 and on a biennial basis thereafter, during the summer. The surveys would assess:

- Establishment and condition of the grassland. Changes to the management plan would be made in consultation with the Local Planning Authority. Recommendations may include variation in cutting regime, weed control options and reseeding with additional grassland mix.
- Establishment of new hedgerow sections and the condition of the existing hedgerows on site, with potential recommendations for change to cutting regime. Particular attention will be given to new sections of hedgerows planted and where whips may need replacing. Spirals used to protect newly planted trees should be removed after a maximum of three years.

Survey findings should be summarised in a short Monitoring Report following each visit, to be submitted to the landowner, Lightsource and the LPA ecologist, along with any proposed modifications to the management protocols.

2 REFERENCES

Clare. J (2013). *Hedgerows: A Good Practice Guide*. The English Hedgerow Trust

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APPENDIX 1 NATURAL ENGLAND HEDGEROW PLANTING
[PDF DOCUMENT]



Hedgerow planting: answers to 18 common questions

www.naturalengland.org.uk

PRINCEBETON COUNCIL: 01454 51511



Hedgerow planting:

answers to 18 common questions

Prepared on behalf of the Steering Group for the UK Biodiversity Action Plan for Hedgerows.

This document will help land managers make decisions about how to plant hedgerows with good results. In particular it offers advice on some of the points to bear in mind before you start planting, on the practicalities of hedgerow planting, and on suitable follow-up management.

Q 1. What are the main benefits of planting new hedgerows?

A good hedgerow is a valuable asset: it can make a stock-proof barrier, provide shelter, enhance the

landscape and benefit wildlife.

New hedgerows that link with existing ones or other habitats like woodland or scrub are likely to be particularly valuable.



Drayton - East Hampshire AONB. © Natural England/Mike McGoran

It is important to have clear objectives in mind before planting a new hedgerow. Being clear on the reasons for planting will make it much easier to make the right choice of species, and to decide on the planting spacing and aftercare of the new hedgerow.

Q 2. What is the best location for a new hedgerow?

New hedgerows are usually best planted where they complement or fill the gaps in any existing hedgerow network, help to re-create former historical hedgerow patterns, or join up other woody and scrub habitats. They can also be planted to screen eyesores or to provide windbreaks.

Hedgerows planted across characteristically open landscapes may have a detrimental effect not only on the landscape but also on wildlife. For example, breeding birds like the lapwing that prefer wide open spaces may become vulnerable to predators such as crows and foxes attracted by hedgerows. Planting hedgerows alongside public rights of way needs careful thought – it might be beneficial to users through adding interest and marking the route, or it could obstruct the view and create a management burden.

Q 3. What time of year is best to plant a new hedgerow?

Bare-root stock can be planted between the end of October and the

end of March. Generally it's best to plant early in the season, before January, to allow the plants more time to establish a network of feeder roots before the onset of spring. However, if planting into clay soils it may be best to wait until the beginning of March as heavy frosts can cause frost heave and expose roots. Also, there is a risk that roots will rot in poorly draining soil if planted early. Never plant during freezing weather or if the ground is waterlogged. Ideally plant on a still, moist day, to minimise root drying and stress to the plants.

Q 4. What species are best to plant?

The species composition of hedgerows varies greatly between different parts of the country, reflecting changes in climate, altitude and geology as well as local traditions. A good rule of thumb is to plant species that already occur in hedgerows in the area. These are more likely to thrive in the local climate and soils and to be in keeping with the character of the landscape.

Generally, the more woody species a hedgerow has, the more valuable it will be for wildlife, so it is usually best to plant a mix of different plants. Use species which are typical for the local area. These will usually include hawthorn or blackthorn on account of their stock-proofing qualities, and hazel in the South-West. One or more of these three species will normally comprise at least 60% of the planting mix.



Other native shrub species can be used to make up the rest, preferably ones found in the locality and known to thrive in the local climate and soils. These less numerous shrubs are best intermixed randomly with the main species, not planted in blocks. If the landscape is characterised by single-species hedgerows, then you may wish to use only one such species in your new hedgerow, particularly if you want to reflect local tradition and historical heritage.

The way you intend to manage your newly planted hedgerow in the long-term may influence which species you plant. Hawthorn, blackthorn and hazel can withstand regular trimming. Most broadleaved trees and shrubs coppice well, with the exception of beech. Dogwood, spindle and guelder-rose are difficult to lay. Holly and beech grow well in the shade cast by mature hedgerow trees. Species like ash, oak and willow can grow very large.

You may also wish to encourage species of wildlife that have particular habitat requirements. The brown hairstreak, for example, is an uncommon butterfly that lays its eggs only on blackthorn, while the caterpillars of the brimstone butterfly feed only on buckthorn and alder buckthorn.

Q 5. Where is the best place to source hedgerow plants?

The widespread use of plants grown from foreign seed is eroding the genetic integrity of our native species. We recommend that you buy plants grown from indigenous, preferably local, seeds or root stocks. These will be adapted to local conditions and will be more likely to establish successfully. There are many specialist hedgerow plant suppliers who supply bare-root stock, transplants or container-grown plants.

Fibrous root. © Natural England/Emily Ledder





Keep plants in the bag until the moment they are to be planted. © Natural England/Emily Ledder

Q 6. What size of plant is best?

The cheapest and most easily acquired plants are those that come with bare roots, commonly known as 'whips'. Typically they are available in late autumn in three sizes: 30-45cm, 45-60cm and 60-90cm. 45-60cm whips are recommended for large-scale planting schemes since they establish most successfully. However, some species such as holly are usually only available as more expensive container-grown or cell-grown plants.

Q 7. How should I look after plants between buying and planting them?

Careful storage, handling and transportation are key to the successful establishment of a hedgerow. Bare-root plants should be supplied in polythene bags and kept in these during transportation. If planted out within four days whips can remain bagged

provided they are kept in a cool frost-free environment and watered regularly. If they are to be stored for longer periods, they will need to be 'heeled-in'. To heel-in, dig a trench to the depth of one spade, cutting one side at a 50 degree angle and casting the spoil onto the opposite side. Place whole bundles of plants tightly against the angled side. The spoil is then cast back over the plant roots and lightly firmed in and watered. Plants can be stored for several months in this way. Container or cell-grown stock can also be kept for several months, as long as the plants are kept damp and protected from frost.

Take great care of roots before planting, keeping them covered at all times especially when sunny or windy. When planting a mixed hedgerow try and avoid having more than one bag open at once. Plant the less numerous species first, one at a time, randomly spacing them along the hedgerow. Then fill in the gaps with the main species.

Q 8. Does the ground need any preparation before planting?

If you can, preparing the ground thoroughly means new plants are likely to become established much easier. Aim to provide good soil conditions and as little competition from other vegetation as you can. Ideally, plant into bare soil achieved through cultivation, herbicide use, turf stripping or by building a bank. If using a

herbicide, spray off the existing vegetation in August or September before planting, and if possible then cultivate the soil. Planting into an established sward is feasible, but the new plants will require more care and the risk of failure is increased.

Q 9. What method of planting work well?

Where the soil is deep and friable, plants can simply be slot-planted. This is the quickest method and suitable for seedlings or transplants with small roots. An alternative method is T-notch planting which makes a larger planting space. In heavy clay or other difficult soils it may be better to use pit or trench planting methods.

Q 10. How many plants do I need to use?

Hedgerows are usually formed of a double staggered row. When deciding which pattern to follow,

think about why you are planting the hedgerow and how you intend to manage it. Look around your immediate locality and assess whether existing hedgerows provide a good template. Hedgerows planted in a double staggered row tend to be better for wildlife than single rows as they are wider and provide more shelter and habitat. Indeed, the wider the hedgerow the better. As a guide, we suggest that at least 40cm is left between each row and that 4-6 plants are planted per metre.

Any plants that die in the first few years may need to be replaced to prevent gaps developing.

Q 11. Do newly planted hedgerows need any protection?

New hedgerows may be vulnerable to damage by grazing stock, rabbits, hares or deer and so need protection. Fencing and other protection like rabbit guards are, however, expensive so do spend time making sure they are necessary. Unless there is a known problem with rabbits or hares, spiral guards may prove counter-productive, encouraging spindly growth and being difficult to remove as well as unsightly. Netting is an alternative form of protection, either on its own or in conjunction with stock fencing. To be effective against rabbits the bottom 25cm must be laid out in the direction of attack and securely pegged to the ground.



After ready for planting © Natural England

Q 12. I want to include trees in my hedgerow, what is the best way of doing this?

A black and white photograph showing a dense canopy of trees with sunlight filtering through the leaves. The bottom of the frame shows the top of a car's roof and a white line on the ground.



any damage. Once planted use a marker stake and tree-tag if necessary, to help prevent the trees being cut along with the rest of the hedgerow. Young trees should be far enough apart to allow them to develop full crowns without competing or producing too much shade. Many farmers will want them to be further apart as mechanical cutters find it hard to work between trees that are close together. Do try and keep trees at irregular spacing to make for a more natural landscape. Take cues from the local surroundings as to what is most appropriate.

Q 13. How soon after planting is it best to start cutting the hedgerow?

Light, regular, trimming of the hedgerow in its early years will encourage dense, bushy growth and is recommended.

Q 14. Will I need to undertake any further weed control following planting?

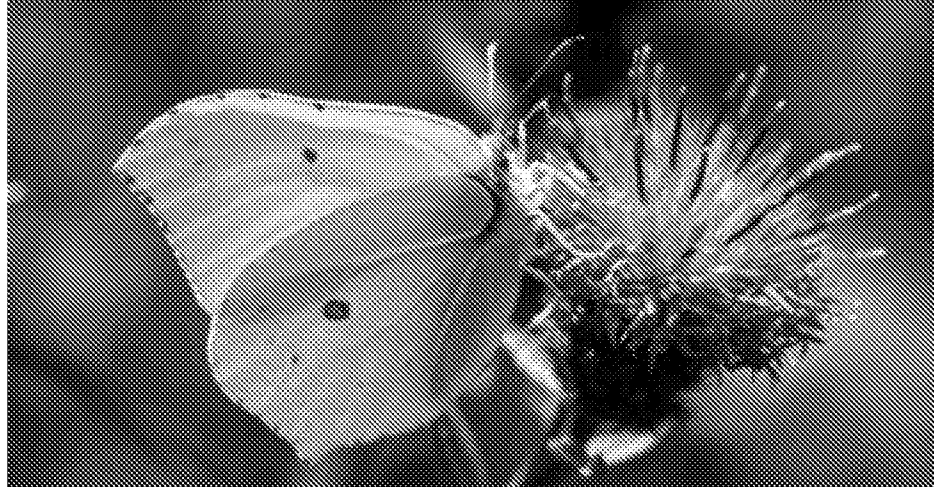
Some weed control may be needed, especially if thorough ground preparation before planting was difficult. Any plant which competes with the hedgerow plants for nutrients, moisture and light, including brambles, nettles and grasses, is likely to reduce growth rates.

The most common ways of controlling weeds are mulches,

herbicides and cutting. A mulch is a layer of material laid over the surface of the ground to suppress weed growth and retain moisture. Mulches include straw, composted bark, and woodchips. Apply them immediately after planting. Black polythene and other sheet mulches are also available and can be laid either before or after planting. Herbicides are initially cheaper and easier to apply than mulches, but over time can prove more expensive. Although time consuming, cutting back competitive species such as brambles and nettles with a hand-held hook can be effective.

Newly planted hedge with hedge tree.
© Natural England/James Le Page





Q 15. Will I need to water the new plants?

Watering is usually impractical unless you invest in an expensive perforated trickle hose. The need for watering will be reduced if weeds are controlled both before and after planting. The use of mulches helps the soil to retain moisture.

Q 16. Does it matter how the land next to a new hedgerow is managed?

A strip of grassland at least 2m wide on either side of the newly planted hedgerow will greatly increased its value for wildlife, particularly if it contains a good range of herbs and other plants. Grassy margins will also help to protect the hedgerow from sprays and fertilisers. Try and avoid spreading fertilisers on the margins, and only use herbicides to spot control weeds. Ideally, try and manage each margin in two halves. Cut the half closest to the hedgerow only once every few years to encourage tussocky grass, and the

other half annually after mid-July.

Q 17. Is it possible to plant up gaps in an existing hedgerow?

Yes, but great care has to be taken to ensure the new plants are not shaded out by existing plants. Hard pruning or even coppicing adjacent shrubs may be helpful. In any case, control of competitive vegetation for the first few years is essential. If using herbicides, take great care not to damage the existing hedgerow or any interesting ground flora. If gaps have developed due to shading from mature trees use plants which are shade tolerant or consider removing the lower branches of the tree to let more light in.

Q 18. Is there any grant-aid available for planting hedgerows?

Funding is available for hedgerow planting in England through Environmental Stewardship. Some local authorities may also have grants available for small scale planting.



Front cover photograph: Newly planted hedge with spiral guards. © Natural England/Rob Wolton

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ISBN 978-1-84754-052-2

Catalogue code NE70

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Printed on Defra Silk comprising 75% recycled fibre.



APPENDIX 2
NATURAL ENGLAND ADVISORY NOTE TIN067: ARABLE REVERSION TO SPECIES-RICH
GRASSLAND – ESTABLISHING A SOWN SWARD
[PDF DOCUMENT]

Arable reversion to species-rich grassland: establishing a sown sward

The reversion of arable land to permanent grassland is a major area of work funded through Environmental Stewardship. There are a number of environmental reasons for recreating grassland and creating a species-rich sward is one of the most significant. This note focuses on establishing species-rich grassland by sowing. Guidance on the selection of suitable sites and the early management of the new species-rich sward is given in other Technical Information Notes.

Key points

- The weed burden must be reduced to a manageable level before sowing. This may mean delaying sowing for a year.
- A fine seedbed should be created.
- The best time for sowing is usually late summer/early autumn.
- Sow an appropriate seed mix that has come from a suitable source.
- Seed should be broadcast on the soil surface and then firmed in by rolling.
- Monitor the new grassland for evidence of pest damage and take early action to deal with any pests.

Site preparation

Reducing the weed burden

The weed burden must be reduced to a manageable level before sowing a seed mix. A very low or nil weed burden is particularly important where wildflower seed is being sown, as the widespread application of herbicides to the new sward will not be permitted.

Where the aim is to create species rich grassland, Italian ryegrass (*Lolium multiflorum*) and white clover (*Trifolium repens*) should also be considered as weeds, as they can have large

soil seed banks and will compete with the sown species.



Arable reversion to chalk grassland, 5-year-old sward, sown species-rich mixture

Weeds are best tackled using herbicides in the preceding crop. Where weeds are a serious problem, it is also worth delaying sowing for a year. The site should be allowed to green up and then a series of cultivations and/or applications of herbicide should be made at intervals, to progressively kill each flush of weed regrowth. The aim should be to create a stale seedbed prior to sowing.

Arable reversion to species-rich grassland: establishment of a sown sward

An alternative method of dealing with pernicious weeds, which may be useful in organic systems, is to plough the land when wet in spring, leaving the soil in furrows.

The soil should crack and dry in the clod, and may then be cultivated repeatedly throughout the summer so the under surface dries and any roots are fragmented. The aim is to accelerate root desiccation and/or progressively exhaust the weeds food reserves by stimulating re-growth from the rootstock after each cultivation. Only when the soil begins to wet in late summer is a fine seedbed produced.

Weeds with wind-blown seeds, eg spear thistle *Cirsium vulgare* and ragwort *Senecio jacobaea*, should be controlled where they occur on adjacent areas, as they can quickly invade the site.

There is a statutory requirement, specified in the Weeds Act 1959, to control injurious weeds which threaten agricultural land or production.

Preparing the seedbed

Adequate seedbed preparation is critical for soil moisture retention and the successful establishment of semi-natural seed mixes.

The aim should be to create a fine, firm and level seedbed, avoiding looseness at depth. As a guide it should be possible to ride a bicycle on it.

If a site is of archaeological importance, extra care may be needed to minimise damage by cultivations. Advice should be sought from your local adviser in these cases before any work is undertaken.

Method and timing of sowing

Seed is normally introduced by conventional sowing of a seed mixture. But it can also be introduced using 'Green Hay' ie herbage cut from a donor grassland site just before seed is shed ie at or slightly before normal hay cutting time. This has a number of benefits: the seed will be fresh, it should be of known provenance and the operation can be cheaper than seed purchase. But the green hay must be transported and spread within a very few hours

to prevent heating so the donor site must be close to the receptor site. Details of green hay are given in TIN063 – this refers to use of the technique for seed introduction to an existing sward but it can be used in the same way for grassland creation on a bare seedbed.

If using conventional sowing the ideal time is **late summer or early autumn** (August and September). This is when the majority of the species being sown would germinate naturally, and those seeds that require a period of chilling (vernalisation) over winter to trigger germination in the spring are also favoured.

Many species in the seed mix, such as the finer grasses, can take up to 8 weeks to germinate, especially if it is dry. To ensure good early establishment and reduce the risk of winter kill, seed should be sown as early as possible in the late summer/early autumn period, provided that there is some residual soil moisture. Sites on heavy clays which flood should be sown sufficiently early to allow grasses to establish well in advance of any flooding.

Spring sowing is possible but there is greater risk of failure due to drought. The most severe weed problems are often associated with spring sowings.

Nurse crops

A nurse crop is a short-term crop sown with the main seed mix to aid its establishment. When sowing semi-natural seed mixes, a nurse crop is not usually necessary. However, it can be useful where there is:

- a need to protect seedlings from the extremes of winter weather on exposed sites; or
- intensive grazing by rabbits or wildfowl; or
- where there is a risk of soil erosion.

Cereals, eg spring barley, are an acceptable nurse crop. Brassicas are unsuitable because they can shade out the desired seedlings. Westerwolds ryegrass is usually unsuitable as it can be very difficult to eliminate.

Where used, the nurse crop should be sown in a conventional manner (drilled and rolled) before

Arable reversion to species-rich grassland: establishment of a sown sward

the seed mix is broadcast. Where appropriate, the nurse crop can be taken off as silage.

Seed mixes

For specific advice on the most suitable seed for a particular site contact your Natural England Adviser and see Technical Information Note TIN038: *Seed sources for grassland restoration and re-creation in Environmental Stewardship*

Seed rate

Recommended seed rates for arable reversion are normally in the range of 15-20 kg/ha, with any wildflower seed component comprising approximately 10% depending on cost and site requirements.

Seed rates can be reduced in some cases, eg where an expensive seed mix is being sown. In these cases herbage production will be very low in the first few years, and careful management will be required to avoid weed problems.

Sowing techniques

Much of the seed in semi-natural seed mixes is very small and must be sown **on or very near the soil surface**. This can be done by broadcasting eg using a fertiliser spreader, slug pellet applicator, grass seed box or one of the modern drills with the coulters lifted up. For small areas, it may be possible to broadcast seed by hand using a hand-held lawn fertiliser applicator, seed fiddle or seed barrow.

Seeds of different sizes and weights may settle out in the seed box or become partitioned during sowing, causing a patchy sowing distribution. A more even coverage can be obtained by bulking up the seed with an inert carrier eg sand, barley meal, poultry chick crumbs or sawdust, and then sowing at half rate in two directions.

In drier seedbeds, especially on lighter soils, shallow drilling may be preferable to broadcasting in order to place the seed in closer contact with soil moisture.

After sowing, roll the site to ensure good seed-to-soil contact. Where soils are likely to cap, use

a Cambridge roller. Otherwise use a heavy flat roller.

Harrowing or raking are not recommended as finer seeds may be blown around or buried too deep.

Post sowing

Any soil capping or frost lift that occurs post sowing can usually be remedied by rolling.

Pests

Potential pests of newly sown grassland include slugs, frit fly larvae, chafer grubs, leatherjackets, wireworms, moles, birds and rabbits. Regular monitoring is advisable to ensure that problems can be dealt with at an early stage.

Slugs can be a significant pest, particularly of wildflower seedlings, and slug control should be considered where wildflower seed is being sown.

In high risk situations slug activity should be monitored prior to cultivation and during the first autumn and winter after sowing eg using traps baited with poultry mash. Slug pellets can be applied with the seed, or broadcast later. Slug pellets should be used in accordance with statutory instructions and directions for use on the product label.

Professional advice should be sought from an agronomist before treating pests.

Further information

Natural England Technical Information Notes are available to download from the Natural England website: www.naturalengland.org.uk. In particular see:

- Technical Information Note TIN066: *Arable reversion to species rich grassland: site selection and choice of methods*
- Technical Information Note TIN068: *Arable reversion to species rich grassland: early management of the new sward*
- Technical Information Note TIN038: *Seed sources for grassland restoration and re-creation in Environmental Stewardship*

Arable reversion to species-rich grassland: establishment of a sown sward

» Technical Information Note TIN060: *The use of yellow rattle to facilitate grassland diversification in agri-environment schemes*

For further information contact the Natural England Enquiry Service on 0300 060 0863 or e-mail enquiries@naturalengland.org.uk.

This note does not supersede prescriptions in agri-environment scheme agreements. If there is any conflict between the information in this note and your agreement please contact your local Adviser.

Authors and contributors

This note was previously published as RDS Technical Advice Note 24. It was written by a number of staff. Including Steve Peel. Editor Susie Smith, photograph Dave Smallshire.

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APPENDIX 3
NATURAL ENGLAND ADVISORY NOTE TIN068: ARABLE REVERSION TO SPECIES-RICH
GRASSLAND – EARLY MANAGEMENT OF NEW SWARD
[PDF DOCUMENT]

Arable reversion to species-rich grassland: early management of the new sward

The reversion of arable land to permanent grassland is a major area of work funded through Environmental Stewardship. There are a number of reasons why arable land is reverted to grassland. This note provides guidance on reversion to create a species-rich sward comprising species, in particular wildflowers, characteristic of semi-natural grassland communities. Guidance on the selection of suitable sites for arable reversion to species-rich grassland and the establishment of a species-rich sown sward is given in other Technical Information Notes.

Key points

- ♦ Regular cutting and/or grazing will be required in the first year to promote grass growth and control weeds.
- ♦ Any problems with perennial weeds should be dealt with quickly, while the plants are young.
- ♦ Productivity may be low in the early years, this can be partly addressed by the application of farmyard manure.

Introduction

During the first growing season regular cutting and/or grazing is usually required to reduce competition from the more vigorous species, including weeds. The grazing or cutting start date will depend on the growth rate of the vegetation and the need to control weeds.

Cutting

For a sward sown in late summer/early autumn cutting may need to start early in the first spring and continue at regular intervals into late autumn. Sward height should be used to

determine when to cut. As a guide once the sward reaches 10-15 cm in height it should be cut to a height of 5-7 cm.



Arable Reversion fields in the Cotswolds

Cutting can pose a threat to ground nesting birds, especially skylark and lapwing, which are often attracted to the sparse vegetation cover of new swards. Ideally agricultural operations should be minimised between 1 April and 15 July to protect breeding birds.

Arable reversion to species-rich grassland: early management of the new sward

However, unless a species which is protected under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) is nesting (eg stone curlew), then the requirement to establish the sward successfully may have to take precedence.

Potential damage to ground nesting birds can be reduced by:

- ❖ Locating and marking nests and avoiding them (lapwing nests are relatively easy to find).
- ❖ Working from one side of the field to the other, or from the centre out, to reduce the risk of concentrating birds and other wildlife in the area to be cut.
- ❖ Starting cutting as early in the season as possible and keeping the sward short throughout the breeding season, since most birds (but not lapwing) find such conditions unattractive for nesting.

Where the objective is to re-create species-rich grassland cuttings should be removed as leaving them retains nutrients on the site and may smother young plants. If it is impractical to remove the cut vegetation, eg because it is too sparse, cuttings should be spread as thinly as possible. In such circumstances a flail type machine is useful as it macerates the vegetation, which then breaks down rapidly.

Grazing

Grazing of the new sward is beneficial as it removes excess growth, encourages tillering and can help control weeds, especially annual arable weeds.

To reduce the likelihood of selective grazing it is generally better to graze with a large number of stock for short periods than a small number for long periods. As a guide, once an average sward height of 5-7 cm has been achieved, stock should be removed and only returned once the sward has grown to over 10 cm.

Care is needed to ensure that overgrazing does not occur at this early stage.

For newly establishing swards grazing with sheep is ideal because they are light on their

feet and have a nibbling grazing action. They can be useful in spring to firm down any frost lift. Cattle should be used carefully at this early stage as they tend to tear the sward when grazing and can easily poach a site if conditions are wet.

Weed control

Uncontrolled, dense growth of seedling weeds can be very damaging to newly established grass. There may be an initial flush of annual weeds, such as common chickweed *Stellaria media*, but these should be controlled by the regular cutting/grazing regime already outlined.

Perennial weeds should be dealt with as soon as possible as they are usually easier to control in their juvenile growth stage. The use of a selective herbicide will usually be acceptable where a grass mix only has been sown. Where wildflowers were included in the seed mix, other control methods such as topping, spot treatment, weed wiping or an 'eco-puller' should be used instead.

Where the aim is to re-create species-rich grassland, white clover *Trifolium repens* should also be considered a weed species. Spot treatment with a selective herbicide is the best method of control.

Weeds with wind-blown seeds, such as spear thistle *Cirsium vulgare* and ragwort *Senecio jacobaea*, should continue to be controlled where they occur on adjacent areas as the new sward will be susceptible to invasion. There is a statutory requirement, specified in the Weeds Act 1959, to control injurious weeds which threaten agricultural land or production.

Productivity

The productivity of arable reversion swards may be substantially lower than that of permanent grassland for several years after establishment due to very low nitrogen availability. This may result in sward thinning and the ingress of moss.

The application of farmyard manure can reduce this problem to some extent, whilst at the same time adding valuable organic matter. Contact

Arable reversion to species-rich grassland: early management of the new sward

your Natural England Adviser for further advice where the use of organic manure is proposed.

Ongoing management

After the first full season the sward should have thickened and it can be beneficial to allow it to flower and set seed before it is cut or grazed.

The long term site objectives agreed with your Natural England Adviser should be used to determine ongoing management. Any problems with weeds or other undesirable species should continue to be addressed, eg by repeated cutting of the problem area(s).

Further information

Natural England Technical Information Notes are available to download from the Natural England website: www.naturalengland.org.uk. In particular see:

- ✱ Technical Information Note TIN066: *Arable reversion to species rich grassland: site selection and choice of methods*

- ✱ Technical Information Note TIN067: *Arable reversion to species rich grassland: establishment of a sown sward*

For further information contact the Natural England Enquiry Service on 0300 060 0863 or e-mail enquiries@naturalengland.org.uk.

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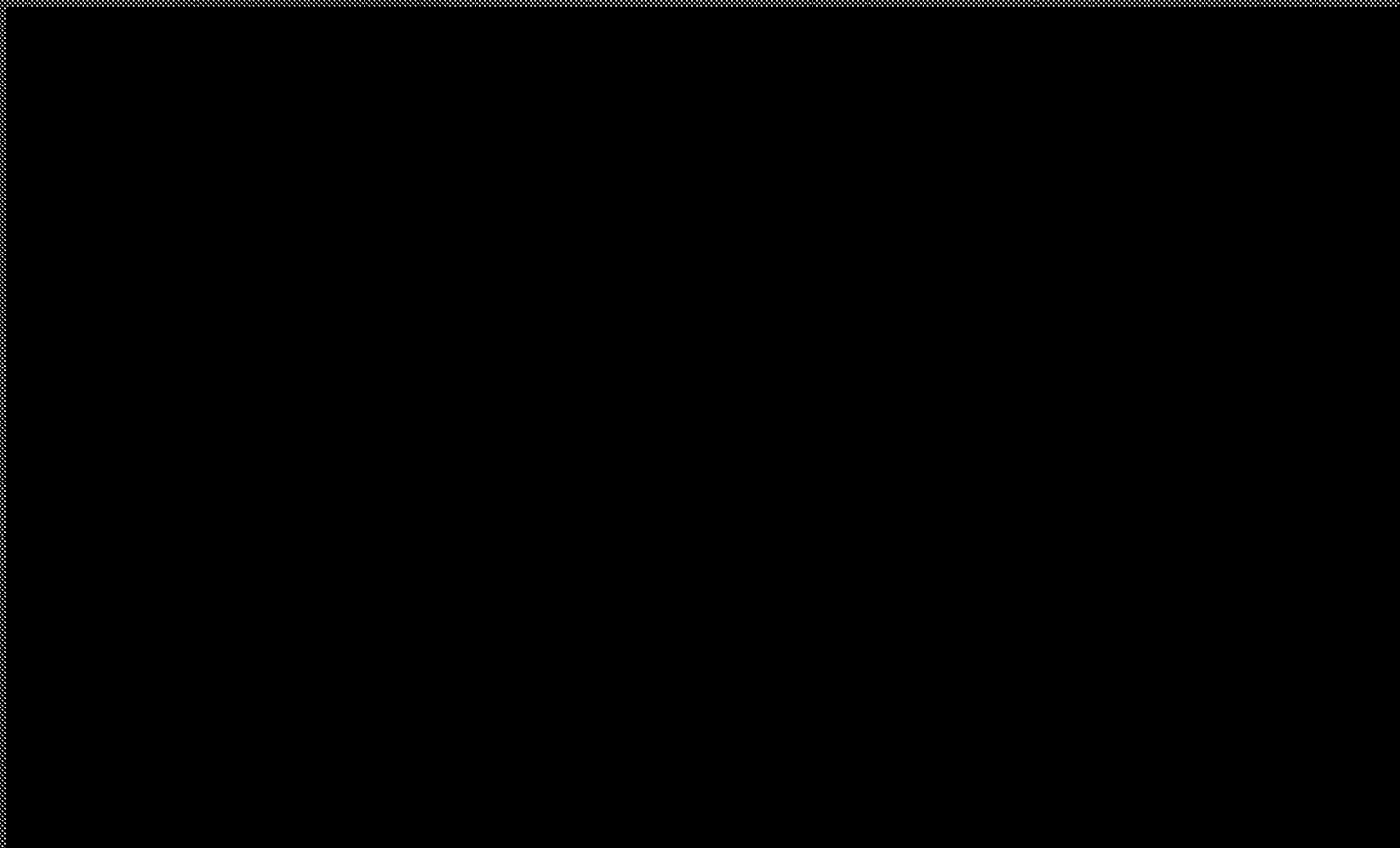
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This Technical Information Note was previously published as RDS Technical Advice Note 24. It was prepared by a number of staff including Morwenna Christian and Steve Peel. Editor Susie Smith, photograph Liz Dack.

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