

Biodiversity Enhancement Assessment

Hanley Castle & Hanley Swan



Biodiversity-friendly green space management will create habitat stepping stones for wildlife in Hanley Parish. Allowing wildflower meadows and spring bulbs to flower will provide pollen and nectar for insects, whilst planting fruit trees and berry-rich shrubs will provide food and nesting sites for insects, birds, bats, hedgehogs and amphibians.



Summary

Project code	54
Applicant	Hanley Castle Parish Council
Site location	Hanley Castle and Hanley Swan
Versions and date	22/11/2019 V1
Natural Networks Officer	Jasmine Walters
Site description	Hanley Swan and Hanley Castle are villages located in south west Worcestershire. Numerous sites within the two villages are included within the project and consist of road verges and public greenspaces. The villages are located within the Malvern Chase with Laugharne Valley Biodiversity Delivery Area, with parcels of Priority Habitats Deciduous Woodland, Traditional Orchards, Running Water (contained within Pool and Mere Brooks Local Wildlife Site (LWS)) and Ponds. Chestnuts Farm Meadows LWS is also located nearby to areas potentially included within the project. Records for the local area show it is important for Worcestershire Biodiversity Action Plan (BAP) species noble chafer beetles, great crested newts, bats, otters and ancient trees. Semi-natural habitat present within the village sites is a largely uniform composition of regularly cut grassland, occasionally planted with trees and edged by hedges. These tidy habitats lack food for foraging wildlife such as birds and insects since grassland is cut before plants within it can flower and hedgerows are cut before branches become mature enough to support an abundance of berries. Year-round shelter within hedges is also limited due to exposure to weather and predators since grassland is cut to the base of hedges and hedges are cut annually in a box shape. The formation of hedgerows and lines of trees, however, are likely to be important habitat corridors for bats with roosting opportunities located within mature trees.
Biodiversity enhancements	Recommended biodiversity enhancements aim to contribute to objectives outlined within the Malvern Chase with Laugharne Valley Biodiversity Delivery Area Statement and to individual Worcestershire BAPs. 1) Short flowering grassland 2) Meadow grassland 3) Wildlife hedgerow management 4) Tree, shrub and hedgerow planting 5) Deadwood 6) Bird boxes, bat boxes and solitary bee boxes 7) Public information Additional benefits: Wildlife friendly grassland management has the potential to reduce management costs since less regular cutting is required. Enhancing biodiversity value of public green space has also been shown to have a positive impact upon people's health and well-being. The project contributes towards achieving goals outlined in the Worcestershire Climate Change Strategy 2012-2020.
Target area	To be confirmed
Timescale	Most capital works are expected to be complete by Winter 2021.
Long-term management and monitoring	It is recommended that a 10-year management and monitoring plan is written for the site to ensure successful establishment of habitats into the future, achieved with engagement of the local community.
Things to consider	• Tree works should be preceded by a check for potential bat roosts. • Tree/shrub felling should be carried out outside the bird nesting season. • The local community and managers of individual sites should be engaged with habitat creation and long-term management of the project.
Next steps	The recommended enhancements should be discussed with the Natural Networks Officer. Following this, the project can make an application to the next available Appraisal Panel meeting in February 2020, for which this project would be required to have prepared a full application by mid-January 2020.

1. Introduction

Natural Networks

The programme is a European Regional Development Fund (ERDF) funded three-year partnership between Worcestershire Wildlife Trust and Worcestershire County Council. The programme aims to deliver direct habitat improvements through offering advice and grants.

Purpose of the report

This Biodiversity Enhancement Report forms the written advice for road verges and public green spaces owned by Hanley Parish Council, referred to collectively in this report as the “site”. This report uses information gathered from site managers, a desk study, and field surveys undertaken on 31st October 2019 by Natural Networks Officer, Jasmine Walters, to:

- Describe the current ecological baseline of the site
- Recommend biodiversity enhancement measures
- Recommend long term management and monitoring actions
- Assess the landscape scale contribution and longevity of the proposed project

Hanley Parish Council may wish to use this report to inform an application to the Natural Networks Appraisal Panel for grant funding for a biodiversity enhancement project. Worcestershire Wildlife Trust and Worcestershire County Council, the partner organisations forming the Natural Networks programme, are engaged to provide information and advice, including design advice, for this project. Recognising Construction Design Management (CDM) Regulations, we will not be undertaking the role of ‘Principal Designer’ and our recommendations are advisory only.

Limitations

A comprehensive ecological assessment of a site can only be made through multiple visits over a period of time spanning the optimal survey period. Consequently, this assessment can only be considered to provide a ‘snapshot’ of ecological interest of the site on the day of the visit, which occurred outside of the optimal survey season. The findings and recommendations outlined within this report are valid for a period of 12 months from the date of issue.

1. Site Context

General

Hanley Swan and Hanley Castle are villages located in south west Worcestershire. Numerous sites within the two villages are included within the project and consist of road verges and public greenspaces, which Hanley Parish Council wish to enhance for biodiversity. The villages are located within the Malvern Chase with Laugharne Valley Biodiversity Delivery Area, which is a priority area for delivery of the Worcestershire Biodiversity Action Plan (BAP) due to a rich mosaic of meadows, traditional orchards, wooded hills and valleys, parkland, scrub, hedgerows and veteran trees (1).

Ecology

Records of designated sites, notable habitats and species located within 0.5km of the site boundary were obtained from Worcestershire Biological Records Centre (WBRC).

The site is located within a small scale, agricultural landscape with parcels of Priority Habitat consisting of Deciduous Woodland, Traditional Orchards, Running Water along brook corridors and Ponds. A number of these habitats are designated as Local Wildlife Sites (LWS). Most notably Chestnuts Farm Meadows LWS and Pool and Mere brooks LWS are located near to some road verges which may be included within the project. A map of designated sites and habitats is shown overleaf, and further details of the designated sites are presented in Table 1.

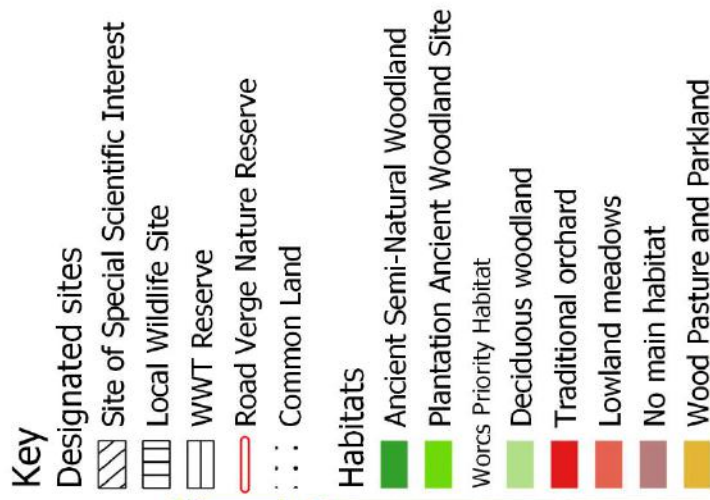
Table 1 Sites designated for biodiversity located within 1km of the site.

Designation	Site name	Features	Distance and direction from project site	Ecological connectivity to project site
LWS	Chestnuts Farm Meadows	Lowland meadow	Adjacent to road verges in Gilbert's end area	Excellent
LWS	Pool and Mere Brooks	Running water	Within 100m of some road verges	Very good via hedgerow network across farmland, with minor roads located between sites.
LWS	River Severn	Running water	Over 450m east of some road verges	Good via hedgerow network, with minor roads and agricultural fields located between sites.

Ancient trees in the area are well recorded and include a few oak trees (such as on Hanley Swan village green) and a common lime tree next to the pumphouse at Hanley Castle. Notable plants recorded on Hanley Swan village green include blinks, knotted clover, early hair grass and Smith's pepperwort. All are typical of low nutrient soils.

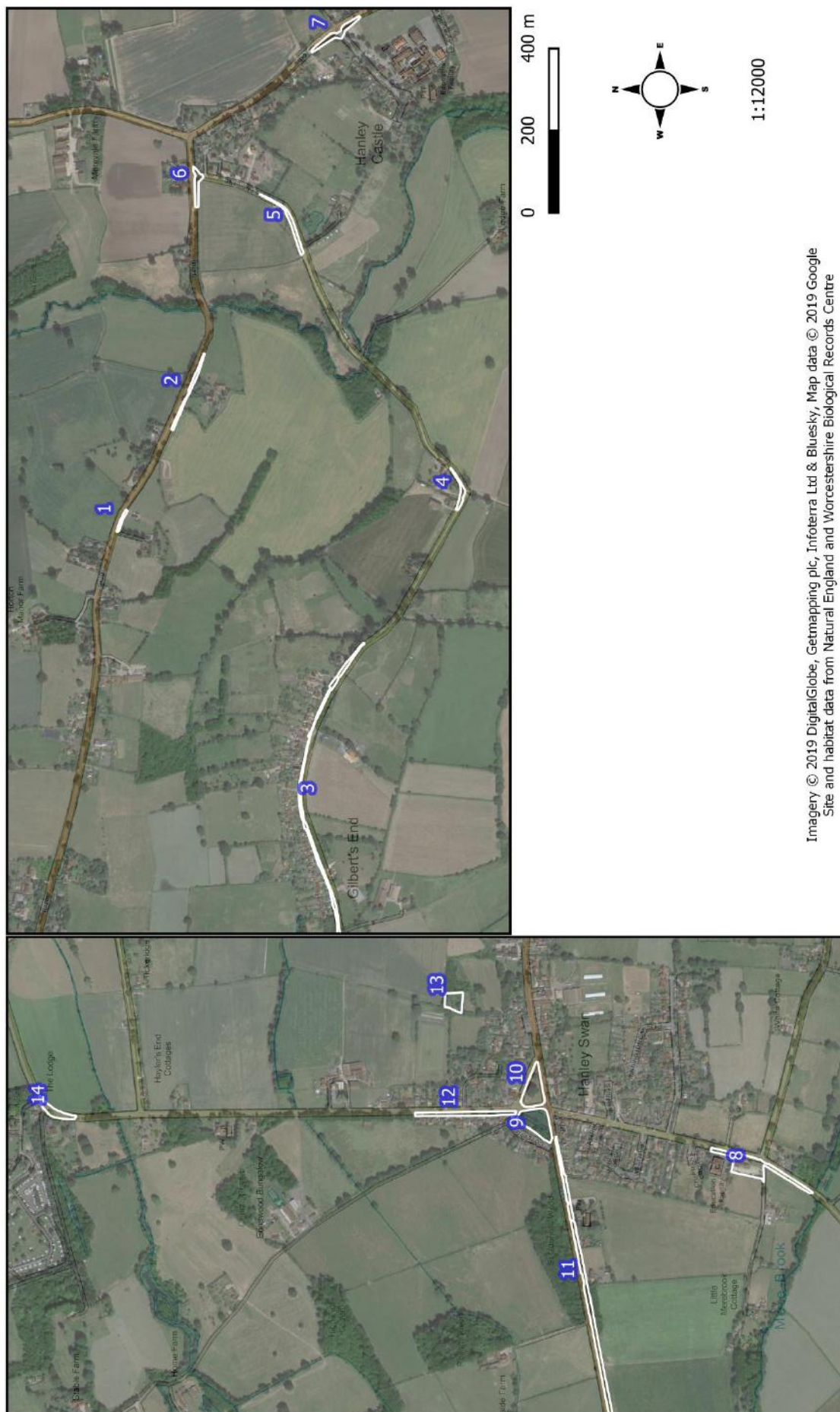
A small number of notable invertebrates are recorded in the area, including moth species figure of eight and sprawler. Great crested newts and grass snake have been recorded within 150m-450m of Hanley Swan village green and pond. Notable birds recorded in the area include spotted flycatcher, mistle thrush, song thrush, starling, house sparrow and barn owl. Bat species recorded in the area are diverse, comprising common pipistrelle, soprano pipistrelle, whiskered bat, serotine, noctule, barbastelle, Natterer's, lesser horseshoe and brown long-eared. Badgers and hedgehogs are recorded frequently in the two villages, and brown hares are seen occasionally in surrounding farmland. Otters have been recorded in association with the Pool and Mere Brooks LWS, a brook network which spans between the two villages.

Note: To increase the holding of biological records for the area, records of species and habitats can be submitted to Worcestershire Biological Records Centre <http://www.wbrc.org.uk/WBRC/records.html>



2. Existing Biodiversity

Field surveys were undertaken following standardised guidelines within the Handbook for Phase 1 Habitat Survey (2). The resulting habitat descriptions are presented below and a species list is located within Appendix 2.



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 Site and habitat data from Natural England and Worcestershire Biological Records Centre

Habitat assessment

Photos of individual sites chosen by Hanley Parish Council for the project are given in Table 2, alongside a description of habitat and management if the road verge was surveyed on foot. At a later stage of the project, Worcestershire Wildlife Trust are available to re-visit any specific sites as project plans develop.

In general, grassland across road verges and village green sites is regularly mown to a short height of 3cm, with clippings left in place. Species diversity of grassland is reasonably high for a short-mown sward, indicating low nutrient levels within the soil. Species recorded at the time of survey include common daisy, yarrow, perennial rye-grass, common cat's ear, ribwort plantain, white clover, salad burnet, ox-eye daisy, self-heal, black knapweed, cowslip, common sorrel, agrimony, red fescue, and creeping buttercup. Trees present within the sites are mostly mature, and some are ancient such as the oak located within Hanley Swan village green and lime trees adjacent to the pumphouse in Hanley Castle. Hedgerows are generally not rich in native woody species, with predominant presence of hawthorn and occasional standard ash trees.

Personnel who carry out management of the sites varies, with grass cutting often carried out by the resident or contractors, and hedgerow cutting carried out by the adjacent landowners.

Table 2: Habitat description for select sites within the project area

Site 1 (*Fortey Green road verge*)



Site 2 (*B4209 road verge*)



Site 3 (*Gilbert's End houses*)



Site 4 (Gilbert's End Farm)



Site 5 (Gilbert's End Lane)



Site 6 (Pumphouse)

A verge with an old pumphouse is occupied by grassland, mature lime trees and a hedgerow. Grassland is short with presence of a diverse range of common and competitive species, including salad burnet, ox-eye daisy, self-heal, black knapweed, common sorrel, agrimony and red fescue. The hedgerow is bordered by a 1m strip of tall grassland with presence of common nettle, bramble, hogweed, cow parsley, common couch, cleavers and false oat-grass. The young hawthorn hedgerow is closely clipped to 1m height and 0.5m width.



Site 7 (Hanley Castle High School)

Grass verges are used to park vehicles. Grass verges are cut by a local resident and highways cut a 1m strip adjacent to the road. A sweet chestnut and spindle tree have been planted on the verge, and a hawthorn hedgerow borders the east edge with occasional mature ash and sycamore trees. The hedgerow is cut to 2m height and 1m width and is situated upon a bank. Grassland is cut to a height of 3cm, and supports a moderately diverse flora which includes common daisy, yarrow, perennial rye-grass, white clover, ribwort plantain, dandelion, common cat's-ear, self-heal, red fescue, salad burnet and red clover.



Site 8 (Village Hall)

A hard-surfaced car parking area surrounds the entrance to the village hall building, edged by short mown grassland and planted horse chestnut, whitebeam, alder and cherry trees. The rear of the building is occupied by short mown grassland and play equipment, and a hawthorn hedgerow with occasional ash trees lies between this area and the road verge. The road verge is also occupied by short mown grassland, with presence of species such as creeping buttercup, common daisy, perennial rye-grass, yarrow, dandelion, common cat's-ear, ribwort plantain, ground ivy and cowslip.



Site 9 (Swan Pond)

The pond is managed by a community group. Ducks are housed on an island in the centre. The margin is lined with patchy emergent vegetation, such as yellow iris, reedmace and hairy sedge, and the west and south bank has been stabilised (preventing erosion) by planted willows.

Grassland around the pond is regularly mown short, and the east bank is shadowed by mature oak trees.



Site 10 (Hanley Swan Village Green)

A large ancient oak tree dominates the village green area, and a younger oak tree (approximately 20 years old) has been planted nearby. Grassland occupies the remaining area of the green and is regularly mown to a short height and clippings left in place. Some areas of the green are reported to lie wet at times of heavy rainfall.



Site 11 (St Gabriel's Wood road verge)



Site 12 (Hanley Swan Road)



Site 13 (Community Orchard)

A traditional orchard of mature fruit trees is managed by a community group. Underlying grassland is managed as a hay meadow, where it is cut in late summer and the cuttings are taken away. A beehive and hedgehog house are also present.



Habitat quality for fauna

Further research is required into the negative effects which roads may have on wildlife, such as fatalities from collision with vehicles and inhospitable habitats forming a barrier to movement (3). However, given the right habitats, road verges and public green spaces have the potential to act as a network of vital corridors or stepping-stones along which wildlife can live and disperse.

As evident from photos, semi-natural habitat upon the surveyed road verges and public open space is a largely uniform composition of short mown grassland, occasionally planted with trees and edged by hedges. This uniformity, achieved by regular cutting of grassland and hedgerows, limits provision of:

- Flowers within grassland and berries/nuts within hedges. All these resources are important for foraging wildlife, ranging from birds to insects.
- Shelter for wildlife to breed and rest within. Grassland is often cut short up to the base of the hedge, although where it is present (such as where a 1m strip of grassland has been left to grow tall at the base of the Pumphouse hedgerow), longer grass protects the hedgerow base from wind and rain, and sheltered crevices at the base of grass tussocks can be found by insects, amphibians, reptiles or small mammals. Thick bushy hedgerows also provide cover for nesting birds, unlike the locally common hedgerows which are cut annually in a box shape.

Hedgerows and trees within the two villages will also be important habitat corridors for bats when travelling across the landscape to roost and forage.

3. Biodiversity Enhancements

Aspirations

Current management of verges and public green space has primarily focused on safety and creating a 'neat and tidy' appearance. This has generated verges which do not fulfil their potential as wildlife corridors. Recommended biodiversity enhancements aim to contribute to objectives outlined within the Malvern Chase with Laugharne Valley Biodiversity Delivery Area Statement, such as integration of species-specific conservation measures (e.g. for noble chafer) into delivery of habitat enhancement actions.

Additional benefits

Recommended wildlife friendly grassland management has the potential to reduce management costs since less regular cutting is required. Enhancing biodiversity value of road verges elsewhere has also been shown to have a positive impact upon people's health and well-being, and for the first time public opinion has shifted away from calls for a 'neat and tidy' appearance towards calls for reduced cutting of road verges to benefit wildlife (4). Habitat creation and restoration can perform functions such as storage of carbon and improvement of air and water quality. As such, the project contributes towards achieving goals outlined in the Worcestershire Climate Change Strategy 2012-2020 (5).

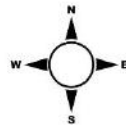
Table 3 Summary of recommended biodiversity enhancements, corresponding to example concept maps overleaf. Suggested target location and area (hectares) of enhancements is derived from professional assessment of the site and aims to maximise ecological opportunities balanced with ongoing site use. **Additional locations may also exist and will be considered as they come forward.**

Recommended biodiversity enhancements	Target location
1) Short flowering grassland Some areas of road verge and public open space require regular short mowing to maintain key sight lines and create a tidy aesthetic appearance with a 'village feel', helping to slow down motorists passing through the villages and reducing behaviour such as littering. Managing short grassland on existing banks also provides ideal sunny warm conditions for plants and invertebrates. Allowing this grassland to grow to 15cm before cutting will enable plants to flower whilst still being neat and tidy, and diversity of flowers can be added by seeding and planting a variety of low growing plug plants and bulbs which flower throughout spring, summer and autumn. This will provide a foraging resource for pollinating insects.	• All road verges (especially those immediately adjacent to residential properties) • Pond and Village Green • Village Hall
2) Meadow grassland Creating wildflower meadows upon wider road verges and village greens will provide food and shelter for a range of wildlife, such as pollinating insects, slow worms, birds and small mammals. Wildflower meadow management also has the potential to look appealing to residents and will act to gradually decrease vigour of grass growth, and hence the management burden of green spaces.	• All road verges (where wide enough) • Pond and Village Green • Village Hall
3) Wildlife hedgerow management Hedgerow longevity and habitat suitability for a range of wildlife species can be enhanced by entering hedges and their trees into a wildlife-friendly management cycle. A margin of tussocky grassland at the base of a hedge will add an undisturbed, sunny, year-round habitat for wildlife which is particularly useful when adjacent meadow or short grassland has been cut.	• All hedgerows (where landowner can be influenced)
4) Tree, shrub and hedgerow planting Worcestershire priority habitat Traditional Orchard is present within the area. Planting additional fruit trees will create stepping-stone habitat for wildlife, such as Worcestershire BAP species noble chafer beetle. Hedgerows are also a Worcestershire priority habitat, so new hedgerows should be planted where feasible to create habitat corridors. Gaps within existing hedgerows should be closed by planting with berry-bearing shrubs.	• All hedgerows (where necessary) • Village Hall
5) Deadwood Any suitable deadwood which arises from tree management should be retained to provide habitat for invertebrates which breed within decaying wood and to deliver hibernation crevices for amphibians etc.	• All hedgerows • Pond
6) Bird boxes, bat boxes and solitary bee boxes The number and diversity of cavities for wildlife to rest and breed in can be increased by adding purpose-built boxes in suitable locations.	• Orchard • Village Hall • Any mature trees
7) Public information Implementing a public engagement programme is key to success of this project, which spans the area of two villages, involves various site managers, and often takes place on people's doorsteps. To involve people with the project, a community group could be formed and information distributed throughout the project area e.g. through leaflets, websites and interpretation panels. <i>Note – Public interpretation materials are eligible for funding, but only up to a value of 20% of the total project cost.</i>	• Pond and Village Green • Village Hall • Outside schools/other public buildings
Total area enhanced (ha) = to be confirmed at later stage of project	

Recommended biodiversity enhancements outlined in Table 2 have been demonstrated in concept maps for a number of example sites, presented overleaf. Recommendations can be applied to additional sites when preparing a project application.



- Key**
-  Hedgerow base
 -  Meadow grassland
 -  Short flowering grassland
 -  Road verge margin
 -  Hedgerow management
 -  Existing tree



0 10 20 m

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- Key**
-  Meadow grassland
 -  Short flowering grassland
 -  Woodland and deadwood habitat
 -  Existing tree
 -  Bat box group
 -  General bird box
 -  Tree and shrub planting



0 10 20 m

1:700

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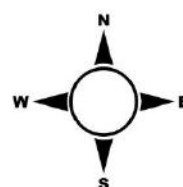


Hanley Parish Council

Example Biodiversity Enhancement Concept Maps

Key

-  Hedgerow base
-  Meadow grassland
-  Short flowering grassland
-  Road verge margin
-  Hedgerow creation
-  Hedgerow management
-  Existing tree
-  House sparrow terraces
-  Tree and shrub planting



1:900

0 10 20 m



Recommended methods

The methods described below can be used to achieve recommended biodiversity enhancements. All works are expected to be undertaken by a contractor appointed by the applicant.

1) Short flowering grassland

Seeding

Some areas of grassland will not require seeding, since a moderate diversity of short flowering species is already present (such as red clover, common daisy and common cat's ear) and if allowed to grow taller would readily flower. For grassland which is poorer in floral diversity, seed can be added.

To prepare grassland for seeding, the sward should be cut as short as possible (with arisings removed) in March - April and harrowed to produce 50% of bare ground in patches with 15cm diameter. This is essential to ensure seed will make contact with soil. Seed can then be broadcast at an approximate sowing density of 3-4g per m². Bulking seed with an inert biodegradable material, such as sand, can help achieve an even distribution. Following seeding, the area should be lightly rolled or trodden to help seed come into contact with soil. Seed mixes should contain only native species and be produced preferably using peat free and organic methods. Species within the seed mix must only be low growing, and could include:

Bird's-foot trefoil *Lotus corniculatis*

Red clover *Trifolium pratense*

Self-heal *Prunella vulgaris*

Autumn hawkbit *Scorzoneroides autumnalis*

Black medick *Medicago lupulina*

Common field speedwell *Veronica persica*

Common cat's-ear *Hypochaeris radicata*

Plug planting

Wildflowers which are difficult to establish from seed (such as Bugle *Ajuga reptans*, cuckooflower *Cardamine pratensis* and cowslip *Primula veris*) could be planted in March - April as 'plugs', which are ready grown young plants. Plants should be native species and preferably grown using peat free and organic methods. Plug plants should be watered before planting and watered after planting if plants show signs of drought stress during the initial period of root establishment. Plugs should be planted with a spacing of 30-60cm within drifts of individual species to give a natural appearance, and species should be located according to their habitat preferences (i.e. wet and dry soils). For example, cowslips can be planted on dry well-drained hedge banks and cuckooflower and bugle can be planted on wetter ground, such as hollows on the village green. The grassland sward should be kept short during the first spring and summer to help establishment and must be protected from rabbits if known to be present.

For further information, see Natural England Technical Note TN0065:

<http://adlib.everysite.co.uk/resources/000/107/688/TIN065.pdf>

Bulb planting

Spring bulbs can be planted in single species drifts to give a natural appearance, at a planting density recommended by the supplier (usually 10-20 bulbs per m²). Planting can be carried out during the autumn/winter months when plants are dormant and less likely to suffer from drought. Due to possible presence of rabbits and deer they must be protected from grazing during establishment. Species should be native and produced preferably using peat free and organic methods. Suitable species include:

English bluebell *Hyacinthoides non-scripta*

Snowdrop *Galanthus nivalis*

Lesser celandine *Ranunculus Ficaria*

Early crocus *Crocus tommasinianus*

Wild daffodil *Narcissus pseudonarcissus* subsp. *pseudonarcissus*

Wood anemone *Anemone nemorosa* – as rhizomes

Management

During the flowering period of spring bulbs, cutting should be delayed until flowering has finished and leaves have turned yellow. Thereafter, the sward can be cut whenever it reaches 15cm height, or

around every 4 weeks. This action will allow other plants to flower and will retain flowers for as long as possible for insects. Cuttings should be collected using cut and collect machinery or raked off by hand in order to remove nutrients in the soil and promote establishment of a greater range of wildflowers. Removing cuttings will also prevent build-up of a thatch layer of dead grass.



Example of spring flowering bulbs within short grassland



Example of low growing wildflowers within short grassland

2) Meadow grassland

Seeding

Areas of road verges where meadow grassland can be maintained at heights of approximately 30-40cm include wider road verges and grassland within the Village Green and Village Hall. Meadow grassland can be created by either allowing already diverse grassland to grow tall and flower or introducing more nectar-rich native wildflower species by seeding. Grassland within the parish (such as nearby to the Pump house) exhibits a moderately diverse flora, indicative of low nutrient soils. Therefore, a number of meadows created without prior seeding could be trialled to determine the response of existing ground flora.

To prepare the verge for seeding, in spring or autumn months the sward should be cut as short as possible (with arisings removed) and harrowed to produce at least 50% of bare ground in patches of around 15cm in diameter. This is essential to ensure seed will make contact with soil. Seed can then be broadcast at an approximate sowing density of 3-4g per m². Bulking seed with an inert biodegradable

material, such as sand, can help achieve an even distribution. Following seeding, the area should be lightly rolled or trodden to help seed come into contact with soil. A seed mixture which would be suitable for the site includes Emorsgate Seeds mixture EM2 General purpose meadow mixture, which includes the following competitive species:

Meadow vetchling *Lathyrus pratensis*

Lady's bedstraw *Galium verum*

Ox-eye daisy *Leucanthemum vulgare*

Bird's-foot trefoil *Lotus corniculatis*

Red clover *Trifolium pratense*

Self-heal *Prunella vulgaris*

Yellow rattle *Rhinanthus minor* - This species is parasitic upon vigorous grasses, so is a useful tool to hamper their growth and promote growth of flowers. NOTE - Yellow rattle must only be sown during autumn months since it requires prolonged chilling over winter to germinate.

Further information about meadow ground preparation, sowing and management can be found on the Emorsgate website: <https://wildseed.co.uk/page/sowing-and-aftercare>

Seed which is of UK native origin should be sourced, in line with Plantlife guidelines:

<https://www.plantlife.org.uk/uk/our-work/publications/keeping-wild-wildflower>

Annual management

Wildflower meadows must be cut once per year after plants have flowered and set seed, and cuttings must be removed. This action reduces vigour of grasses and competitive species, so prevents them from smothering growth of wildflowers. Fertilisers (or pesticides) must never be applied to any habitat for this reason. Visual interest and structural variation for wildlife can be created by mowing the edge of the meadow in a wavy line, or by cutting short mown paths through the meadow areas.

First year management aims to help annual and perennial seedlings establish.

- Spring sowing - If the meadow mixture seed is sown in spring and sowing of yellow rattle delayed until autumn, cut the meadow sward throughout the growing season (April – September) at 5-10cm and remove the arisings. This will hamper vigorous grasses and weeds from smothering seedlings of perennial species as they develop.
- Autumn sowing – Once yellow rattle has been sown (or if all seed is sown) in autumn months, the following actions should be carried out over the following growing season. Cut the meadow sward in April above young annual plants (above approx. 10cm height) and remove cuttings. Delay further cutting until annual plants have flowered and set seed (around late-July or when yellow rattle seed pods turn brown and rattle when shaken). From late July and onwards over winter, cut the meadow regularly to a height of approximately 5-10cm to keep fast growing weeds at bay and remove arisings.

Long-term management mimics traditional hay meadow management once seed has been sown and has established.

- Check during summer months if weed control is required (e.g. docks and thistles).
- Cut sward once annually after plants have set seed (usually between late July and September). Allowing plants to flower throughout summer will ensure they set seed for establishment in subsequent years and provide a prolonged foraging resource for insects and summer habitat for wildlife such as slow worms. Ideally, stagger the cut in sections from late July to September to favour both early and late flowering species.
- Optional additional cutting to 5cm height can be implemented between September – April. This will act to control growth of weeds and will maintain a neat and tidy appearance.
- Collect and remove arisings after every cut. This acts to remove biomass and the nutrients they contain away from the meadow and reduces the layer of dead grass which may smother germinating seeds or prevent them from reaching the soil when shed.

It should also be noted that creation of a species-rich meadow is a long-term vision, dependent upon long term and regular repeated management. Depending on a site's individual environmental conditions (such as soil nutrient content), it may take as long as 10 years to develop a species-rich meadow. However, a sequence of competitive wildflowers can be observed over a meadow's early life which will

be of value to a myriad of wildlife species. For example, many new meadows become dominated by ox-eye daisy for a few years, a bright colourful flower attractive to hoverflies.



Example of a meadow within Worcestershire

3) Wildlife hedgerow management

Hedgerow cycle

An appropriate hedgerow management cycle promotes longevity of a hedgerow for centuries and promotes a thick dense hedgerow of benefit for all wildlife. The hedgerow grows for 20-40 years, before the clock is re-set by coppicing or laying to rejuvenate the hedge, as demonstrated by the diagram below. Ensuring hedgerows in a site are at different stages of the cycle results in a diversity of hedgerow structures, which will benefit a diversity of species.

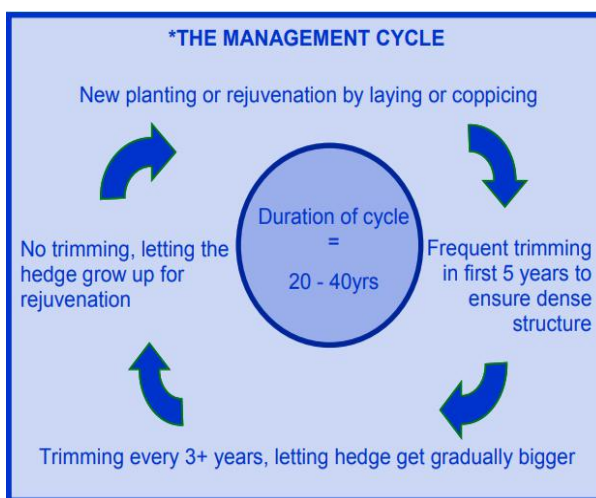
Trimming should be carried out only every 3-5 years. This allows branches to mature enough to grow an abundance of berries and nuts and provide a place of shelter for wildlife. Cutting should be carried out on an annual rotation, so that only a small length of the total length of hedgerows within the area are cut in a single year. Cutting hedgerows in an 'A' shape also promotes warm sunny hedgerow faces, and shelter for wildlife within.

Growth phase:

Allow close-clipped hedgerows to gain height incrementally by increasing the cut height by a couple of inches at every cut until the hedgerow reaches 3m in height. Increasing the height over 10 years or so allows it to be rejuvenated by laying, a management intervention which promotes dense multi-stemmed growth at the hedgerow base and production of flowers, fruits and nuts. Significant gaps can be planted up.

Rejuvenate phase:

Outgrown hedgerows if left unmanaged will grow into a line of trees with no basal shrub growth, which makes a poor boundary and provides less habitat for wildlife. Suitable shrubs should be coppiced or layed to stimulate multi-stemmed growth at the base, the canopy height of developing standard trees should be raised to allow growth of shrubs below, and new shrubs can be planted into gaps.



The Hedgerow Management Cycle © Hedgelink

Hedgelink's 'Hedgerow Management Cycle' should be used for further guidance:

http://www.hedgelink.org.uk/cms/cms_content/files/78_hedgelink_a5_12pp_leaflet_7.pdf

Hedgerow base

A tussocky grass margin should be left at the base of hedgerows where appropriate to provide year-round shelter for wildlife. It is created by simply reducing the cutting regime of a grassland strip adjacent to the hedgerow and allowing vegetation to grow over long periods of time (2-5 years). When tussocky grassland is cut, the cuttings should ideally be removed. The margin can vary in width (aim for minimum 0.5m width) and can be cut in a wavy line.



Example of existing tussocky hedgerow base at Site 6, nearby to the Pumphouse.

4) Tree, shrub and hedgerow planting

Hedgerow creation

A new hedgerow can be planted at the village hall, adjacent to the playing field. Two parallel lines spaced approximately 40-50cm apart can be planted with whips every 20-30cm, arranged in a zig-zag pattern across the two lines. Shrubs should be planted in small single species groups to give a natural appearance and reduce competition between species. Planting can be carried out during the autumn/winter months when plants are dormant and less likely to suffer from drought, and due to potential presence of deer and rabbits they must be protected from grazing. The planted shrubs should reinforce existing landscape character and be of UK native provenance.

Shrubs and trees should be sourced from a supplier that produces stock organically and with peat-free compost. Species which would be suitable for hedgerow planting include:

Hawthorn *Crataegus monogyna*
Oak *Quercus robur*
Hazel *Corylus avellana*
Holly *Ilex aquifolium*
Yew *Taxus baccata*
Pear *Pyrus domestica*
Apple *Malus domestica*

Crab apple *Malus sylvestris*
Plum *Prunus domestica* spp.
Rose *Rosa* spp.
Blackthorn *Prunus domestica*
Ivy *Hedera helix*
Honeysuckle *Lonicera periclymenum*

The hedgerow base can also be planted with native spring flowering bulbs, listed in recommendation 1) Short flowering grassland – bulb planting.

During the first year of establishment, maintaining an organic mulch layer, for example bark, at the base of the shrubs will prevent competitive growth of weeds and will reduce moisture loss. Whips which have failed to establish should also be replaced at this stage. In the first spring, cut the shrubs down to 45–60cm above the ground to encourage shrubs to bush out, helping to create a thick hedge.

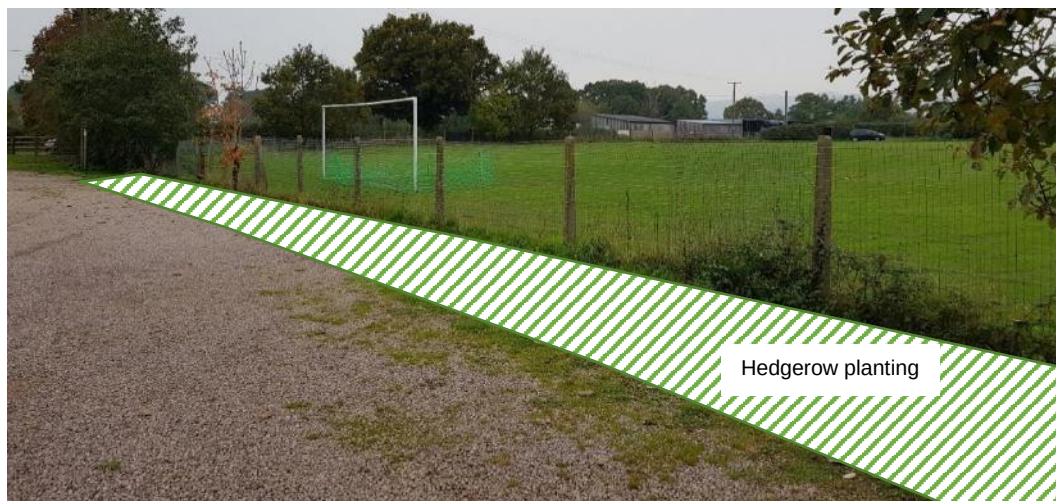


Diagram to demonstrate suggested location of hedgerow planting

General planting

Where space allows, trees and shrubs which have value for wildlife can be planted. Including fruit trees will help create habitat stepping-stones for noble chafer between known old traditional orchards in the wider landscape. Planting guidance outlined above for hedgerows can be followed. All stock purchased should be of UK native provenance and preferably grown using peat free and organic methods.

Woodland Trust tree planting website pages can be consulted for further information:

<https://www.woodlandtrust.org.uk/plant-trees/advice/how-to-plant/>

5) Deadwood

A few trees next to the pond may have to be felled due to hazards the roots pose to adjacent buildings. If this is necessary, it is recommended that deadwood habitat is created as a result of the work rather than felled material being removed from site and stumps ground down.

If a tree is felled, all wood should be retained on site as large pieces and used to make log piles, ideally situated on the same site as the tree and at a sunny south facing woodland margin. Alternatively, Growth of a tree can be stopped by crown removal/ring barking. This option has the benefit of resulting in standing deadwood habitat where roots and a vertical trunk are left in place. Bats and cavity nesting birds can make use of rot holes in the trunk and invertebrates can complete lifecycles within deadwood with the necessary various temperatures and rot. The vertical trunk should be left as tall as possible or cut to chest height if its location may be hazardous to houses and people.



Above: Example of large wood logs piled at a sunny woodland edge

Right: Example of vertical standing deadwood habitat, covered in ivy for added wildlife habitat



6) Bird boxes, bat boxes and solitary bee boxes

It is recommended that all boxes purchased are constructed from woodcrete or similar material because they have a much longer lifespan, better insulating properties, and provide better protection from predators.

Bats and birds

Boxes suitable for bat species such as pipistrelles, noctule and serotine can be installed on suitable mature trees. It can be helpful to group boxes and install them facing various positions to increase the likelihood of bats taking up residence at that location. Boxes should be sited to avoid direct lighting upon the box and the entry/exit flight path, and in a sheltered sunny position more than 4m above ground.

Naturally occurring nesting and roosting sites for barn owls are often limited in the countryside. A barn owl box could be fixed to a suitable mature tree at a height of over 3m, nearby to areas of rough grassland, distant from roads, with access unobstructed by overhanging branches and directed away from prevailing wind. House sparrows can thrive if suitable nesting locations and food resources are present. To aid availability of nesting locations, house sparrow terrace boxes should be installed on the village hall building, above reach of people. Other bird boxes suitable for general use can be fixed to suitable mature trees across the site.

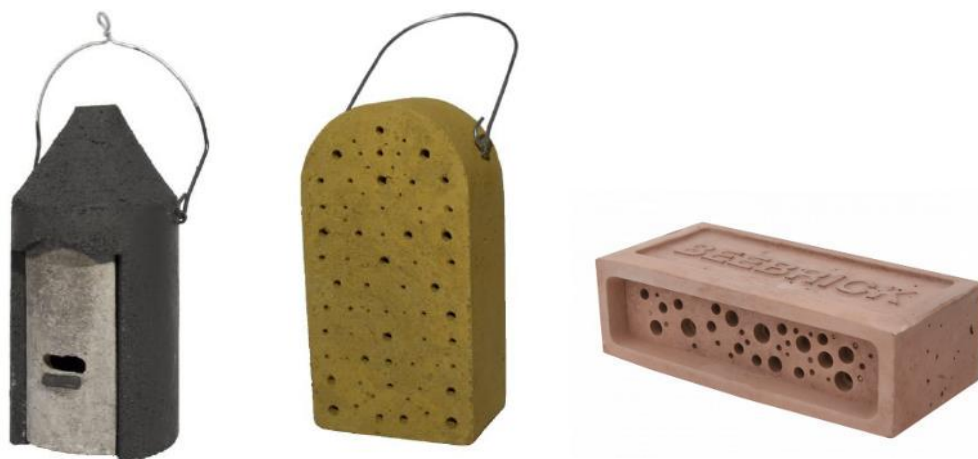
Further information for wildlife boxes can be found at:

<https://cdn.bats.org.uk/pdf/Bat-Box-Information-Pack.pdf?mtime=20181101151309>

<https://www.barnowltrust.org.uk/barn-owl-nestbox/owl-boxes-for-trees/>

Solitary bees

Solitary bees are wild species of bee which are not aggressive since they do not have a queen, hive or honey to protect. Each bee nests within an individual hole, which for some species can be provided in the form of drilled blocks, or bee bricks. Since fruit within the orchard is dependent upon pollination by such bees, an ideal location to place a box would be the community orchard. The box should be placed in a warm sunny spot which is south facing, at a minimum height of 1m and with no vegetation obstructing the holes. Bees' use of the structures will depend upon food sources in the surrounding area, so an abundance of flowers within the vicinity of the box will be important. Uptake of the boxes by bees may vary year to year depending upon parasite and disease presence, but such fluctuations can be regarded as part of natural cycle and cleaning is not necessary.



Example of woodcrete bat box, solitary bee nesting block and Bee Brick available from suppliers such as NHBS

<https://www.nhbs.com/4/practical-conservation-equipment>

7) Public information

Due to the collective nature of this project which spans the area of two villages and takes place often on people's doorsteps, a successful community engagement programme will be essential to its success. Each habitat enhancement can be delivered with involvement of the community through actions such as:

- Formation of a volunteer action group who lead and champion the project
- Engagement with adjacent landowners and framing the project's message based upon a 'habitat network', where for example each grassland verge outside every house has a role to play within the project for wildlife.
- Supply of a habitat management leaflet (or similar) to each person who carries out management of the verges and hedgerows.
- Organisation of community planting days for bulbs, plug plants, trees and wildflower seeds
- Organisation of community management days for wildflower meadow management

Permanent interpretation boards could also be installed at key locations, such as the village hall, schools and village green. Panels can be designed with information about the habitats and wildlife which can be found within them, helping people to understand and value the aims of the project.

Project timeline

Table 4 Suggested timeline for grant funded biodiversity enhancements. (Note – timing of some recommendations is seasonally constrained, e.g. for wildlife legislation reasons outlined in Section 6).

- 1) Short flowering grassland
- 2) Meadow grassland
- 3) Wildlife hedgerow management
- 4) Tree, shrub and hedgerow planting
- 5) Deadwood
- 6) Bird boxes, bat boxes and solitary bee boxes
- 7) Public information

Public information												
2020-2021	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
	1 & 2) Wildflower seeding		2) Regularly cut meadow areas to 5-10cm				2) Wildflower seeding of yellow rattle					
			1) Regularly cut short flowering grassland when a height of 15cm is reached									
	1) Plug planting								1) Bulb planting			
									3 & 5) Tree and hedgerow management			
									4) Tree and shrub planting			
	6) Install bat boxes, bird boxes and solitary bee boxes											
	7) Public information											

4. Long-term management and monitoring

Table 5 Suggested annual calendar for long-term management of biodiversity enhancements

March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Allow bulbs in short flowering grassland to finish flowering			Regularly cut short flowering grassland to 15cm height and remove cuttings								
Cut meadows to 5cm height <i>if needed</i> and remove cuttings		Leave meadows uncut			Cut meadows and remove cuttings		Cut meadows to 5cm height <i>if needed</i> and remove cuttings				
					Cut hedgerow grass base every 2-5 years and remove cuttings				Trim hedgerows every 3-5 years		
									Rejuvenate hedgerows every 20-40 years		
Annual check for good condition (and identification of remedial actions if needed) of planted trees, shrubs and bulbs, meadows, wildlife boxes, deadwood and information signs.											

A long-term management plan ensures successful establishment of habitat enhancements and their survival beyond the life of the project. Including monitoring actions within the plan will also inform management decisions and identify remedial actions where needed. Therefore, it is recommended that a 10-year plan is produced which includes the following information:

- Long-term vision for the project
- Description of biodiversity interest
- Maps of habitat management compartments and public access routes
- Management schedule and strategy
- Monitoring schedule and strategy
- Roles and responsibilities

The Natural Networks team is entitled to carry out any additional monitoring at the site after successful claim of the grant, as and when may be required by the programme.

5. Things to consider

It is imperative for biodiversity enhancement projects to ensure their impact on the environment is wholly positive. To do this consideration must be given to the need for consents from statutory bodies, compliance with wildlife law, and the need for further assessment of sites prior to work.

Considerations (not exhaustive) specific to this site include:

- All species of bat are European Protected Species. To avoid harm, tree works should be preceded by a check for likely bat roost features by a suitably qualified professional and next steps informed by the professional. Mature trees with potential roost features should remain undisturbed during enhancement activities.
- Nesting birds are protected by the Wildlife & Countryside Act 1981. Tree/shrub coppicing and felling should be carried out outside of the bird nesting season, which is typically February – August inclusive.
- Engagement of the local community and managers of individual sites will be important to the success of the project and its long-term management.

Pre-payment monitoring

Upon completion of works a Natural Networks Officer will carry out a site visit to check enhancements are in accordance with the full application approved for a grant. Enhancement work can be split into appropriately timed annual checks throughout the duration of the project. If work is found to be completed to an unsatisfactory standard or incomplete the grant cannot be claimed until remedial works are undertaken by the applicant.

6. Next steps

Enhancements should be discussed with the Natural Networks Officer. Following this, Hanley Parish Council would be welcome to apply for a grant from the Natural Networks programme for the recommended enhancements. A full application can be prepared for the next available Appraisal Panel meeting in February 2020, for which this project would be required to have prepared a full application by mid-January 2020. Any enhancement work carried out prior to a grant approval will not be eligible for funding.

References

- (1) Worcestershire Biodiversity Partnership (2018). Malvern Chase and Laugharne Valley Biodiversity Delivery Area. Worcestershire County Council, Worcester. Available at: http://www.worcestershire.gov.uk/downloads/download/1087/biodiversity_delivery_area
- (2) Joint Nature Conservancy Council. (2010). Handbook for Phase 1 habitat survey. London: JNCC.
- (3) Roberts & Phillips (2019). Road verges and their potential for pollinators: A review of the costs, benefits and management options. Buglife, Peterborough.
- (4) Bromley, J., McCarthy, B. & Shellswell, C. (2019). Managing grassland road verges: a best practice guide. Plantlife. Available at: https://www.plantlife.org.uk/application/files/9415/6954/1807/Managing_grassland_road_verges.pdf
- (5) Worcestershire Partnership Climate Change Group (2012). Worcestershire Climate Change Strategy 2012-2020, Worcestershire.
- (6) Worcestershire Green Infrastructure Partnership (2013). Green Infrastructure Strategy 2012-2018. Worcestershire County Council, Worcester.

Appendix 1

Species recorded within 0.5km of the site boundary by Worcestershire Biological Records Centre (as of 2019)

Order	Scientific Name	Common Name	Status
amphibian	<i>Triturus cristatus</i>	Great Crested Newt	WCA NERC s.41 UKBAP ECH4 WorcBAP
bird	<i>Passer domesticus</i>	House Sparrow	NERC s.41 UKBAP Bird:Red
bird	<i>Sturnus vulgaris</i>	Starling	Bird:Red
bird	<i>Turdus philomelos</i>	Song Thrush	Bird:Red
bird	<i>Turdus viscivorus</i>	Mistle Thrush	Bird:Red
bird	<i>Muscicapa striata</i>	Spotted Flycatcher	NERC s.41 UKBAP Bird:Red
bird	<i>Tyto alba</i>	Barn Owl	WCA
flowering plant	<i>Aira praecox</i>	Early Hair-grass	Locally Nb
flowering plant	<i>Cardamine impatiens</i>	Narrow-Leaved Bitter-Cress	Locally Nb Nationally Scarce
flowering plant	<i>Montia fontana</i>	Blinks	Locally Nb
flowering plant	<i>Achillea ptarmica</i>	Sneezewort	Locally Nb
flowering plant	<i>Ranunculus parviflorus</i>	Small-Flowered Buttercup	Locally Nb
flowering plant	<i>Carpinus betulus</i>	Hornbeam	Locally Nb
flowering plant	<i>Trifolium striatum</i>	Knotted Clover	Locally Nb
flowering plant	<i>Berula erecta</i>	Lesser Water-parsnip	Locally Nb
flowering plant	<i>Cirsium eriophorum</i>	Woolly Thistle	Locally Nb
flowering plant	<i>Typha angustifolia</i>	Lesser Bulrush	Locally Nb
flowering plant	<i>Bidens tripartita</i>	Trifid Bur-marigold	Locally Nb
flowering plant	<i>Butomus umbellatus</i>	Flowering Rush	Locally Nb
flowering plant	<i>Anthemis cotula</i>	Stinking Chamomile	Locally Nb RedListGB; vulnerable
flowering plant	<i>Orobancha minor</i>	Common Broomrape	Locally Nb
flowering plant	<i>Carex acuta</i>	Slender Tufted-sedge	Locally Nb
flowering plant	<i>Hyoscyamus niger</i>	Henbane	Locally Nb
flowering plant	<i>Saxifraga granulata</i>	Meadow Saxifrage	Locally Nb
flowering plant	<i>Stachys arvensis</i>	Field Woundwort	Locally Nb
flowering plant	<i>Lamium hybridum</i>	Cut-leaved Dead-nettle	Locally Nb
flowering plant	<i>Lepidium heterophyllum</i>	Smith's Pepperwort	Locally Nb
insect - beetle (Coleoptera)	<i>Protapion filirostre</i>	Protapion filirostre	Notable B
insect - beetle (Coleoptera)	<i>Rhinocyllus conicus</i>	Rhinocyllus conicus	Notable A
insect - hymenopteran	<i>Dolichovespula (Dolichovespula) media</i>	Dolichovespula (Dolichovespula) media	Notable A
insect - moth	<i>Diloba caeruleocephala</i>	Figure of Eight	NERC s.41 UKBAP
insect - moth	<i>Brachionycha sphinx</i>	Sprawler	NERC s.41 UKBAP
reptile	<i>Natrix helvetica</i>	Grass Snake	WCA NERC s.41 UKBAP
terrestrial mammal	<i>Eptesicus serotinus</i>	Serotine	WCA ECH4 WorcBAP
terrestrial mammal	<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	WCA ECH4 WorcBAP
terrestrial mammal	<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Myotis mystacinus</i>	Whiskered Bat	WCA ECH4 WorcBAP
terrestrial mammal	<i>Nyctalus noctula</i>	Noctule	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Pipistrellus</i>	Pipistrelle sp.	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Meles meles</i>	Badger	PBA
terrestrial mammal	<i>Myotis</i>	Unidentified Bat	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Lutra lutra</i>	Otter	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Pipistrellus sp.</i>	Pipistrelle sp.	WCA NERC s.41 UKBAP ECH4
terrestrial mammal	<i>Rhinolophus hipposideros</i>	Lesser Horseshoe Bat	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Myotis nattereri</i>	Natterer's Bat	WCA ECH4 WorcBAP

terrestrial mammal	<i>Plecotus auritus</i>	Brown Long-Eared Bat	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Erinaceus europaeus</i>	Hedgehog	NERC s.41 UKBAP
terrestrial mammal	<i>Barbastella barbastellus</i>	Barbastelle	WCA NERC s.41 UKBAP ECH4 WorcBAP
terrestrial mammal	<i>Lepus europaeus</i>	Brown Hare	NERC s.41 UKBAP
terrestrial mammal	<i>Mustela putorius</i>	Polecat	NERC s.41 UKBAP
Locally Nb: Locally Notable NERC s.41: Natural Environment and Rural Communities Act (2006) Section 41 UKBAP: United Kingdom Biodiversity Action Plan WorcBAP: Worcestershire Biodiversity Action Plan Bird: Red: Red Listed by Birds of Conservation Concern 4 (2015) WCA: Wildlife and Countryside Act (1981) PBA: Protection of Badgers Act (1992) ECH4: European Protected Species, under The Conservation of Habitats and Species Regulations (2017)			

Appendix 2

Field Survey Records 02/10/2019

Common name	Species name
Common daisy	<i>Bellis perennis</i>
Perennial rye grass	<i>Lolium perenne</i>
Yarrow	<i>Achillea millefolium</i>
Creeping buttercup	<i>Ranunculus repens</i>
White clover	<i>Trifolium repens</i>
Yorkshire fog	<i>Holcus lanatus</i>
Common sorrel	<i>Rumex acetosa</i>
Common cat's-ear	<i>Hypochaeris radicata</i>
Bryophytes	-
Autumn hawkbit	<i>Scorzoneroides autumnalis</i>
Self-heal	<i>Prunella vulgaris</i>
Common knapweed	<i>Centaurea nigra</i>
Red fescue	<i>Festuca rubra</i>
Red clover	<i>Trifolium pratense</i>
Common nettle	<i>Urtica dioica</i>
Bramble	<i>Rubus fruticosus</i> agg.
Cock's-foot	<i>Dactylis glomerata</i>
Hogweed	<i>Heracleum sphondylium</i>
Cow parsley	<i>Anthriscus Sylvestris</i>
False oat-grass	<i>Arrhenatherum elatius</i>
Common couch	<i>Elymus repens</i>
Cleavers	<i>Galium aparine</i>
Salad burnet	<i>Sanguisorba minor</i>
Dandelion	<i>Taraxacum officinale</i> agg.
Ox-eye daisy	<i>Leucanthemum vulgare</i>
Ground ivy	<i>Glechoma hederacea</i>
Tansy	<i>Tanacetum vulgare</i>
Creeping cinquefoil	<i>Potentilla reptans</i>
Agrimony	<i>Agrimonia eupatoria</i>
Hawthorn	<i>Crataegus monogyna</i>
Ivy	<i>Hedera helix</i>
Ash	<i>Fraxinus excelsior</i>
Cowslip	<i>Primula veris</i>
Cherry	<i>Prunus</i> sp.
Alder	<i>Alnus glutinosa</i>
Horse chestnut	<i>Aesculus hippocastanum</i>
Whitebeam	<i>Sorbus</i> s.
Sycamore	<i>Acer pseudoplatanus</i>
Ribwort plantain	<i>Plantago lanceolata</i>
White dead-nettle	<i>Lamium album</i>
Spear thistle	<i>Cirsium vulgare</i>
Common mouse-ear	<i>Cerastium fontanum</i>
Speedwell	<i>Veronica</i> sp.
Sweet chestnut	<i>Castanea sativa</i>