Annex C

Review of how well existing Environmental Stewardship provisions meet key hedge management requirements for biodiversity, with suggestions for change

Report under Defra/NE contract BD5214: *Understanding the combined biodiversity benefits of the component features of hedges*.

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Contents

1. Summary

1.1. This report analyses how well Environmental Stewardship currently delivers key hedge management requirements for biodiversity and makes suggestions for improvement. Both Entry Level Stewardship (ELS) and Higher Level Stewardship (HLS) are covered.

1.2. 12 key hedge management requirements are identified. These are based on an analysis of the ways in which Section 41 species and farmland environmental quality indicator species use the different structural components of hedges (shrub layer, mature trees, the base, ditch and margins) (see Annex 1). The 12 management requirements are considered to reflect the needs of the great majority of biodiversity associated with hedges, not just rare and declining species.

1.3. In total 45 suggestions are given, to improve ES delivery for the biodiversity of hedges. Six have been identified as broad priorities:

1.3.1. Under ELS, additional points should be given for co-location of priority options covering more than one hedge component. The combinations which will bring the greatest benefits to biodiversity are Shrub + Tree, Base + Margin, and Shrub + Tree + Base + Margin. (An alternative approach is to limit applicant choice to a number of bundles of options - all or most of the options in a chosen bundle must be selected.)

1.3.2. Across ES, maintaining and increasing connectivity between hedges, and between hedges and other semi-natural features such as woodlands and ponds, should be given a higher profile. More resources need to be directed towards new hedge planting. Increasing connectivity is likely to assist with climate change adaptation through facilitating species dispersal to favourable climate space. It will also improve resource protection by reducing surface run-off and erosion and increasing infiltration.

1.3.3. Across ES, there is a need to raise the profile of hedge structural diversity, especially height range at a whole farm level. Agreement holders should be given clear direction and guidance on the benefits of adopting the management cycle approach.

1.3.4. Across ES, substantial further resources should be directed to encouraging hedge rejuvenation (i.e. hedge laying and coppicing).

1.3.5. Across ES, achieving a dense shrub layer, from top to bottom, should be an important goal. This can be linked to improvement of structural diversity and adoption of the management cycle approach. It will also assist with carbon mitigation.

1.3.6. Across ES, further encouragement should be given to applicants to establish new hedgerow trees, unless there are specific landscape or species reasons not to do so. An increase in tree numbers will assist with climate change mitigation through increased carbon storage.

2. Introduction

2.1. This review forms part of Defra/NE contract BD5214: *Understanding the combined biodiversity benefits of the component features of hedges*. Overall, the project explores the ways in which the different structural components of a hedge act together to sustain biodiversity. The structural components are the shrub layer, mature trees, base (with or without a bank), ditch and margins.

2.2. There are two main expected outputs. The first of these is a series of advisory leaflets covering selected priority and Farmland Biodiversity Quality Indicator species which are significantly associated with hedges.

2.3. This document provides the basis for the second output. It makes suggestions to Natural England on improvements that can be made to Environmental Stewardship to better the management of hedges for biodiversity, with particular reference to Section 41 and Farmland Indicator species. The brief required that these suggestions should be based on ELS and HLS as they currently stand (January 2013), and not propose any fundamental scheme architecture redesign.

3. Method to develop suggestions for change

3.1. The steps that have been undertaken leading to the suggestions given below are:

3.1.1. Identification of the Section 41 and Farmland Indicator species which are at least partially dependent on hedges for their survival. 107 such species were identified, excluding widespread moths.

3.1.2. Analysis of the different hedge components used by the 107 species, and how they use them (e.g.for feeding, breeding or shelter). This analysis was presented in a first interim report (Annex 1 to this document gives a summary of key findings taken from that report).

3.1.3. Selection of 9 species or species groups for detailed review and preparation of advisory leaflets. These species or groups have been chosen to be representative of major taxonomic groupings and of the different ways in which animals use each structural hedge component. They have also been chosen to be representative of the habitat requirements of a range of other species: they are widely distributed, cover all major landscape types, and are known to favour well-connected landscapes. The species/groups selected were: bumblebees *Bombus* spp., hairstreak butterflies, saproxylic insects, ditch invertebrates, grass snake *Natrix natrix*, farmland birds, hedgehog *Erinaceus europaeus*, dormouse *Muscardinus avellenarius* and bats. A table presenting key hedge attributes used by the 9 species/species groups is given as Annex 2.

3.1.4. Review of relevant published information on hedges and biodiversity. This includes drawing on the contents of Fera, ADAS and CCRI's BD5011 report, *Evidence requirements to support the design of new agri-environment schemes*, draft Jan 2013. This is a comprehensive review of the evidence for the effectiveness of Environmental Stewardship in meeting its objectives. See also Davey *et al.*, 2010a; Davey *et al.*, 2010b; Fuentes-Montemayor *et al.*, 2011a, 2011b; Gabriel *et al.*, 2010; Heard *et al.*, 2012; Hof and Bright, 2010; Merckx *et al.*, 2009a; Merckx *et al.*, 2009b; Pywell *et al.*, 2007.

3.1.5. Based on 3 and 4 above, 12 key management principles have been identified (see below). Together, we believe these will deliver favourable habitat for the great majority of hedge biodiversity. A summary advisory leaflet on hedge management has been drafted, which carries forward these 12 principles.

3.2. Identification of current Environmental Stewardship (ES) provisions for hedges, as presented within the most recent versions (Jan 2013) of the ELS and HLS Handbooks, coupled with Indicators of Success (IOS) for key HLS options provided by Natural England. For ELS hedge options see Annex 3, for HLS options see Annex 4, for IOS see Annex 5, and for HLS capital items specifications see Annex 6.

3.2.1. Comparison of current ES provisions against the 12 key management principles from step 5, to identify gaps in provision. The suggestions given below are based on this gap analysis.

4. Approach to developing suggestions

4.1. Examination of the key hedge attributes used by the 9 species or species groups that have been examined in detail, as presented in Annex 2, reveals that there is a high degree of overlap between species in the attributes they require. Furthermore, there are very few instances where these requirements conflict – the only one identified is that open, water-filled, ditches probably form a barrier to movement by dormice and even here they are easily capable of jumping 1metre-wide water courses (Tom Fairfield, pers. comm.).

4.2. Likewise, an overview of the requirements of the remaining Section 41 species strongly suggests that here too there is much overlap in hedge attributes required for species to thrive, and little conflict. In short, it appears that a farm's hedges can be managed to meet the needs of the great majority of threatened (and other) species present: management does not need, for the great part, to be tailored to the needs of individual species. Where fine tuning is necessary, as for example the need to keep tree trunks hosting important lichens clear of ivy *Hedera helix*, this can be incorporated into mainstream advice. This approach differs from that recommended by Kleijn *et al.* (2006), but they were comparing a diversity of habitats across five European countries. Merckx *et al.* (2010) noted that it should be possible to design agri-environment schemes that deliver for both rare and common species.

4.3. As a consequence, we have decided it is both appropriate and more helpful to present whole-biodiversity management suggestions rather than a range of specific options for individual species.

4.4. The validity of this approach does, however, depend heavily upon hedges being managed at the farm scale. It will not work if hedges are considered in isolation.

5. Key management requirements, with rationale, and suggestions for improvements to Environmental Stewardship

Suggestions in bold are considered to be the highest priorities.

5.1. Multi-component approach

Key management: Consider the complete hedge – the shrub layer, mature trees, base/bank, ditch and margins - together.

Rationale: The majority of Section 41 and farmland indicator species make significant use of more than one hedge component (65%), with over a third (35%) using three or more components (see 1st interim report). For species that are still widespread, as many as 81% use more than one component, including all farmland biodiversity quality indicators (comprising various butterflies, birds and bats). This confirms the advantages that are likely to arise to population size and viability from the management of components together rather than treating each in isolation (Field and Mason, 2005; Field and Gardiner, 2006; Hinsley & Bellamy, 2000; Vickery *et al.*, 2009).

Current ES cover: The only options that directly cover two components at once are the ELS ones that address combined hedge and ditch management (EB8-10). However, these are only applicable where the ditches are substantial, forming field boundaries in their own right and regularly containing flowing or standing water. (The points scored are less than that which would be given if the hedge and ditch could be applied for separately). Otherwise, within ELS, the only steer towards addressing the requirements of two or more components at the same time, is guidance that cereal headlands (EF9-10) will be especially useful when located next to grass buffer strips (EE1-6).

Likewise, within HLS, the multi-component, or co-location, approach is scarcely covered, being limited to an optional prescription under the Enhanced hedge management options (HB11-12) to encourage more floristic diversity in the immediate hedge margin.

Suggestions:

1. Under ELS, additional points should be given for the co-location of priority options covering more than one hedge component. The combinations which will bring the greatest benefits to biodiversity are Shrub + Tree, Base + Margin, and Shrub + Tree + Base + Margin. (An alternative approach would be to limit applicant choice to a number of bundles of options - all or most of the options in a chosen bundle must be taken up.)

2. Specifically, within ELS, for a single hedge, choosing both EB3 (Enhanced hedgerow management) and EC23 (Establishment of hedgerow trees by tagging) should score extra points. Similarly, choosing EE1-6 (Buffer strips) with one of either EF2 (Wild bird seed mixture), EF3 (Nectar flower mixture) or EF9-10 (Cereal headlands) should score extra points. A combination of EB3, EC23, EE1-6 and one of EF2, EF3 and EF9-10, should score maximum points.

3. Within HLS, there should be strong direction and guidance to use appropriate options in combination to maximise benefits to biodiversity, and IOS linked to these options should further encourage this.

5.2. Connectivity

Key management: Retain all hedges and plant new ones to fill in large gaps in the farm network.

Rationale: Research increasingly reveals the importance of linear landscape features, of which hedges are the most frequent, for the abundance of, movement of and survival of animal species within farmland (Aviron *et al.*, 2005; Batary *et al.*, 2010; Burel, 1989; Burel, 1996; Cranmer *et al.*, 2006; Daniels, 1994; Dawson, 1994;; Dover & Fry, 2011; Dover & Sparks, 2000; Hinsley & Bellamy, 2000; Kyrkos *et al.*, 1998; Lawton *et al.*, 2010; Ludwig *et al.*, 2012; Macdonald *et al.*, 2007; Pollard & Holland, 2006; Spellerberg & Gaywood, 1993). Examples of taxonomic groups or species which benefit from hedge connectivity through facilitating their movement through the landscape include carabid beetles (Charrier *et al.* , 1997; Jopp & Reuter, 2005; Joyce *et al.*, 1999; Petit & Burel, 1998; Petit & Usher, 1998), bumblebees (Cranmer *et al.*, 2006), solitary wasps (Heard *et al.*, 2012; Holzschuh *et al.*, 2009), butterflies (Dover *et al.*, 1997; Dover, 1990), moths (Coulthard, 2012), grass snakes (Edgar *et al.*, 2010; Meister *et al.*, 2010), yellowhammer *Emberiza citrinella* (Cornulier *et al.*, 2007), some woodland birds (Mortelliti, 2010), hazel dormouse *Muscardinus avellenarius* (Bright, 1998; Carroll, 2013), some bats (Cowan and Crompton, 2004; Downs and Racey, 2006; Entwistle *et al.*, 1996; Longley, 2003; Motte & Libois, 2002; Murphy & Greenaway, 2012; Robinson & Stebbings, 1997; Walsh & Harris, 1996; Zeale *et al.*, 2012) and weasels *Mustela nivalis* (Macdonald *et al.*, 2004).

Most of the available evidence, as presented above, for the benefits delivered by connected hedges relate to commuting movements between breeding sites and food supplies (Spellerberg & Gaywood, 1993). Even here the relative importance of resources for complementation and supplementation (Ouin *et al.*, 2004) is often not made.

The evidence for the role played by hedge networks in dispersal is weaker. Nevertheless, they are likely to be important in this context too (Burel & Baudry, 2012; Davies and Pullin, 2006; 2007; Schippers *et al.*, 2009). Such dispersal movement increases genetic flow, survival of metapopulations and helps animals to adapt to climate change. On the negative side, connectivity may help with the spread of predators, crops and diseases (Kettunen *et al*., 2007). Evidence for links between connectivity and dispersal of woodland plant species is particularly weak (McCollin *et al.*, 2000), although one study has shown a link for animal-dispersed shrubs (Sarlöv Herlin & Fry, 2000). The apparent ineffectiveness of hedges for the dispersal of woodland plants in western Europe may be because the hedges are usually too narrow (Burel & Baudry, 2012).

Conversely, hedges may act as barriers to movement for some non-woodland or woodland-edge species. For example for newts (Joly *et al.*, 2001), aquatic chironomid flies (Delettre & Morvan, 2000; Delettre, 2005) some carabid beetles (Eggers *et al.*, 2010; Garcia *et al.*, 2000; Joyce *et al.*, 1999; Mauremooto *et al.*, 1995; Thomas *et al.*, 1998) and some hoverflies (Wratten *et al.*, 2003). Hedges may also impede genetic flow through limiting pollen dispersal, as with *Primula acaulis* in France (Campagne *et al*., 2006). Small gaps in hedge networks may, however, assist the dispersal of such species through increasing landscape permeability (Eggers *et al.*, 2010; Joyce *et al.*, 1999).

New hedges are likely to increase species abundance and diversity (Fuentes-Montemayor, 2011; Fuller *et al.*, 2001) within the landscape, as well as the robustness of ecological networks at the farm scale (Evans *et al.*, in press). New hedges planted parallel and close to existing hedges to create green lanes are exceptionally valuable to wildlife (Burel, 1989; Croxton *et al.*, 2002; Croxton *et al.*, 2005; Dover *et al.*, 2000; Walker *et al.*, 2005) and easy to create by planting parallel hedges or new ones alongside existing ones (e.g.along farm tracks) . New hedges should not normally be planted within fields important for skylarks *Alauda arvensis* or lapwings *Vanellus vanellus* since their presence is likely to increase predation rates from mammalian predators and corvids (Mason & Macdonald, 2000; Winspear & Davies, 2005).

Increased hedge connectivity may be expected to assist with resource protection, through reducing surface run-off and soil erosion and increasing infiltration (Forman & Baudry, 1984), through increased populations of crop pest predators (Fournier & Loreau, 1999; Holzschuh, 2009; Pollard & Holland, 2006) and through facilitating the movement of pollinators (Dennis, 2004; Dennis & Sparks, 2006). It may also be expected to enhance landscape character in many areas.

Current ES cover: One sentence in the ELS Handbook encourages applicants to consider planting-up gaps to increase connectivity between hedgerows and other semi-natural features such as woodlands and ponds. Otherwise neither ELS options/guidance, nor HLS options or Indicators of Success (IOS), specifically encourage increasing connectivity through planting or restoring hedgerows. HLS does make available capital payments for new hedge planting, but not in the context of increasing connectivity, while ELS focuses on planting-up gaps, typically less than 5 m wide, which are not necessarily the priority in terms of increasing connectivity.

Suggestions:

4. Maintaining and increasing connectivity between hedges, and between hedges and other semi-natural features such as woodlands and ponds, should be given a much higher profile within ES, as a priority. More resources should be directed towards new hedge planting. Increasing connectivity is likely to assist with climate change adaptation through facilitating species dispersal to favourable climate space, and resource protection through reducing surface run-off and soil erosion and increasing water infiltration.

5. For example, applications could be encouraged from holdings which meet, or intend to meet, a minimum average number of connections per hedge (e.g. 4 connections), or from those where there are, or will be, at least 'x' connections per ha.

6. There should be greater focus on filling major breaks (greater than, say 20 m wide), in networks rather than on small gaps, and on the creation of green lanes.

7. Mandatory Indicators of Success covering connectivity should be introduced within HLS, with associated prescriptions.

5.3. Shrub species diversity

Key management: Promote a wide diversity of different shrubs and trees.

Rationale: The greater the diversity of plant species in a habitat, the greater the diversity of animal life, including birds (Green *et al.*, 1994; Macdonald & Johnson, 1995; Osborne, 1984) and mammals such as dormice (Bright & Macpherson, 2002; Ehlers, 2012). Correspondingly in hedges, the higher the diversity of trees and shrubs present, the greater the number of specialist herbivores, along with their parasites and predators (Maudsley, 2000). High shrub and tree diversity is also linked to increased structural diversity which is also critical for biodiversity (e.g.Goiti *et al.*, 2003; Maudsley, 2000). Research shows that high plant diversity facilitates greater resilience in invertebrate communities to change (Woodcock *et al.*, 2010).

Current ES cover: Neither ELS nor HLS directly promote shrub species diversity. Current advice given is that gapping-up and new planting should be in line with existing species mixes in the immediate landscape, even if this means planting monocultures of hawthorn *Crataegus monogyna*. While this approach may be desirable from a landscape perspective, it is not from a biodiversity one.

Suggestions:

8. Where new hedges or gaps are being planted, at least 5 different native shrub and tree species should be used rather than mixes typical of the immediate landscape, except in special circumstances (e.g. the hedges are of very high landscape value). Within HLS, there should be an optional IOS linked to this.

5.4. Structural diversity

Key management: Plan to have a range of different hedge heights on the farm; some tall, some shorter. Follow the management cycle.

Rationale: Different species favour hedges of different widths and heights (Arnold, 1983; Fuller *et al.*, 2001; Heard *et al.*, 2012; Hinsley & Bellamy, 2000; Macdonald & Johnson, 1995; Mason & Macdonald, 2000; Maudsley, 2000; Parish *et al.*, 1994, 1995; Sparks *et al.*, 1996). For example, grey partridges *Perdix perdix* and whitethroats *Sylvia communis* typically like shorter hedges while turtle doves *Streptopelia turtur* and bullfinches *Pyrrhula pyrrhula* prefer taller ones (Browne *et al.*, 2004; Dunn & Morris, 2012). Pipistrelle bats (*Pipistrellus* spp.) prefer tree lines for commuting and foraging (Downs and Racey, 2006). Large hedges have greater butterfly diversity than small ones (Sparks & Parish, 1995). It follows that ensuring that both tall and short hedges, and those in between, are present at the farm scale will help to maximise the diversity of life present. Adopting the management cycle approach will help to ensure that a range of different hedge heights are available and hedges across the farm are in good structural condition.

Current ES cover: No ELS or HLS options or IOS directly encourage a diversity of hedge heights across a holding. No guidance is given to adopt the management cycle approach, beyond passing reference to the desirability of letting hedges that are becoming gappy grow up prior to laying or coppicing. Applicants and agreement holders are not currently encouraged to assess the condition of hedges across the farm, or to plan to create hedges that are healthy and in a wide range of different points on the management cycle.

The low priority given to rejuvenation of hedges within HLS regional targeting statements and consequent low numbers of agreements with agreed hedge laying or coppicing work plans, coupled with the ELS hedge restoration option (EB14) being limited to laying no more than 40 m pa of hedge per holding, is not sufficient to deliver a sustainable future for England's hedges.

Suggestions:

9. Increasing hedge structural diversity, especially height range, at the holding scale should be given much higher profile within ES, as a priority. Agreement holders should be given much more explicit direction and guidance on the benefits of adopting the management cycle approach.

10. In the absence of any relevant publications, as an informed view, applications that aim to achieve 5% of hedges that have been recently rejuvenated, 60% that are between 1 m and 2 m tall, and 30% that are between 2 m and 5 m high should be encouraged.

11. Mandatory Indicators of Success covering structural diversity should be introduced, with associated prescriptions.

12. Substantial further resources should be directed within ES to encouraging hedge rejuvenation. As noted by Hedgelink (Wolton, 2011), rejuvenation is a greater priority than achieving the small increases in flower and fruit production, and bird breeding cover, gained from EB1-2.

5.5. Dense shrub layer

Key management: Create dense hedges, especially at the base, by appropriate trimming and stock control. Wider hedges are better for wildlife than narrow ones, but don't shade out margins or ditches.

Rationale: Dense hedges are better than thin ones for protection from predators and unfavourable weather (Dover *et al.*, 1997; Hinsley & Bellamy, 2000; Maudsley, 2000) and increase the chances of successful breeding by many birds (e.g.Kelleher & O'Halloran, 2007; Osborne, 1984) and hazel dormice (Wolton, 2009). They also provide richer and safer feeding for ground-dwelling animals like grass snakes (Reading & Jofre, 2009) and hedgehogs (Hof and Bright, 2010), and contain more deadwood habitat for saproxylic insects. Dense (and wide) hedges, through storing more carbon, will assist with carbon mitigation (Robertson *et al.*, 2012).

Current ES cover: There are no ELS options aimed at achieving dense hedges (beyond supporting the protection of newly restored banks and laid or coppiced hedges through fencing): there are no options which ensure a proportion of hedges on the farm are cut regularly, that stock do not graze-out the base of hedges, and that hedges which are gappy at the base should be allowed to grow up in preparation for rejuvenation. Nor do any of the options require that hedges achieve a minimum width. This is a major omission.

Under the HLS Enhanced hedge management option (HB11/12), hedges must achieve a specified width (e.g. 0.75 m from the centre of the hedge) at a certain point in the agreement (e.g. Year 2), and this is also an IOS. However, there are no HLS prescriptions or IOS relating to hedge density, other than an optional one promoting regular cutting in the first years after rejuvenation.

Under HLS, for new hedge planting (PH) and hedge gapping-up (HR), planting must be in a staggered double row 30 cm apart, with at least 6 plants per metre depending on the local situation. While this prescription may have been appropriate where the objective was to create hawthorn hedges that would create effective stock barriers with minimum loss of

cropping land, it is not appropriate for hedges where the primary objective is to benefit biodiversity. Wider hedges are better for biodiversity, and such narrow spacing between plants can be restrictive where the objective is to create species-rich hedges.

Suggestions:

13. **Achieving a dense shrub layer, from top to bottom, should be recognised as an important goal within ES. This can be linked to improvement of structural diversity and adoption of the management cycle approach. It will assist with carbon mitigation.**

14. Shrub layers that have a clear gap greater than 0.5 m between the canopy and ground should not be eligible for hedge cutting options (EB1-3). Instead, consideration should be given to introducing a new option which requires these hedges should be protected from heavy grazing and not cut until they are 4-5 m high, with a view to entering them into "Restoration" option EB14. Ideally, the new option should be combined with EB14.

15. Within ELS, the Enhanced Hedgerow Management option EB3 should specify a minimum width of hedge (e.g. 1.5 m) that must be achieved by the end of the agreement.

16. Mandatory IOS should be introduced relating to hedge density, with associated prescriptions.

17. The requirement for new hedge planting (PH) and gapping-up (HR) to be in a staggered double row just 30 cm apart should be removed. Instead, the creation of wide hedges should be encouraged.

5.6. Outgrowths

Key management: Encourage some bramble *Rubus fruticosus* agg., rose *Rosa* spp. and suckering outgrowths (e.g. blackthorn *Prunus spinosa*), both to create further wildlife habitat for breeding and feeding, and to increase the availability of warm, sheltered spots.

Rationale: Hedges with outgrowths of bramble, rose, ivy *Hedera helix* or suckering blackthorn or elm (*Ulmus* spp.) are highly beneficial to a wide range of species (pers. obs.) The resulting wavy edges increase the availability of warm, sheltered spots for insects such as butterflies, bees and hoverflies (Merckx & Berwaerts, 2010), and are analogous to the scalloped edges widely promoted for woodland rides (Stephens, 2005). "Soft" edges are also known to be favoured by saproxylic beetles (Wermelinger *et al.*, 2007). Bramble, rose and ivy flowers are favoured nectar sources for many insects, including a wide range of butterflies (Dover, 1996) and other pollinators (Jacob *et al.*, 2010). The outgrowths provide the dense structures required for successful breeding by a range of farmland and woodland birds and dormice, conditions which may otherwise be absent from the landscape (Bright & Macpherson, 2002; Wolton, 2009). Blackthorn suckers are favoured egg-laying sites for the brown hairstreak butterfly *Thecla betulae* (Merckx & Berwaerts, 2010).

Current ES cover: Under Single Payment Scheme (SPS) rules, allowing hedges to grow more than 2 m into fields from the centreline is likely to reduce the area eligible for payments and may also conflict with cross-compliance requirements (GAEC 12). Reflecting this, outgrowths are not encouraged by either ELS or HLS. Indeed, under ELS buffer strip options (EE1-6), agreement holders are implicitly encouraged to cut back any scrubby growth that encroaches

on margins. This needs to be rectified. (Note, though, that under the Take field corners out of management options (EK1 and EL1), the development of low scrub is implicitly encouraged.)

Suggestions:

18. Single Payment Scheme conditions should be changed so claimants are not at risk from financial penalties for allowing outgrowths of bramble, rose, ivy and suckering shrubs.

19. Both ELS and HLS guidance should reflect the high biodiversity benefits of allowing these outgrowths to occur.

20. On buffer strip options (EE1-6), at least low "scrub invasion" should be allowed to occur, as is the case with field corner options (EK1 and EL1).

21. Within HLS, optional IOS should be introduced relating to outgrowths.

5.7. Flowering and fruiting shrubs

Key management: Encourage flowering and fruiting by trimming shrubs only once every three or more years, and/or raising the cutting height on each occasion. Trim hedges on a rotation, so only a third or less are cut each year, scattered across the farm. Where brown hairstreaks are present, tailor rotation to ensure survival of sufficient oviposition sites.

Rationale: Shrub flowers are important nectar and pollen sources for many insects, especially in the spring and early summer. They are also important for bullfinches and dormice (Bright, 2002; Winspear & Davies, 2005). The berries and fruits provide important autumn and winter food for farmland birds (Chetrienne & Eraud, 2002; Hinsley & Bellamy, 2000) and for small mammals (Heard *et al.*, 2012). Flowers and fruits are fundamental to farmland trophic and pollinator networks. The frequency and timing of cutting has a major impact on the size of flower and berry crops (Heard *et al.*, 2012; Staley *et al.*, 2012), cutting every 3 years resulting in 2.1 times more flowers and a 3.4 times greater berry mass than cutting every year, for hawthorn *Crataegus monogyna*. Cutting biennially increases berry yield very little, if at all, if the hedges are cut early in the autumn (as is normal practice) (Heard *et al.*, 2012; Staley *et al.*, 2012). Hedges that in the spring have at least one year's growth provide better nesting habitat for a range of birds, increasing protection from predators (e.g. corvids) and their breeding success (Cath Jeffs, RSPB, pers. comm.).

Current ES cover: Trimming hedges not more often than once every three years, or every two years if the cutting occurs in January-February, is promoted as an ELS priority option (EB3). However, many applicants, probably the majority, will continue to opt for the low priority two-year cutting options (EB1-2) which permit cutting in the autumn of the second year, even though the points scored have been reduced to be much lower than EB3. There is no specific option as yet promoting incremental raising of trimming height, pending improved evidence of the benefits from the current CEH study, BD2114.

Under EB1 and EB2, it is a requirement that some hedges should not be cut in any one year, although the proportion to be left is not specified, while under EB3 the requirement is to cut no more than half of hedges on a holding in any one year. It would be better if, under EB3 at least, only one third of hedges should be cut in any one year and also if there was a maximum size for a block of land with which the rotation must take place, say 20 ha. Otherwise, with

very large holdings, say 1,000 ha, it is currently possible to cut all the hedges over a very large block in one year.

Under the HLS Enhanced hedgerow management options (HB11-12), the relevant IOS is weak, only requiring that some hedges should remain uncut each year.

Suggestions:

22. Within ELS, consider dropping hedge trimming options EB1-2 in favour of directing the resources towards higher priority options.

23. Under EB3, change the requirement to cut no more than half of hedges in any one year to cut no more than a third, and specify a maximum area of land (e.g.20 ha) within which the 3 year cutting rotation must take place. If brown hairstreaks are present, finer grained advice is desirable from informed NE advisers, reflecting the known locations of colonies.

24. Depending on the results of on-going research, consider introducing an option which allows annual trimming but only if the cutting height is raised (e.g.by 15 cm) each time.

25. Strengthen the IOS relating to hedge cutting frequency, and make such an IOS mandatory, to reflect optimal requirements of target species.

5.8. Hedgerow trees

Key management: Look after mature hedgerow trees and encourage new ones, retaining as much standing and fallen dead wood as possible.

Rationale: Mature hedgerow trees are of far greater value to biodiversity than the area they occupy within the landscape would suggest (Forest Research, 2009). They attract large numbers of insects, including moths and true flies (Merckx *et al.*, 2009b, 2010b, 2012; Peng *et al.*, 1992). These in turn provide sources of food for birds and bats (Boughey *et al.*, 2011; Hinsley & Bellamy, 2000; Macdonald & Johnson, 1995; Parish *et al.*, 1994, 1995). Hairstreak butterflies feed on honeydew in the crowns and use the tree canopies as focal points for mating. Birds preferentially use hedgerow trees variously for foraging, nesting and as song posts (Siriwardena *et al.*, 2012): the presence of oak and willow trees has been shown to increase chaffinch *Fringilla coelebs* breeding success (Whittingham *et al.*, 2001). The trunks can support rich lichen communities including national rarities (1st interim report). Hedgerow trees with veteran features (i.e. rot holes, dead branches, snags, etc.) can be of considerable importance for the survival of deadwood insects, in particular beetles, including the stag beetle *Lucanus cervus* (Alexander, 2002; Clements and Alexander, 2009). They can also provide roosting or nesting habitat for bats (Smith & Racey, 2005), birds (Osborne, 1984) and insects such as butterflies that overwinter as adults (e.g.Wiklund & Tullberg, 2004). Pollards are of particular importance in this context (Dubois *et al.*, 2009). Ivy, while potentially smothering important lichen communities, is a valuable source of late season nectar, pollen and berries (Jacobs *et al.*, 2010). Both the retention of and numerical increase of hedgerow trees is likely to benefit the landscape in the majority of National Character Areas.

Current ES cover: While the ELS option (EC23) for the establishment of hedgerow trees by tagging will help here, the low points and therefore payment (£1 per tree pa) is not attractive to most farmers; nor does it reflect the high biodiversity value of these trees. The options (EC24-25) to improve survival rates of mature trees by providing buffer zones around their

roots include the requirement that all limbs, including lower ones, should be retained (except for health and safety reasons), and that fallen timber should be left beneath the canopy, stacked if necessary to allow management of the buffer strip.

While guidance encourages the choice of native trees for tagging or planting, no further advice is given on species choice, with exception of saying the elm should be avoided. More needs to be done under ELS to promote sustainable, balanced populations of hedgerow trees.

The HLS Enhanced hedgerow management options (HB11-12) have an optional IOS covering the number of new trees to be established by planting or tagging, and a mandatory prescription requiring that all standing deadwood should be left in place (unless it is a significant safety hazard), and optional prescriptions for pollarding and retention of ivy. These are all appropriate, as are the capital payments available for new hedgerow tree establishment and for tree surgery including pollarding.

Under the HLS capital item covering hedgerow tree planting (STT), no advice is given on appropriate species to plant, beyond saying they must be native and preferably of local provenance.

The specifications for hedge restoration by laying (HR) require that all cut branches should be removed from the immediate site and disposed of by burning or chipping. The reasons for this are not given. Instead, encouragement should be given to creating brushwood piles in appropriate places, since this will benefit a wide range of dead wood organisms from fungi to saproxylic insects. The current encouragement while laying to retain larger trees and select saplings to grow on to become mature hedgerow trees is, however, welcome.

Suggestions:

26. Within both ELS and HLS, further encouragement should be given to applicants to establish new hedgerow trees, unless there are specific landscape or species reason not to do so (e.g. the presence of breeding lapwing in adjacent fields). An increase in tree numbers will assist with climate change mitigation through increased carbon storage, and often with landscape objectives.

27. ELS Hedgerow tree buffer strips options (EC23-24) should continue to be considered a priority for biodiversity and be strongly promoted.

28. Within ELS, young tree tagging and planting (EC23) should be awarded higher points (and so higher payments), to encourage increased uptake.

29. Within both ELS and HLS further guidance should be given on appropriate hedgerow tree species, including encouraging the growth of mature specimens of species that produce heavy crops of berries and fruits such as hawthorn, crab apple *Malus sylvestris* and wild cherry *Prunus avium*.

30. Pollarding should be encouraged, as an effective means of extending the lives of trees and creating more veteran features, and, where dead trees pose a safety hazard, advice should stress the benefits of leaving standing trunks.

31. The specifications for hedge restoration by laying (HR) should be changed, so that, rather than insisting that cut branches are either burnt or chipped, agreement holders are

encouraged to use at least some of the branches to create brushwood piles in appropriate places, to benefit wildlife.

5.9. Fertilizers and pesticides

Key management: Keep fertilizers and pesticides away from hedge bottoms and ditches, and don't graze out the bottom of hedges.

Rationale: Fertilizer inputs fundamentally alter the ecology of hedge habitats (Critchley *et al.*, 2013; Sheridan *et al.*, 2009). When they enter the base of hedges and immediate margins, they can lead to a dominance of nettle *Urtica dioica*, goosegrass *Galium aparine* and docks *Rumex* spp., with consequent loss of biodiversity. This is a major issue across both grassland and arable farmland. Likewise, the increased nutrient status in ditches leads to algal blooms, with consequent de-oxygenation and loss of species.

Current ES cover: Cross compliance measures currently prohibit the application of fertilisers or pesticides within 2 m of the centreline of hedgerows or 1 m of the edge of ditches, fulfilling this requirement adequately except for the widest hedges.

Suggestions:
None. (It is assumed that advice on appropriate equipment to avoid pesticide or fertilizer drift into the two metre protection zones will continue to be provided, along with adequate monitoring and enforcement.)

5.10. Tussocky-grass margins

Key management: Allow tussocky grass-rich growth to develop at the base and alongside the shrub layer, preferably with perennial herbs present (eg. knapweed *Centaurea nigra*, meadow vetchling *Lathyrus pratensis* and hogweed *Heracleum sphondylium*). Only cut this to control scrub encroachment (other than desirable outgrowths – see 6 above), after flowering and on rotation. Avoid heavy grazing.

Rationale: Tussocky grass margins support large numbers of invertebrates, and are an important overwintering or aestivation place for many and source of summer recruitment (Benjamin *et al.*, 2008; Blackshaw & D'Arcy-burt, 1997; Merckx *et al.*, 2012; Pywell *et al.*, 2005; Woodcock *et al.*, 2008). This includes soil macrofauna like earthworms, woodlice and staphylinid beetles (Smith *et al.*, 2008a, 2008b). The invertebrates are a major source of food for many animals, especially for farmland birds, nearly all of which feed their young on invertebrates (Bishton, 1986; Perkins *et al.*, 2002; Robinson & Sutherland, 1999). Such dense vegetation is also important for bumblebees to nest in (Lye *et al.*, 2009; Osborne *et al.*, 2008), for the larvae of less mobile macro-moth species (Merckyx *et al.*, 2009), as cover for amphibians and reptiles like newts and grass snake (Reading & Jofre, 2009; Wisler *et al.*, 2008), for some birds to nest in such as grey partridge(Parish *et al.*, 1994, 1995; Rands, 1986), for small mammals (Kotzageorgis & Mason, 1997; Macdonald *et al.*, 2007) including harvest mice *Micromys minutus* (Churchfield *et al.*, 1997), for mustelid predators (e.g. weasel *Mustela nivalis*, stoat *M. erminea* and polecat *M. putorius*) (Macdonald *et al.*, 2004), and for hedgehogs (Hof and Bright, 2010). Uncut grass margins next to cut grass margins or flower-rich margins are of particular value to farmland birds (Perkins *et al.*, 2002). Perennial flowers among the tussocks, like knapweed and meadow vetchling and in particular tall umbellifers (e.g. cow parsley *Anthriscus sylvestris*, wild carrot *Daucus carota* and hogweed) are highly valued

sources of nectar and pollen for many insects (e.g. bees, hoverflies and longhorn beetles), and are likely to increase arthropod abundance (Thomas & Marshall, 1999) and indeed may be key components in farmland trophic networks (Pocock *et al.*, 2012). The presence of wide grass margins also makes it more practical, on heavy ground, to cut the shrub layer late in the winter, so extending the period during which berries are available for birds. Tussocky grass margins may also assist with crop pest regulation, through providing breeding, aestivation and overwintering habitat for predators (e.g. spiders and carabid and staphylinid beetles) (Burel, 1989; Garcia *et al.*, 2000; Holland *et al.*, 2012; Pywell *et al.*, 2005; Smith *et al.*, 2008a; Woodcock *et al.,* 2008). Management of hedges, including their margins, is likely to deliver a wider range of ecosystem services such as an increase in biodiversity, resource protection, pest control, crop pollination and landscape enhancement (Wratten *et al.*, 2012).

Current ES cover: ELS buffer strip (EE1-6) and field corner (EF1) options encourage the formation of tussocky grass margins up to 6 m wide, as "buffer" strips. EE1-3 apply to cultivated land, and EE4-6 to intensive grassland. For EE4-6, there is a requirement not to "overgraze" the buffer strips – however, normal grazing levels will often prevent the grass from becoming tall and tussock forming. There is no requirement to take the strips out of production, as is the case with arable buffer strips (EE1-3), although the points allocated are the same.

Option EE12 (Supplement to add wildflowers) is specifically designed to add perennial non-tussock grasses and herbs to new buffer strips and field corners adjacent to cultivated land, but requires that these areas should be cut every year which will prevent strong tussock development.

Within HLS, under Enhanced hedgerow management options HB11-12 an optional prescription is to cut the herb layer adjacent to the hedge annually or biennially after a specified date, removing dense cuttings. Cutting should be at a specified minimum height (e.g.4 cm) and should not expose bare soil. This prescription is presumably designed to promote flower-rich margins, however no IOS cover this. In contrast, the Floristically enhanced grass margin (HE10) and Enhanced strips for target species on intensive grassland (HE11) options have relevant IOS.

Within HLS, the Floristically enhanced grass margin option (HE10) has IOS and prescriptions that are largely incompatible with tussocky grass development. No direction is given to establish enhanced margins outside tussocky grassland strips, leading to possible conflict.

Suggestions:

32. Within ELS, Buffer strip options for intensive grassland (EE4-6) should be labelled priority options for biodiversity. (In arable areas, tussocky grass margins are already frequent.) For EE4-6, a requirement should be that grazing levels are controlled (e.g. by temporary fencing) as necessary to allow tall grass growth. This will also prevent the base of the shrub layer being grazed out.

33. Within buffer strip options (EE1-6), "scrub invasion" should be allowed to occur over the first 1 m away from the shrub layer edge (see Outgrowths above).

34. Within HLS, a mandatory IOS should be introduced for the Enhanced hedgerow management options (HB11-12) relating to the condition of vegetation at the base and

immediate margins of the shrub layer, to promote the development of tussocky grass with at last scattered perennial flowering herbs.

35. Within HLS, uptake of the Floristically enhanced grass margin option (HE10) should be encouraged outside buffer strips, or so that at least 1 m of tussocky grassland remains between the edge of the shrub layer and the floristically enhanced margin.

36. The use of plastic or other long-life mulches when planting new hedges (HP) should be discouraged, since this will delay the establishment of dense ground vegetation. Likewise, the adverse effects of using herbicides to control aggressive competitors should be considered by advisors.

See also recommendation 1 under Flower-rich margins and banks below.

5.11. Flower-rich margins and banks

Key management: Cultivate flower-rich margins, preferably beyond tussocky grass margins. Where hedgebanks are present, encourage some of these to have flower-rich bank sides by cutting away shading growth and trimming or grazing them lightly.

Rationale: Flower-rich margins, where coarse grasses are infrequent and short-lived herbs tend to predominate, provide important sources of nectar and pollen for butterflies, bees and other pollinators (Field & Gardiner, 2006; Macleod, 1999; Pywell *et al.*, 2005, 2006, 2007), and the seeds can be critical for farmland birds during the "hungry gap" in the late winter (Newton, 2004; Siriwardena *et al.*, 2008). They may also have high invertebrate populations (e.g. spiders, grasshoppers and flies) which are more accessible to birds than those in tussocky-grass margins because of the more open, patchy sward (Douglas *et al.*, 2009; Winspear & Davies, 2005). Patches of bare ground within these margins provide the warm conditions necessary for many invertebrates that may otherwise be lacking in the landscape, as well as breeding sites for some (e.g. solitary bees), and basking sites for reptiles (Reading & Jofre, 2009). As with the shrub layer, diversity of structure at the farm scale will maximise the benefits of margins. Combinations of tussocky grass margin and flower-rich margins are especially valuable (Heard *et al.*, 2012; Vickery *et al.*, 2009).

Where hedges have substantial banks, as is frequent in the South-West, the bank side flora can be very diverse and flower-rich, and provide the same functionality as flower-rich margins.

Current ES cover: Under ELS, flower-rich blocks or strips at least 6 m wide are encouraged next to field edges on arable land or temporary grassland through Wild bird seed mixture (EF2) and Nectar flower mixture (EF3) options. The Cereal headlands options (EF9-10) encourage the formation of "weed"-rich strips 3 m – 24 m wide around arable crops. The Wildflower addition supplement for field corners and buffer strips (EE12) is designed to create flower-rich areas with a greater diversity and structure of vegetation than grass-only areas. Although guidance for the Cereal headland options recognises that they will deliver most benefit when sited next to buffer strips, no similar guidance is given in relation to Wild bird or Nectar flower mixtures and buffer strips.

No ELS or HLS options, or IOS, specifically promote flower-rich banks, indeed the benefits of such banks to biodiversity (and landscape) appear to have been overlooked entirely.

Suggestions:

37. Within ELS, Wild bird mixture (EF2), Nectar flower mixture (EF3), Cereal headland (EF9-10) and Supplement to add wildflowers to field corners and buffer strips on cultivated land (EE12) options should all continue to be considered to be priorities for biodiversity. However, uptake should be steered more explicitly towards creating these features outside tussocky grass margins.

38. Within both Farm Environment Records (ELS) and Farm Environment Plans (HLS), hedgebanks with rich floras should be identified.

39. Within ELS consideration should be given to introducing a new option (or modified EB3) which requires that these banks are kept free of heavy shade from overhanging branches and that they are lightly grazed or trimmed as necessary to maintain the diversity of flowering herbs.

40. Flower-rich banks should be considered a priority for Earth bank management options (EB12-13 and UB12-13) and restoration (UB16).

41. Within HLS, there should be an optional IOS for HB11-12 which covers the condition of herb-rich banks.

5.12. Ditches

Key management: Cut back branches over ditches and clean them occasionally and on rotation, encouraging shallow sides.

Rationale: Ditches within hedges can provide the larval habitat for very large numbers of flies, which although not rare, are an important food source for other insects, birds and bats (Aquilina *et al.*, 2007; Drake, 2001; Oakeley & Jones, 1998). Although the majority of hedge ditches are small and for much of the year only moist at the bottom, some are more substantial and regularly have standing or flowing water. These larger ditches can support good populations of aquatic insects which are of more conservation value in their own, right, such as dragonflies, mayflies and water beetles. Ditch sides increase the cover available for shelter and safe breeding for many animals, can provide valuable sources of nectar for pollinators (especially during drought years) (Harris *et al.*, 1991; Ruth Feber, Oxford University, pers. comm..), and can be important nesting or foraging habitat for some birds such as the yellowhammer (Arnold, 1983; Bradbury *et al.*, 2000; Hinsley & Bellamy, 2000; Parish *et al.*, 1994, 1995; Peach *et al.*, 2004; Perkins *et al.*, 2002). The rank vegetation that occurs on ditch sides may also assist with crop pest regulation through providing breeding and overwintering habitat for predators (e.g. spider and carabid beetles). Where dormice or hedgehogs are likely to be present, the creation of substantial open ditches with standing or flowing water should be considered carefully since these may prove a significant obstacle to movement of these mammals (1st interim report).

Current ES cover: While ELS and HLS ditch options (EB 6 -10, HB14) meet these management requirements, they only apply to substantial ditches – ones that form a field boundary in their own right and regularly have standing or flowing water. This is not typical of most hedges ditches, which are shallower and only have an intermittent, often seasonal, flow of water. For Combined hedgerow and ditch options (EB8 -10), the only additional requirements to the

standard hedge cutting options (EB1-3) are that the volume of hedge trimmings entering the ditch should be minimised.

No specific guidance, options, prescriptions or IOS cover the management of typical hedge ditches.

Suggestions:

42. No new options within either ELS or HLS are probably necessary to promote appropriate management of ditches that form a component part of hedges, where these ditches do not form a barrier in their own right or regularly contain open or standing water. However, guidance should be given on the importance of typical hedge ditches for biodiversity, and agreement holders encouraged to maintain them.

43. Specifically, within ELS, guidance on ditch management which encourages removal of overhanging branches or extensive outgrowths that are casting dense shade on the ditch bottom, and occasional light cleaning, should be included within ELS Enhanced Hedgerow Management (EB3) and Buffer strip (EE1-6) options.

44. Within HLS, an optional IOS should be included for HB11-12 (Management of hedgerows of very high environmental value) to cover ditch management.

45. Consideration should be given to extending Ditch, dyke and rhine restoration (DR) capital payment available under HLS to hedge ditches where these do not meet the definition of a ditch as being a barrier in its own right and regularly containing water, but are nevertheless of significant biodiversity value.

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Annex 1. Key results from interim report, covering Section 41 and England farmland indicator species

1. More species are dependent on the tree layer (60%) and the shrub layer (56%), alone or in combination with other components, than on any other components. The base/bank (42%) and margin (40%) follow. Comparatively few of the listed species are dependent on ditches (9%).

2. The majority of species are dependent on more than one component (65%), with over a third (35%) being dependent on three or more components.

3. In contrast, over half (57%) of species with a restricted distribution are dependent on just one component on the basis of current knowledge. The great majority (81%) of species with a widespread distribution are dependent on more than one component. These include all farmland biodiversity quality indicators (comprising various butterflies, birds and bats).

4. Where species are dependent on more than one combination, the combinations that support most species are in descending order:

    i. Shrub + Tree (19 species)
    ii. Shrub + Base + Margin (9)
    iii. Shrub + Tree + Margin (8)
    iv. Base + Margin (6)
    v. Shrub + Tree + Base + Margin (6)
    vi. Shrub + Tree + Base + Margin + Ditch (4)

5. Across species, the base has a greater range of functionality than other components, being used for feeding, breeding and shelter, while margins and ditches are used primarily only for feeding.

Annex 2. Key hedge attributes important for selected species population viability

Beneficial attributes	Bumblebees	Hairstreaks	Saproxylic insects	Ditch inverts	Grass snakes	Farmland birds	Dormouse	Hedgehog	Bats	Overall attribute score
South-facing side		Yes			Yes	Yes				**3**
Warm, sheltered aspect	Yes	Yes	Yes	Yes	Yes	Yes				**6**
Dense structure, to base		Yes				Yes	Yes	Yes		**4**
Species-rich shrub layer	Yes					Yes	Yes		Yes	**4**
Bramble or rose clumps on edge	Yes	Yes			Yes	Yes	Yes	Yes		**6**
Plentiful shrub and rambler flowers and fruits, over long season	Yes	Yes	Yes	Yes		Yes	Yes		Yes	**7**
Mature isolated hedgerow trees	Yes	Yes	Yes	Yes		Yes	Yes		Yes	**7**
Lines of trees	Yes		Yes				Yes		Yes	**4**
Veteran trees			Yes			Yes	Yes		Yes	**4**
Suckering outgrowths		Yes			Yes	Yes	Yes	Yes		**5**
Good cover in hedge base - herbaceous, stumps, lying/fallen wood	Yes		Yes		Yes	Yes	Yes	Yes		**6**
Tussocky grass margin	Yes				Yes	Yes	Yes	Yes	Yes	**6**
Wet ditch with vegetated sides and some overhanging side vegetation	Yes			Yes	Yes	Yes	Yes		Yes	**6**
Unshaded ditch				Yes	Yes		No		Yes	**1**
Flowering herbs in margin (e.g.tall umbellifers)	Yes	Yes	Yes	Yes		Yes			Yes	**6**
Short, often open, herb-rich margin outside tussocky grass margin	Yes				Yes	Yes		Yes		**4**
Full range of hedge management cycle structures	Yes		Yes			Yes	Yes	Yes	Yes	**6**
Few small gaps (< 20m) in hedge network	Yes				Yes		Yes	Yes	Yes	**5**
Well connected to other hedges and other semi-natural habitats	Yes		Yes	Yes	Yes		Yes	Yes	Yes	**6**

Annex 3. Current hedge options within Entry Level Stewardship (Jan 2013)

Component	Code	Option	Points	NE priority option for	Key management requirements
Shrub	EB1	Hedgerow management for landscape (on both sides of a hedge)	16/100m		• Hedge must be 1.5m high (from top of bank) • Cut no more than once every 2 years. • Do not cut all hedges in same year. • Do not cut between 1 March and 31 August • Any gaps in excess of 10% of hedge must be planted within 2 years
Shrub	EB2	Hedgerow management for landscape (on one side of a hedge)	8/100m		As above
Shrub	EB3	Hedgerow management for landscape and wildlife	42/100m	Biodiversity Landscape Climate change mitigation Climate change adaptation	In addition to above: • Hedge must be 2.0 m high (from top of bank) • Cut no more than once every 3 years, or, if cut every other year, cut between 1 January and 28 February only • Do not cut more than half of hedges in same year.
Shrub	EB14	Hedgerow restoration	10/1m	Water quality Biodiversity Landscape Climate change mitigation Soil quality	• Hedge can be restored by laying or gapping-up. • Maximum of 40m per year. • Restored hedges must have no more than 10% gaps (>1m wide) and be protected from livestock damage. • Hedgerow trees must be retained where a characteristic feature of the local landscape. • Only use herbicides to treat injurious or invasive non-native species. • Lay or plant between 1 Nov and 1 March (exceptionally 1 April for laying). • Wood may be stacked as dead wood habitat. • Cut material may be chipped and used as mulch to control weeds. • Planted species should match existing ones.
Tree	EC23	Establishment of hedgerow	1/tree	Biodiversity	• Maximum of 3 trees per 100m.

		trees by tagging		Landscape Climate change mitigation Climate change adaptation	• Hedges must be managed under one of EB1/2/3/8/9/14. • Select existing straight saplings of native species, except for elm, of, if such saplings absent, plant new ones. • Saplings must be at least 20 m apart to allow full crowns to develop. • New trees must be tagged and checked annually.
Tree	EC24	Hedgerow tree buffer strips on cultivated land Hedges must be managed under one of EB1/2/3/8/9/14, and have at least 1 tree per 100m. Trees must be native species, within 1m of hedgerow and at last 30cm DBH.	400/ha	Biodiversity Landscape Climate change mitigation Climate change adaptation	• Establish or maintain a 6 m-wide grassy strip during the first 12 months of your agreement, either by sowing or, ideally, by natural regeneration. • After the first 12–24 months, cut the 3 m next to the crop edge annually after mid-July. Only cut the other 3 m to control woody growth, and no more than once every 2 years. • Do not remove tree limbs, including the lower limbs, other than for health and safety reasons where adjacent to a public highway or right of way. • Leave fallen timber beneath the canopy. Stack if necessary to allow management of the buffer strip.
Tree	EC25	Hedgerow tree buffer strips on grassland Conditions as for EC24	400/ha	Biodiversity Landscape Climate change mitigation Climate change adaptation	• On fields that will be mown, leave an uncut 6 m buffer strip around the edge. Graze this buffer strip along with the aftermath, following the final cut. • After the first 12 months of the agreement, cut buffer strips only to control woody growth, and no more than once every 2 years. • Do not remove tree limbs, including the lower limbs, other than for health and safety reasons where adjacent to a public highway or right of way. • Leave fallen timber beneath the canopy. Stack if necessary to allow management of the buffer strip.
Base/Bank	EB4	Stone-faced hedgebank management on both sides	16/100m		• Protect stone-faced banks from damage or deterioration and repair gaps
Base/Bank	EB5	Stone-faced hedgebank	8/100m		As above

		management on one side			
Base/Bank	UB4	Stone-faced hedgebank management on one side on or above the Moorland Line	24/100m	Landscape	As above
Base/Bank	UB5	Stone-faced hedgebank management on one side on or above the Moorland Line	12/100m	Landscape	As above
Base/Bank	UB15	Stone-faced hedgebank Restoration within SDA	55/m	Landscape	• Maximum of 40m per year. • Carry out all restoration work in the traditional materials used in the original bank construction, following the style characteristic of the local landscape and using appropriately shaped and sized local natural stone. • Do not carry out restoration work on a bank with a hedge between 1 March and 31 August.
Base/Bank	EB12	Earth bank management on both sides	14/100m		• Protect earth banks from damage or deterioration and repair gaps
Base/Bank	EB13	Earth bank management on one side	7/100m		As above
Base/Bank	UB12	Earth bank management on both sides on or above the Moorland Line	18/100m	Landscape	As above
Base/Bank	UB13	Earth bank management on one side on or above the Moorland Line	9/100m	Landscape	As above
Base/Bank	UB16	Earth bank restoration within SDA	12.5/m	Landscape	• Maximum of 40m per year. • All repair and maintenance work must be carried out in the traditional materials used in the original earth bank construction, following the style characteristic to the local landscape. The shape and height of the bank must be consistent with other banks that are in good condition in the immediate vicinity. • Do not carry out restoration work on a bank with a hedge

					between 1 March and 31 August.
Ditch	EB6	Ditch management	24/100m	Biodiversity Landscape	• Only cut sides between 15 Sept and 28 Feb. • Cut no more than half ditch sides in any one year • Where necessary to prevent flooding, up to half the vegetation in the bottom may be cut every year • Clean no more often than once in (5yr) agreement, and only between 15 Sept and 31 January • Spread dredging evenly across adjacent field, avoiding other land managed under ES if possible. • Don't move or re-profile, or increase width or depth of ditch
Ditch	EB7	Half ditch management	8/100m	Biodiversity Landscape	As above
Shrub & Ditch	EB8	Combined hedge and ditch management (incorporating EB1 Hedgerow management for landscape)	38/100m		• Follow EB1 and EB6 • Take care to minimise hedge trimmings entering the ditch. Remove trimmings restricting flow.
Shrub & Ditch	EB9	Combined hedge and ditch management (incorporating EB2 Hedgerow management for landscape)	26/100m		• Follow EB2 and EB6. • Take care to minimise hedge trimmings entering the ditch. Remove trimmings restricting flow.
Shrub & Ditch	EB10	Combined hedge and ditch management (incorporating EB3 Hedgerow management for landscape and wildlife)	56/100m	Biodiversity Landscape Climate change mitigation Climate change adaptation	• Follow EB3 and EB6. • Take care to minimise hedge trimmings entering the ditch. Remove trimmings restricting flow.
Margin	EE1	2 m buffer strips on cultivated land	255/ha		• Establish or maintain a 6 m-wide grassy strip during the first 12 months, either by sowing or, ideally, by natural regeneration. • Regular cutting in the first 12-24 months may be needed to control annual weeds and encourage grasses to tiller.

					• After the first 12-24 months, cut buffer strips only to control woody growth, and no more than once every 2 years. • Do not apply fertilisers or manures. • Only apply herbicides to spot-treat or weed-wipe injurious weeds or invasive non-natives.
Margin	EE2	4 m buffer strips on cultivated land	340/ha		As above
Margin	EE3	6 m buffer strips on cultivated land	340/ha		As for EE1 And EE2, and: • After first 12-24 months cut 3m next to crop edge annually after mid-July. • Only cut the other 3m to control woody growth and nor more than once every 2 years.
Margin	EE4	2 m buffer strips on intensive grassland	255/ha		• Do not cut buffer strip, and graze it along with the aftermath. • After the first 12months cut buffer strips only to control woody growth, and no more than once every 2 years. • Do not apply fertilisers or manures. • Only apply herbicides to spot-treat or weed-wipe injurious weeds or invasive non-natives.
Margin	EE5	4 m buffer strips on intensive grassland	340/ha		As above.
Margin	EE6	6 m buffer strips on intensive grassland	340/ha	Water quality	As above.
Margin	EE12	Supplement to add wildflowers to field corners and buffer strips on cultivated land	63/ha	Biodiversity	Use only with EE1 – EE3. In addition: • By the end of the first 12 months of the agreement, establish a mix or maintain existing areas containing fine-leaved grasses and flowers. Do not sow tussock-forming grasses. • By the beginning of year three, there must be at least five flower species (excluding injurious weeds) and three fine-leaved grass species present frequently across the flower-

					rich area. • Regular cutting and removal of cuttings in the first 12 months after sowing may be needed to ensure successful establishment of sown species. • After establishment, cut the whole area to 10 cm between 1 August and 30 September, removing cuttings to avoid patches of dead material developing. If excess vegetation threatens to suppress the flowers, cut again the following March or April providing no birds are nesting in the flower-rich area.
Margin/in field	EF1	Management of field corners	400/ha	Soil quality Water quality Biodiversity Climate change adaptation	• Establish or maintain a field corner during the first 12 months, either by sowing or, ideally, by natural regeneration. • Patch size must be no more than 2 ha and there must be a maximum of 1 paid patch per 20 ha of arable land to ensure that patches are well distributed across the land. • Only apply herbicides to spot-treat or weed-wipe injurious weeds or invasive non-natives. • After controlling weeds patches may be surface seeded with a tussocky grass mix.
Margin/in field	EF2	Wild bird seed mixture	450/ha	Biodiversity Birds	• Available on arable land or temporary grassland. • As a 'rotational option' it can be moved around the farm within the normal rotation. • Sow a balanced combination of at least three small-seed bearing crops (choice specified). • In the first year, sow at the optimum time for the chosen species mixture, which may be autumn or spring. • Retain the crop mixture until at least 1 March before re-establishment in spring. • Only apply herbicides to spot-treat or weed-wipe injurious weeds or invasive non-natives. • Apply environmentally sympathetic insecticides during

					establishment where there is a strong risk of crop failure due to severe pest attack.
Margin/in field	EF3	Nectar flower mixture	450/ha	Biodiversity Birds Climate change adaptation	• As a 'rotational option' it can be moved around the farm within the normal rotation. • Sow a mixture of at least four nectar-rich plants. • Sow in blocks and/or strips at least 6 m wide in early spring or late summer. • Re-establish the mix as necessary, to maintain a sustained nectar supply (typically after 3 years). • Regular cutting and removal of cuttings in the first 12 months after sowing may be needed to ensure successful establishment. • To stimulate valuable late flowering to meet the peak demand from bees, cut half the area to 20 cm between mid-June and the end of the first week of July, unless ground-nesting birds are present. • Cut the whole area to 10 cm between 15 September and 31 October, removing or shredding cuttings to avoid patches of dead material developing. • Do not graze in the spring or summer. Late autumn/early winter grazing of areas is allowed and will benefit legumes • Do not apply fertilisers or manures. • Only apply herbicides to spot-treat or weed-wipe injurious weeds or invasive non-natives.
Margin	EF9	Cereal headlands for birds	100/ha	Biodiversity Birds	• As a 'rotational option' it can be moved around the farm within the normal rotation. • Sow and manage a 3 m–24 m wide cereal headland along the edge of an arable crop. • Do not apply fertilisers or manures to the headland between harvest of the previous crop and resuming normal management.

					• Do not apply insecticides between 15 March and the following harvest. • Only specified herbicides may be used to control problem grass and broad-leaved weeds.
Margin	EF10	Unharvested cereal headlands for birds and rare arable plants	330/ha	Biodiversity Birds	• As a 'rotational option' it can be moved around the farm within the normal rotation. • Sow and manage a 3 m–24 m wide cereal headland along the edge of any arable crop. • Sow in autumn or spring (do not leave as bare ground over the winter) and leave unharvested until the following spring (1 March), before resuming normal management. • Sow a cereal or cereal mixture at a reduced seed rate, to encourage a more open headland structure. On more difficult or weedy sites, conventional seed rates can be used. • Do not apply insecticides between 15 March and the following harvest. • Only specified herbicides may be used to control problem grass and broad-leaved weeds.

Annex 3 cont.

ELS notes

Cross compliance
Cross compliance conditions include a requirement to maintain 'protection zones' by not cultivating or applying fertilisers, manures or pesticides to land within 2 m of the centre of a hedgerow or watercourse. This requirement also applies to all land within 1 m of the top of the bank of a watercourse. ELS options cannot duplicate this requirement.

Treatment of hedgerow gaps
Where the hedgerow includes gaps or gates, these may be included in the length entered into an option, providing they comprise less than 10 per cent of the total length of the particular hedge. Gaps above this 10 per cent threshold should be deducted from the length included unless it is intended to plant up

the gaps in the first two years to achieve a hedge with no more than 10 per cent gaps. A gap is a complete break in the canopy. Where a tree canopy overlaps the hedgerow canopy, this is not counted as a gap.

Ditch definition
Ditch options (EB6, EB7) are intended for ditches forming field boundaries in their own right and aim to establish both a varied bank-side and aquatic vegetation, and an undisturbed wildlife habitat adjacent to the ditch. Eligible ditches must regularly contain standing or flowing water. They must contain vegetation typical of wet ditches, for example common reed, yellow flag, reed canary grass, water mint, fools watercress and marsh-marigold.

Growth of top of banks
Where there is woody growth on top of an earth bank or stone-faced bank, one of the hedgerow options EB1, EB2, EB3 or EB14 may also be applied for. The specified height of the hedgerow is measured from the top of the bank.

Buffer strips on intensive grassland. These options (EE4, EE5, EE6) are only available on improved grassland receiving more than 100 kg/ha of nitrogen per year in fertilisers or manures.

Annex 4. Current Higher Level Stewardship (HLS) hedge options and capital payments (Jan 2013)

Component	Code	Option	Payment rate	Targeting and objectives
Shrub layer	HB11	Management of hedgerows of very high environmental value (both sides)	£54 per 100 m	• Used to manage hedgerows that support target species of farmland birds, insects or mammals, such as the tree sparrow, brown hairstreak and dormouse, or that make a significant contribution to the local landscape character and/or are historically important boundaries. • To improve the structure of hedgerows through sympathetic trimming, and encouraging a diverse range of hedges across the farm, including the development of a balanced tree population where it is appropriate to the local landscape. Benefits farmland birds, insects, plants and mammals. • Cannot be used with ELS hedge options (e.g.EB1-3).
Shrub layer	HB12	Management of hedgerows of very high environmental value (one side)	£27 per 100 m	As above
Shrub layer	HR2010	Hedgerow restoration including laying, coppicing and gapping up	£7 per m	Capital item. Supplements available for removal of old fence lines, substantial pre-work, top-binding and staking, casting-up hedgebanks and fencing.
Shrub layer	PH	Hedgerow planting – new hedges	£5 per m	Capital item.
Mature tree	STT	Standard parkland tree/hedgerow tree and planting	£7.50 each	Capital item.
Mature tree	TS1	Tree surgery, minor – to include minor pollarding	£43.00 each	Capital item.
Mature tree	TS2	Tree surgery, major – to include major pollarding	£89.00 each	Capital item.
Base/bank	BR	Stone-faced hedge bank repair	£16 per m	Capital item.

Base/bank	BS2010	Stone-faced hedge bank restoration	£55 per m	Capital item.
Base/bank	ER2010	Earth bank restoration	£10.10 per m	Capital item.
Base/bank	EC	Creation of new earth banks	£11 per m	Capital item.
Ditch	HB14	Management of ditches of very high environmental value	£36 per 100 m	• Aimed at the management of ditches that support target species of plants, birds, mammals and insects, whether in grassland, wetland or arable landscapes. • To maintain a variety of ditch habitats, from open water to ditches full of wetland plants to benefit the target species.
Ditch	DR	Ditch, dyke and rhine restoration	£2.90 per m	Capital item.
Margin	HE10	Floristically enhanced grass buffer strips (non-rotational)	£485 per ha	• Used to provide habitat and foraging areas for insects and birds by maintaining buffer strips that contain a mixture of grass and wildflower species. The strips can be located along field boundaries or as a buffer strip around in-field features, such as ponds or archaeological features. • Management must include establishing the strip by natural regeneration or by sowing a seed mixture agreed with NE. Once established, the strip must be cut or grazed to deliver the desired outcomes.
Margin	HF12	Enhanced wild bird seed mix plots (rotational or non-rotational)	£475 per ha	• Used to provide a valuable winter food source for declining farmland birds in arable and mixed farming landscapes. The plots or margins provide a year-round supply of food including small seeds. The size, location, number and composition of plots or areas will need to be tailored for the target bird species. • Management must include establishing an agreed seed mixture every year or every other year, and following an agreed pesticide and fertiliser programme.
Margin	HF14	Unharvested, fertiliser-free conservation headland (rotational)	£440 per ha	• Applied to the cereal headland of a cropped area. The aim is to provide a year-round food source for declining populations of farmland birds and habitats for other farmland wildlife. The restricted pesticide programme will allow insects to flourish, providing food for chicks in summer and over

				winter, the unharvested headland becomes a valuable food source for farmland birds by providing grain and seeding arable plants. If managed alongside HE10 (Floristically enhanced grass buffer strip) or with buffer strip options (EE1/OE1 or EE3/OE3), significant additional wildlife benefits accrue. • Management includes cultivating and sowing a 6 m to 24 m cereal headland, which can surround a range of crop types including cereals. The headland is managed by following a restricted herbicide and insecticide programme, without the use of fertilisers and left unharvested until the following spring, when normal land management can be resumed.
Margin	HE11	Enhanced strips for target species on intensive grassland	£590 per ha	• Used to provide additional habitat for invertebrates, birds and small mammals by managing buffer strips in intensive grass leys. These strips of wildflowers and grasses provide nesting habitat and shelter, as well as a food source for a variety of species including farmland birds, bats and insects such as bumblebees and butterflies. • Management will include sowing and establishing a specified seed mixture of wildflowers and grasses. The strip will need to be protected from grazing and will need to be re-established when the cover of wildflowers decreases. Other management, such as cutting and fertiliser applications, will be tailored to each site based on the species targeted.

Annex 5. Current Key HLS hedge options Indicators of Success (provided by Natural England, November 2012)

Bold text is mandatory, rest is by agreement between NE and agreement holder, text in square brackets can be amended)

HB11/12 Management of hedgerows of very high environmental value

Indicators of success

- By year [2], the average sward height of the grass strip adjacent to the hedge should be between [4cm and 15cm] after cutting.
- By year [2], the cover of bare ground on the grass strip should be less than [5%].
- **By year [2], hedges [XXXX] should be [at least / no more than 2m in height and 0.75m in width (measured from the centre of the hedge)].**
- By year [X], [X] trees should have been planted and/or tagged across the holding.
- **Each year, there should be some uncut hedgerows on the holding.**
- [Plant / tag] [2] hedgerow trees each year across the holding where trees already exist in a hedge. If planting new trees, use native and locally common species.

Prescriptions

- **Allow hedges [XXXX] to reach and then maintain a minimum height of [2] metres and minimum width of [0.75] metres (measured from the centre of the hedge) by year [5].**
- Cut the herb layer adjacent to the hedge [annually / 1 year in 2] after [31 August] and remove dense cuttings. Cut at a height of no less than [4cm] and do not expose bare soil.
- For those hedges containing fast-growing species or where the hedge has been left untrimmed for more than three years, trim using a [circular saw / cutter bar machine].
- Leave hedges [XXXX] to grow untrimmed [with a view to managing under a long-term laying or coppicing rotation].
- Remove cuttings from the edge of the hedge after trimming.
- Re-pollard hedgerow trees as specified in the capital works programme.
- Retain all mature growth of ivy on trees.
- **Retain all standing deadwood unless it presents a genuine safety hazard.**
- **Trim hedges between [31 December] and 28 February only.**
- Trim hedges no more than one year in [three]. Trimming of hedges should be rotated to avoid cutting all hedges in the same year.
- Hedges [XXXX] should be trimmed every two years by siding up only in preparation for laying or coppicing.
- After laying, hedges [XXXX] should be trimmed annually for 5 years following restoration. However, the hedge should not be cut back to the same point each year and must be allowed to gain height and width incrementally.

HB14 Management of ditches of very high environmental value

Indicators of Success

- Ditches must permanently contain water [contain water for at least xx months of the year].
- There should be no more than 10%/xx% of the ditch length with heavy shade ie where vegetation overhangs more than half the width of the channel surface.

- There should be a xx% early, xx% middle and xxx% late successional ditches on the holding.
- By year [2], one third of ditches [XXXX] should have been keetched [cleaned?]
- By year [6], two thirds of ditches should have been keetched during the present agreement.
- [By year x] at least xxx of the following quality indicator species should be occasional [and at least xx should be frequent]: xxxx
- [By year x] there should be no scrub growing on the ditch banks.
- **Filamentous algae should be less than 10% cover.**
- **Non-native species - water fern/Australian swamp stonecrop/parrot's feather/Hydrocotyle should be absent [maximum of xx%/confined to ditch xxxx].**
- The water should be clear enough to allow the ditch bottom to be visible, unless obscured by aquatic vegetation, in at least 90% of the ditch length.
- Water depth should be minimum 0.5m/1m/xxxx.

Prescriptions

- Follow the agreed [management plan / capital works programme produced by XXXX on XXXX].
- **Cut the emergent and aquatic vegetation [every year/every 2 years/xxxx] leaving the roots in the base of the ditch. Place the arisings [on top of the bank/in the adjacent field/xxxx]. [Retain a fringe of emergent vegetation on both sides/one side of the ditch.]**
- Cut the vegetation on the ditch banks annually/on a 2 year rotation/xxx. [Only one bank should be cut each year].
- **Manage ditches and banks between 1 October and 28 February only.**
- Cattle should be allowed to trample the ditch edges so that small pools form in their hoof prints.
- Do not re-profile the ditch [unless agreed with your Natural England adviser].
- Re-profiled ditches must have their banks sloping at 45 degrees or less [and must be non trapezoidal in cross section.]
- Do not de-silt/dredge ditches [unless agreed with your Natural England adviser].
- De-silt/dredge ditches to their previous profile [no more than once/twice/xx during your agreement.] Place the arisings [on top of the bank/in the adjacent field/xxxx].
- Following de-silting/dredging/re-profiling, bankside vegetation must be re-established by natural regeneration.
- If the ditch bank is not grazed cut the bank adjacent to the ditch 1 year in 2 after [31 August] and remove dense cuttings. Cut at a height of no less than [4cm] and do not expose bare soil. Cut only one bank of the ditch in any year, leave the opposite bank.
- Ditch banks should be grazed as part of the field management.
- **Remove cuttings from the edge of the ditch after trimming.**
- Ditch banks in hay fields should be aftermath grazed.
- Re-pollard trees as specified in the capital works programme.
- Trim hedges beside a ditch every year [2 years].
- Remove [all/xx%] of scrub growing on the ditch banks using methods approved by your Natural England adviser.
- **Do not cultivate or apply fertilisers, manures or pesticides to land within 2m of the centre of the ditch or 1m of the top of ditch banks.**
- **Only use mechanical means (including hand tools) to clean the ditches or trim the bank. Do not use herbicides.**

HE10 Floristically enhanced grass margin

Indicators of Success

- **By year [2], there should be at least [75%] cover of desirable species [XXXX].**
- **By year [3], there should be between [5% and 25%] cover of at least [XXXX] desirable broad-leaved species.**
- By year 2, cover of bare ground should be between [5%] and [25%].
- **At full margin establishment, there should be no more than [5%] cover of undesirable species [XXXX].**

Prescriptions

- Remove any areas of soil compaction prior to establishment.
- **In the [first] agreement year, unless subject to arable flora survey requirements, [establish the following grass & wildflower seed mix XXXX or permit natural regeneration at an average width of 2 / 4 / 6 / 8 / 10 / 12 metres]. Cutting regularly in the first year of establishment may be needed to control coarse vegetation and encourage tillering.***
- **The width of the margin should be measured from [the edge of the required cross-compliance buffer zone / the current line of cultivation]. Hedges must not grow out more than 1 metre over the margin.**
- **[Mow/graze the same half/part of the margin each year before 15 June/after mid-July, and at least 75%/all of the margin after 15 September/leaving up to 25% of the margin uncut.]**
- It is permitted to graze the margin at a frequency of no more than [2 years in 10 and/or to take a hay or silage cut from the margin between 31 July and 15 September and graze the aftermath].
- **Cutting [and/or grazing] should leave a sward height of between [10cm and 20 cm]. ***
- **All [dense] cuttings must be removed.***
- **Do not apply fertilisers, organic manures or waste materials (including sewage sludge) [unless specifically agreed in writing with your Natural England contact and / or stated in a management plan / capital works programme]. *)**
- **Treatments to, or management of adjacent land, must not affect or encroach onto the area under management.**
- **Control undesirable species under guidance provided by your Natural England contact.***
- **The area must not be used for regular access, turning or storage.**

HE11 - Enhanced strips for target species on intensive grassland

Indicators of Success

- **At full crop establishment, there should be between [75% and 100%] cover of the sown species.**
- The crop should provide a sustained supply of seeds for wild birds over the winter [until 15 March].
- By the second year after sowing, the cover of desirable flowering plants (including red clover) should be frequent (as defined in the FEP Handbook) and in flower between [March and October].
- **The target [bird species XXXX] should be regularly seen using the crop.**
- **At full crop establishment, cover of bare ground should be between [5% and 25%] of the plot.**
- **[By year 3], cover of undesirable species such as [Creeping Thistle / Spear Thistle / Curled Dock / Broad-leaved Dock / Common Ragwort / XXXX] should be less than [5%].**

Prescriptions

- **In the first year under agreement, sow the following seed mix [XXXX]. ***
- **Re-establish the mixture [every 2 years / if the cover of desirable flowering plants falls below the target level]. The strip may be moved to a different location within the same field, provided the location has been agreed in writing with your Natural England contact.***
- **Do not allow the strip to be grazed [between April and September. /Protect the strip from grazing by installing temporary electric fencing].***
- **Treatments to, or management of adjacent land, must not affect or encroach onto the area under management.**
- **Control undesirable species under guidance provided by your Natural England contact.***
- Do not apply fertilisers, organic manures or waste materials (including sewage sludge) [unless specifically agreed in writing with your Natural England contact and / or stated in a management plan / capital works programme].
- Well-rotted farmyard manure may be applied at a maximum rate of [12.5] tonnes/ha/yr. [In addition/alternatively, inorganic nitrogen fertiliser may be applied at max rate of 50 kg/ha N, unless this would be higher than your existing application rate]. There must be no other application of nutrients such as fertilisers, other organic manures or waste materials (including sewage sludge). Do not apply manures or fertilisers between 1 April and 30 June (and not within 10 metres of a watercourse).

Annex 6. Current specifications for HLS capital items

Hedgerow Planting - New Hedges Specification

General
The line of the hedge must not damage sites of ecological or archaeological interest.

Ground Preparation
Before planting a new hedge prepare the ground along a 1.5m wide strip to control existing vegetation and weeds. This can be by herbicide treatment or cultivation. In organic systems, where an alternative method of ground preparation may be required, this can be agreed with your Natural England contact. Damage to other vegetation must be kept to a minimum and control must not extend beyond the strip.

Planting
Plant bare-rooted nursery stock during the winter months from November to March when the ground is not frozen or waterlogged. The plants should be at least 2-year old transplants, 450-600mm high (BS3936) and of British native origin where possible, ideally sourced locally. Planting must be in a staggered double row 30cm apart, with at least 6 plants per metre depending on the local situation. You must agree in writing the density and mix of plant species with your Natural England contact.
All failures must be replaced in the following planting season. Once planted the hedge should be maintained so there is a continuous hedgerow in good condition at the end of the agreement.

Weed Control
Until the hedge has become established the plants are to be kept clear of competitive weeds. This can be by using a suitable mulch, spot treatment with an appropriate herbicide, or hand pulling. Strimming is not recommended as it can damage the plants. Where spraying is involved you must observe the requirements of current legislation and codes of practice.

Protection
Damage by livestock and other grazing animals must be prevented. Protective fencing (on one or both sides of the hedge) or individual guards may be needed. Spiral guards and tree shelters must be adequately supported and designed to last for 5 years. They must be removed once the plants are established. Protective fencing must be set back at least 1.2m from the centre of the hedge.

Hedgerow Restoration - Gapping Up Specification (HR)

Ground Preparation
When gapping up into existing hedges, unless otherwise agreed with your Natural England contact, the gaps must first be thoroughly cleared of existing vegetation. The hedge on either side should be cut back to healthy growth.

Planting
Plant bare rooted nursery stock during the winter months from November to March when the ground is not frozen or waterlogged. The plants should be 2-year old transplants, 450-600mm high (BS3936) and of British native origin, ideally sourced locally. Planting must be in a staggered double

row 30cm apart, with at least 6 plants per metre depending on the local situation. You must agree the density and mix of plant species with your Natural England contact.

All failures must be replaced in the following planting season. By the end of the agreement there should be a complete hedge in good condition for every metre grant-aided.

Weed Control
Until the hedge has become established the plants must be kept clear of competitive weeds. This can be by using a suitable mulch, spot treatment using an appropriate herbicide, or hand pulling. Strimming is not recommended as it can damage the plants. Where spraying is involved you must observe the requirements of current legislation and codes of practice.

Protection
Damage by livestock and other grazing animals must be prevented. Protective fencing (on one or both sides of the hedge) or individual guards may be required. Spiral guards and tree shelters must be adequately supported and designed to last for 5 years. They must be removed once the plants are established. Fencing must be set back at least 1.2m from the centre of the hedge.

Hedgerow Restoration - Coppicing Specification (HR)

Coppicing is generally undertaken when a hedge stem is too thick to lay, when rejuvenation of the hedge is required or coppicing is the traditional method of management. Work should be carried out in accordance with local best practice and custom. Coppicing should be done in the winter months between mid-November and early March when the hedge is dormant. If undertaking coppicing after 1st March (the bird nesting season) you must ensure you are also meeting your obligations on the protection of birds under the Wildlife and Countryside Act 1981.

Preparation and Cutting
Before coppicing, any old fencing or wire should be removed.
The stems should then be cut down to between 7.5cm and 15cm from the ground to encourage vigorous regrowth from the base of the plant. The cuts should be angled so that water can easily run off. Elder stumps should be treated with herbicide to prevent regrowth, but a few may be left to grow back for wildlife. In organic systems control should be agreed with your Natural England contact.
Retain any hedgerow trees and where they are a characteristic feature of the landscape, saplings of suitable species should be left uncut to develop into future hedgerow trees.

Disposal of Cut Material
Cut material may need to be removed from the immediate site and disposed of by burning or chipping. This operation should only be carried out where there will be no environmental damage. Some cuttings could be placed over newly coppiced stools to prevent rabbit browsing and to leave dead wood for wildlife.

Protection
Damage by livestock and other grazing animals must be prevented. Protective fencing (on one or both sides of the hedge) may be required. Fencing must be set back at least 1.2m from the centre of the hedge.

Weed Control

Weed control should not be necessary as new growth should be vigorous and able to out-compete weeds. If weeds do threaten re-growth, the control method should be agreed in advance with your Natural England contact.

Hedgerow Restoration - Laying Specification (HR)

Laying must achieve a complete reconditioning of the hedge in which all or selected stems are partially cut near ground level, laid over at an angle of 35-45° from horizontal and tucked tightly together to form a stock proof barrier. The stems can be retained in position by staking and top-binding where appropriate in terms of local styles and tradition. Hedge laying should, where possible, always be in the same direction and hedges should not be laid downhill. Work should be carried out between late September and late April while the hedge is still dormant. If undertaking hedge laying after 1st March (the bird nesting season) you must ensure you are also meeting your obligations on the protection of birds under the Wildlife and Countryside Act 1981.

Preparation
Before laying, any old fencing or wire should be removed.

Cut and pull out bramble, clematis or other scrambling plants as these will hinder the laying process. Cut out elder plants, as these cannot be laid due to the brittleness of the stems. Treat the stumps with herbicide to prevent regrowth, although a few may be left to grow back for wildlife. In organic systems control should be agreed with your Natural England contact.

Cutting and Laying Pleachers
Usually the stems to be laid will be 5-10cm in diameter at the base, and 2.5-3.5m in height. Stems should be partially cut at ground level, bent down, and held in position by vertical stakes. However, it is possible to lay hedges (using a chainsaw) where the stems are up to 25cm in diameter. Stems larger than 25cm are best cut off completely or left to grow into hedgerow trees.

Existing hedgerow trees should be retained. Where appropriate, saplings of suitable species should be left uncut to develop into future hedgerow trees where these are characteristic features of the landscape.

Disposal of Cut Material
All cut branches should be removed from the immediate site and disposed of by burning or chipping. This operation should only be carried out where there will be no environmental damage.

Protection
Damage by livestock and other grazing animals must be prevented. Protective fencing (on one or both sides of the hedge) may be required. Fencing must be set back at least 1.2m from the centre of the hedge.

Weed Control
Check the hedge at least once during the first growing season, and take action as necessary if weeds have grown up. In particular bramble and cleavers can seriously effect the growth of a newly laid hedge.

Follow-up Management
For the first two to three years the hedge should be lightly trimmed to encourage bushy growth. Do not trim to the same point each year, instead allow the hedge to become a little taller and wider at each cut.

Planting Standard Parkland/Hedgerow Tree Specification (STT)

This item is for the planting and management of standard trees in parkland situations or in hedgerows. Planting of new trees must follow an agreed management/restoration plan.
Do not plant trees where they could damage sites of ecological or archaeological interest, either through physical damage as they grow or during removal.

Tree planting

Trees should be native species and of local provenance if available. They should be at least 1.5 m tall. Non-native ornamental or exotic parkland species may be planted provided there is a history of these species on the particular site. The species planted must be agreed with your Natural England contact.

Plant trees at sufficient spacing to allow for full crown development. When planting trees into existing hedges, plant into gaps in the hedge where there is less competition.

Plant between November and March, but do not plant into waterlogged soils or during periods of frost or drought. The tree must be pit planted with the pit deep enough and wide enough to contain the full depth and width of the root system with room to spare. The tree should be staked and tied securely, appropriate to the size and species of tree and in a manner which will not cause damage to the stem or roots. To prevent damage by wind, rubber flexible and adjustable proprietary tree ties should be used. Tree ties should be checked after periods of growth and windy weather. They should be removed once the tree is fully established and no longer requires support.

Until the trees have become established they are to be kept clear of competitive weeds. This can be by using a suitable mulch, an appropriate herbicide or by hand pulling. In all cases where spraying is involved you must observe the requirements of current legislation and codes of practice. Strimming is not recommended, as it is likely to damage trees.

All dead plants must be replaced in the following planting season and at the end of the agreement there must be a living tree in good condition for each tree grant aided.
Trees must be protected from livestock and wild mammals. Parkland guards should only be used in an appropriate setting - most commonly designed parklands - and should not be used to protect trees in hedgerows. Spiral guards and tree tubes should be adequately supported and designed to last for five years. Guards should be checked regularly and must not be allowed to cause damage to the growing tree.